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GLOBAL CRANE TRAINING

AC200-1 OPERATION

Brakes



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Brakes Content

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Content	Pg.
General	3
Service brake	4
Parking brake	6
Retarder brakes	8
ABS system	13

Content	Pg.
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Brakes

The braking system is designed in accordance with German road traffic regulations and European EEC directives for axle loads of up to 12 tons (26.4 kip).

Ensure therefore that these axle loads are observed.

Never drive with a defective brake system.

Emergency Pressure Supply – Braking System

Display of the pressure supply

The pressure supply can be called up on the display (43) “Driver information” (to do so, see notes in section 4).

1. Call up the menu selection 4 (Check information” in the main menu.
2. Then select menu point 4 “Pressure supply in braking circuits 1 and 2”.

In the top row, the pressure in braking circuit 1 and in the bottom row the pressure in braking circuit 2 is displayed (bar display).

If the emergency pressure supply is below 7 bar (101.5 psi), the braking system must be topped up at medium revs, until a pressure of 8 bar (116 psi) has been reached.

Fault / warning displays

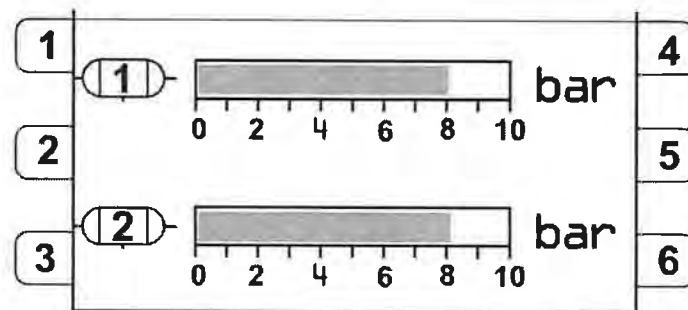
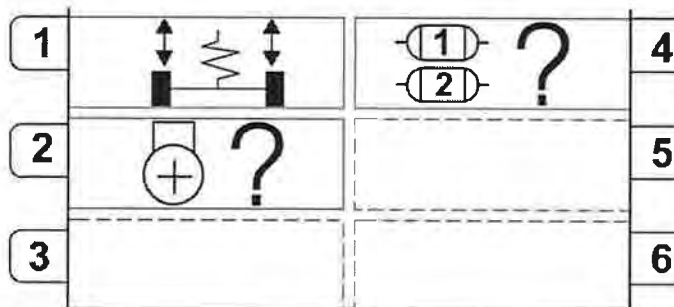
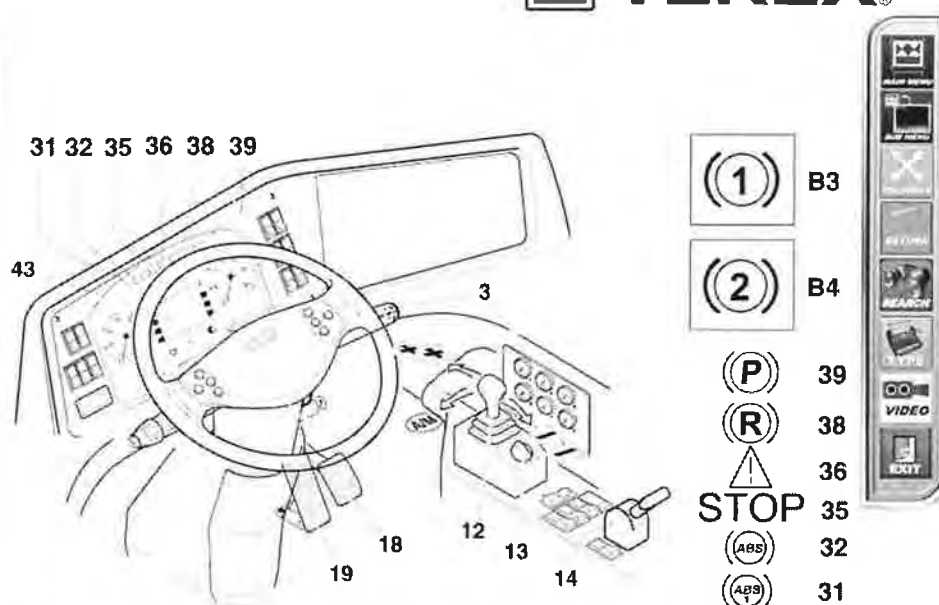
The following warnings are displayed on display (43), if the pressure supply falls below 5.5 bar (79.8 psi):

- Preheating indicator (B3) for braking circuit 1
- preheating indicator (B4) for braking circuit 2

At the same time the preheating indicators (B3 / B4) appear, the “STOP” display (35) is shown and the warning buzzer sounds.

If the preheating indicators (B3 / B4) light up together with the “STOP” display (35) and the warning buzzer sounds, the pressure supply in the braking system is too low.

Stop the vehicle immediately; there is a serious risk of accidents.



Service Brake

The service brake (dual circuit compressed air braking system) acts on all wheels.

To brake, press down pedal (19) of the brake valve sensitively.

Immediately after driving, test the brakes on a dry, anti-skid road surface (service and retaining brake).

When doing so, make sure the crane brakes evenly, does not veer to the side and that brake delay is faultless.

There must be no oil or water in the brake linings. If moisture has seeped through to the brake linings, apply the service brake lightly until braking is faultless.

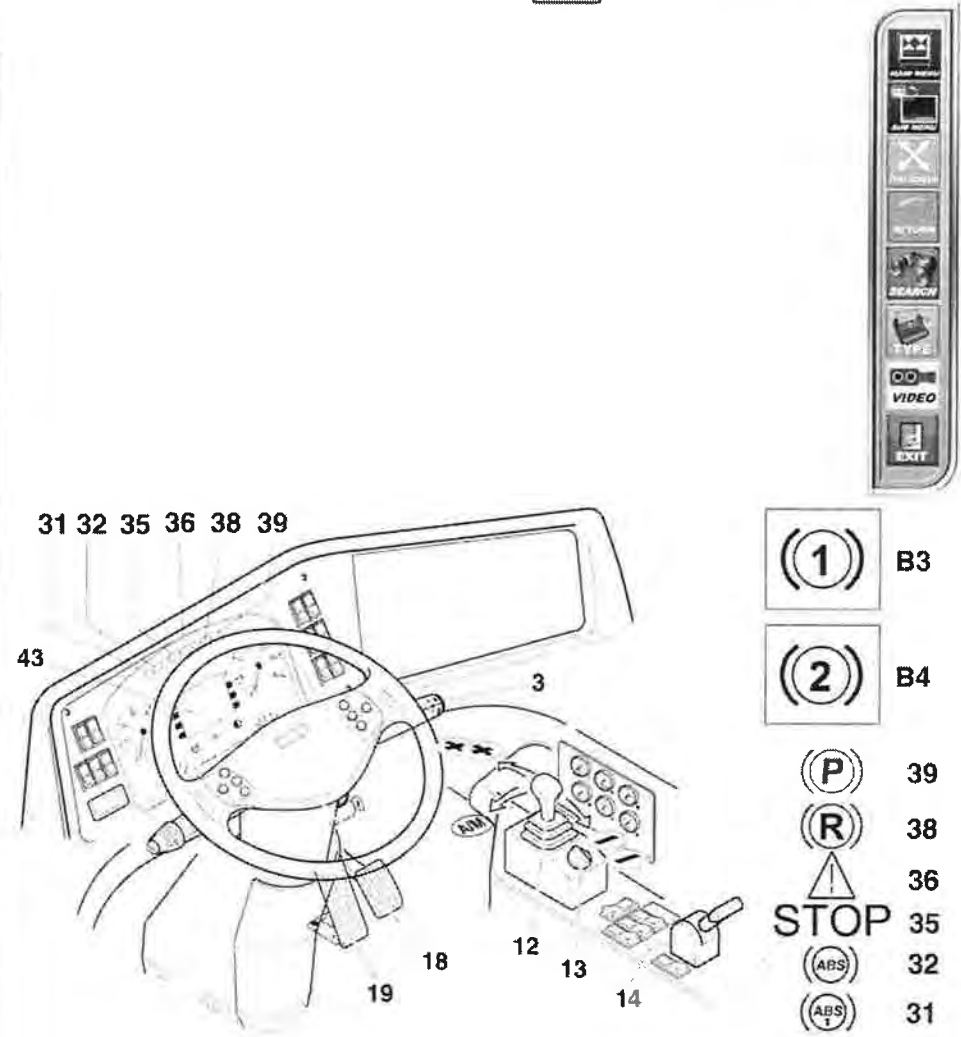
The service brake must not be used for sustained periods under any circumstances. Danger of overheating (fading)!

The service brakes may only be used when driving downhill in order to brake the crane until a speed has been achieved where the crane switches back to the next gear.

This is why you must select the gear before driving downhill with which the speed of the crane can be maintained when driving downhill.

Never drive with a defective brake system!

After the brakes have been used more intensively, do not switch off the vehicle immediately but drive on for a little while in order to allow the brakes to cool off faster from the driving wind.



Display of Wear to the Brake Linings (Disc Brake)

The brake linings are monitored by wear displays. Any wear on the left disc brake is indicated by indicator light (B35) and any wear on the right disc brakes is indicated by indicator light (B36).

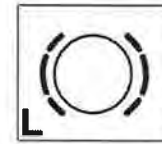
At first, the wear displays are only illuminated during braking. They are constantly illuminated as wear increases.

RISK OF ACCIDENTS!

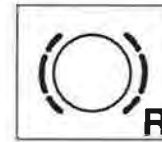
The brake linings are worn and the braking effect is greatly reduced if indicator light (B35) or indicator light (B36) is illuminated constantly or during braking.

Components of the braking system could become damaged if driving is continued.

The brake linings must always be replaced axle by axle.



B35



B36



Parking Brake

To park the crane, the parking brake (hand brake) must be applied!

It is opened with compressed air and closed with accumulated spring force.

In the 5-axle basic unit the retaining brake is effective for axles 1, 3, 4 and 5.

In the 6-axle basic unit the retaining brake is effective for axles 1, 3, 5 and 6.

If the service brake fails, the retaining brake can be used as an emergency brake.

If the emergency pressure supply in the spring accumulator brake circuit is too low, the spring accumulator parking brake can be mechanically released in an emergency.

As the parking brake does not work on all wheels, its braking effect is less than that of the service brake.

Apply the parking brake:

Move lever (14) from the neutral position to the fully braked position at the rear (lever locks in place). The indicator light "parking brake" (39) lights up.

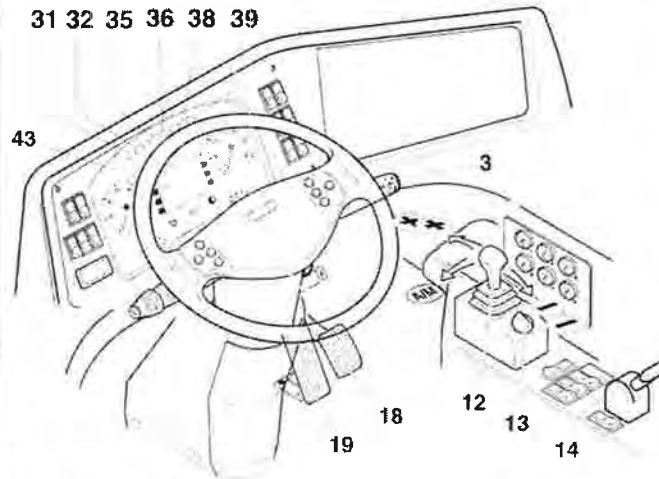
With partial braking, the lever must be held in the desired position as it otherwise returns automatically to the released (neutral) position.

RISK OF ACCIDENTS!

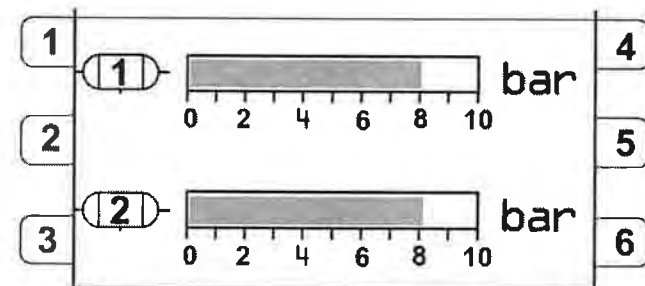
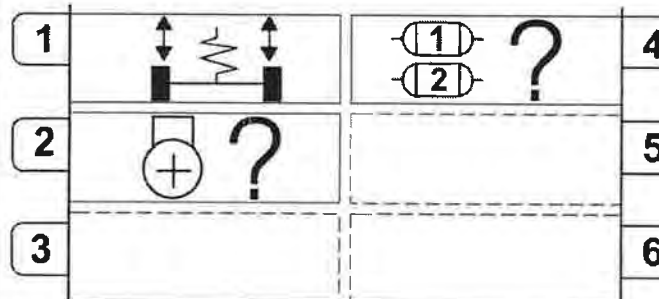
Make sure that the lever (14) locks correctly in the full brake position, as it can otherwise return automatically to the released position.

The lever (14) must not be able to be pushed backed into the released position (without actuating the lock).

31 32 35 36 38 39



- (1) B3
- (2) B4
- (P) 39
- (R) 38
- ! 36
- STOP 35
- (ABS) 32
- (ABS) 31



Release the parking brake:

Lift and hold the lock of the parking brake valve. Swing the lever (14) forwards up to the stop. The indicator light "parking brake" (39) must go out.

The parking brake holds the crane on a max. incline of 28 % but not on the maximum incline on which the crane can be driven.

If required, additionally secure the crane with chocks to prevent it from rolling on downhill slopes.

When using the parking brake as an emergency brake, do not move the lever (14) suddenly, but slowly and evenly. The braking effect can thus be applied increasingly. Do not allow the lever to lock in place!

Only use the parking brake for parking or in case of an emergency.

Never drive with a defective brake system.

Brake Pressure Limit

(Optional Equipment / National Regulations)

For special transport conditions with reduced axle loads (for special national regulations) the vehicle can be equipped with a brake pressure limit.

Observe the permitted axle loads and drive carefully.

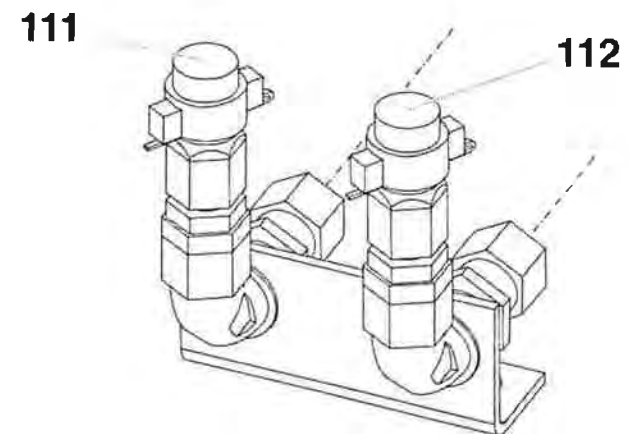
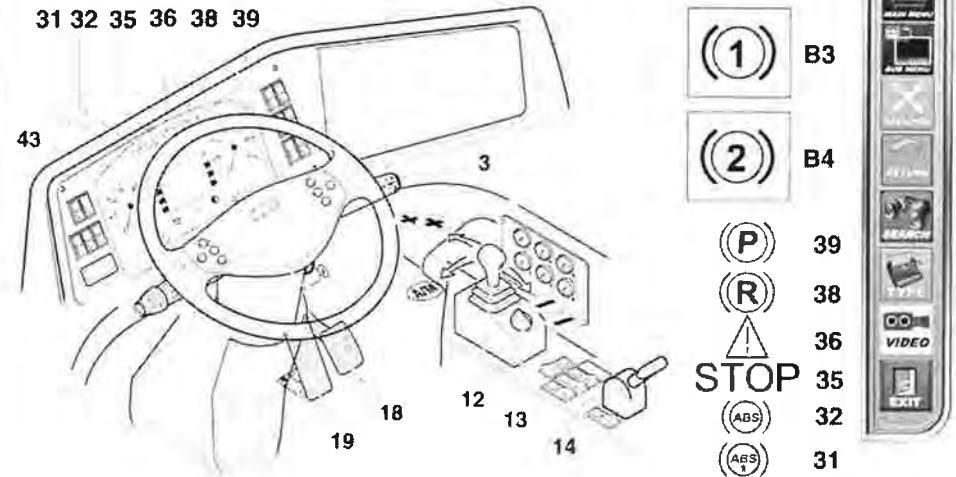
Observe the information sign in the driver's cab.

Test Points of the Braking Circuits

(Optional Equipment / National Regulations)

Depending on customer requirements and national regulations, the vehicle can be equipped with additional test points (111, 112) for both braking circuits. The test points have been marked with signs so they can be assigned to a braking circuit.

The test connections (111, 112) are located in the storage compartment on the left side of the vehicle between the axles.



Retarder Brakes

The crane vehicle is fitted with two sustained action brakes (exhaust brake, hydraulic retarder) as standard.

Both are actuated using the combination switch (3). When switching on (lever in level I) the indicator light (38) lights up.

Risk of skidding!

Do not activate the exhaust brake / retarder on a slippery road surface. The wheels cannot lock.

The sustained action brake is automatically switched off as long as there is ABS control. However, the indicator light (38) does not go out. Afterwards, the operating mode most recently activated is switched on.

In switching step I, only the exhaust brake is activated; from switch stage II the hydraulic retarder is switched on as well. Depending on the lever position, the brake effect is increased steadily from the first to the last step.

Lever in position

“0” = switched off

“I” = exhaust brake

“II–V” = exhaust brake + retarder, 4 steps

Especially when driving down longer downhill stretches use the sustained action brakes. Also in normal driving conditions, the non-wearing sustained action brakes should be used where possible for braking.

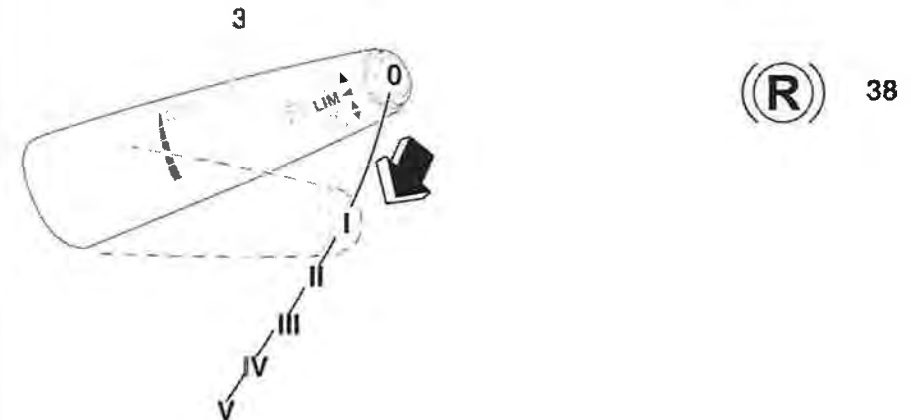
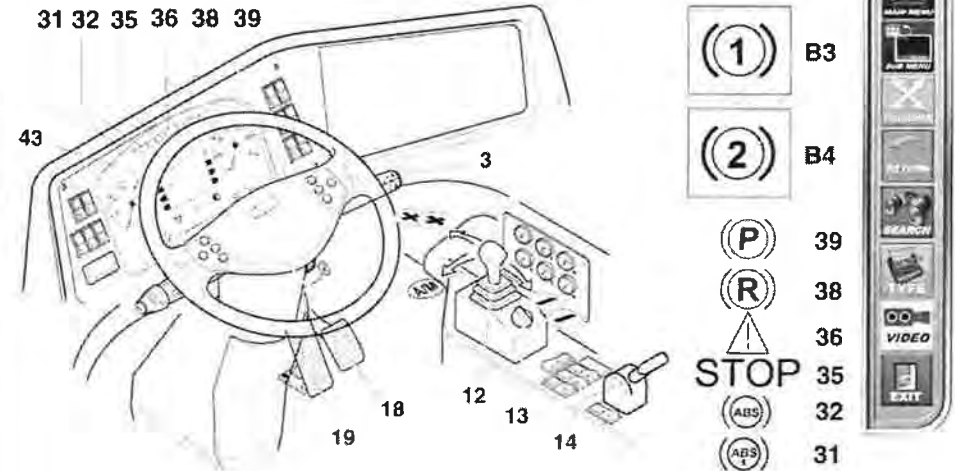
The effect of the exhaust brake and the hydraulic retarder is dependent on the engine speed.

The higher the rpm/speed, the greater the braking effect.

The accelerator must not be pressed when the sustained-action brakes are in operation!

The correct gear level must be selected before a downhill/uphill stretch is reached at which the speed can be held constant.

The effect of a sustained action brake is interrupted during a shifting procedure. The vehicle can speed up during downhill driving.



Manual Driving Operation

The exhaust brake is deactivated by the system during gear shifts. After shifting, the exhaust brake is automatically activated again.

Automatic Driving Operation

When activating the exhaust brake the system automatically switches back to the gear for which there is the maximum braking performance.

Engine Brake (Exhaust Brake and Constant Throttle)

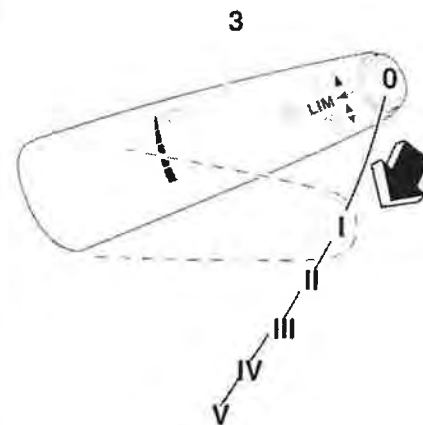
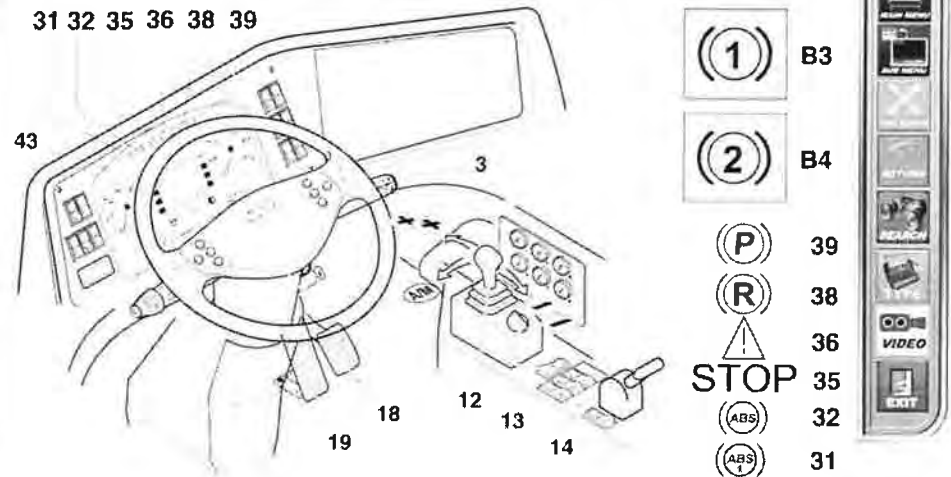
The engine brake consists of a combination of exhaust brake and constant throttle.

The constant throttle valve is closed during normal operation. When the exhaust brake is activated, it opens constantly and increases the braking effect by reduced compression.

When the combination switch (3) is activated (lever in position "I"), the exhaust brake is switched on; the indicator light (38) is illuminated.

The exhaust brake is only effective at an engine speed of more than 900 min⁻¹ (rpm) . If the engine speed falls below 900 min⁻¹ (rpm), the exhaust brake is automatically switched off (and switched back on again when the speed increases).

The exhaust brake is deactivated even when engine speeds are over 2300 min⁻¹ (rpm).



Hydraulic Retarder (System “ZF Intarder”)

The retarder is an additional hydrodynamic brake which is integrated in the transmission and functions without causing wear.

By actuating the combination switch (3) (lever in position II–V) the hydraulic retarder is switched on; the indicator light (38) is illuminated.

The brake effect is increased steadily from the first to the last step.

Using the retarder has no effect on transmission operation.

If the clutch is applied (for switching gears), the braking force of the retarder remains unchanged.

Depending on the engine speed, the retarder is activated with a short time delay.

When the hydraulic retarder is used, heat is created in the transmission.

The transmission oil temperature is monitored indirectly (via the coolant temperature of the engine) with the help of the preheating indicator (B13) in the driver information display.

Before and during downhill driving, make sure that the engine speed does not fall below 1600 min⁻¹ (rpm). Otherwise, sufficient cooling is not ensured.

You might have to switch back a gear in order to increase speed and water pump and fan performance.

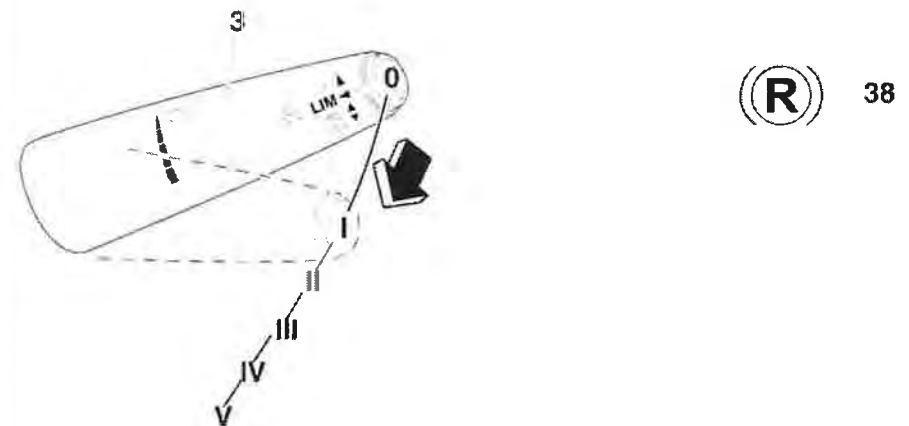
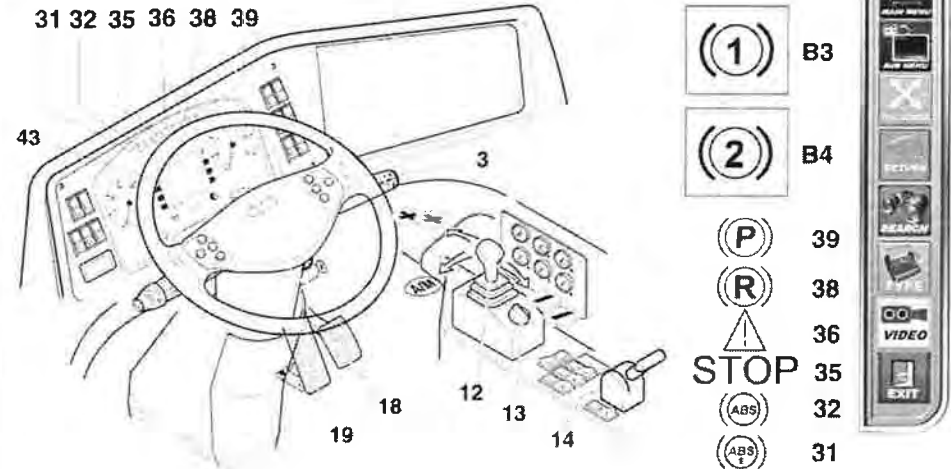
If the oil temperature rises to unauthorized values (over 150C / 302F) – which leads to a coolant temperature which is too high – the retarder performance must be reduced until the coolant temperature has reached a steady state at less than 95C (203F).

If the retarder performance is not regulated by the driver, the system automatically reduces the braking effect until the permitted temperature has been achieved (again).

When the retarder braking effect has been reduced, the indicator light (38) starts to flash.

The reduced braking effect must be taken into consideration and driving must be adapted (gear selection, service brake).

Following longer downhill stretches with the retarder switched on, the engine can only be switched off when the temperature indicator has returned to the permitted range.



Function “Sustained Action Brake Cruise Control”

Using the function “Sustained action brake cruise control” a set (“fixed”) speed can be kept constant during a downhill stretch – within the limits of the existing braking capacity (engine brake torque, gear step).

The sustained action brake cruise control is activated using the actuating lever (3) on the right-hand side of the steering column.

The preheating indicator (A21) in the driver display (43) is illuminated.

The sustained action brake cruise control can only be activated if the sustained action brake is switched on (= lever position I–V).

The desired driving speed – in relation to the speedometer – can be selected and “fixed” (lever position 6 or 7) in any lever position.

The electronic system saves the driving speed “fixed” in this way.

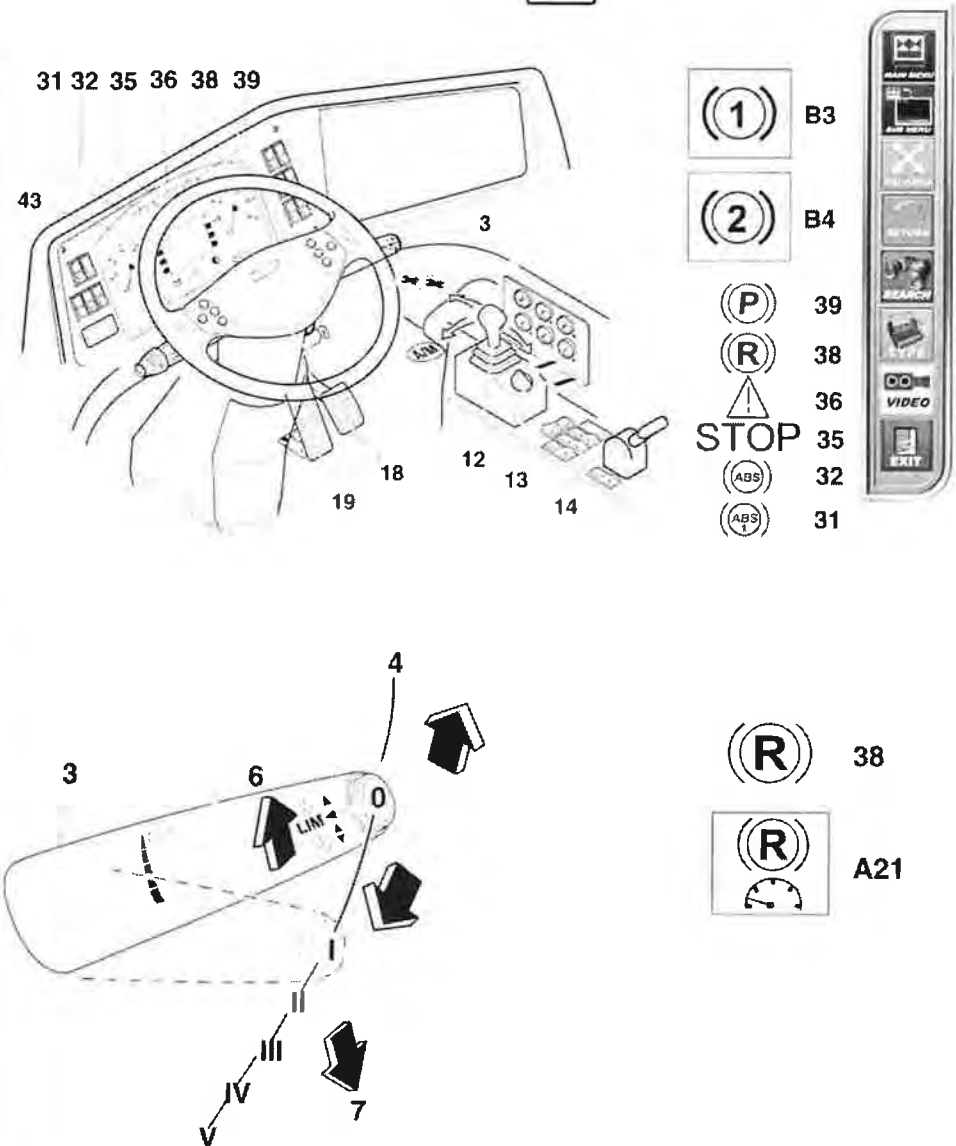
The saved speed is maintained when the braking effect of the sustained– action brake is sufficient.

If the current driving speed is lower than the “set” speed, the sustained– action brake remains without function. If speed attains the saved value again, the sustained action brake becomes active again.

If speed is increased while the sustained action brake cruise control is activated, the vehicle returns to the saved speed after the driving pedal has been released.

If speed is to be reduced to lower than the currently set speed using the sustained action brake, the “sustained action brake cruise control” must be switched off first (tap gearshift position 4). Then the driving speed can be reduced manually via the different steps (lever positions I–V) of the sustained action brake. To do so, the speed must be “set” again from lever positions 6 / 7 as described above.

A saved speed is automatically deleted if the ignition is switched off.



Activating the sustained action brake cruise control:

- Lever (3) in position

0 = deactivated

I-V = sustained action brake step I-V (engine brake and retarder)

6/7 = sustained action brake cruise control

After the lever has been released, the current speed is saved.

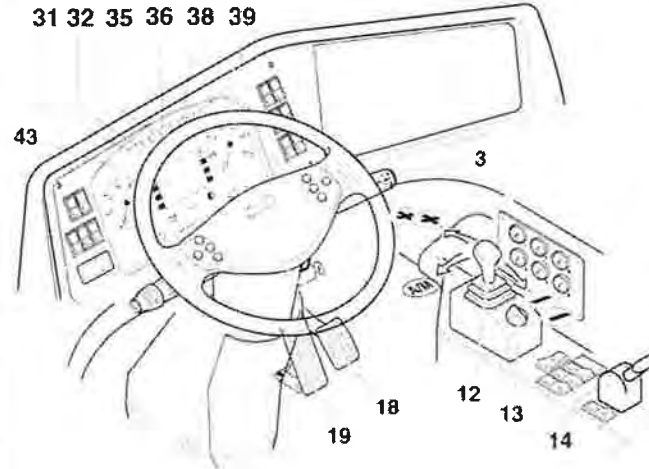
After the lever has been released, the vehicle drives with the saved

brake effect (speed).

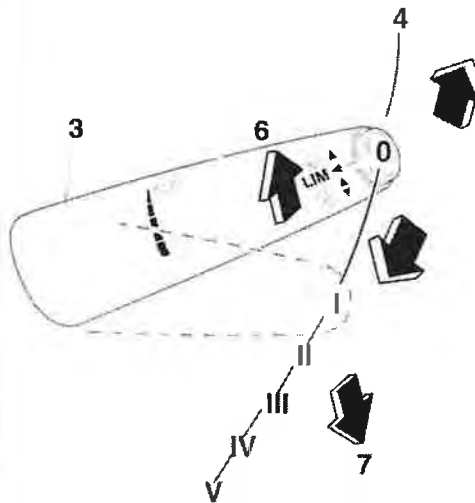
Switching off the sustained action cruise control:

Tap actuating lever (3) in position "4".

31 32 35 36 38 39



- (1) B3
- (2) B4
- (P) 39
- (R) 38
- STOP 36
- STOP 35
- (ABS) 32
- (ABS) 31



- (R) 38
- (R) A21

Anti-Blocking-System (ABS)

The vehicle is equipped with the blocking protection "ABS".

5-axle basic unit

The ABS circuit consists of all axles (of the vehicle) and possibly a dolly as well.

The function is monitored as follows:

- Lamps B29 + 32 for the vehicle axles.
- Lamps B30 + 31 for possible dolly axles / additional axle / dummy axle.

6-axle basic unit

The system consists of two separate circuits (not to be confused with braking circuits).

ABS circuit 1

consists of axles 1, 2, 3, 5, 6 (of the vehicle) and possibly a dolly as well.

The function is monitored as follows:

- Lamps B29 + 32 for the vehicle axles (without axle 4).
- Lamps B30 + 31 for possible dolly axles / additional axle / dummy axle.

ABS circuit 2

is simply axle 4 of the vehicle.

The function is monitored by the preheating indicator (B27).

The ABS stops the wheels from blocking when the vehicle starts driving at walking speed – independent of the surface of the road (water, iciness).

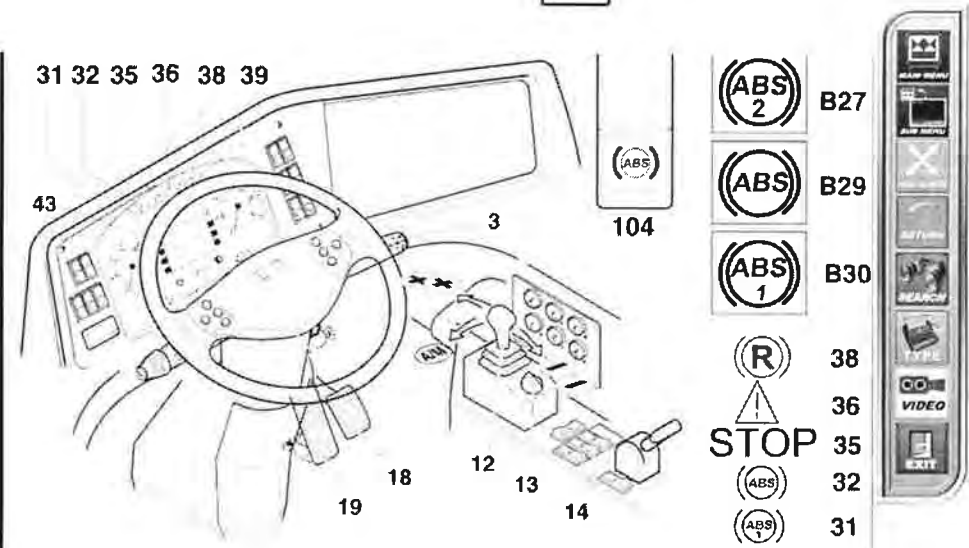
During ABS control, the sustained action brake is automatically switched off. However, the indicator light (38) does not go out.

Afterwards, the operating mode most recently activated is switched on.

RISK OF ACCIDENTS!

ABS does not release you from driving in a way that is adapted to the traffic and road conditions. Track and steerability of the vehicle are improved.

For example, ABS is not able to prevent the consequences of keeping too small a safety distance or of increased curve speeds.



ABS: Full Function / Off-road Mode

ABS is always active, however, the driver can switch it to "Terrain mode" using key (104).

ABS in "Terrain mode" is indicated by the flashing of the indicator light (32).

The brake path can be reduced on terrain or unpaved roads (i.e. soft or extremely bumpy surfaces as well as sloping roads) by switching ABS over to "Terrain mode".

The control is speed dependent; at higher speeds the ABS control also switches to full function when in "Off-road mode".

ABS can be switched over when the vehicle is at a standstill (key in the ignition lock in driving position) or during driving. After the engine has been switched off and started again, full function is automatically activated. When driving on terrain, switch ABS over again.

In the 6-axle basic unit, only the ABS circuit 1 is switched over to terrain mode due to the system. The ABS circuit 2 cannot be switched over.

Terrain mode may not be used on public roads.

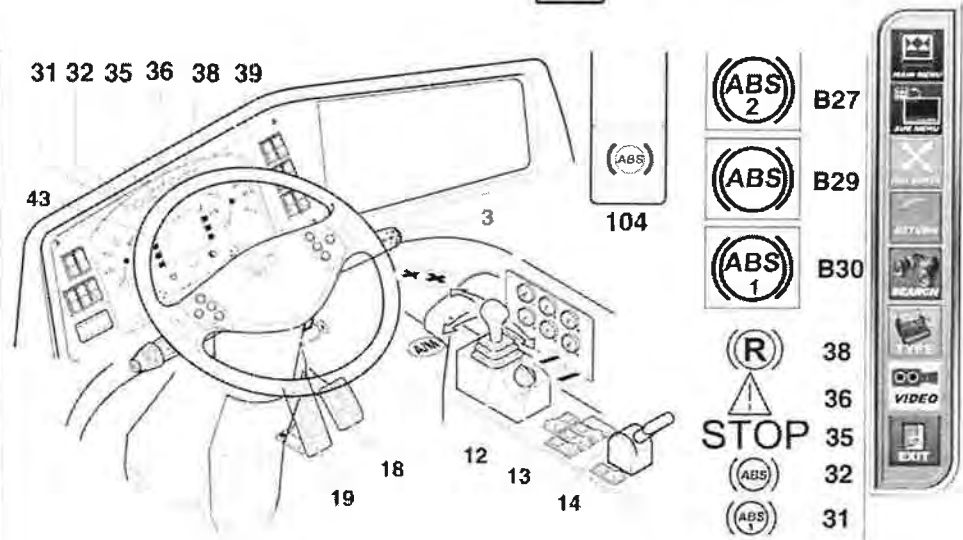
ABS Functions Check / Fault Display

Every time the ignition is switched on the signal connections to the instrument panel are checked again.

The indicator lights (32 / 31) must light up for a short period of time.

The indicator light (B27, B29, B30) is only displayed in case of damage (indicator light B27 only exists in the 6-axle basic unit).

The functions check is finished after the two check signals (approx. 30 sec.) have sounded.



The indicator lights (31, 32) must light up for a short period of time and must have gone out after the acoustic check signal.

Blocking protection is not ensured if the displays for functions check do not light up or do not go out after the check signal.

The preheating indicators (B27, B29, B30) may not be illuminated.

(Indicator light B27 only exists in the 6-axle basic unit) If it lights up, locking protection is not ensured at each axle.

RISK OF ACCIDENTS!

If an ABS fault is displayed, ("CAUTION" (35) would light up at the same time), braking behavior of the vehicle can change.

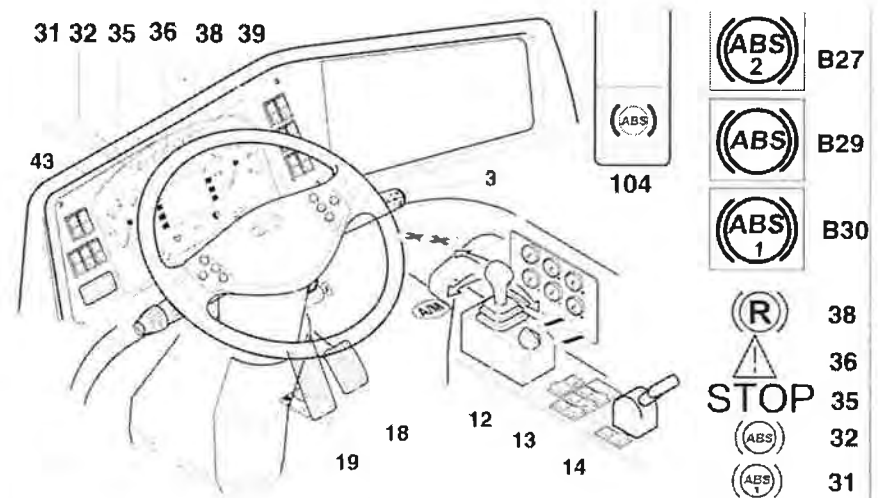
Drive especially carefully.

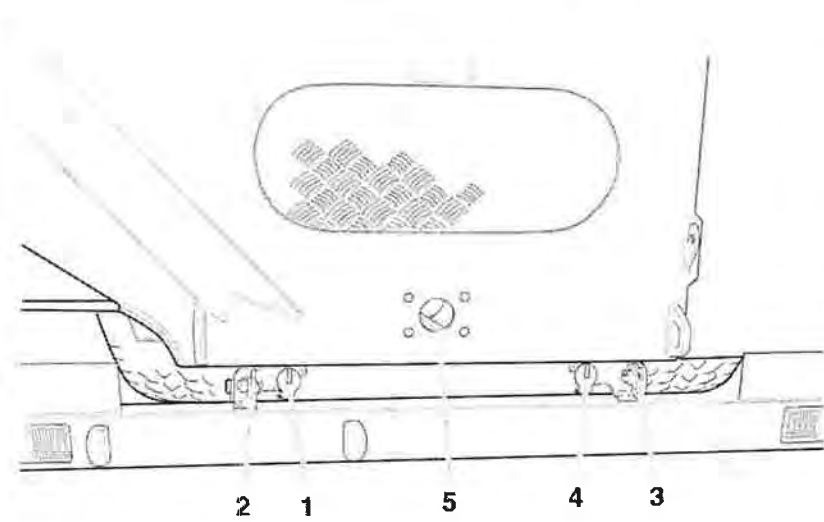
Have the fault rectified immediately in a specialist garage.

Braking with ABS

- In case of danger, fully activate the brake pedal. This ensures that all wheels are monitored and optimum delay of vehicle is achieved.
- During ABS control, the sustained action brake is automatically switched off. However, the indicator light (38) does not go out.
- If you drive with a dolly without ABS, it can lock up if you have to make an emergency stop. In this case, the driver must observe the towed vehicle in the rearview mirror. The towing vehicle with ABS remains steerable; This means that the driver can keep his towed vehicle steady.

- If the indicator lights (31) "ABS control, dolly" or (32) "ABS control, vehicle" light up, ABS will not function (defective) for the dolly or towing vehicle.
- If only the indicator light (31) "ABS control, dolly" lights up, the dolly can lock up. In this case, the driver must observe the towed vehicle in the rearview mirror. The towing vehicle (with ABS) remains steerable; This means that the driver can keep his towed vehicle steady.
- If indicator light (32) "ABS control, vehicle" light up, ABS is in "Terrain mode".





ABS with Dolly Operation

If the crane vehicle has been fitted with a dolly coupling (optional)

ex works, there is a special ABS socket (4) for the transfer of the ABS function at the rear of the vehicle rear.

4 ABS socket 7-pole)

When using a dolly, the relevant regulations must be observed (e.g. if for example ABS is required due to the number of axles).

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