Operating Manual

PistenBully 100

From WKU 4 821 MA B L 011654

EN

www.pistenbully.com

PistenBully®

Kässbohrer Geländefahrzeug AG
Kässbohrerstraße 11
D-88471 Laupheim, Germany

Printed in Germany

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OTHER ON-BOARD DOCUMENTS

– Log book
– Operating manual, diesel engine
– Customer's workshop information

NOTES

YOUR OPINION IS IMPORTANT TO US.

To ensure that your operating manual is optimum in all ways.

Sender: ...

.....

.....

Phone No.....

Fax: .....

To:
Kässbohrer Geländefahrzeug AG
Kässbohrerstraße 11
D-88471 Laupheim
Attn.: Mr. Peter Görlich
Fax No.: +49(0)7392/900100
E-mail: peter.goerlich@pistenbully.com

Quality of translation

☐ Correctly translated

☐ Mistakes in translation

Comments:.....

.....

.....

.....

Graphics and photos

☐ Provide good explanations

☐ More explanatory diagrams required

Comments:.....

.....

☐ A CD-ROM would be good!

This operating manual provides information about:

- how to handle, maintain and care for your PistenBully.
- important instructions concerning correct and economical operation.
- warnings so that you recognise dangers in good time and avoid them.

❍ Make sure that the operating manual is always in the oddments tray in the driver's cab.

ABBREVIATIONS USED

e.g. = for example

M_A = tightening torque

SP no. = order number for spare part

min./max.= minimum / maximum

Sec. = Section

SYMBOLS USED

DANGER!

Direct and imminent danger threatening life and limb unless appropriate precautions are taken.

WARNING!

Potentially highly dangerous situation!
Danger to life and limb unless appropriate precautions are taken.

CAUTION!

Dangerous situation!
Could lead to injury unless appropriate precautions are taken

Important notes!
Possibility of damage to the machine or its immediate surroundings.

This symbol draws attention to practical tips

TECHNICAL CUSTOMER SERVICE AND SPARE PARTS DEPARTMENT

Service worldwide		**Phone, office**
Director of Service (GS)	Mr. Mayer	+49(0)7392/900-101

Technical customer service (TKD)

Head of department TKD	Mr. Strähle	+49(0)7392/900-103
Area Manager TKD	Mr. Kirsamer	+49(0)7392/900-137
Area Manager TKD	Mr. Braun	+49(0)7392/900-105
Area Manager TKD	Mr. Arbogast	+49(0)7392/900-118
Area Manager TKD	Mr. Bohnet	+49(0)7392/900-116
Area Manager TKD	Mr. Dehm	+49(0)7392/900-117
		Fax +49(0)7392/900-100

24-hour service emergency number: Phone. +49 171/7124096

Spare Parts department (ETV)

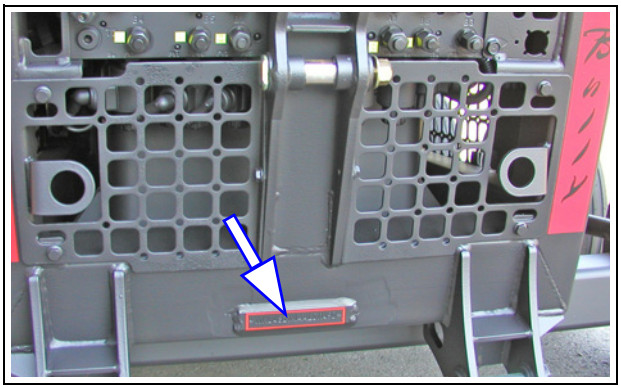
Director, ETV,	Mr. Heim	+49(0)7392/900-107	Fax	+49(0)7392/900-130

Spare parts distribution (ETV) emergency number: Tel. 0171/3732230

Contact at my national office:

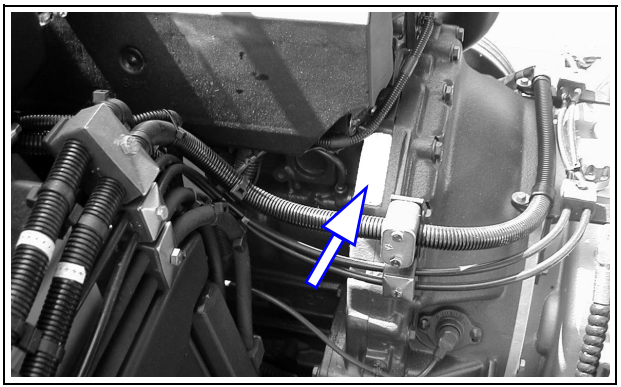
Technical customer service	Name:.....	Telephone number:.....
Spare parts department	Name:	Telephone number: .....
Repair mechanic	Name:.....	Telephone number:.....

❍ Always quote the vehicle number when making enquiries and ordering spare parts.
The deployment of service mechanics is controlled centrally by TKD (Technical Service).



The vehicle number is stamped on the front of the vehicle, on the face end of the right hand frame.

WKU.....



The engine number is stamped on the engine type plate.

Engine No. .....

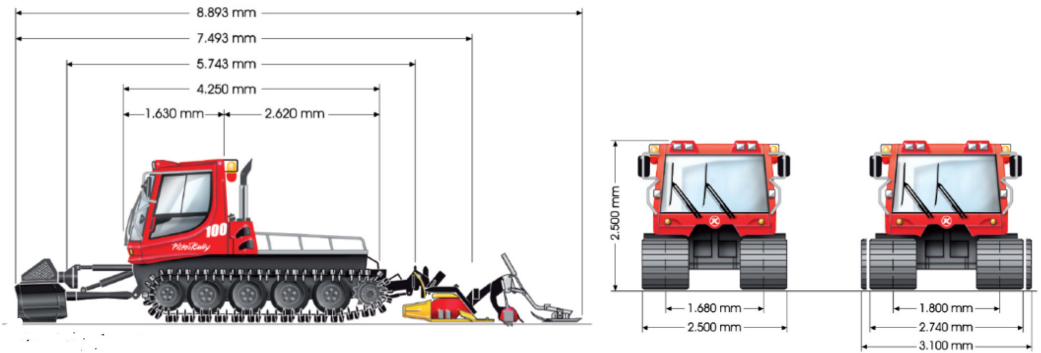
Use of genuine spare parts

In your own interests, please note the following:

We recommend the use of genuine spare parts from Kässbohrer Geländefahrzeug AG and parts for conversion and accessories expressly approved for your type of vehicle. These parts have been subjected to a special test procedure and they have been proven to be reliable, safe and suitable for Kässbohrer off-road vehicles. Despite continuous observation of the market, we are unable to assess these aspects of other products – even products that have been scrutinised by a technical inspectorate or for which an official approval has been issued – and consequently, we refuse to accept liability for them.

Genuine parts and approved accessories and parts for conversion are available from your Kässbohrer Geländefahrzeug AG service centre. The experts there will provide in-depth advice – including advice on permissible technical modifications – and install the components using the correct procedures.
The use of parts other than genuine spare parts voids your guarantee. We refuse to accept liability for consequential damage resulting from such use.

Kässbohrer Geländefahrzeug AG



Dimensions:

	Width		**Height**
without tracks	1.680 / 1.800 mm	Height	2.500 mm
across aluminium tracks	2.500 / 2.740 mm 3.100 mm	Ground clearance..... Load area	ca. 320 mm 1735 x 1920 mm
across steel tracks	2.500 mm		**Length**
across tiller and finisher.....	3.570 / 3.870 mm 4.170 mm	with pusher blade and tiller.....	7.143 mm
Suggested garage dimensions	4300 / 4600 / 4900 mm	Length 8.000 mm / Height 3.200 mm	

Weight		Engine	
Dead weight with aluminium tracks	3.930 / 3.970 / 4.035 kg	Type - Mercedes Benz	OM 924 LA Euromot 3A
Dead weight with steel tracks.....	3.600 kg	Number of cylinders.....	4
Permissible gross weight with auxiliary driven machinery.....	6.200 kg	Displacement.....	4.820 cc
Payload of load area without auxiliary driven machinery.....	1.500 kg	Output, ECE rating.....	145 kW (197 ECE HP), Tier 3
Operating parameters:		Max. torque	705 Nm/1200 rpm
		Fuel consumption	approx. 8.5 l/h
Continuously variable speed	0 - 25 km/h	Tank capacity	150 l
Spec. ground pressure with aluminium tracks	0,054 kg/cm^2		
Spec. ground pressure with steel tracks	0,063 kg/cm^2	Brakes	
Production rate with tiller	37.500 m^2/h 41.000 m^2/h 44.500 m^2/h	Wear-free (hydrostatic) service brake.	2 multi-disk brakes

Sound power level and vibrations	Per EN 15059
Measured at rated engine speed and maximum fan speed	
Sound pressure level at operator's workplace	77 dB(A)
Radiated sound power level	105.0 dB(A)
Measured during grooming *(vector sum)*	
Vibrations at the steering wheel	<2.5 m/s^2
Vibration at driver's seat	<0.5 m/s^2

Front weights

It is essential to comply with the instructions regarding the transport position of the auxiliary driven machinery (see the operating instructions for the auxiliary driven machinery).

WARNING!

The high moment of the auxiliary driven machinery restricts the manoeuvrability of the vehicle, so the route to the work zone must be through easily accessible terrain.

- Attaching excessively heavy machinery or machinery with an excessively high moment voids the vehicle manufacturer's warranty and excludes liability on the part of the vehicle manufacturer.
  The only exceptions to this rule are those items of auxiliary driven machinery for which the vehicle manufacturer has issued approval.
- Operation with an item of auxiliary driven machinery is restricted to the intended purpose and is subject to the limit of the time required for said purpose (short-term).

Permissible weights of front-mounted auxiliary equipment

Long-term attachment moment of auxiliaries	Load of auxiliaries	Moment of auxiliaries
SWS-100 at hook plane	max. 485 kg	5.430 Nm
SWS-100 AWB 2.5 - 3.1 + Snow Cutter	max. 175 kg	2.500 Nm

Short-term attachment moment of auxiliaries	Load of auxiliaries	Moment of auxiliaries
SWS-100 + Zaugg FS 2700 mm Restriction: - 10 km/h maximum speed - Tiller mounted or 300 kg counterbalance on load platform at rear	840 kg	11.500 Nm

DIESEL FUEL

- If the engine is run on diesel fuels with a sulphur content of more than 0.3 percent by weight, the scheduled times between oil changes must be divided by two.
- If the engine is run on diesel fuels with a sulphur content of more than 0.8 percent by weight, the scheduled times between oil changes must be divided by three.

Diesel fuels at low temperatures

Select the diesel fuel's resistance to the cold in accordance with the temperature characteristics in the area of use and source the fuel from the fuel supplier (refer to MB Fluids and Lubricants Specifications 131.0, 137.1 and 141.0)

Active link:
www.bevo.mercedes-benz.com

CHANGING COOLANT

Water quality

Free of contaminants (grease, dirt, lime...), because failure to comply with this requirement means: less efficient removal of heat, formation of deposits, and clogging of coolant ducts.

Drinking water often satisfies the water quality requirements.

Changing coolant

Make sure that container and funnel are free of residues of other fluids and lubricants.

Designation	Grade	Capacity	Interval between changes
Mercedes Benz engine OM 924 LA Active link: www.bevo.mercedes-benz.com	MB sheet 228.5 / SAE 10W40 / 5W40 MB sheet 228.51 / + Diesel particulate filter	15 litres	At least: once a year every 800 hours
	MB sheet 228.3 MB sheet 228.31 / + Diesel particulate filter		At least: once a year every 600 hours.
	If an engine oil of a different grade is used for topping up, the maintenance interval is the interval for the lower-grade oil.		
Fuel tank	Diesel fuel to MB sheet 131.0, 137.1, 141.0	150 litres	At least: once a year drain condensation.
Fuel filter			every 800 hours
Air filter			At least: once a year every 1200 hours
Cooling / heating system	50% drinking water + 50% antifreeze (MB sheet 325.0) Active link: www.bevo.mercedes-benz.com	25 litres	At least: every 3 years every 3600 hours
Transfer box	**Poly Alpha Oleofin (PAO)** - CLP HC VG 150 / 220 ISO VG 220 (for summer operation) - API GL4, SAE 75 W 90 (PAO)	1.8 litres	At least: once a year every 800 hours at 100 hours (new vehicle)
Planetary gearbox	**Poly Alpha Oleofin (PAO)** - CLP HC VG 150 / 220 ISO VG 220 (for summer operation) - API GL4, SAE 75 W 90 (PAO)	2.5 litres 3.5 litres	At least: once a year every 800 hours at 100 hours (new vehicle)

Designation	Grade	Capacity	Interval between changes
Hydraulics Propulsion unit + auxiliary driven machinery see section on hydraulic fluid	HVLP DIN 51524 DEXRON II D / III F ATF Type A Suffix A <-30°C -AVIA Synthofluid PE-B 30 (PAO)	35 l tank 80 l total	At least: once a year every 1200 hours
Hydraulic oil filter			at 100 hours every 1200 hours
Hydrostatic vehicle drive see section on greases	OKS 250		
Lubricate wheel hubs and swinging arms.	Calcium saponified grease KP2K-30, DIN 51502 e.g. Aviacal 2 LD		every 400 hours
Other lubrication points see section on greases	Calcium saponified grease KP2K-30, DIN 51502 e.g. Aviacal 2 LD		every 100 hours
Tillers, spiral-bevel coupling	Avialith 2 F OKS 400 Molykote BR 2		every 1200 hours
Electrical system Battery terminals	Bosch FT 40V1 grease		
Generator with Stauffer grease cup	Bosch grease FT 1V34		every 1200 hours
Servo adjustment device for Moog valves	Insulating oil DIN 57370 / VDE 0370		

Intended use

Snow groomers may only be operated as specified in the manufacturer's operating manual.

- **The PistenBully may be used for the following purposes only:**
  - Preparing slopes for downhill skiing.
  - Removing snow from paths.
  - Tracks in countryside (not public roads).
  - Preparing trails for Nordic skiing.

If you wish to use the equipment for any other purpose, you must apply for and obtain prior written approval from the manufacturer.

DRIVER

- Drivers must be specifically appointed to drive snow groomers.
- You may appoint people to drive the snow groomers on their own only when you are certain that they will be able to reliably fulfil the tasks assigned to them.

In particular, they must satisfy the following:

- be at least 18 years old (or of the minimum legal age required by national law).
- be physically and mentally suitable.
- be trained in how to drive the snow groomer and have proven their driving ability to the operator.
- be familiar with snow conditions and with the peculiarities of operating equipment in facilities for skiers.
- be familiar with the area where the vehicle is to be used, especially with regard to particularly dangerous areas.
- be familiar with first-aid procedures in the event of an accident.
- if avalanches pose a threat in the area where snow groomers are to be used, in addition to the aforementioned conditions, drivers must also be instructed about how avalanches are started, the consequences of them and how to behave when there is a risk of avalanches.
- In order to help ensure safe operation, operators must wear appropriate footwear with non-slip soles.

DANGER ZONE FOR PERSONS

- No-one is permitted to enter the snow groomer's immediate danger zone.
- The driver may only operate and drive the snow groomer provided that there is no-one in the immediate danger zone.
- The driver must issue warnings to draw attention to potential dangers.
- Special protection measures must be taken if the snow groomer is being used in an area where the driver does not have a clear view of the surrounding terrain, or the nature of the terrain is such that the machine might not be immediately visible to people in its vicinity. Depending on the circumstances of each case, these measures may take the form of warning signs, closed runs or off-limit markers.

ENTERING

- Complete the daily checks and maintenance tasks.
- Walk right round the vehicle and make sure that the danger zone is clear of persons and objects.
- Step onto the track.
  Danger of slipping on the track when entering and exiting the driver's cab.
  Always take a firm grip on the handle of the driver's door when entering the vehicle.
- When parking on a slope, be particularly careful when opening the door. The door opens suddenly.
- Buckle the safety belt.

DRIVING

- Never leave the vehicle unattended with the engine running.
- Risk of poisoning from exhaust gases.
  Never leave the engine running in enclosed spaces.
- The driver may start and/or move the snow groomer only when seated in the driver's seat, after fastening the seat belt.
- Do not attempt to adjust the driver's seat or steering wheel when driving.
- Snow groomers must be used and operated in a manner which ensures their stability.
- Drivers must always restrict the vehicle to a speed at which they can stop within the distance visible. This does not apply to steep slopes

where the vehicle cannot be stopped as a result of the angle of the terrain. Drivers may drive on such steep slopes only when certain that they can do so without putting themselves and others at risk.

- Drivers may drive the snow groomer only at a speed at which they maintain control at all times. They must adapt the speed to the snow, terrain and visibility conditions and to the characteristics of the snow groomer, with due allowance for the auxiliary equipment fitted.
- Make sure that the doors are closed.
- Switch on the rotating beacon system.
- Check that loads are correctly secured.
- When driving past people, slow down, keep at a safe distance and always bear in mind that the people may behave unexpectedly.
- Always come to a complete stop before reversing the vehicle.
- Ensure that the area behind the machine is clear.
- Avoid crossing slopes at an angle because the PistenBully may slip downhill.
- When a tracked vehicle is being driven, the traction is so great that the vehicle may be driven well beyond the point at which it should start to tilt; if this happens the vehicle might then suddenly tip over.

STOPPING / EXITING

- Park the vehicle where it is clearly visible.
- Do not apply the parking brake until the vehicle has come to a complete stop.
- Risk of poisoning:
  Do not leave the engine running in an enclosed space.
- Turbocharger - risk of overheating:
  Do not immediately switch off the diesel engine after it has been run at full load. Drive for approx. 2 minutes in the part-load range and then switch off.
- Lower the front and rear auxiliary driven implements, switch off the tiller, set the direction of travel switch to "neutral".
- Before exiting the driver's cab
  - Apply the parking brake

- Switch off the engine.
- Remove the ignition key from the lock.

❍ Fully raise the steering-wheel column and the left armrest.

❍ Step onto the track.
Danger of slipping on the track when entering and exiting the driver's cab. Always take a firm grip on the handle of the driver's door when exiting the vehicle.

❍ Lock the driver's cab.

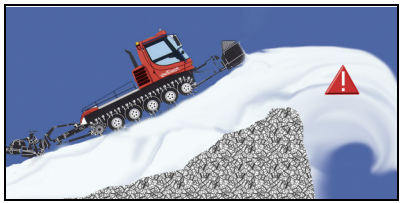
TERRAIN

❍ Before using the snow groomer, check that the intended terrain is drivable.

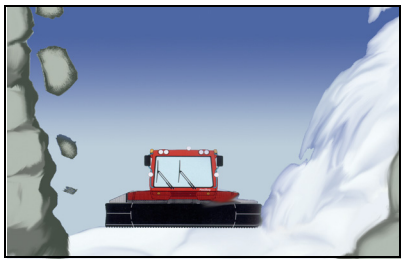
Risk of break-through

❍ Driving on frozen rivers and lakes is very dangerous. Consequently, you are urgently advised not to do so.

Snowdrifts



Avalanches / rockfalls



❍ The driver must be accompanied by a co-driver when driving in areas where the vehicle cannot be seen

and when the weather is bad, unless several vehicles are working together as a team. This does not apply if the driver uses a two-way radio to remain in constant contact with someone at the base who can send out a rescue team should an accident occur.

- When using snow groomers at night-time, handheld searchlights must also be on board.
- When the winch is in use, the driver must wear the seat belt at all times.

DRIVING WITH PASSENGERS

- Only 1 co-driver may sit in the driver's cab.
- The co-driver must be seated in the co-driver's seat at all times when the vehicle is in motion.
- When persons travel in the PB people carrier cabin, they must sit in their seats with their safety belts correctly fastened, and hold tight.
- The retaining screws of the people carrier cabin must be checked every day to ensure that they are tight.
- **Do not drive the vehicle with people on:**
  - the load area
  - the auxiliary equipment
  - externally mounted machinery.
- Avoid abrupt changes of direction and angles of inclination.

MAINTENANCE

- Snow groomers must be maintained by trained staff specifically appointed by the operator.
- Do not perform maintenance work under moveable parts in their open or raised positions unless they have been secured to prevent them from slamming closed or dropping.
- Snow groomers and raised equipment must be secured before maintenance work is started to prevent them from accidentally moving.
- Markings, warning signs and information plates on the PistenBully and auxiliary equipment must not be removed or covered over or made illegible in any other way.

- Compliance with the manufacturer's maintenance instructions is mandatory.
- Faults which could affect safety levels must be rectified immediately.
- Repair welding is an operation that invariably requires extensive safety measures. Please consult your nearest Service Support Centre.

MONITORING

- Before starting off, the driver must check operation of the safety-relevant components, e.g.:
  - by testing the brakes.
  - by switching on the lights,
  - by checking that the warning systems are fully operational.
  - by checking the controls of the working machinery.
- If radios are required to ensure safe operation of the snow groomer, before starting off checks must be performed to ensure that the radio is functioning correctly and that there is a radio connection.
- The driver must immediately report defects to the supervisor and, on vehicle handover, to the replacement driver.
- In the event of damage, defects or changes that endanger operational safety, the driver must immediately cease operation of the vehicle.
- The supervisor must be notified immediately in the event of accidents involving injury to persons or damage to property or to the vehicle.
- The supervisor must perform random checks in order to ensure that the snow groomer is operated in a safe manner.

INSPECTION

- The operator must ensure that the snow groomers are inspected whenever necessary, at least once a year and after maintenance work. This inspection must ensure that the snow groomers are safe and must be performed by a skilled specialist.

Skilled specialists are people who have an extensive knowledge about vehicle technology as a result of their specialist training and experience. They are also sufficiently familiar with the appropriate national safety at work legislation, accident prevention guidelines, directives and generally accepted rules of engineering practice (e.g. DIN publications, VDE regulations or national equivalents) to ensure that they can judge whether snow groomers are in a condition suitable for operation.

❍ The results of the inspection must be recorded in writing and filed.

FIRST-AID BOX

The first-aid kit is secured to the co-driver's door or stowed beneath the co-driver's seat.

❍ Always make sure that the first-aid kit is complete.

FIRE EXTINGUISHER

The fire extinguisher is beneath the co-driver's seat.

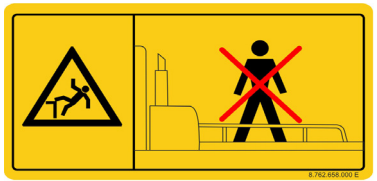
❍ Note expiry date.
Replace used fire extinguishers immediately.

NOTES

WARNING SIGNS

- Strict compliance with the warning signs on the PistenBully and on auxiliary driven implements is mandatory.
- Make sure that warning signs that are damaged or come loose are replaced immediately.

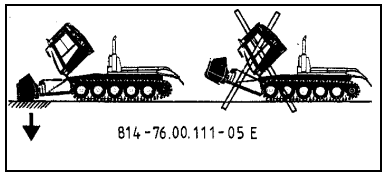
Warning sign



Location: **Rear bulkhead of driver's cab**
No. 8.762.658.000E

Text:
WARNING!
No-one is permitted on the load area while the vehicle is in motion.

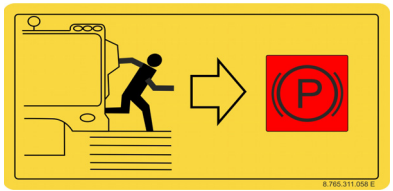
Warning sign



Location: **Steering wheel**
No. 814.76.00.111.05E

Text:
Lower the equipment carrier before tilting the cab (risk of collision).

Warning sign



Location: **Driver's cab/parking brake.**
No. 8.765.311.058E

Text:
Attention:
Apply the parking brake before leaving the cockpit.

Warning sign

Location: **Diesel engine**
No. 8.312.085.064

Text:
WARNING!
Do not use start-assist fluids or ether to start the diesel engine (risk of explosion).

Warning sign

Location: **Fan/engine**
No. 8.762.634.054E

Text:
Attention:
The fan ring rotates when the diesel engine is running.

Protect the fan against damage.

Warning sign

Location: **Console/ driver's cab**
No. 8.765.246.000E (**D**)
No. 8.765.246.001E (**F**)
No. 8.765.246.005E (**GB**)
No. 8.765.246.008E (**I**)
No. 8.765.246.011E (**E**)

Text:
Attention:
In manual control mode (digital electronics deactivated), the vehicle moves off immediately.
Set the driving-speed potentiometer to zero.

Warning sign

Location: **Tiller**
No. 8.762.638.058E

Text:
WARNING!
Wait until all parts have come to a complete standstill before touching.

Warning sign

Location with KFS only**: Steering wheel.**
No. 8.765.679.000E (**D**)
No. 8.765.679.001E (**F**)
No. 8.765.679.005E (**GB**)
No. 8.765.679.008E (**I**)
No. 8.765.679.011E (**E**)

Text:
WARNING!
Use of the INCH potentiometer for reversing is prohibited. Always comply with the instructions in the operating manual.

2x Warning sign

Location: **Engine cover**
No. 8.762.643.000E

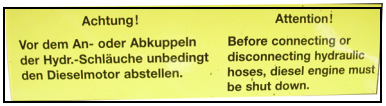
Text:
WARNING!
Keep clear of the danger zone (load platform / Driver's cab) unless the lock of the lifting cylinder is engaged!

Warning sign

Location: **Auxiliary driven machinery**
No. 8.762.660.000E

Text:
WARNING!
Do not reach into crushing zone while parts there may be moving!

Warning sign



Location: **Tiller**
No. 8.762.271.053C

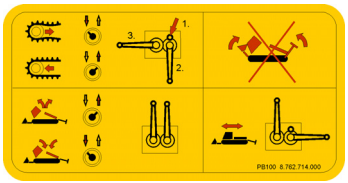
Text:
Attention:
Before connecting or disconnecting the hydraulic hoses, diesel engine must be shut down.

Sign

Location: **Driver's cab**
No. 8.762.642.000E

Text:
Read operating manual and safety instructions before startup and comply with both at all times.

Sign



Location: **Driver's cab**
No. 8.762.714.000

Text:
Changeover valve position for tilting driver's cab / load platform.

Warning sign

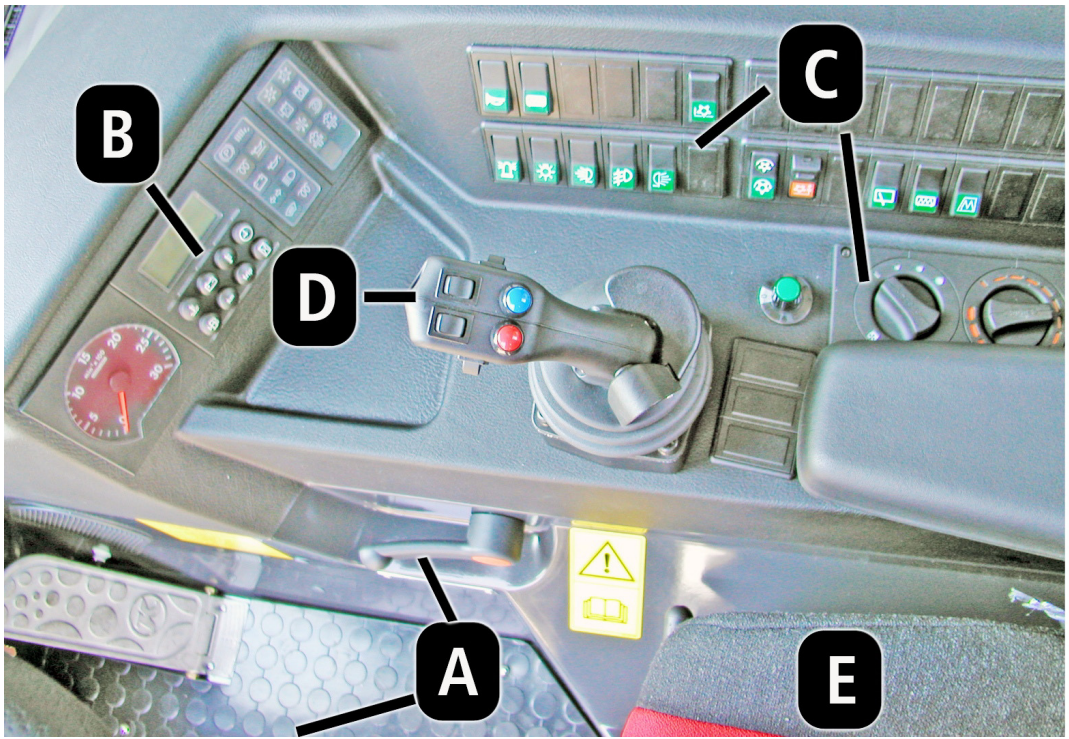
Location: **Driver's cab**
No. 814.76.00.111.05E

Text:
Risk of burns caused by the exhaust muffler.
Keep clear of hot surfaces.

Symbol

Location: **Console/co-driver's seat**
No. 8.762.631.000E

Text:
The CE symbol indicates the manufacturer's compliance with all directives, standards and laws applicable to the product.



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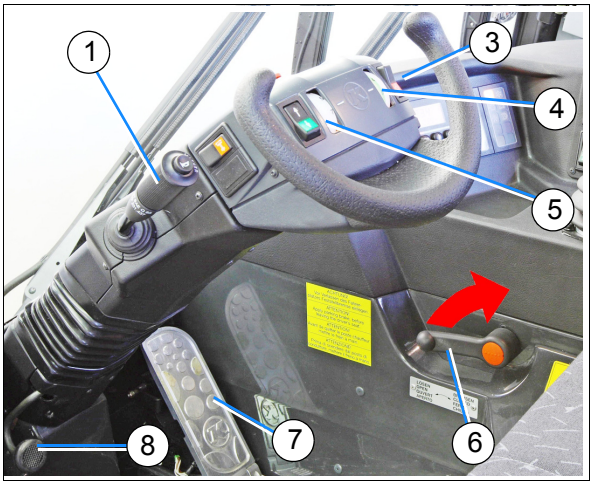


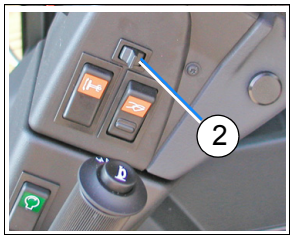
1 Multifunction switch

see Page 36

2 Pushbutton for wipers

Switch pushed forward = Front wipers execute a single wipe.

Switch pushed back = Rear wiper executes a single wipe *(For instructions on saving a new intermittent-wipe time, see Page 37).*



3 Ignition lock

0 Inserting and removing ignition key.
- Switch off the engine.

I Ready for operation / Driving

II Starting

4 Knurled knob for adjusting tiller shaft speed

Turn the potentiometer to adjust tiller shaft speed. Tilling speed is increased / reduced to suit the snow conditions.

5 Knurled knob for driving speed

The speed at which the vehicle travels depends on engine rpm, on the setting of the potentiometer, and on drag. You bring the engine to the correct rpm by depressing or easing up the accelerator pedal, and set the maximum speed by turning the potentiometer.

6 Parking brake

WARNING!

Use the parking brake only to keep the vehicle at a standstill.
The PistenBully will brake sharply to a complete stop if the parking brake is applied while the vehicle is in motion.

Applying parking brake

- Only when the PistenBully is at a complete standstill: move the lever in the direction indicated by the arrow.
- If the engine is running and the parking brake is not applied, the buzzer sounds if a door is opened.
- Always apply the parking brake before you park or exit the vehicle.

7 Accelerator

8 Steering-column latch

Height adjustment

Steering-column switch

Selector switch for direction of travel

Top section pressed = Forward
Centred = Neutral
Bottom section pressed = Reversing with reversing alarm

ROCKER SWITCH

3. Adjustment pump for tiller drive

Top section pressed = OFF
Bottom section pressed = ON
Indicator light comes on.

When the parking brake is engaged, the tiller drive automatically switches off.
Once the parking brake has been released, the tiller drive remains off. You must move the rocker switch of OFF and back to ON in order to reactivate the tiller.

3-POSITION PUSHBUTTON

Swivelling rear equipment carrier

Top section pressed = Equipment carrier horizontal float position. Indicator light comes on.
Centred neutral = Equipment carrier locked in position
Bottom section pressed =
Equipment carrier centred.

PUSHBUTTON

Diesel engine idling speed

Top section pressed = Increase engine speed
Bottom section pressed = Reduce engine speed
Note: See tachometer

LATCHING ROCKER SWITCH

Front equipment carrier, floating position

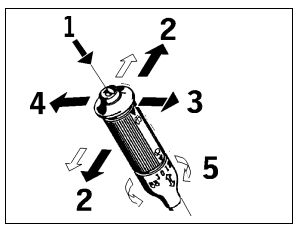
Release the latch and press the switch.
See Page 61

ROCKER SWITCH

Working lights *(Swiss variant)*

Top section pressed = OFF
Bottom section pressed = ON

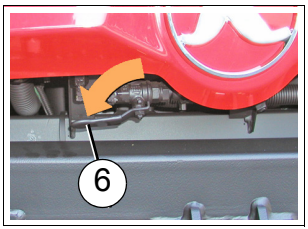
Multifunction switch



1 Horn
Press button

2 Flashing turn indicators
Left or right without automatic cancellation. Move control stalk past stop until it locks in position.

3 Headlight flasher
Push stalk to the right.



4 High beams and low beams

High beams = Push stalk to left until it locks in position.
Low beams = Push stalk to the right until it locks in position.

5 Wipers

Turn control stalk sleeve:

Position II = Fast

Position I = Normal

Position 0 = Off

Position INT = Intermittent wipe

Windscreen wipers heated *(optional equipment)*

❍ Swivel handle **6** at the front of the PistenBully in the direction indicated by the arrow.

Programming new intermittent-wipe time

Intermittent-wipe time for windscreen

❍ Move the multifunction switch **1** briefly to INT and then back to 0.

Wipers perform one sweep.

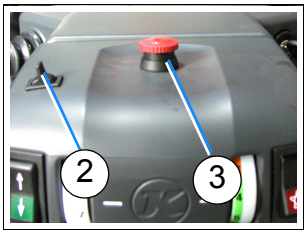
❍ Wait for intermittent-wipe time required (max. 20 sec.) and move the multifunction switch to the INT position.

The time you waited between setting the multifunction switch to 0 and returning it to INT is accepted as the intermittent-wipe time.

Intermittent-wipe time for rear window

❍ Operate the rocker switch for rear-window wipe.

❍ The rest of the procedure is analogous to that for setting



the intermittent-wipe time for the front wipers.

2 Swivel equipment carrier horizontally

see Page 65

3 STOP button

The PistenBully does not have a separate service brake for stopping, it has only a parking brake. The PistenBully does not stop abruptly when you lift your foot off the accelerator pedal or set the direction-of-travel switch to the neutral position.
If you hit the STOP button, the PistenBully brakes sharply to a complete stop.

Hit the STOP button:

– if a dangerous situation arises

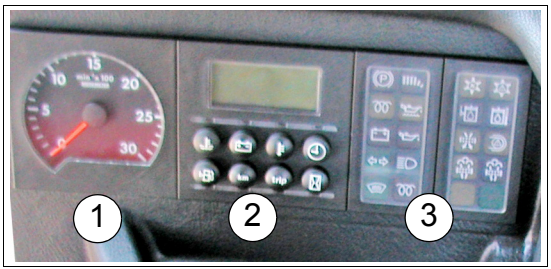
The PistenBully comes to an immediate stop and will not answer to the steering.

- ❍ Immediately apply the parking brake.
- ❍ Set the direction switch to the neutral position.
- ❍ Switch off the diesel engine.
- ❍ Rectify the fault.

Resuming operation after a stop

- ❍ Turn STOP button **3** and pull it up.

The PistenBully is again ready for operation.



Multifunction display

1 Revolution counter

2 Keypad for calling up functions

3 Warning lights and status-indicator symbols

Coolant temperature

Press 2x = **Diesel engine oil pressure**

On-board voltage

Outside air temperature

Time

Diesel fuel

Display in litres

Odometer reading

Total
Press 2x = **Speed of travel**

Tripmeter

Can be reset

Operating hours counter

Diesel engine

Self-test

❍ Switch on the ignition.

- All display segments are activated, LEDs light up.
- Sensors are tested.
- If a sensor is faulty an acoustic signal sounds and a visual warning is displayed until the button is pressed as acknowledgement.
- Multifunction display is ready.

Indication of sensor faults

Sensor faults (short circuit, open circuit) are indicated as follows (see also "Reading out limit-value and sensor-fault entries").

- Corresponding LED lights up.
- 2 Hz acoustic signal as warning of sensor fault.
- General warning symbol shows on the display.
- Pinout number of central connector is shown (top line of display shows for example nr 12 = pin for stat. input 1; bottom line of display shows for example SenS 1 = sensor stat. input 1).
- After the self-test, sensor faults are shown as "---".

Selecting a function

❍ Press a button.

- The corresponding value (e.g. fuel level) shows on the display.
- Red LED for the button you pressed lights up.

Activating background function

Programming allows two background functions to be mapped onto each line of the display.

1st background function

❍ Press the selected button.

- The corresponding background function (e.g. operating hours) shows on the display.
- Red LED for the button you pressed goes out.

2nd background function

- The fuel level shows, for example, when the ignition is switched ON.
- Engine rpm, for example, shows while the engine is running.
- Switchover between these functions is automatic.

Master instrument keypad

Using the keypad to set the time

❍ Press buttons 6 and 7 simultaneously for five seconds.

- The time flashes on the display.

❍ Press button 5, 6, 7 or 8, as appropriate, until the time is correct.

- The corresponding time unit increases by one.

Accepting the time

❍ Simultaneously press buttons 6 and 7 until the time stops flashing.

Acknowledging threshold warnings

If a defined threshold value (such as a pressure) is overshot or undershot a warning can be issued.

The following options are possible:

- Overshot/undershot value flashes on the display.
- Red LED for the corresponding button flashes.
- Buzzer sounds.
- Switch output is activated.

❍ Press the corresponding button to acknowledge the warning.

- If the warning is for a background function, press any button to acknowledge.
- The display returns to its original status.
- The LED for the button pressed beforehand lights up.

There are also some warnings for which no acknowledgement is accepted
(e.g. cease operations and stop engine).

If two or more warnings occur simultaneously they are shown in sequence in a 3-second cycle.

A high-priority warning shows constantly and has to be acknowledged before the next warning is shown.

The warning is cancelled when the parameter that overshot or undershot the threshold returns to normal or is reset.

Resetting the daily operating-hours count

❍ Press the corresponding button for approximately three seconds.

Resetting the daily tripmeter count

❍ Press the corresponding button for approximately three seconds.

Acknowledging service-due indicator (Service Interval Approaching, SIA)

The service-due indicator (SIA) is a reminder that a regular service is due.

- "SIA" shows on the display.
- All LEDs flash.

❍ Press any button in the keypad.

- The master instrument returns to normal operating status.

The "SIA" message is re-issued by the display every time the ignition is switched on.

Reading out limit-value and sensor-fault entries

Limit-vale overshoots and undershoots (warning and alarm thresholds) and sensor faults (open circuit, short circuit) are stored as fault messages in memory. This memory can be read out.

❍ Switch off the ignition.
❍ Press buttons 5 and 6 simultaneously for at least three seconds.
- In the display, the top line shows the number of fault messages.
- The bottom line shows the fault code.

3 Warning lights and status-indicator symbols

The acoustic warning (buzzer) sounds to indicate that an operating parameter has reached its minimum or maximum permissible value: Stop the vehicle – Apply the parking brake – Ascertain the cause.
- Do not drive the vehicle.

WARNING LIGHT

Braking-air check, parking brake

Parking brake indicator lights up and the parking brake is **not** engaged:
release pressure has dropped below 120 bar.

WARNING LIGHT

Engine management system fault

LA-MR/ADM

WARNING LIGHT

Intake air preheating

switched on

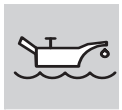
If the light for intake air preheating (red warning light) comes on while the vehicle is in operation: **Cease operations.**

INDICATOR LIGHT

Intake air preheating

switched on.

NOT USED



WARNING LIGHT

Engine oil pressure

has dropped to an unacceptable level.

WARNING LIGHT

Battery charge indicator

not charging

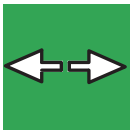
If the battery-charge indicator lights up during operation:
- Bring the vehicle to a stop.

INDICATOR LIGHT

Electric heater for windscreen

switched on

INDICATOR LIGHT



Left / right turn **indicators**

INDICATOR LIGHT

High-beam headlights

switched on

INDICATOR LIGHT

Tiller drive

switched on.

INDICATOR LIGHT

Tiller shaft

is rotating.

WARNING LIGHT

Hydraulic fluid level

below the minimum level

WARNING LIGHT

Hydraulic fluid temperature

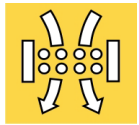
has risen to an unacceptable level

INDICATOR LIGHT

Emergency operation.

Drive electronics switched off.
If the vehicle is in emergency operation mode, drive it no further than to the nearest workshop.

INDICATOR LIGHT



Air-filter monitor

Check the air filter and replace if necessary.

INDICATOR LIGHT *(optional equipment)*

Diesel particulate filter flashing.

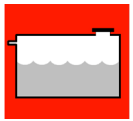
Remedy: Operate the vehicle under higher load. This will enable the diesel particulate filter to regenerate itself.

WARNING LIGHT *(optional equipment)*

Diesel particulate filter fault

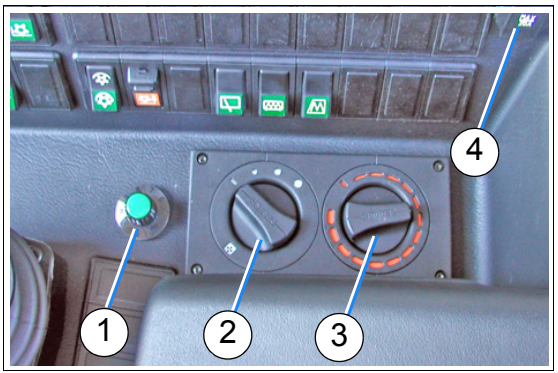
Buzzer sounds.
Cease operation.

WARNING LIGHT *(optional equipment)*



Coolant level

below the minimum level



1 Potentiometer
Contact pressure / relief pressure of the tiller / tracker plates *optional*

2 Heater blower control

3 Cab heating control

4 12-volt socket *(max. 20 amps)*

ROCKER SWITCH

Acoustic warning

Top section pressed = Acoustic warning for forward movement ON
Bottom section pressed = Acoustic warning for forward movement OFF

PUSHBUTTON

Windscreen heating

Bottom section pressed = ON
Indicator light comes on.

ON time approx. 10 minutes with engine running.

ROCKER SWITCH *(optional equipment)*

Adjust SnowCutter / KFS

Top section pressed = Raise
Bottom section pressed = Lower

ROCKER SWITCH *(optional equipment)*

Drive hydraulics for auxiliary equipment at front and rear.

Top section pressed = Front ON (with KFS).
Centred = OFF
Bottom section pressed = Rear ON
Note: Functions as of engine speed of 1100 rpm.

Drive hydraulics for auxiliary equipment at front ON + tiller drive ON

Restraint.

If the PistenBully does not come to a halt due to the heavy load carried and steep gradient:

❍ Turn the driving speed knurled knob to a scale value of 0 to -3.

WARNING!

Reverse motion with direction indicator displaying forwards travel.
As soon as the PistenBully has come to a halt, the knurled knob for the driving speed has been turned to a scale value of 0 to -3 and the accelerator is then depressed, the PistenBully begins to move in reverse. The steering turns in the opposite direction.

Only ever change the direction of travel using the travel direction switch.

PUSHBUTTON

Tiller-depth adjustment

Top section pressed = Tiller high
Bottom section pressed = Tiller low
For tilling depth, see instrument panel display.

Tiller-depth indicator on overhead console

ROCKER SWITCH

Optional equipment

Raise/lower left tracker plate tiller

Optional

Raise/lower 3 centre tracker plates

ROCKER SWITCH

Optional equipment, see Page 51

Reposition tracker plate tiller

Top section pressed = **B** - Increase spacing
Bottom section pressed = **A** - Reduce spacing

ROCKER SWITCH

Optional equipment, see Page 51

Track width left/right

Top section pressed = Wide track
Bottom section pressed = Narrow track

ROCKER SWITCH

Tracker plate tiller drive

Top section pressed = OFF
Bottom section pressed =ON
Disengage the latch and operate the switch.

ROCKER SWITCH

Optional equipment, see Page 51

1. Switch for left side finisher
2. Switch for right side finisher

Top section pressed = Raise
Bottom section pressed = Lower

ROCKER SWITCH

Rotary beacon

Top section pressed = OFF
Bottom section pressed = ON

ROCKER SWITCH

Low-beam headlights

Top section pressed = OFF
Centred = Side lights
Bottom section pressed = Low-beam headlights ON

ROCKER SWITCH

Front working lights

Top section pressed = OFF
Bottom section pressed = ON

ROCKER SWITCH

Front foglights

Top section pressed = OFF
Bottom section pressed = ON

ROCKER SWITCH

Rear working lights

Top section pressed = OFF
Bottom section pressed = ON

ROCKER SWITCH

Rear window wiper

Top section pressed = OFF
Centred = Intermittent wipe
Bottom section pressed = ON

ROCKER SWITCH

Rear window heater

Top section pressed = OFF
Centred = Intermittent wipe
Bottom section pressed = ON

ROCKER SWITCH

Side-window heating

Top section pressed = OFF
Bottom section pressed = ON

ROCKER SWITCH

Tiller forward operation / counter-rotating

Top section pressed = Forward operation
Bottom section pressed = Counter-rotating

LATCHING ROCKER SWITCH *(optional equipment)*

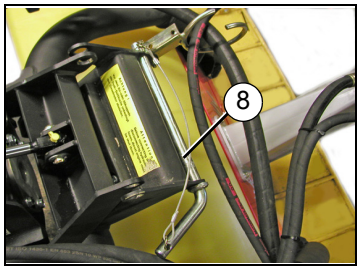
Automatic lifting

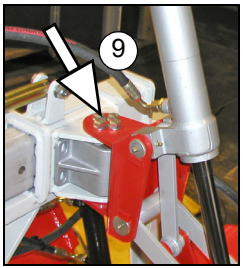
of rear-mounted auxiliary equipment during reverse travel
(lock engaged).

Automatic lifting deactivated

Release the latch and press the switch.

Tiller tracker plates *(optional equipment)*





WARNING!

Risk of injury by cutting.
When the tracker plate tiller is raised and in operation.
Remedy:
Operate the tracker plate tiller only when it is fully lowered.

- Fully lower the tracker plate tiller only when the vehicle is on the move.
- After 50 operating hours, check the security of 4 screws (*see arrow* **9**).
- **Visual check before operation:**
  Keeper removed and pin **8** secured in the pin holder.

ROCKER SWITCH

1. Switch for left side finisher
2. Switch for right side finisher

Top section pressed = Raise
Bottom section pressed = Lower

PUSHBUTTON

Raise/lower tracker plates

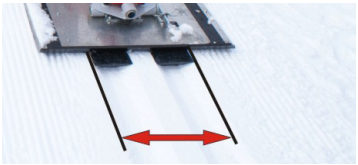
Top section pressed = Raise
Bottom section pressed = Lower
Contact pressure adjustable by potentiometer.

A pushbutton = left tracker plate
B pushbutton = right tracker plate

WARNING!

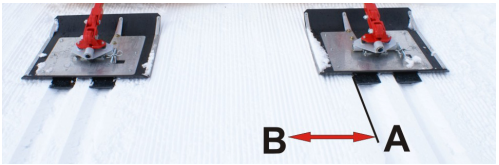
Risk of damaging tracker plates
Always lift the tracker plate tiller clear of the ground before turning the PistenBully in its own length.

Widening/adjusting the tracker plates



Track width

Top section pressed = Wide track
Bottom section pressed = Narrow track

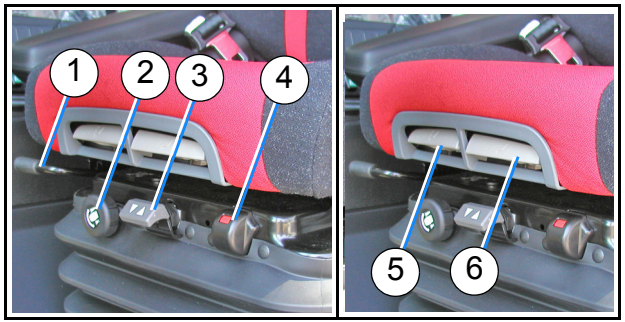


Adjusting the tracker plates

Top section pressed = **B** - Increase spacing
Bottom section pressed = **A** - Reduce spacing

CAUTION!

Extra weight of equipment.
As a rule, raise the tracker plate tiller only in position B. Fully retract cylinder.



Joystick *section D*

❍ Joystick for auxiliary equipment *see Page 61*.

Driver's seat

1 Fore-and-aft position

Pull the lever up and adjust the position of the driver's seat. Release the lever and make sure it engages correctly.

2 Spring travel setting for seat height

3 Raise/lower weight setting

❍ Switch on the ignition.

❍ Pull the lever up.

The suspension system is adjusted to suit the driver's weight by the air compressor.

4 Weight setting display

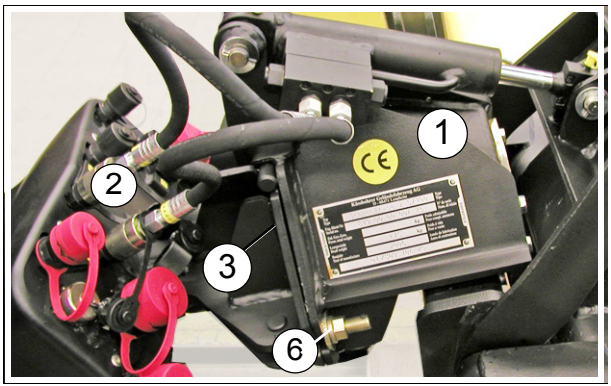
A green viewing window with black bar indicates that the correct weight setting has been achieved.

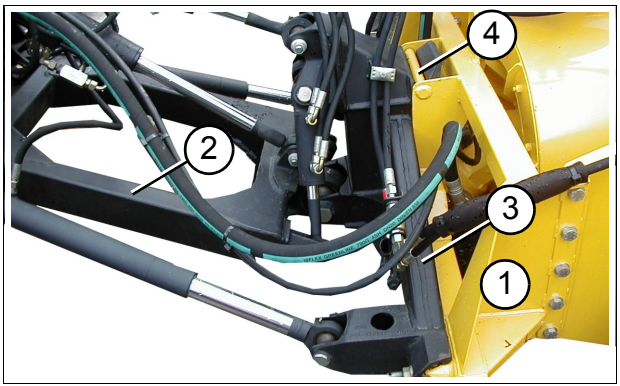
5 Tilting the seat squab

6 Seat squab forwards/backwards

7 Seat heating

NOTES





INSTALLING AUXILIARY DRIVEN IMPLEMENTS

❍ Clear all ice and snow off the adapter plate and centring head of the auxiliary driven implement.

WARNING!

Do not permit anyone to enter the zone between the vehicle and the auxiliary driven implement while the engine is running.

❍ Lower carrier plate **2** or pusher frame **2**.

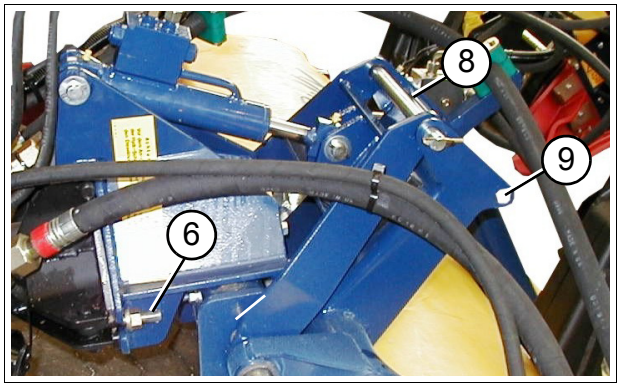
❍ Tilt adapter plate for pusher frame **3**.

❍ Drive the PistenBully up to the implement.

❍ Apply the parking brake.

❍ Slowly raise the carrier plate or pusher frame.

❍ Raise the carrier plate or pusher frame just far enough to enable the implement **1** to seat against adapter plate **3**.



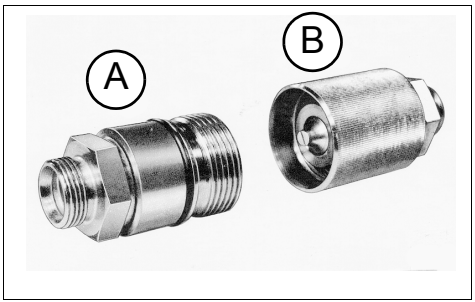
❍ Swing eyebolts **6** inward and tighten both nuts.
- Tightening torque 250 Nm.

Check the security of the nuts after approx. 10 minutes of operation.

❍ Lower the auxiliary driven implement.

❍ Remove the keeper from pin **8** and secure the pin in holder **9**.

Remove the rear-mounted auxiliary implement before prolonged periods of dozing work.

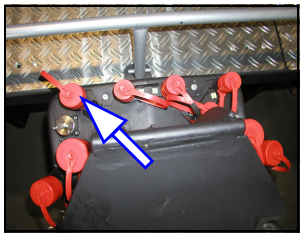


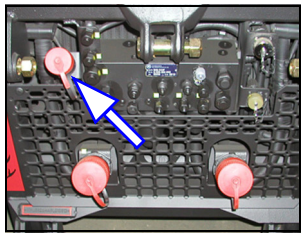
Connecting hydraulics

The threaded **high-pressure couplings** are for connecting and disconnecting hydraulic hoses.
Check valves that enable or disable flow, as applicable, are actuated automatically in the coupling process.

A = Vehicle end

B = Implement end





Before connecting or disconnecting the hoses for auxiliary driven implements, always:
- Switch off the engine.
- Apply the parking brake.

❍ Switch the ignition for the diesel engine ON and actuate the appropriate functions to depressurise the hydraulic lines.

❍ Ignition for diesel engine OFF

When making the connections, always make sure that both parts of the couplings are perfectly clean.

❍ Connect the leak-off fluid line first *see illustration, arrow.* This will enable excess pressure in the system to escape.

- ❍ Connect the hydraulic hoses, making sure that the colour codings are correct and that the hydraulic couplings are correctly seated. Use suitable tools to tighten the hydraulic couplings.
- ❍ Connect the electrical plug of the auxiliary driven implement to the socket of the PistenBully and make sure it is correctly engaged. The plug completes the electrical circuit, so that the controller can recognise the auxiliary driven implement.
- ❍ Function-test the auxiliary driven implement.

Make sure there is no-one in the danger zone.

- ❍ Check the driven implement for fluid leaks and, if necessary, have the equipment repaired by trained, qualified persons.

Removing the auxiliary driven implement

- ❍ Lower the driven implement, with the stands fully extended and secured, onto firm, smooth ground.
- ❍ Removal is the reverse of the installation procedure.
- ❍ Disconnect the leak-off oil line last.

Protect the driven implement from the sun if it is to be out of use for a prolonged period of time.

OPERATION OF AUXILIARY DRIVEN IMPLEMENT

Precondition for initial operation of the drive hydraulics

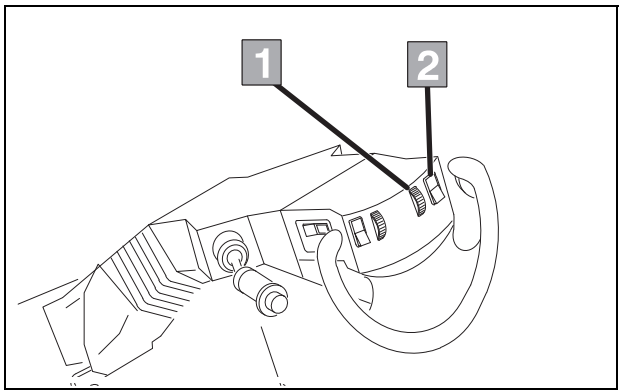
- The rear-mounted tiller must be less than 50 mm clear of the surface of the snow.

As a safety precaution, the tiller hydraulics are deactivated when the rear-mounted driven implement is raised to a height of approx. 50 cm.

- The plug of the auxiliary implement must be in the socket (socket E).

Failure to comply with this precaution will mean that the electronically controlled speed reduction function is not available.

- The diesel engine must be revving at a speed at least equal to the pullaway speed of 1200 rpm.



1 Knurled wheel
Reducing rotary shaft speed

2 Rocker switch

3. Adjustment pump – tiller drive

Top section pressed = OFF
Bottom section pressed = ON

Indicator light comes on.

If there is a leak in the drive hydraulics always switch off the diesel engine and have the fault rectified.

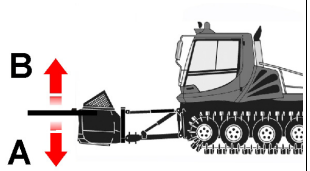
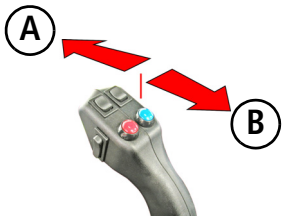
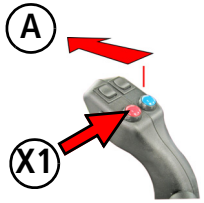
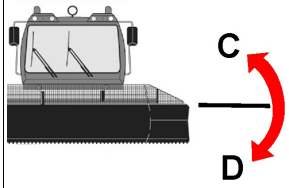
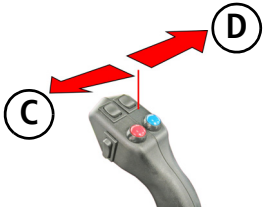
Rocker switch

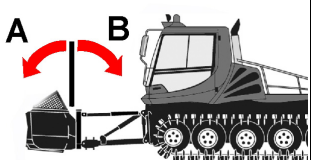
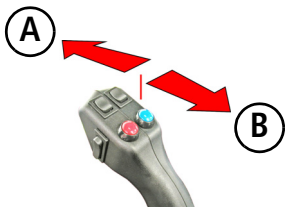
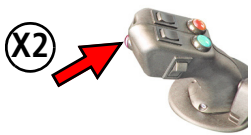
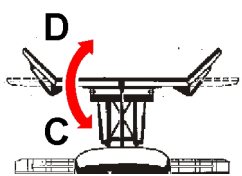
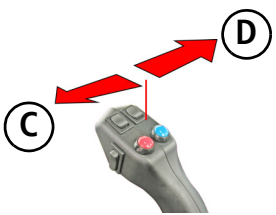
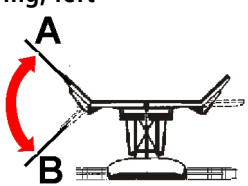
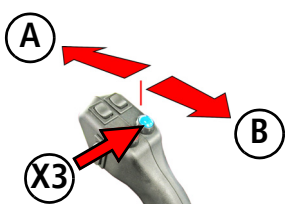
Tiller- forward operation / counter-rotating

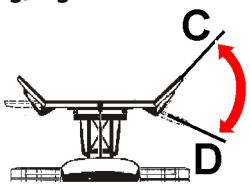
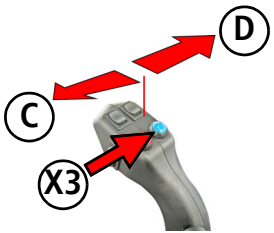
Top section pressed = Forward operation

Bottom section pressed = Counter-rotating

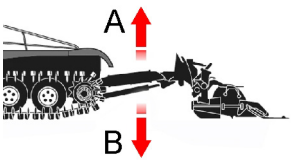
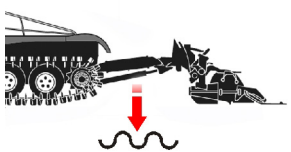
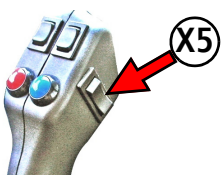
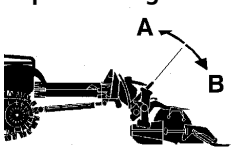
Do not use the counter-rotating setting when driving uphill. Increased power loss.

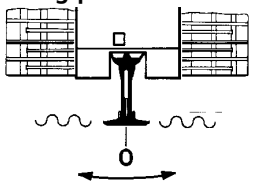
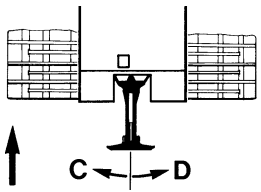
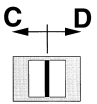
Front blade	Joystick	Joystick position	Pushbutton / rocker switch
Raise - lower 		**A** - Lower **B** - Raise	Floating position 
Lower quickly		**A** - Lower	X1
Tilt 		**C** - Left **D** - Right	

Front blade	Joystick	Joystick position	Pushbutton
Roll 		**A** - Forward **B** - Back	
Swivel 		**C** - Swivel left **D** - Swivel right	
Wing, left 		**A** - Move wing in **B** - Move wing out	

Front blade	Joystick	Joystick position	Pushbutton
Wing, right 		**C** - Move wing in. **D** - Move wing out.	X3

REAR-MOUNTED AUXILIARY DRIVEN IMPLEMENT

Rear-mounted auxiliary driven implement	Activity	Pushbutton / rocker switch
Raise - lower 	Top section pressed = **A** - Raise Centred = Locked Bottom section pressed = **B** - Lower	Rocker switch 
Press into snow or relieve pressure 	Rocker switch **X4** in the "Lower" position Rocker switch **X5** Top section pressed = Relieve tiller pressure Centred = Floating position Bottom section pressed = Press tiller into snow, pressure variable by means of potentiometer.	Rocker switch 
Depth setting 	Top section pressed = Tiller high Bottom section pressed = Tiller low	Pushbutton  For tiller depth, see instrument display!

Auxiliary driven implements	Activity	Pushbutton / rocker switch
Floating position 	**X4** Rocker switch in the "Lower" position **Rocker switch** Top section pressed = Floating position Centred = Locked Bottom section pressed = Centering Joystick in locked position (zero position).	Pushbutton 
Swivel horizontally 	**C** - Swivel left (locked) **D** - Swivel right (locked)	Pushbutton: *(see steering wheel)* 

NOTES

Precondition:

- Always remove all loose objects before tilting the driver's cab or load platform.
- Park the vehicle on a firm surface that is as horizontal as possible.
- Apply the parking brake.
- Switch off the tiller drive.
- Direction of travel switch in neutral position.
- Lower the front-mounted and rear-mounted auxiliary driven implements.

Failure to comply with this precaution will result in the risk of collision between the load platform or the driver's cab and the auxiliary driven implement.

- Exit the driver's cab.

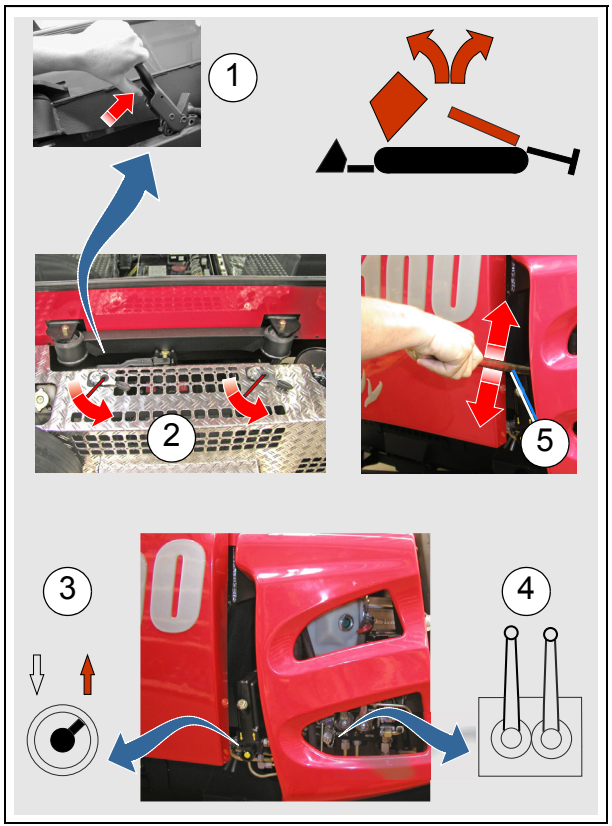
CAUTION!

Close the doors
Failure to comply with this precaution will result in a risk of accident due to sudden movement of the doors.

- Make sure there is no-one in the danger zone.

Tilting the driver's cab and load platform

- Open locking lever for cab **1** on the load platform.
- Remove both toggle screws **2**.
- Turn adjuster valve **3** to the correct position (using pipe **5** from the onboard toolkit).
- Move the lever of block ball cock **4** to the appropriate position.
- Connect pipe **5** to the manual pump and operate the pump until cab and load platform are tilted to the limit of travel.



WARNING!

Risk of injury by crushing:
If hydraulic pressure is lost the load platform / cab will move downward.
Secure the support to ensure that the assembly cannot move downward of its own accord.

WARNING!

Risk of burns caused by the hot exhaust bowl or engine.

Securing cab and load platform to prevent movement from tilted position

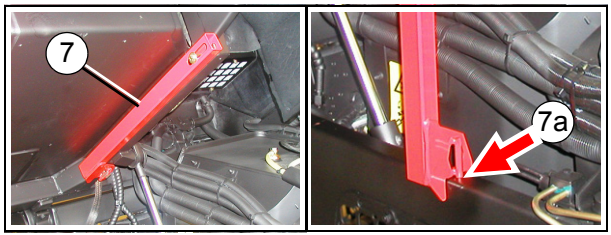
WARNING!

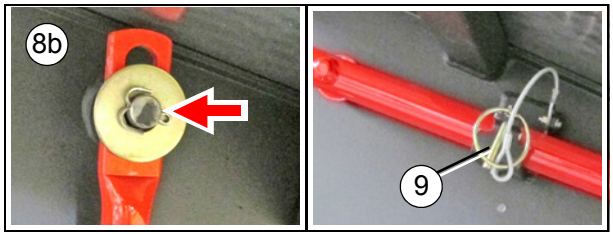
Risk of injury by crushing.
If hydraulic pressure is lost the cab / load platform will move downward.
Secure the support to ensure that the assembly cannot move downward of its own accord.

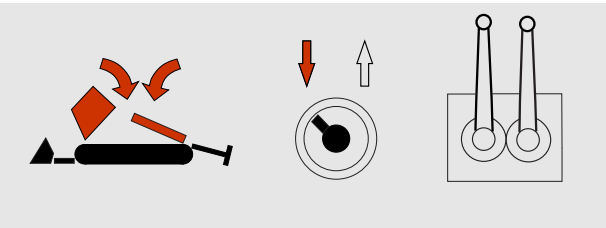
- Swivel support **7** down and push locking pin **7a** into the hole.
- Raise the load platform all the way and release **support 8** and swing it down.
- Engage the support and press it down into the anchorage *(see Fig. 8a)*.

WARNING!

The support can be inadvertently knocked out of its anchorage. Lower the load platform until the stud is seated in the guide slot *(see Fig. 8b)*.

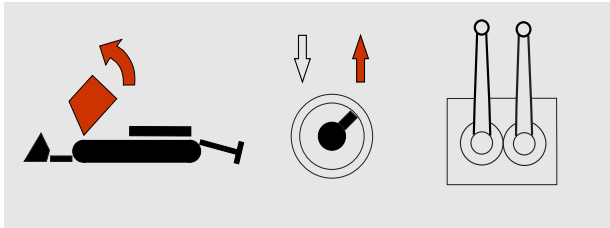






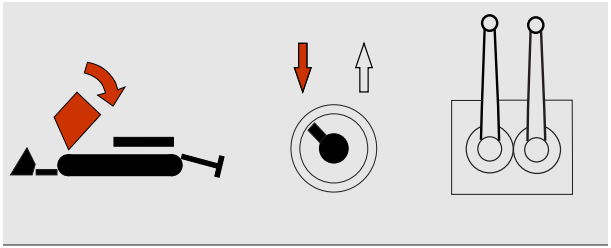
Lowering the driver's cab and load platform

- Tilt the load platform all the way up.
- Disengage the support from its anchorage and secure it in the holder.
- Secure the support with retaining ring **9**
- Pivot support **7** up and engage it in the raised position.
- Move the adjuster valve to the appropriate position.
- Install the pipe and operate the manual pump.
- Close the locking lever.
- Install both toggle screws.



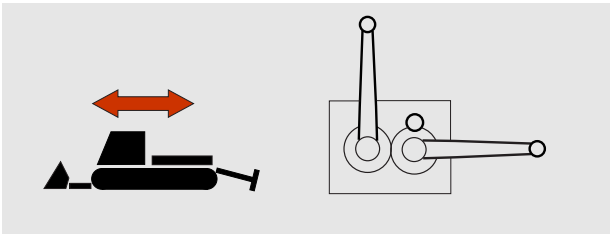
Tilting the driver's cab

- Open the locking lever of the driver's cab.
- Move the lever of the block ball cock to the appropriate position.
- Move the adjuster valve to the appropriate position.
- Operate the manual pump.
- Install the support to secure the cab in the tilted position.



Lowering the driver's cab

- Pivot support up and engage it in the raised position.
- Move the adjuster valve to the appropriate position.
- Operate the manual pump.
- Close the locking lever of the driver's cab.



Driving

Notes

FUSES / MINIATURE RELAYS / CONTROL UNIT

Take a grip in the handle recess and raise centre console **H**.

1 Console switch

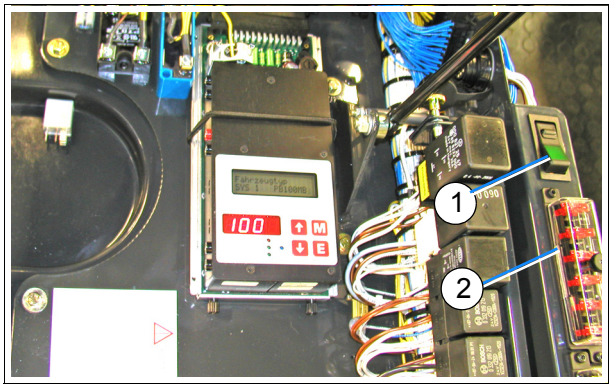
LATCHING ROCKER SWITCH

Emergency switch for drive electronics
Indicator light comes on.
See Page 77

2 Fuses / miniature relays

Replacing fuses

Fuses are designed to provide protection against excessively high currents in the electrical system.



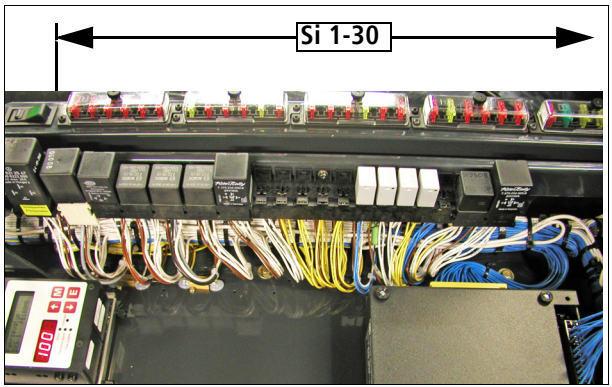
WARNING!

Risk of cable fire and short-circuit – Never attempt to jumper or repair fuses or insert replacement fuses with a higher ampere rating than the originals.

Unless otherwise stated, fuse rating = 10 amperes.

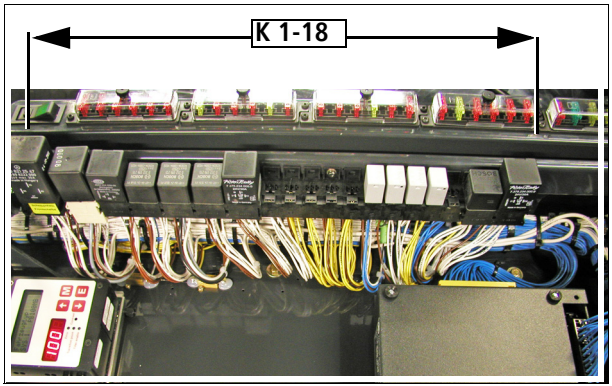
Fuses (Si)

1 (10 A) High-beam headlights and indicator
2 (10 A) Low-beam headlights
3 (10 A) Overhead working light, left
4 (10 A) Overhead working light, right
5 (10 A) Instrument lighting, parking light/tail light, right.
6 (10 A) Dashboard lighting, parking light/tail light, left.
7 (20 A) Xenon working lights, front
8 (10 A) Rear spotlights.
9 (10 A) Drive/tiller electronics
10 (20 A) Steering wheel (power supply)
11 (10 A) Front snow blower
12 (10 A) Rear wiper, side wing
13 (10 A) Front wipers, horn
14 (10 A) Instruments, telltale lights
15 (10 A) Driver's seat, hand-held light, searchlight
16 (20 A) Working hydraulics
17 (10 A) Grid heater, 24/12 V voltage converter, radio
18 (10 A) Socket, hand-held light
19 (10 A) Flashing indicators, headlight flasher, working hydraulics
20 (20 A) Cab heating
21 (10 A) Engine electronics



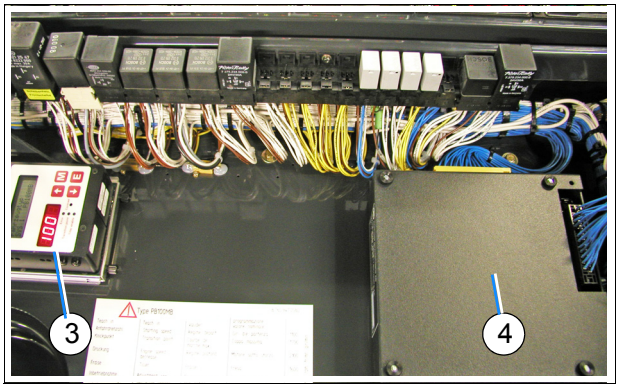
22 (10 A) Engine electronics
23 (10 A) Engine electronics
24 (10 A) Engine electronics
25 (10 A) Engine electronics
26 (30 A) Reserve
27 (10 A) Voltage with engine running, mirror heater, side-window heater.
28 (20 A) Rear-window heater
29 (30 A) Windscreen heater
30 (20 A) Rotating beacon, interior light

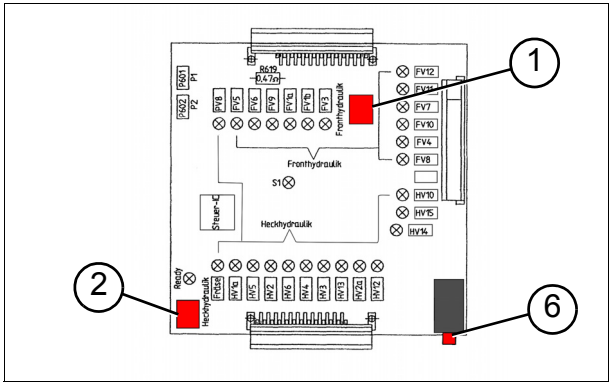
Miniature relay (K)



1 Windscreen heater
2 Headlights
3 Flashing indicators
4 Voltage with engine running
5 Lights
6 Rear-window heater
7 Front wiper interval, intermittent wipe
8 Door and brake warning system
9 - 12 Tiller blower
13 Front hydraulics
14 Cold-start system
15 Cold-start system
16 Stop switch
17 Tracker plate tiller
18 Reversing light

Miniature relays are not interchangeable.





3 Controller, working hydraulics

4 Digital propulsion and tiller electronics

see Electrics

FAULT IN WORKING HYDRAULICS

WARNING!

Switch off the rotary tiller.

❍ If the control system fails, you can raise the auxiliary hydraulics by means of emergency-operation switch **1** for the **front hydraulics** and emergency-operation switch **2** for the **rear hydraulics**.

Power is supplied via fuse **6** (20 A).

FAULT IN DRIVE ELECTRONICS

Operate the emergency switch for drive electronics

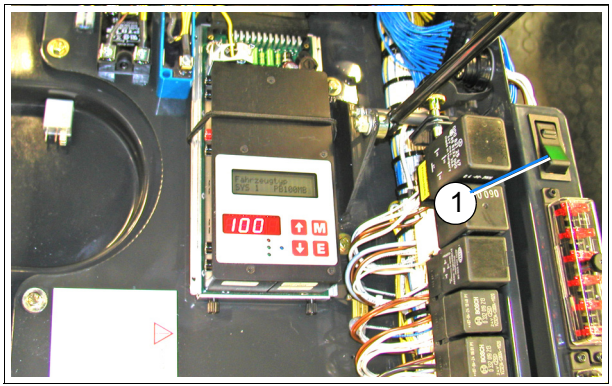
WARNING!

Failure to comply with the procedure as described below will result in an accident risk, because the vehicle could move off immediately and in an uncontrolled manner.

WARNING!

If the vehicle is in emergency operation mode (with the electronics out of operation, in other words), drive it no further than to the nearest workshop.

- Apply the parking brake.
- Move the direction of travel switch to the neutral position.
- Set the track-speed potentiometer to 0.
- Lift the centre console.
- Unlatch rocker switch **1** for "emergency drive" and set it to the position for manual control – the indicator lights up.



- Start the diesel engine and increase engine speed to approx. 2000 rpm.
- Move the direction of travel switch to the position corresponding to the direction in which you want to travel.
- Release parking brake.
- Slowly turn the track-speed potentiometer to 9: the PistenBully begins to move.
- Drive at low speed only. Observe engine rpm at all times: Variations in load can cause the engine to cut out.
- Back off the track-speed potentiometer when you want to brake.

WARNING!

The vehicle will immediately brake to a standstill if you move the direction-of-travel switch to the neutral position.

❍ Immediately apply the parking brake if the engine stalls.

VEHICLE BATTERY

The **two 12 V, 100 Ah/449 A** batteries are mounted on the upper frame.

WARNING!

The battery must be secured by means of the retainer.
Risk of explosion of oxyhydrogen gas:
Keep all sources of ignition well away from the battery.
Do not place metal objects on top of the battery.

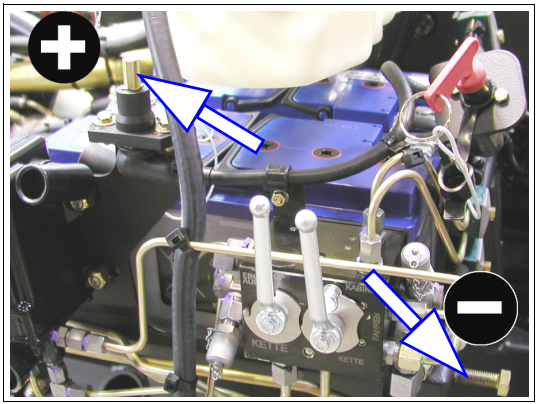
Topping up battery fluid

WARNING!

Take care when handling battery acid
Risk of caustic burns:
- Wear protective goggles and protective gloves.

❍ Remove the screw caps

❍ Top up the fluid in the cells to the max. mark with distilled water.



Charging the battery

❍ Connect the battery master switch to the on-board electrical system.

WARNING!

- Make sure that polarity is not reversed.
- Do not bring the battery clamps into contact with each other.
- Make sure the room in which the battery is charged is well ventilated.
(formation of oxyhydrogen gas).

JUMP STARTING

WARNING!

A mistake in the jump-starting procedure could result in fatality or severe burns due to electric shock.
<u>Do not</u> make a connection between the cable terminals.
<u>Do not</u> connect the jump-start leads to the connections between the two batteries.

Risk of damaging electronics:
Do not use a rapid charger to start the engine.

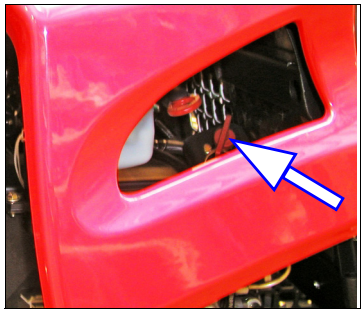
Voltage peaks when disconnecting the adapter
Risk of damaging the electronic packaging!
Switch on great appliances (e.g. windscreen heating, seat heating) before disconnecting the jumper cable.

❍ Use only separate batteries for jump starting.

Connecting jump leads

- From **+ pole** of the PB battery **to + pole** of donor battery (24 V).
- From **– pole** of the PB battery **to – pole** of donor battery (24 V).

BATTERY MASTER SWITCH



The battery master switch provides a means of isolating the battery from the vehicle's on-board electrics.

Switch off the battery master switch:

- if the electronics are defective.
- to help prevent the battery from discharging during a prolonged storage.

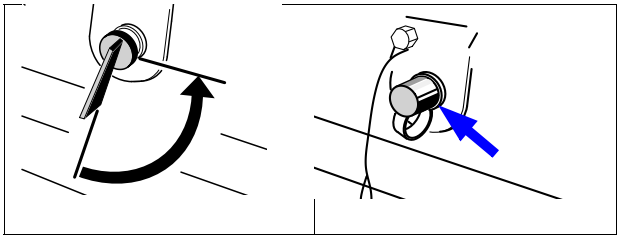
Voltage peaks:

While the engine is running, do not switch off the battery master switch except in an emergency.

The engine electronics will lose data.

Before disconnecting the battery from the vehicle's on-board electrics:

- Switch off the ignition.
- Wait 30 seconds.
- Then operate the battery master switch.



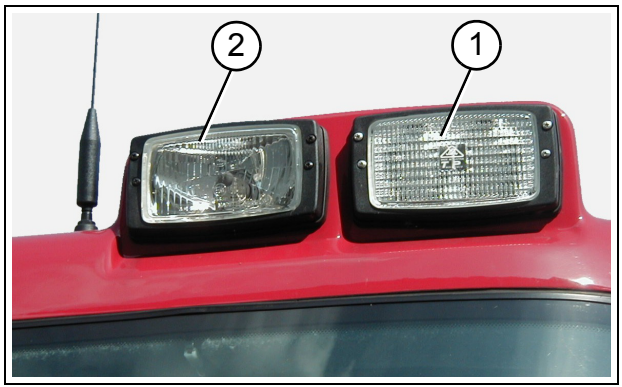
Switching off the battery master switch

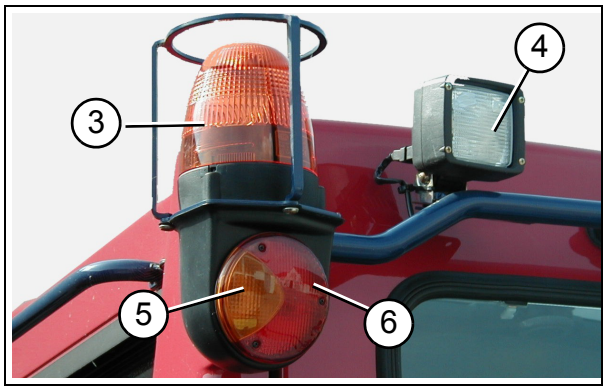
- Turn the toggle counter-clockwise and remove.
- Fit the protective cap.

The battery is isolated from the on-board electrical system.

LIGHTS

Never touch the glass of a halogen bulb.





1 Working lights

2 Low-beam/high-beam headlights

3 Rotary beacon

4 Rear working lights

5 Flashing lights

6 Rear light

Xenon working lights *(optional extra)*

WARNING!

Bright light could injure eyes.
Do not look directly into the bright light.

WARNING!

Health hazard due to gas.

- If a xenon bulb breaks in an enclosed space, leave immediately and ventilate the room for at least 20 minutes before re-entering.

Damage to electronic ballast:
Persistent light problems indicated by flickering of the gas-discharge light can result in damage to the electronic circuitry in the ballast.
Switch off immediately if the light flickers.

Risk of breaking the lens:
Do not use liquid to clean the lens while hot.

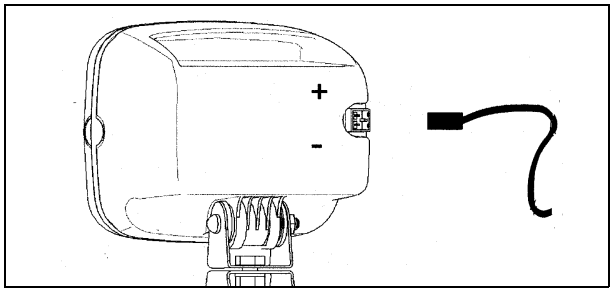
- Clean the glass lens from time to time when cold.
- Do not use aggressive or abrasive cleaning agents.

Safety instructions for changing xenon bulbs:

- Before changing a bulb, always switch off the headlights and isolate them from the power supply.
- Do not probe into the bulb socket.
- The electrical connection between headlight and ballast carries a high voltage: do not break this connection.

- Never operate the ballast without a bulb, as this could cause dangerous arcing at the bulb socket and result in damage.
- Allow the bulb to cool down before you commence work.
- Wear protective goggles and protective gloves when changing bulbs.
- The glass body of a xenon bulb is pressurized (danger of flying splinters of glass if the bulb shatters).
- Always hold the bulb by the base.
- Operate xenon bulbs in closed headlights only.

Dispose of the spent xenon bulb as hazardous waste.



Electrical connection

- Before connecting, always interrupt the circuit by switching off the battery master switch.
- Use only the factory-installed wiring harness for electrical connection.

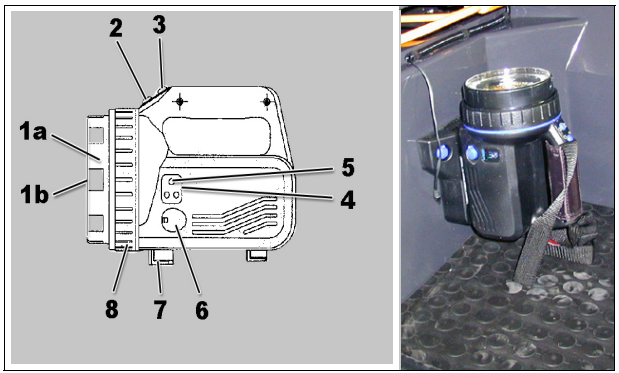
Hand-held light

The bracket and the charging station for the hand-held light are beneath the co-driver's seat.

- Always remember to reconnect the hand-held light to the charging station after use.

The lead-gel battery in the hand-held light can be recharged approximately 300 to 400 times. Always replace with a battery of the same type.

Spent batteries (rechargeable and non-rechargeable) must be disposed of in accordance with the applicable environmental-protection laws for the disposal of problem waste.



1a Focus

For adjusting the width of the beam

1b 100 mm lens

2 ON/OFF switch

3 Dimmer

4 Charge indicator light

5 Safety valve

red LED: battery charging
green LED: battery fully charged

6 Charge connection, 12V adapter

7 Charge contacts wall bracket / charging station

8 Threaded ring for 10W halogen bulb

Notes

INSTRUCTIONS FOR CHECKS AND MAINTENANCE

WARNING!

Risk of injury by cutting or crushing action.
At all moving parts.
When the engine is running, keep at a safe distance from rotating parts.

- Always perform the specified checks before starting off.
- Perform all checks with the engine off and the vehicle parked on a horizontal surface.
- Make sure that the oil and coolant levels are always to specification (check at oil dipstick, overflow plug, etc.).

New vehicles

- Check security of wheels after the first **5 operating hours**. Tightening torque 140 Nm.
- When the vehicle is new, check track tension at frequent intervals.

TOPPING UP FLUIDS AND LUBRICANTS

WARNING!

Do not permit fluids or lubricants to come into contact with the skin (wear protective gloves, change wet clothing).
Do not inhale or swallow fluids or lubricants (risk of poisoning).

WARNING!

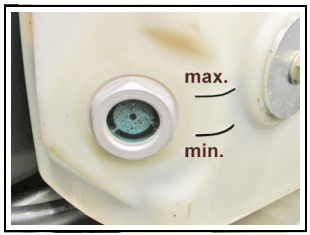
Risk of explosion due to build-up of gas in fuel tank.
Keep all possible sources of ignition when clear when the vehicle is being refuelled.

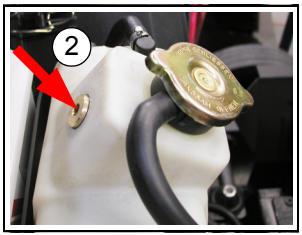
Do not spill fluids or lubricants (they are hazardous to soil and water). Always dispose of these substances in an environmentally compatible manner (comply with local laws).

CHECKING COOLANT LEVEL

Check the coolant level and top up only when the engine is cold. Slacken bleed screw **2** when topping up the coolant. This will enable the system to fill much more rapidly.

- Check the coolant level in the sight glass of the expansion tank.
  The water level must be between the min. and max. marks.
- Check the antifreeze of the coolant, (see the section on fluids and lubricants).
- Check that the hoses in the cooling and heating systems are tight and not leaking.

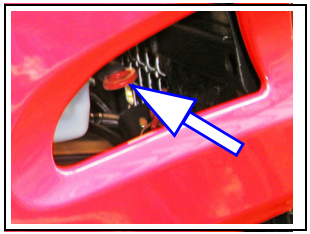


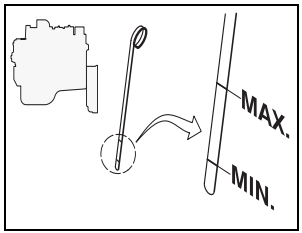


CHECKING ENGINE OIL LEVEL

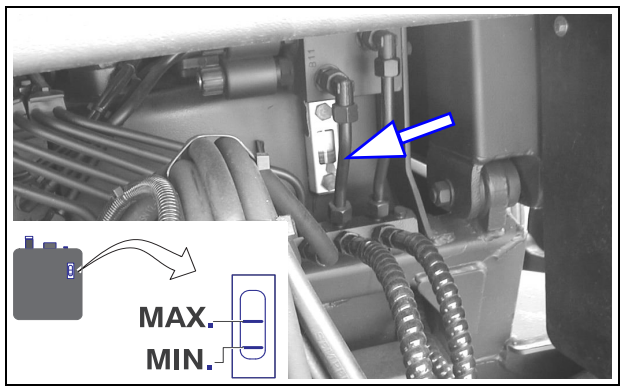
- Use the dipstick to check the engine oil level.
- Top up the oil with the engine stopped and the Pisten-Bully standing on level, horizontal ground.
  The oil level must be between the min. and max. marks on the oil dipstick.

Use only approved engine oil (see fluids and lubricants specifications).





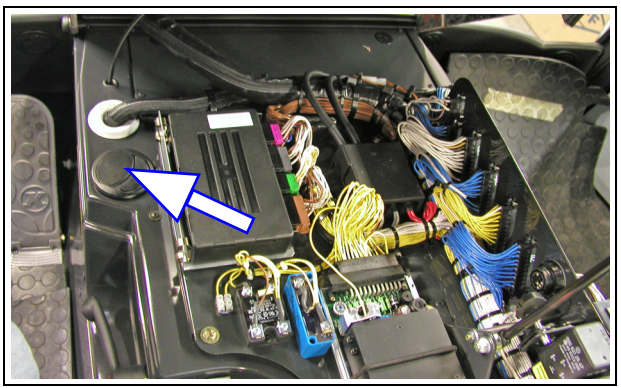
CHECKING HYDRAULIC FLUID LEVEL



- Check the hydraulic-fluid level and top up only when warm.
- The fluid level must be between the min. and max. marks.

Use only approved hydraulic fluid (see fluids and lubricants specification).

RECIRCULATING-AIR FLAP, HEATING



There is a risk of driving snow icing up the blower if the air intake is set to fresh air.

Set the system to air intake through driver's cab

- Open both recirculating-air flaps (see arrow).

AIR-INTAKE FLAP

Adjusting the air-intake flap

The air-intake flap adjuster is located next to the diesel filler neck *(see arrow)*.

Basic setting

❍ For every restart, the adjusting lever in position **1**.

Non-compliance can result in the diesel engine losing power

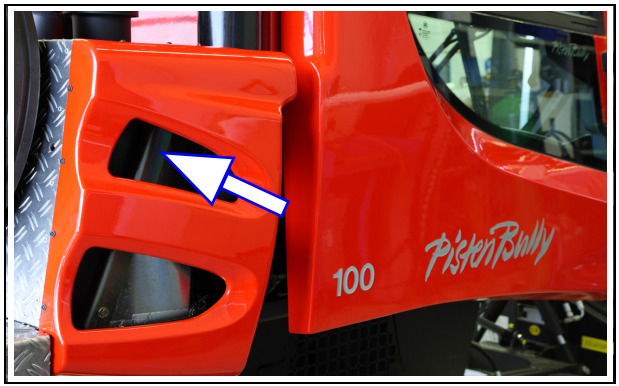
Air filter indicator lamp lights up

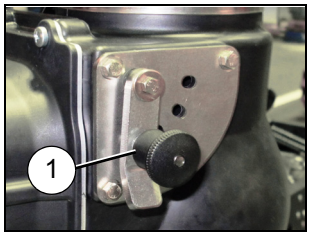
Air filter symbol lights up as soon as the air filter is iced up. *(See Chap. Operation)*.

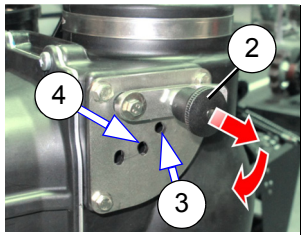
❍ Adjusting lever in position **2**

Air filter indicator lamp goes out

❍ Adjusting lever in position **3** or, respectively, **4**.







Adjusting air-intake flap

1 = Basic setting (Fresh air)
2 = Air intake from engine compartment

CHECKING ELECTRICAL SYSTEM

- Check the lights and flashing indicators and the rotating beacon system; repair or replace components as necessary. Always comply with the instructions for working on the rotating beacon system (high-voltage system).
- Replace defective bulbs and fuses.
- Check the wipers, horn and back-up alarm.

Never operate the PistenBully if the warning lights and rotating beacon system are not fully functional.

VISUAL INSPECTION

- Make sure that the fan drive is free of snow.
- Visually inspect the tracks and sprockets, check for tyre damage.
- Visually inspect the fasteners of the auxiliary driven implements (locking pins, bolts, nuts).
- Visually inspect the hydraulic system (drive hydraulics and hydraulics for auxiliary driven implement), hydraulic lines, connectors, hoses, hydraulic cylinders for leaks and chafing.

PistenBully with diesel particulate filter

- Check the exhaust pipe for soot deposits.
- Check formation of smoke during operation.
  Stop operation during the exhaust of black smoke / Inform the service

CHECKING PARKING BRAKE

- Make sure there is no-one in the danger zone.
- Start the engine and apply the parking brake: Indicator light comes on.
- Set the direction-of-travel switch or the propulsion lever to "Forward" and briefly accelerate the engine to approx. 2000 rpm.
  The PistenBully must remain motionless.

Do not operate the vehicle if the parking brake is defective.

- The indicator light in the instrument cluster must go out when the parking brake is released.

CHECKING FUEL PREFILTER

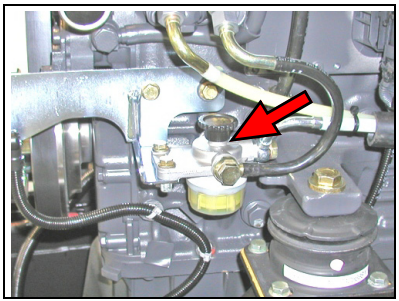
- Unscrew the filter housing and remove the filter element; cleanse it in clean diesel fuel using a soft brush.

Replace the filter element if it is very dirty or damaged.

- Check the sealing ring for the filter housing; replace if necessary.
- Slip the filter element into the filter housing and reinstall the housing. Tightening torque 10 Nm.

Make sure that the sealing ring is correctly seated.

Dispose of used filters and fuel residues in accordance with the locally applicable environmental-protection and safety regulations.



Drive belt

Check the drive belt on the engine (engine fan, alternator); make sure that belt tension is correct and that the belt is free of damage (see the manual supplied by the engine manufacturer).

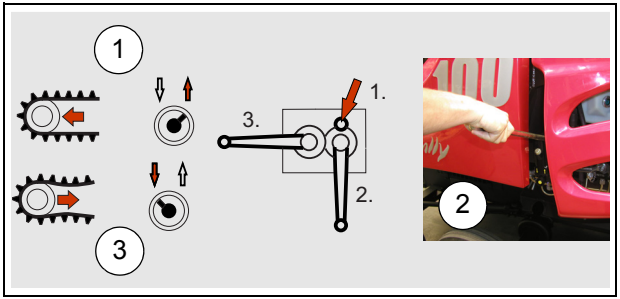
TRACK TENSION

Checking track tension

- Vehicle parked on horizontal, snow-covered ground.
- No load on vehicle and auxiliary driven implements lowered.
- After equalising track tension by driving backwards and forwards.

Track tension is correct when the upper section of the track can be lifted **approx. 40 – 50 mm** midway along its run.

- Check the condition of the track cleats, track lacings, tyre guides and backing plates, replace damaged components.



Tensioning track

- Set the adjuster valve to position **1** (using the appropriate tool from the toolkit).
- Move the lever of the block ball cock to the appropriate position.
- Connect the pipe to manual pump **2** and operate the pump until the track is correctly tensioned.

Relieving chain tension

- Move adjuster valve **3** to the appropriate position and operate the manual pump.

TRANSFER CASE

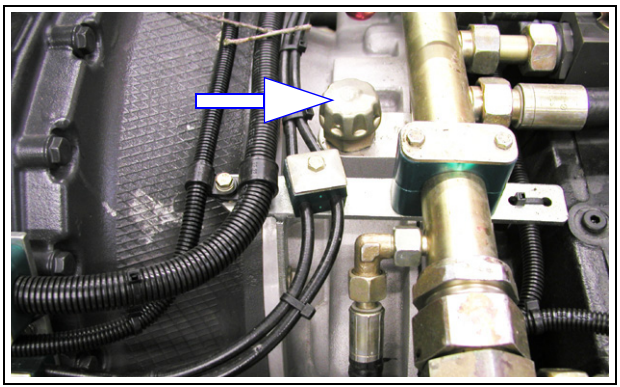
- Tilt the load platform.
- Use the dipstick to check the engine oil level.
- Check the level with the underside of the dipstick knob resting on the housing (dipstick not screwed in).
- The oil level must be between the min. and max. marks on the oil dipstick.

Use only approved oil for transfer cases
(see fluids and lubricants specifications).

CHECKING WHEELS

Tightening torques / tyre pressures

Tensioning axle	Drive axle
140 Nm	140 Nm
-------	7.0 bar



TEST DRIVE

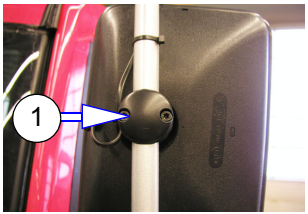
- Check operation and test all instruments and indicators.
- Check running gear and engine / transmission unit for abnormal noises.
- Visually inspect for smoke at the exhaust.

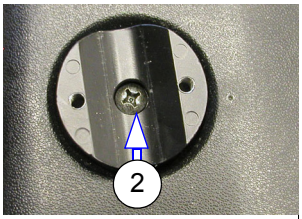
Check the air filter element if the exhaust is smoky.

Notes

ENTERING

❍ Before entering the cab, complete the daily checks and maintenance tasks.





Adjusting exterior mirrors

❍ Slacken cross-head screws **1** and **2**

❍ Walk right round the vehicle and make sure that the danger zone is clear of persons and objects.

❍ Always take a firm grip on the grab handle of the driver's door when entering the vehicle.

CAUTION!

Risk of slipping on the track when climbing into and out of driver's cab. Always take a firm grip on the handle in order to step onto the track.
In order to help ensure safe operation of the PistenBully, operators must wear appropriate footwear with non-slip soles.

❍ Press the door lock. The driver's door opens.
Note: When parking on a slope, be particularly careful when opening the door. The door opens suddenly.

❍ Always take a firm grip on the grab handle of the driver's door.
- Fully raise the armrest.
- Take a grip on the steering wheel and swing yourself into the driver's seat.

❍ Close the door.

❍ Adjust the seat and the steering wheel to an ergonomically comfortable position.

❍ Fasten the seat belt.

❍ Visual check:
Direction-of-travel switch in "Neutral" position, parking brake applied.

STARTING THE DIESEL ENGINE

WARNING!

Risk of explosion:
The use of proprietary starting agents (such as Startpilot, for example) is prohibited.

- Apply the parking brake.
- Direction of travel switch in neutral position.
- Switch off electrical consumers.
- Turn the ignition key to position I.

The following telltale lamps light up:

- Battery-charge indicator
- Engine oil pressure indicator
- Braking-air indicator
- Engine monitor
- Intake air preheating
- Warning light for air-intake preheating

Start procedure

- Ignition ON

Depending on the ambient temperature, the intake-air preheating light goes out after approx. 2 seconds (no preheating) or within 30 seconds (maximum preheating time).

When the intake-air preheating light goes out:

- Start the engine
- Do not depress the accelerator pedal.
  - Operate the starter until the engine is turning at 700 rpm
  - Maximum duration of start attempt 30 seconds

Engine refuses to start?

- Immediately repeat the start attempt (do not repeat the preheating procedure). Duration of start attempt, max. 30 seconds

If it is necessary to repeat the reheating procedure:

- Ignition OFF
- Wait 5 - 10 seconds and then switch the ignition ON

Situational help

The warning light for air-intake preheating may stay lit for up to approx. 3 minutes after the engine starts.

- Risk of damaging electronics:
  If the warning light for air-intake preheating lights up during operation:
  - Cease operation.
  - Proceed to the nearest workshop.
  - Switch off the battery master switch.

WARMING-UP PHASE

Air temperature above 0° C to –20° C

- Allow the diesel engine to idle for approximately 3 minutes.
- Pull away with the engine operating in the partial-load range.
- The engine can be operated at full load as of a coolant temperature of + 80° C.

Air temperature below –20° C

- Allow the diesel engine to idle for approximately 6 minutes.
- Pull away with the engine operating in the partial-load range.
- The engine can be operated at full load as of a coolant temperature of + 80° C.

INSTRUCTIONS FOR ENGINE BREAK-IN

Up to 40 operating hours

❍ Operate carefully up to max. 3/4 full-load speed

After 40 operating hours

❍ Gradually work up to full load.

ENGINE SPEED RANGE

On steep gradients

❍ Increase engine speed.

Operating in extremely difficult terrain

❍ Use the potentiometer to reduce driving speed.

The speed for the auxiliary driven machinery remains unchanged.

Situational help

PistenBully slows down on account of lack of propulsive power

❍ Switch the auxiliary to forward rotation.

❍ Use the potentiometer to reduce the speed of the auxiliary.

SWITCHING OFF ENGINE

Turbocharger - risk of overheating:
Do not immediately switch off the diesel engine after it has been run at full load. Drive for approx. 2 minutes in the part-load range and then switch off.

❍ Turn the ignition key to the **0** position.

DRIVING

- Before driving away, always check that there is no-one in the danger zone, in other words in the immediate vicinity of the vehicle or at or on the tracks.
- Press the direction-of-travel switch to the position corresponding to the direction in which you want to travel. An audible signal (back-up alarm) sounds if you set the direction switch to the position to reverse.

Even though the vehicle is fitted with a back-up alarm, you remain under the obligation to check carefully the area behind the vehicle when reversing.

- Depress the accelerator pedal to increase engine rpm to above pullaway speed: The PistenBully pulls away.

The PistenBully accelerates steplessly to its maximum speed as engine speed increases.

When the vehicle is moving, the electronics monitor the engine speed set in response to movements of the accelerator pedal and adjust the hydraulic ratio in accordance with load, so that engine speed remains constant and only the speed of the vehicle changes.

When you turn, bear in mind that the left and right propulsion hydraulics switch to counter-rotation just before full lock is applied to the steering wheel. The PistenBully turns in its own length.

PistenBully with diesel particulate filter

Optimal cleaning of the diesel particulate filter

- Driving with low diesel engine speed and high service loading.
- Avoid long periods of idle speed.
  Maintenance of the diesel particulate filter

- Observe all instruments when driving.

Engine oil pressure

❍ The warning light for the diesel engine comes on during the start procedure and if oil pressure drops.

Engine operating temperature

If the reading is too high, determine the cause, for example:

- Gauge in correct working order.
- Not enough coolant in system.
- Outside of radiator dirty.
- Check the tension of the Vee-belt.
- Check engine fan.

Fuel supply

Continually monitor the fuel supply and fill up in good time. This precaution will prevent the fuel supply from failing on a gradient, which would mean the engine stopping inopportunely.

Battery-charge indicator

If the battery charge indicator lights up when the engine is running, the alternator is no longer charging the starter batteries. Determine the cause, for example:

- Loose cable connectors
- Generator dirty
- Drive belt slipping or broken

Hydraulic fluid level warning light

Occasional flashing on descents is not indicative of a fault.

Telltale light for parking brake

If the indicator lamp lights up, check the parking brake.

BRAKING - STOPPING

The hydrostatic drive brakes the vehicle without causing wear. You reduce engine speed by easing the pressure on the accelerator pedal; engine speed lowers and the change in the hydraulic ratio causes the vehicle to slow down.
If engine speed falls below the pullaway speed, the electronic drive control system returns both variable displacement pumps to the zero position and the PistenBully comes to a standstill.
A parking brake (spring-loaded brake) operated by a parking-brake lever in the driver's cab acts on the sprockets.

WARNING!

Use the parking brake only to keep the vehicle at a standstill.
The PistenBully will brake sharply to a complete stop if the parking brake is applied while the vehicle is in motion.

STOPPING AFTER USE

- Park the vehicle where it is clearly visible.
- Park the vehicle on a firm, level surface.
- Lower front and rear auxiliary implements,
  - Switch off the tiller.
  - Direction of travel switch in neutral position.
  - Apply the parking brake.
  - Relieve the tension of the track.
- Set engine idle speed to below 800 rpm.

Turbocharger - risk of overheating:
Do not immediately switch off the diesel engine after it has been run at full load. Drive for approx. 2 minutes in the part-load range and then switch off.

- Switching off engine.
  Turn the ignition key to the **0** position.
- Remove ignition key and lock the cab.

EXITING

- Fully raise the steering-wheel column and the armrest.
- Be particularly careful when opening the door if the vehicle is parked on a gradient. The door opens suddenly.
- The procedure for exiting the vehicle is the reverse of the entry procedure.

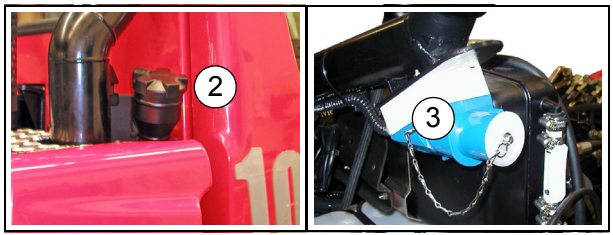
WARNING!

Risk of slipping on the track when climbing into and out of driver's cab.
Always take a firm grip on the handle in order to step off the track.

WARNING!

Risk of explosion due to build-up of gas in fuel tank.
Keep all possible sources of ignition when clear when the vehicle is being refuelled.

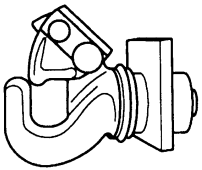
- Refuel **2** the PistenBully immediately after operation, in order to prevent condensation forming in the tank.



- Then remove as much snow and ice as possible from the tracks, sprockets and wheels to prevent them freezing fast, in order to avoid damage when the machine is restarted.
- Secure raised auxiliary driven implements.
- Connect coolant preheating (optional extra).
- **Adapter 3** yellow 110/ blue 220 V provides a means of preheating the coolant system with the thermostatically controlled preheater, or of preheating the hydraulic fluid with a heater available as an optional extra.

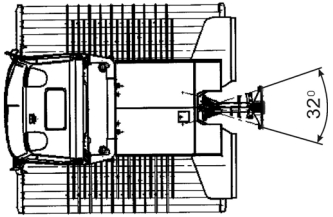
1 - 2 hours of preheating prior to starting does not improve cold starting.
Undertake preheating immediately after parking the vehicle.

Use only cables that comply with the applicable regulations in the country of use.



Only trained, qualified persons are permitted to operate the emergency release of the parking brake.

Towing a PistenBully is an operation requiring extensive safety measures. Please consult your nearest Service Support Centre.



Attachment weights, towing hitch

Permissible towed weight

- Max. towed weight 2000 kg.
- Max. off-centre angle for descents 16^0 to left or right.

The towed load must be secured to ensure that it cannot skew beyond the maximum permissible off-centre angle on descents or when inclines are crossed.

The section entitled "Driving tips and information" is intended merely as an overview and is not under any circumstances to be considered in itself as providing adequate familiarisation with the driving characteristics of the PistenBully.

Quantity is not as important as quality and economy.

LOW FUEL CONSUMPTION

- **Diesel engine rpm** green zone on rev. counter. Max. torque 675 Nm at 1200 rpm.
- **Adjust tiller shaft** speed to suit snow conditions by turning the potentiometer.
- **Adjust tiller depth** to suit snow conditions by observing the gauge and using the pushbutton controls. Set the depth so that the tiller removes only as much snow as is absolutely necessary.
- **Steplessly adjust the downforce of the finisher** by means of the joystick. Use the lowest down-force setting that is compatible with snow conditions

SNOW TYPES

In the atmosphere, snow forms from water droplets at temperatures of at least –4° C.

Ice crystals in widely varying shapes form:

Hailstones are snow crystals enlarged by the adhesion of ice; they are usually spherical or tapered in shape.

Hoarfrost or rime forms from water vapour or precipitation on chilled objects (fences, bushes, surface of snow).

White frost develops when the wind carries chilled droplets of water onto solid objects.

Fresh-fallen snow initially forms an airy structure of loosely intermeshed snowflakes.

The original shapes soon disappear, however, and the individual flakes are no longer recognisable only a few days after falling.

Always work so as to cause as little damage as possible to the snow. The aggressive action of driven implements such as a tiller damages the snow crystals; these damaged crystals have lost their ability to mesh as a loose blanket, tending instead to ball and form gritty snow (often at entrances to garages, approaches to lifts, bottlenecks).

Preparing fresh-fallen snow

Fresh-fallen/ powdery snow consists of crystals that are loosely attached to each other and which therefore trap a great deal of air. The process of preparation inevitably expels some of this air and packs the crystals more tightly together. This gives the surface layer of snow the ability to bear weight.

Bumpy runs

The friction of skis over the surface causes some of the crystals to melt and form a film of water, and this produces sheets of ice and the softer spots beside them.

Over a period of time skiers break down the topmost layer – humps and hollows form and the run becomes bumpy.

Preparing slopes like this is a process in which old snow is mixed with relatively fresh-fallen snow (snow crystals) and this produces a durable surface.

If outdoor temperatures are correspondingly low the snow freezes and forms lumps - **when this happens the only way of making a ski run look well is to work with a tiller mounted on the rear of the vehicle.**

The teeth of the tiller break the lumps down into gritty snow, which fills the hollows in the surface of the run; the finisher shapes the surface and a water film forms to hold the grains of gritty snow together. Breaking down the lumpy snow also damages the ice crystals, so they lose a considerable proportion of their ability to cohere. This is the reason why only gritty snow, not powdery snow, can be produced from ice.

A durable ski slope can be formed only by mixing this material with fresh-fallen snow or with unused old snow from deeper levels.

Iced slopes/sheets of ice

Do not break up an iced slope unless the ice is of adequate thickness or fresh snow falls. The gritty snow produced by breaking up the ice needs fresh-fallen snow to cohere, or else it will cohere with water - and this will again cause ice to form. Consequently, it is advisable only to roughen the surface of the ice to make the slope skiable. Sheets of ice on slopes that are otherwise in good condition can be broken up and mixed with crystals from deeper in the snow.

The more frequently the ice is turned and the crystals damaged, the less will be their ability to cohere.

Wet snow/slushy snow

The relatively large amounts of moisture and the formation of a film of water on the finisher can produce a relatively hard surface, which inexperienced skiers in particular find difficult.

In order to counteract this effect, Kässbohrer has developed a bolt mechanism for tilting the rear-mounted tiller comb. In combination with special finishers, this machine can change the uniform surface structure and produce a "powdery-snow" effect.

Extremely slushy snow in spring

It is advisable to use the side wings, because the tiller can produce edge walls as it passes through the snow. Kässbohrer also offers an extra-wide side wing for more efficiency when used in combination with the rear frame steering – this also means that the machine can prepare on one side at a time.

If a satisfactory run cannot be prepared in **slushy snow,** is might be advisable to wait two or three hours to allow the temperatures to change. Work on preparing slopes at higher altitudes can proceed in the interim.

Allow the snow to set-up, so that crystals can form.

CLIMBING ABILITY

The climbing ability of the PistenBully depends on the limit of adhesion of the snow. The machine's centre of gravity is another factor influencing climbing ability. It is important for the driver to ensure that as much of the surface area of the tracks as possible is in contact with the ground, as otherwise there is a risk of the vehicle toppling. The limits are heavily dependent on the way in which the vehicle is used, on load, on the prevailing conditions, and on the skill and ability of the driver.

S = Centre of gravity

H = Downgrade force

Each situation must be assessed with care. Never assume that it is safe to operate in a certain area at any given time merely because a vehicle was in the area in question beforehand.

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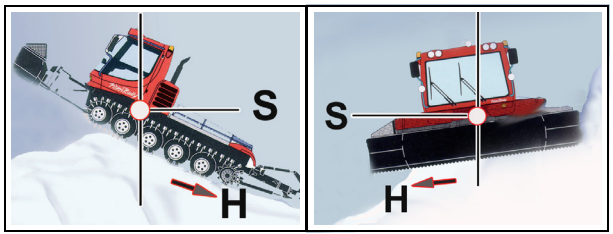


Inexperienced drivers, in particular, should familiarise themselves with the vehicle and equipment before undertaking operations in difficult terrain.

DRIVING WITH THE PISTENBULLY

The basic rule is: Do not use the vehicle until the snow is deep enough to prevent damage to the underlying vegetation.

The objective in preparing a ski-slope is to achieve visually excellent slope quality:

Build up supplies of snow in good time at critical points, so that reserves will be available to make up for the snow removed from the slope.

Holes and snow heaped up by movement and by manoeuvring must be smoothed out with as little delay as possible.

If speed is excessive, the tracks will throw snow out sideways and over the auxiliary mounted implement onto the prepared surface.

Regularly remove snow from the load platform. Otherwise, the increase in weight will result in higher fuel consumption.

Always keep the engine revving in the most economical range (indicated by the green zone on the tachometer).

The drive electronics adjust speed to suit engine rpm.

Driving: On upgrades

Always study upgrades and look for the easiest route; do not start at the steepest point. Frequently, it is better to detour to the highest point of a slope via an alternative route and then work from the top down to prepare the first part of the run. Whenever possible, negotiate slopes by following the line of fall and by keeping steering movements to a minimum.

Do not overrev the engine: use only as much power as is necessary; note the level of traction. Overrevving will cause the tracks to slip, with the result that the vehicle will dig into the snow. If the tracks start to dig in stop immediately and try a different line.

Digging in ruins the ski-slope and destroys the surface beneath the snow.

Turning

In order to avoid damaging the surface of the ski-slope, you must turn at or beyond the edge of the prepared slope. You should, of course, use areas that are free of vegetation (forestry plantations and the like) for this purpose.

❍ Always keep the front-mounted and rear-mounted auxiliary driven implements raised when turning.

Turning with counter-rotating tracks

You can turn the vehicle in its own length by counter-rotating the tracks. This causes the vehicle to dig in to some extent, so you should manoeuvre in this way only when the snow is of adequate depth. It is advisable to employ this method of turning in exceptional situations only. Turning with counter-rotating tracks places very high strains on the rubber belts and the track cleats.

Driving: On downgrades

Always maintain a moderate speed on downgrades. This precaution will enable you to ensure that the engine does not overrev, the vehicle does not drift out of control and the snow is not dragged downhill by the action of the tracks.
Use the track-speed potentiometer to reduce the speed of descent.

Restrict your steering movements to a minimum. Make sure that both tracks are turning.

Reduce speed as you crest rises, in order to ensure that you have the vehicle under control as it tips forward. This will prevent the front blade from digging in and the tracks from losing traction.

Invariably, do not negotiate a downgrade unless you are sure that:

- the adhesion of the snow is adequate.
- your run out at the bottom of the slope is adequate and safe.
- there are no skiers in the danger zone.

If the PistenBully starts slipping on a downgrade and drifts at an angle to left or right (vehicle's longitudinal axis is at an angle to the line of fall), you must immediately apply opposite lock (turning the steering wheel to the right or left, as applicable), counter-rotating the tracks if necessary, in order to bring the vehicle's longitudinal axis back onto the line of fall. Briefly increase engine speed in the process.
You can counteract slippage along the line of fall by reversing the tiller shaft's direction of rotation and carefully employing the front blade to re-stabilise the vehicle.

PREPARING THE SKI-SLOPE

When preparing a slope, always make sure that the side finishers overlap onto the prepared surface, in order to ensure a smooth transition from one pass to the next.

Notes on depth of tiller

The tiller has to be set to the correct depth in order to:

- Achieve a visually attractive ski-slope.
- Retain the firmness of the slope's substructure.
- Operate within the most economical range.
- Apply least load to the PistenBully and the tiller.

Effects of incorrectly set tiller depth:

- Tiller shaft too high: Tiller quality output is negligible.
- Slope is not contoured in areas of hard snow.
- Tiller shaft too low: Insufficient snow processing, so the snow is forced out of the tiller at the side and forms an edge wall.
- The snow crystals' ability to cohere and the quality of the slope's substructure are impaired.
- More power input necessary – less economical.

Counter-rotating tiller shaft

A PistenBully with electronic tiller control enables you to set the tiller to rotate either forward (standard direction) or backward.

It can be helpful to have the tiller counter-rotate, for example as an additional brake in very steep terrain.

Errors in operation and counter measures

Summarised countermeasures

Edge walls forming on left and right:

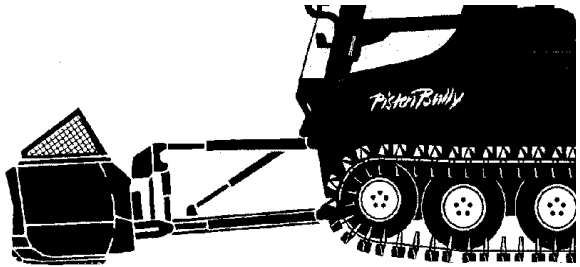
- Speed of rotation too high.
- Tiller set too low.
- Downforce setting selected instead of floating setting.
- Cylinder of carrier plate incorrectly adjusted.
- Tiller shafts not rotating.

Visual appearance of prepared slope not satisfactory

- Tiller set too high (adjust height setting).
- Speed of rotation too low.
- Lever not locked in position (floating position).
- Vehicle travelling too fast.
- No smooth surface with the U-shaped pusher blade (rotary plough is on a hump).

Vehicle comes almost to a stop:

- Tiller too low.
- Speed of rotation too high.
- Cylinder of carrier plate inadvertently out of adjustment.
- Tiller shafts are counter-rotating.
- Tiller shafts stopped – clogged, jammed, frozen.
- Severe vibrations perceptible in vehicle when the tiller is switched on
- Shaft imbalanced, tooth missing – have repairs carried out by specialists.
- Frozen snow – remove.
- Imbalance means vibration – screws work loose, bearings are damaged – have the imbalance rectified.



Applications:

- Use of the front blade on steep slopes covered with fresh-fallen snow
- Smoothing heavily worn ski slopes
- Smoothing bumpy ski slopes
- Making a location line

Material wear due to load.
During dozing work (i.e. when pushing snow with the front blade), fully raise rear carrier plate.

A front blade is essential for modern ski-slope upkeep and preparation.

It is ideal for smoothing bumpy runs and dozing snow clear. The front blade is also very useful for working uphill through fresh-fallen snow and it can be used as a brake to prevent the vehicle from slipping. Consequently, it is advisable to leave the front blade installed at all times.

Smoothing bumpy ski slopes

The best method of smoothing low bumps or waves is to use the front blade in what is known as the "floating" position. This means that the front blade applies only its own weight to the surface, without being pushed downward by the hydraulics.

The blade's angle of attack is set by means of the roll cylinder. Exercise great care when setting the roll cylinder, because if the angle of attack is too steep the front blade will tend to dig into the snow.

Approach large bumps with the blade at approximately half height and the float function switched off, so that the blade will push the snow forward off the bump and into the hollow on the other side. In this case, too, it is best to use the roll cylinder to adjust the depth of cut, instead of raising and lowering the front blade. This is the most dependable way of smoothing out the slope.

The ideal configuration is to have a leader snow roller mounted in front of the blade, as this will enable the equipment to adjust automatically to compensate for surface irregularities.

Making a location line

The best way of doing this is to approach the downslope at an angle from above and, with the pusher blade swivelled to one side, doze a flat location line in the snow.

It is advisable to start with no more than a small amount of snow, picking up more and more snow as you proceed along the line. This should enable you to complete the full length in a single run.

The snow you push out on the downhill side inevitably widens your location line, increasing the margin of safety.

Use of the front blade on steep slopes covered with fresh-fallen snow

When you prepare fresh-fallen snow you need the front blade not only to push the snow, but also to distribute the weight and apply pressure to the surface of the snow. You can use the front blade to help the vehicle climb steep slopes by stopping just before the PistenBully digs in, and reversing with the front blade lowered. This will smooth out the step. Raise the front blade and drive forward a few meters before repeating the procedure; this is one way of climbing difficult slopes.

Smoothing heavily worn ski slopes

One consequence of modern skiing techniques is that the skiers carry the snow progressively further down the slope, finally depositing it toward the bottom of the slope. The objective, therefore, is to restore the snow to as uniform a depth as possible over the entire length of the slope. This entails pushing the snow back up the slope from the bottom. If necessary, winch the PistenBully into position.

Pivot the front blade to an angle at which the snow can slide along it toward the inside. If you are using a 12-way front blade you can set the wings to an angle that best suits this method of handling the snow. The front blade can be adjusted in a number of ways to the position that best suits the terrain. The end result is efficient transportation of the snow to the parts of the slope where it is needed.

Less experienced drivers in particular should bear in mind that transporting large amounts of snow quickly is not always the way to achieve the best results. The driver has to assess the terrain and decide whether it would be advisable to push snow downhill, or whether this might result in even more snow being lost.

The correct position of the compactor bar also depends on the conditions of the snow.

A well-prepared slope is free of heaps of snow, does not have walls along the edges, and is contoured so as to be attractive to the eye.

The tiller has hydrostatic drive and is used to loosen compacted snow on much-used slopes, for breaking up lumps of hard snow and ice, and for mixing fresh snow through old snow.
The height of the tiller shaft can be adjusted hydraulically from the cockpit, and the shafts can rotate forward or counter-rotate. The two shafts are easy to change and can be removed and replaced with other types of shaft when snow conditions change.

On account of the quick-change design, the tiller can be removed and installed by one person working without assistance.

Intended use of the tiller:

Use of the tiller is permissible, given an adequate depth of snow, for:

- Reworking slopes covered with freshly fallen snow.
- Smoothing humpy slopes (in combination with front blade).
- Roughing up icy slopes.
- Breaking up hard lumps of snow.
- Breaking up and mixing sheets of ice.
- Mixing freshly fallen snow through old snow.
- Compressing wet snow.
- Preparing glacier ice (in summer).

Adjusting tiller depth

❍ Press the pushbutton for adjusting tiller depth to lift the tiller completely clear of the surface.

Only the finisher of the tiller is resting on the surface of the snow.

❍ Run the tiller up to medium speed and set the vehicle in motion.

❍ Gradually lower the tiller shaft with the vehicle on the move.

The tiller depth is correct when the slope behind the finisher has a good appearance.

When **ascending**, always set the tiller shaft to forward operation and use a suitable working speed until the ski slope has been prepared to specification. An attempt to operate the rotary plough at too high a speed will divert too much power from the engine, with the result that the engine will not be able to develop enough power to propel the PistenBully.

When **descending** extremely steep gradients, the tiller shaft can be set to counter-rotate so as to help stabilise the PistenBully.

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KÄSSBOHRER GELÄNDEFAHRZEUG AG

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