Operation & Maintenance Manual

VEAM980500

WA95-3

WHEEL LOADER

SERIAL NUMBERS HA980376 and up

⚠ WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

NOTICE

Komatsu has had the operating and maintenance instructions translated into all the languages of the member states in the European Union. Should you wish to have a version of the operating instructions in another language, please don't hesitate to ask at your local dealer's.

KOMATSU

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Information on these Operating Instructions

Why You Should Read these Operating Instructions

The machine must be operated, cleaned, and maintained very carefully to ensure safe and troublefree operation. If you operate the machine correctly, these operating instructions will help you to avoid injuries and damage to property. To ensure this, these operating instructions take into account all applicable legal regulations and directives; the operating instructions comprise the following information:

- Notes on the Operating Instructions
- Notes on Transport
- Notes on Safety Regulations
- Operating Instructions
- Troubleshooting
- Maintenance Instructions
- Technical Data
- Notes on Lubricants and Operating Agents

The operating instructions are part of the machine and must always be available at hand in the machine. If the operating instructions have been lost or if they have become unreadable, because they are dirty, you may receive a new copy from Komatsu or your local Komatsu dealer. If the machine is resold, the operating instructions, the EU Declaration of Conformity (CE), and the licence are to be handed over to the new owner.

The owner of the machine has to ensure that

- **all persons driving the machine have the legally required minimum age and are physically and mentally fit to perform the tasks they are charged with.**
- **all persons in charge with operating or maintaining the machine are appropriately instructed before operation or maintenance is started. They must have completely read and understood these operating instructions. In particular, this applies to the following section "Notes on Safety Regulations" and the chapter "Safety".**
- **all persons driving the machine have read the accompanying leaflet "Notes on Operation of Komatsu Construction Machines in Public Traffic" - applying to operation of construction machines with a speed of more than 20 km/h on German public roads.**
- **the machine is correctly operated.**
- **the machine is not improperly modified.**

Please note:
If the owner modifies safety-related parts of the machine, the certificate of conformity of the manufacturer will lapse and the person who has performed the modification has to issue a new certificate. Should you have any questions concerning this point, please do not hesitate to ask Komatsu.

Our continuous effort to improve the machine's design may lead to changes of machine details. However, the introduction of these improvements does not oblige us to perform them on machines which have already been delivered and are already in use.

If these improvements result in minor changes, these minor changes will not be described in the operating instructions. Should you require new available information about your machine or have any questions concerning the information given in the operating instructions, please do not hesitate to contact either Komatsu or your responsible Komatsu dealer.

These operating instructions may refer to attachments and special equipment not available from your local Komatsu dealer. Should you require attachments or special equipment, ask your responsible Komatsu dealer.

Notes on Safety Regulations

The procedures and precautionary measures concerning operation and maintenance only apply on the provision that the machine is used as intended.

Correct Use

A loader is a machine which has its own drive and which is moving on either tracks or wheels. By moving in forward direction, a loader can load material or cut the ground with the work unit (use of bucket) provided for loading which is attached to its front.

The standard working cycle of a loader comprises filling and lifting the loading bucket, transporting material, and emptying the loading bucket.

If you use the machine for any other purpose than specified above, we will not accept any responsibility for safety. All considerations concerning safety will then be up to the owner or the operating and maintenance personnel. In any case, neither you nor any other person are/is authorised to perform work and functions explicitly prohibited in these operating instructions.

Safety Notes in the Operating Instructions

Most accidents are caused by disregard of basic safety regulations during operation and maintenance of machines. In order to avoid accidents and thus damage to persons and property, read all applicable safety notes and warnings in these operating instructions and on the machine, before you start operation or maintenance of the machine and always adhere to these safety notes and warnings.

The chapter "Safety" starting on page 1-1 contains a summary of all safety notes applying to this machine. We cannot, however, predict all circumstances resulting in potentially dangerous situations when operating and maintaining the machine. For this reason, it may be possible that the safety notes in these operating instructions and on the machine do not comprise all possible safety measures. If procedures or measures are required which are not recommended or approved, you must ensure that performing them is neither dangerous nor involving potential damage to the machine. Should you have any doubt concerning safety of a procedure, either directly contact Komatsu or your responsible Komatsu dealer.

The following signal words are used to indicate safet notes in these operating instructions and on the labels attached to the machine:

DANGER **This word is used in the safety notes and on safety labels in situations or places where severe injuries cannot be ruled out, if the danger is not avoided. The safety notes or labels contain precautionary measures which must be heeded to avoid this danger.**

WARNING **This word is used in the safety notes and on safety labels, if there is a potentially dangerous situation which may lead to severe injury, if the danger is not avoided. The safety notes or labels contain precautionary measures that must be realised to avoid this danger.**

CAUTION **This word is used in the safety notes and on safety labels in dangerous situations which may lead to minor injury, if the danger is not avoided. It may also refer to dangers which may lead to damage of the machine.**

NOTE **This word is used for precautionary measures which must be realised to exclude processes which would shorten the service life of the machine.**

IMPORTANT **This word is used for important additional information.**

Standards and Guidelines

This machine is labelled with the CE mark indicating that it meets all basic requirements concerning safety and protection of health of the EU Machinery Directive 89/392/EEC, its supplements 91/368 EEC and 93/44 EEC for Europe, and the regulation 95/27/EEC. In addition, the harmonised European standards EN 292-2 and EN 474/1 of 1994, and EN 474-3 of 1996 were applied for manufacture of the machine. This fact is documented in the EU Declaration of Conformity (CE) which is supplied together with the machine.

This means that in those cases in which the machine is modified in such a way that safety of the machine is affected, the person responsible for safety of the machine is the one who has arranged for the machine to be modified. If you use the machine for any other purpose than that defined as correct use, you are the person who has to ensure that safety is maintained. Modifications of the machine or use of the machine for any other purpose than that specified as correct use may require a new CE mark and thus new issuing of an EU Declaration of Conformity.

If a machine is used in other countries than Germany, it may be possible that special national safety devices and specifications are missing which may be required for the application in the relevant country. For example, for Komatsu machines, the manufacturer has to design the cab roof in such a way that a warning beacon can be attached to the roof. However, when driving the machine on roads, this warning beacon must be covered.

Should you have any questions concerning standards and guidelines in the respective country the machine is to be used in, please ask your Komatsu dealer before you start commissioning the machine.

In addition to the operating instructions, you must also adhere to all legal regulations on public traffic and all applicable regulations on prevention of accidents. A corresponding leaflet "Notes on Operation of Komatsu Construction Machines in Public Traffic" - applying to operation of construction machines with a speed of more than 20 km/h on German public roads - has been handed over to the dealer together with the machine papers.

The expert inspection for earthmoving machines has to be performed according to VBG 40 §50 (VBG: German Administrative Professional Association). The requirements for this expert inspection are defined in the paragraphs 1 to 3 as follows:
1) Prior to first commissioning and after major modifications, earthmoving machines must be inspected by an expert before they are put into service again.
2) Earthmoving machines must be inspected by an expert at least once every year. Moreover and depending on the respective operating and local conditions, they must additionally be inspected by an expert, when required.
3) The inspection results must be recorded in writing and stored at least until the next inspection is due.

Notes on Later Installation of Electrical and Electronical Devices and Components

Electrical or electronical devices and/or components installed later emit electromagnetic radiation which may influence the proper function of electronic components and parts of the machine. This may impair safety of the machine and endanger persons. For this reason, strictly adhere to the following safety notes.

If you later install electrical and electronical devices and/or components in the machine and connect them to the vehicle electrical system, you are responsible for any malfunctions of the vehicle electronics or other components resulting from this installation. Above all, check that all electrical and electronical components which you install later comply with the valid version of the EMC directive 89/336/EEC and that they are labelled with the CE mark.

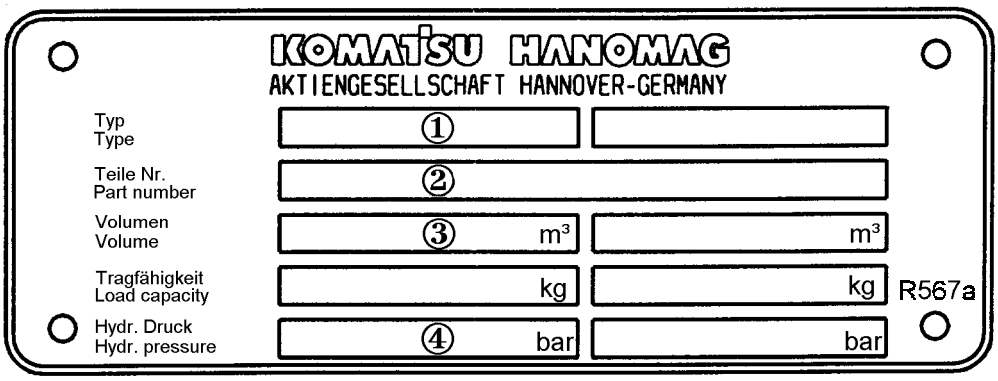
The following requirements must additionally be met for a later installation of mobile communication systems (e.g. radio, telephone):

- Only install devices which have a licence referring to valid national regulations (e.g. BZT-licence in Germany).
- The device must be stationary.
- Only use portable or mobile devices in the cab, if they are connected to a stationary external aerial.
- Install the sender in such a way that it is physically separated from the vehicle electronics.
- When installing the aerial, make sure that it is installed correctly with a good chassis earth connection between the aerial and the chassis of the vehicle.

In addition, adhere to all information about installation and connection of cables and maximum power input indicated in the manufacturer's installation instructions of the machine.

CE-Conforming Equipment

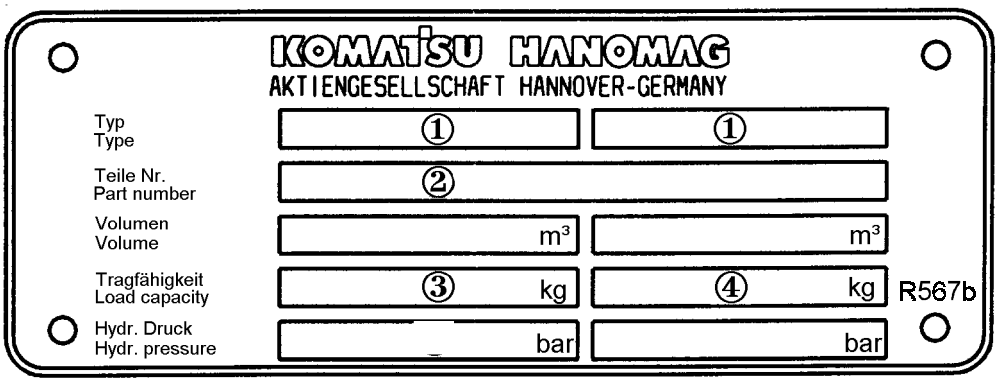
CE-conforming equipment					
WA 95-3	1	2	3	4	–
	Type	Part No.	Volume m³	Hydr. pressure bar	Weight kg
Bucket	WA95-3	42W-70-12021	1,1	---	387
		42W-70-12030	1,1	---	411
		42W-70-12090	0,9	185	670
		42W-70-12100	0,9	185	620
		42W-70-12210	1,0	185	700
		42W-70-12240	1,0	185	640
		42W-70-12051	1,25	---	410
		42W-70-12061	1,6	---	420
		42W-70-12120	1,0	185	540
		42W-70-12080	1,5	185	770
		42W-70-12110	1,0	185	615
CE_1WA95.TBL					



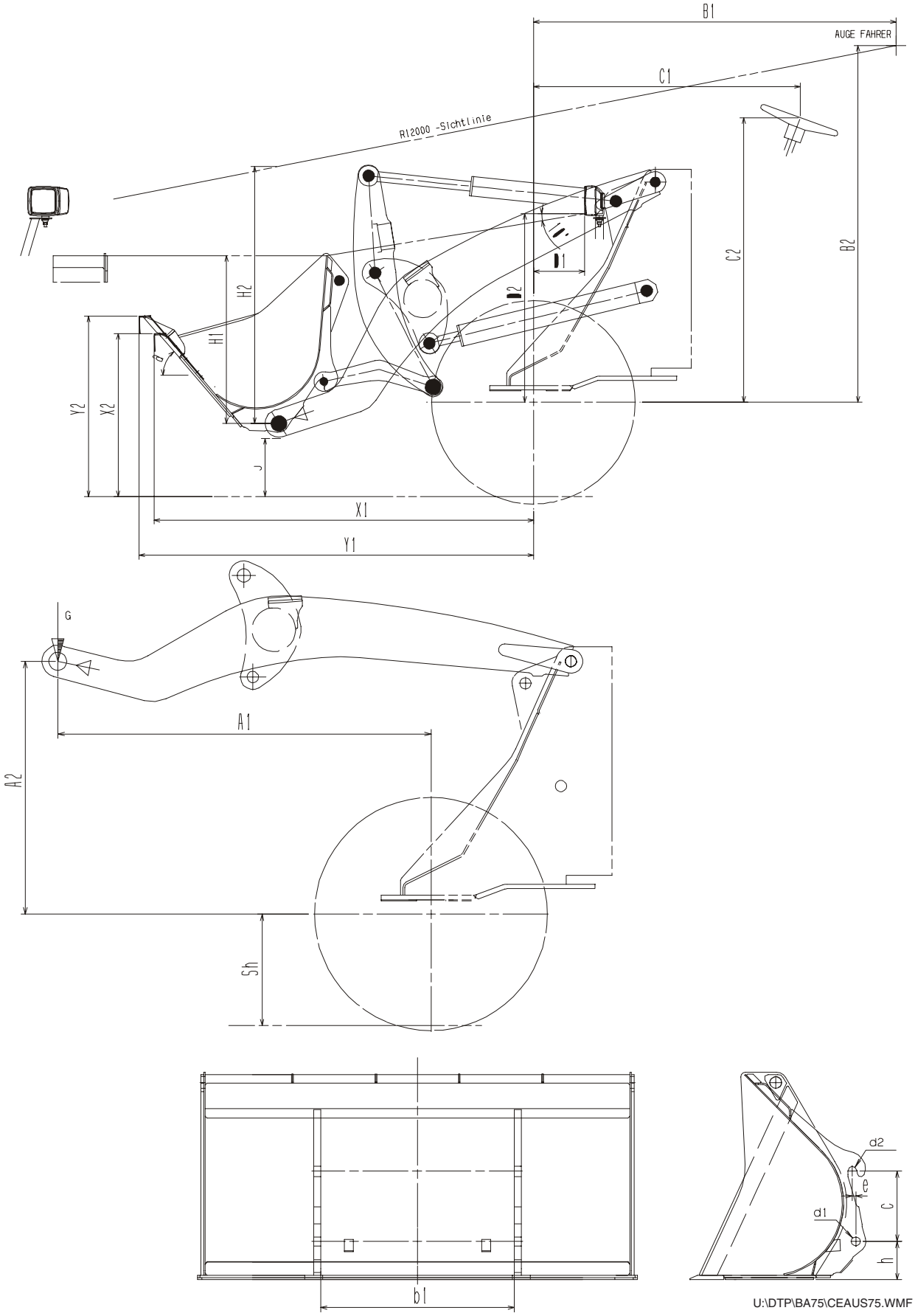
CE-conforming equipment					
WA 95-3	**1**	**2**	**3**	**4**	**–**
	Type	**Part No.**	**Work load of fork carrier STD kg / pair**	**Work load of fork carrier with CTW kg / pair**	**Weight kg**
Fork carrier	WA95-3	42U-70-12080	*) 2500 **) 1870	*) 2600 **) 1950	121

*) Standing security 80% of the tipping load on firm and level ground
**) Standing security 60% of the tipping load on uneven ground
STD Machine in standard version
CTW Machine with counterweight

CE-conforming equipment					
WA 95-3	**1**	**2**	**3**	**4**	**–**
	Type	**Part No.**	**Carrying capacity mm / kg**	**Carrying capacity mm / kg**	**Weight kg**
crane boom	WA95-3	42U-70-12530	500 / 1500	1000 / 1300	100
					CE_2WA95.TBL



CE-Conforming Equipment of the Manufacturer According to Document 42W-93-11130



CE-Conforming Equipment of the Manufacturer According to Document 42W-93-11130

The responsibility for observing the regulations which are valid for wheel loaders with "exchangeable equipment/attachments" (e. g. bucket or forklift truck attachment), which is supplied by other manufacturers lies with the supplier of the relevant parts which were subsequently fitted to the machine.

The guidelines for CE Conformity and road-traffic registration are deemed to have been fulfilled when the manufacturer of the equipment confirms fulfilment of the document 42W-93-11130.

The certificate must be sent to the customer and the manufacturer of the wheel loader. Only then will the CE conformity declaration for the specific wheel loader be valid.

The **dimensions X1, X2, Y1 and Y2** must be provided by the manufacturer of the equipment for approval for use on public roads. *)

It is required to add the dimension **Sh** to the dimension **D2** (smallest tyre radius).

The figure **G** (in kg) represents the maximum load (equipment and operating load) permitted to act at this point.

*) valid in Germany

A1 Distance bucket pivoting point - front axle, horizontal
A2 Distance bucket pivoting point- front axle, vertical
B1 Distance driver's eye - front axle, horizontal
B2 Distance driver's eye - front axle, vertical
D1 Distance front axle- lower edge of headlights, horizontal
D2 Distance front axle- lower edge of headlights, vertical
G Weight of the equipment and carrying load without additional counterweight
H1 Distance bucket pivoting point - upper edge of bucket, vertical (carrying position)
H2 Distance bucket pivoting point - to visual line, vertical (carrying position)
J Distance road level - lower edge of bucket in carrying position (to be considered during driving on public roads)
Sh Distance road level - front axle
X1 Distance cutter protection - front axle, horizontal
X2 Distance cutter protection - road level, vertical
Y1 Distance teeth protection - front axle, horizontal
Y2 Distance teeth protection - road level, vertical
a tip-in angle
b1 Bucket connection dimension boom width, interior
c Bucket connection dimension between d1 and d2, vertical
d1 Bucket connection dimension bolts for boom
d2 Bucket connection dimension bolt for tip-in rod
e Bucket connection dimension d1- d2 horizontally displaced
h Distance lower edge of bucket - drill hole of boom bolt

WA 95	42W-93-11130
A1	1,670
A2	1,180
Sh	545
B1	1,980
B2	1,860
C1	1,490
C2	1,490
D1	285
D2	1,075
G	2,480
H1	1,030
H2	1,400
J	270
X1	
X2	
Y1	
Y2	
a	52
b1	860
c	312
d1	40
d2	40
e	15
h	200
Tyre	Dunlop 455/70 R20
Bucket	42W-70-12030 1.1 m³

CEDok95.TBL

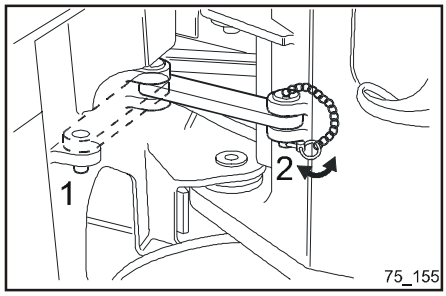
Loading and Transporting the Machine

Loading and Transporting the Machine

If you have to transport the machine over far distances, either use a low bed loader or a railway wagon. You may lift the machine onto the transport vehicle. Optionally, you may drive it onto the low bed loader or railway wagon via loading ramp (also refer to "Safety Measures During Operation, Transport"). Before you start driving, check that the following requirements are fulfilled: the roads are broad enough, the bridges are wide enough, the clearance heights of tunnels and the like are sufficient, the carrying capacities of roads and bridges are sufficient.

Securing the Articulated Steering

Secure the articulated steering before you lift up the machine or start to perform repair measures.



1. Set the machine to straight driving.
2. Loosen the spring bolt and remove the bolt.
3. Turn the locking bar from position '1' to position '2'.
   '1' Articulated steering unlocked
   '2' Articulated steering locked
4. Insert the bolt and secure it with the spring bolt.

Lifting the Machine

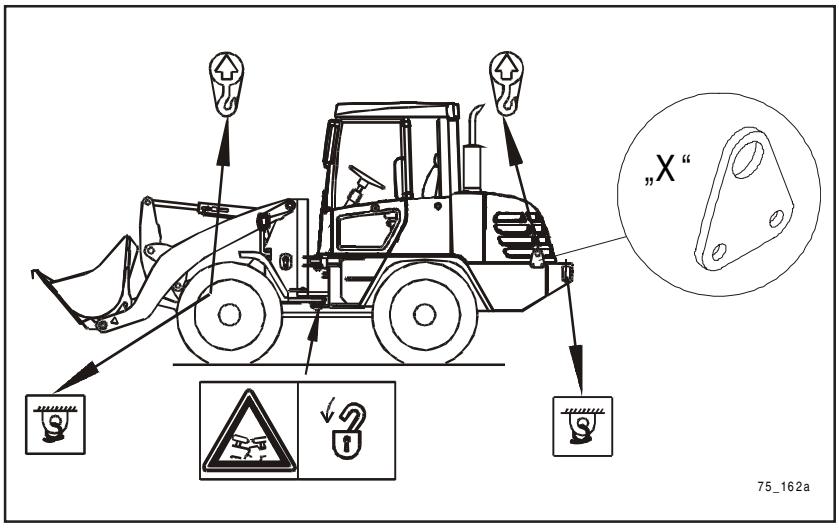
DANGER

- **Danger of pinching! An unlocked articulated steering may suddenly move!**
  Secure the articulated steering before you lift up the machine.
- **Danger of accidents! Carrying ropes with insufficient carrying capacities may tear so that the machine may fall down!**
  Only lift up the machine using carrying ropes with sufficient carrying capacities.
- **Hoisting equipment with insufficient carrying capacities may suddenly bend and cause severe accidents!**
  Only use hoisting equipment capable of carrying the machine's operating weight.
- **Objects lying on the machine may fall down and cause injuries when the machine is lifted up!**
  Remove all loose objects from the machine before you lift up the machine.

CAUTION

Incorrectly attached ropes may damage the machine!
Only fasten the eye hooks of the carrying ropes at the marked attachment points.

There are two attachment points each at the front part and the rear part of the machine. These attachment points are shown in the following figure.



Information signs attached to the machine indicate the attachment points.To avoid damage to the machine, attach the eye hooks only to the attachment points.

X = Machine accessories:

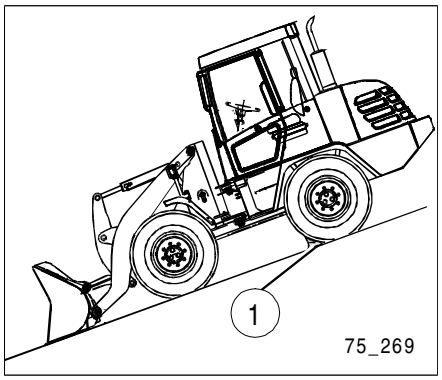
- 2 brackets, order no. 42U-98-12A10
- 4 screws M16 x 40
  + strength 10.9, order no. 01016-51640
  + screws in rear frame, inside, screwed in.
  + torque: 280 Nm

When selecting the lifting equipment, take the operating weight of the machine into account. Insufficient carrying capacities of the lifting equipment may cause severe accidents. Also use carrying ropes with appropriate carrying capacities for the operating weight of the machine. Carrying ropes with insufficient carrying capacities may tear when the machine is lifted up and cause severe accidents. The operating weight of the machine depends on the attached bucket. You find the operating weights of the machine in the chapter "Dimensions, Weights, and Operating Values".

Driving Machine Onto Loading Area of Transport Vehicle

WARNING

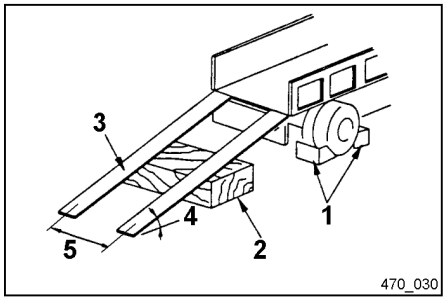
If the transport vehicle or the loading ramp starts skidding while you are driving up the loading ramp, the machine may fall off the ramp and cause severe accidents!
Secure the transport vehicle against accidental movement. Secure the wheels of the low bed loader with wheel chocks or wedges.



The transport vehicle for the machine must have an appropriate work load. The operating weight of the machine depends on the attached equipment. The operating weights of the machine can be found in the respective table in the chapter "Dimensions, Weights, and Operating Values".

The articulated steering must be unlocked before the machine is driven onto the transport vehicle to ensure that the machine remains steerable. Remove any mud, snow, or ice adhering to the wheels to ensure that you can drive onto the ramps without danger of skidding. Do not load the machine via landing stage unless you have checked that the landing stage is broad enough and that its strength is sufficient to carry the load.

The loading ramps (3) must be aligned to the wheel tracks (5) of the machine. The loading ramps must be secured in such a way that they cannot slip while the machine is being loaded. Support the loading ramps by placing support blocks (2) under both ramps. Make sure that the transport vehicle may neither tip over, start to skid, or roll away while you are driving it onto the transport vehicle. Secure the wheels of the low bed loader with wheel chocks (1) or wedges.
Position the machine straight in front of the loading ramp and slowly drive up the loading ramp. Do not perform steering movements on the ramp. If required, drive off the ramp, correct the position of the machine on the ground and drive up the ramp again.



Securing the Machine During Transport

DANGER

If the machine is insufficiently secured, it may start to skid or fall off the transport vehicle and cause severe accidents!
Always secure the machine with ropes and wheel chocks or wedges to avoid falling down and skidding.

CAUTION

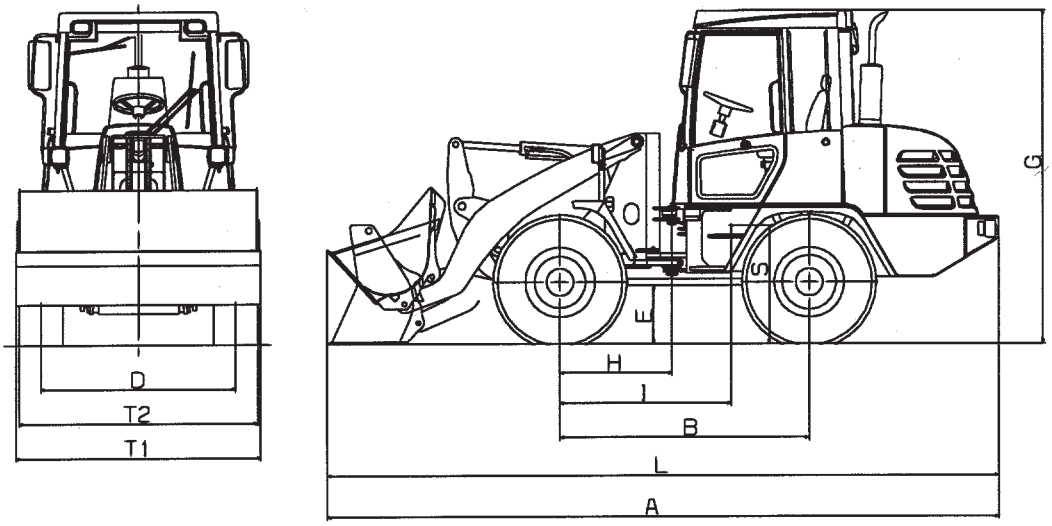
Stay ropes that are incorrectly attached may damage the machine!
Only fasten the eye hooks of the stay ropes at the marked attachment points.

When the machine is on the loading area of the transport vehicle, secure the articulated steering as described in the chapter "Securing the Articulated Steering". Then, block the wheels of the machine with wheel chocks or wedges and secure the machine with ropes in such a way that it will neither start to skid nor tip over during transport. To avoid damage to the machine, only fasten the eye hooks of the stay ropes at the marked attachment points. The attachment points to be used are the two eye hooks at the front frame and the tie bolt at the rear frame of the machine. The positions of the attachment points are shown in the figure on the previous page.

After Transport

After transport, remove all securing devices, such as wheel chocks or wedges and ropes. Remove the catch of the articulated steering before you drive the machine off the transport vehicle. For this purpose, reverse the steps 1 through 4 described in the chapter "Securing the Articulated Steering".

Dimensions, Weights, and Operating Values

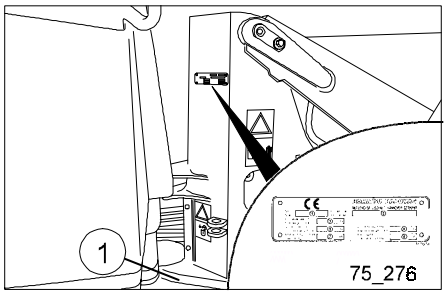


	Dimensions, Operating Values			
	Bucket capacity according to ISO 7546	**m³**	**1.1**	
	Loose weight	t/m³	2.0	
	Stat. tipping load, straight	kg	4860	
	Stat. tipping load, bent by 40°	kg	4200	
	Working load without CTW Working load with CTW	kg kg	2500 2600	
	Tear-out force, hydraulic	kN	72.5	
	Hydr. lifting capacity on ground	kN	57.0	
	Operating weight	kg	5830	
	Turning radius over bucket	mm	4455	
L	Bucket length in transport position	mm	5550	
A	Bucket length during planing	mm	5580	
T1	Width with bucket	mm	2150	The 1.1 m³ standard bucket given in the table is also available with blade attachment.
T2	Width without bucket (above wheels)	mm	2060	
G	Height, including ROPS	mm	2750	
D	Track (front section) Track (rear section)	mm mm	1590 1590	Special buckets: 125 m³ light weight material bucket 1.6 m³ light weight material bucket 0.9 m³ multi-purpose bucket
B	Width over tyres	mm	2150	
H	Distance articulated steer. - front axle	mm	1035	These values apply to machines with 455/70 R20 tyres
E	Ground clearance, axle / transfer gear ground clearance, cardan shaft	mm mm	395 505	
F	Centre of gravity, height above axle centre	mm	420	*) CTW = additional counterweight
I	Centre of gravity, distance to front axle	mm	1440	
				ABM_95E.TBL

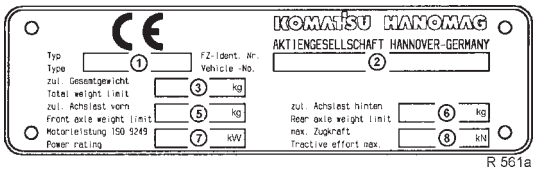
Technical Data

Machine name-plate position
(see enlargement)

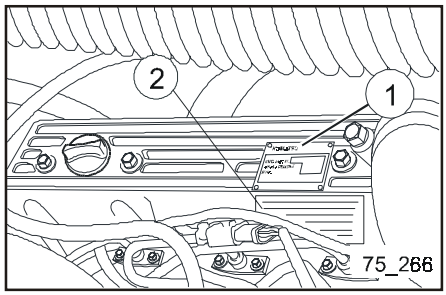
Serial no. stamp marking (1)



Machine name-plate with serial no.



Engine name-plate (1) with serial no.
EPA label (2)



Serial no. and address of manufacturer
Must be filled in before machine is put into service:

Serial No. Machine	.....
Serial No. Engine	.....
Dealer Name	.....
Dealer Address	....
Telephone	.....
Fax	.....
Maintenance Personnel	.....
	SE-NO_75.TBL

Safety

DANGER

Failure to adhere to these safety instructions can lead to accidents with serious injuries!
Read and adhere to all safety instructions.

This chapter also contains safety instructions for special equipment and attachments.

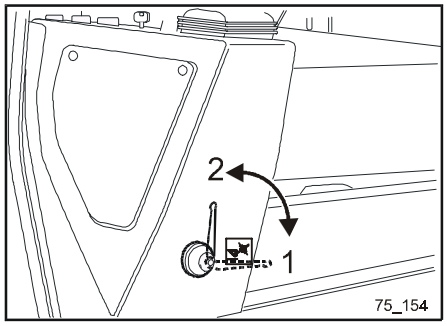
General Safety Measures

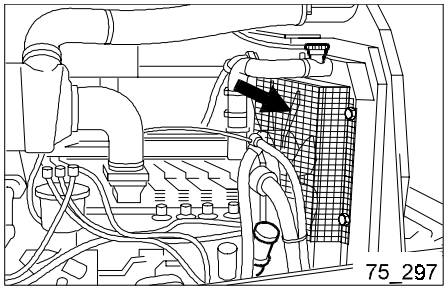
Safety Instructions

- Do not operate or service the machine unless you have been trained and are authorised to do so.
- Always adhere to all instructions, measures, and safety instructions when operating or servicing the machine.
- When working together with other persons, agree beforehand on all hand signals that you want to use to avoid accidents due to misunderstandings.

Safety Devices

- Check that all safety devices and covers of the machine are correctly installed.
- Ensure that damaged safety devices and covers are repaired before you start the machine.
- Use all safety devices as prescribed, e.g. the safety lever for the work hydraulic system (see opposite figure) and the safety belt.
- **Do not** remove any of the safety devices e.g. the protective grid above the fan (see opposite figure). Safety devices must be kept in perfect condition.



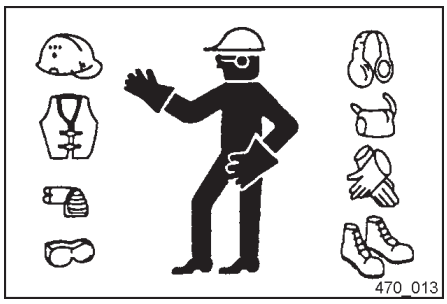


Emergency Exit

In an emergency situation, you can use the door on the right-hand side of the driver's cab (seen from the driving direction) as an emergency exit.

Clothing and Personal Protection

- Do not wear loose-fitting clothing, jewellery, or open long hair. There is danger that you get caught by control elements or moving parts leading to serious injuries.
- Immediately replace clothing stained with highly inflammable substances.
- When operating and servicing the machine, wear the appropriate protective equipment, e.g. safety helmet, safety goggles, safety shoes, dust protection mask, and safety gloves.
- Always wear safety goggles, safety helmet, and protective clothing, if it is likely that chippings or splinters will be produced while operating the machine (e.g. when removing or driving in bolts or cleaning with compressed air).
- Ensure that no unauthorised person is within the danger zone.

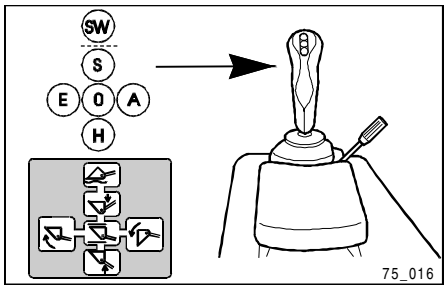


Machine Modifications

- Komatsu will not be liable for modifications performed without prior expressed consent by the manufacturer.
- Komatsu will not be liable for any injuries or damage resulting from unapproved modifications.

Before You Leave the Driver's Seat

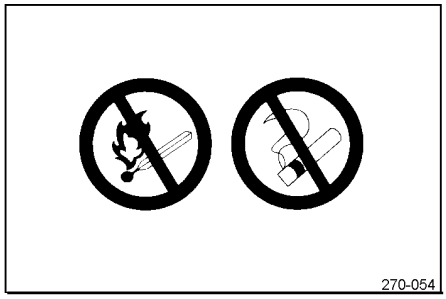
1. Lower the work unit onto the ground.
2. Switch off the engine.
3. Press slowly the multi-function lever to the front into position 'S'. The remaining hydraulics pressure will be reduced.
4. Remove the ignition key before you leave the driver's seat. Store the ignition key in a safe place.
5. Close the cabin door.



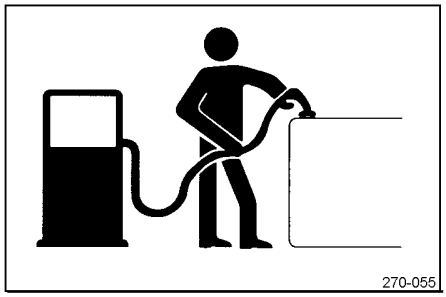
Mounting and Dismounting

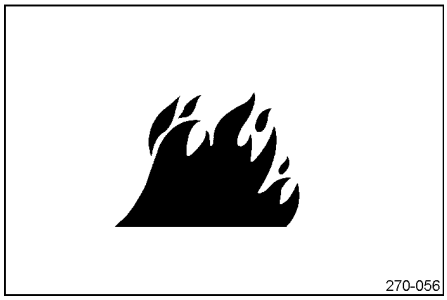
- Do not jump on or off the machine. Do not mount on or dismount from a moving machine.
- Always use the handle bars and tread steps for mounting or dismounting the machine. Do not hold onto the control levers while mounting and dismounting.
- To ensure safe hold, hold the handle bar with one hand and stand on the tread steps with both feet. Optionally, stand on the tread steps with one foot and hold the handle bars with both hands.
- To reach the left rear mudguard for checking of the coolant level, set one foot into the driver's cab and use it as the fourth step. Dismount backwards.

Fire Prevention and Fire Fighting

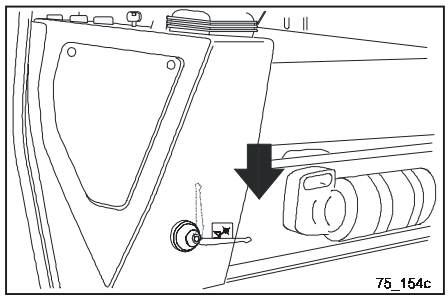


- Fuel, oil, and antifreezing compound are highly inflammable and could cause a fire.
- Do not approach inflammable material with naked light.
- Prior to refuelling, switch off the engine and stop smoking.
- Refuelling and refilling of oil are to be performed in sufficiently ventilated places.
- Store oil and fuel in special places appropriate for this purpose. Ensure that unauthorised persons do not have access to these places.
- Tightly close all cover caps.
- Check the fuel system, the lubrication system, and the hydraulic system for leaks. Have leaks repaired. Remove any excess oil, fuel, or other inflammable substances.
- Carefully and completely remove wooden chippings, leaves, paper, and other highly inflammable materials that may have collected in the engine compartment, since they could cause a fire.
- Do not operate the machine in the vicinity of naked light.

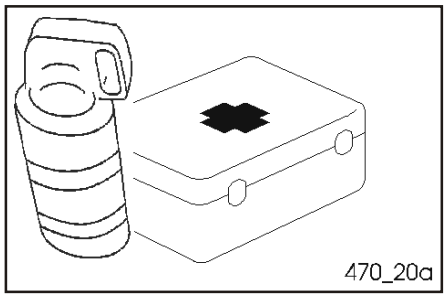




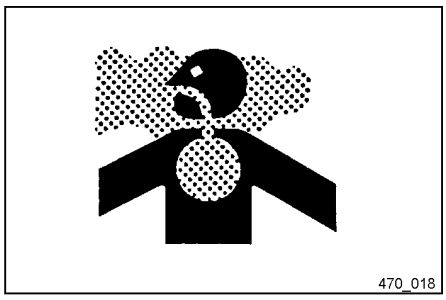
Fire Extinguisher and First-Aid Kit



- A fire extinguisher can be stored in the compartment under the driver's seat. Two appropriate fastening points are already attached to the back of the compartment.
- A fully operational fire extinguisher must be available at hand.
- If, in the course of certain operations, there is danger of fire, fire extinguishers must be at hand. Familiarise with the use of the fire extinguishers.
- Inform yourself on measures to be taken in the event of a fire.
- The first-aid kit can be stored in the compartment under the driver's seat next to the fire extinguisher.
- Make sure that you know all telephone numbers of the persons that you need to contact in an emergency.



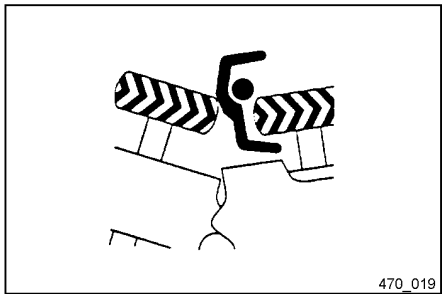
Protection Against Asbestos Dust



Asbestos dust is a health hazard if breathed in. This machine is free of any parts containing asbestos.
When handling material that may contain asbestos fibres, strictly adhere to all legal instructions and regulations. Furthermore, adhere to the following protective measures for your own protection:

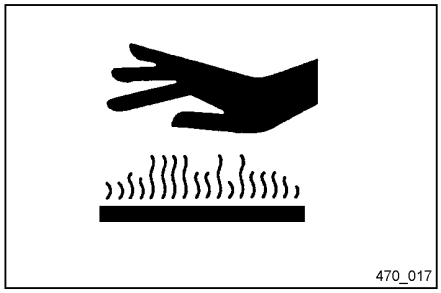
- Work, if possible, with a following wind.
- While working, wear an approved dust protection mask.
- After work, clean the machine with water to minimise formation of dust. Do not use compressed air for cleaning.

Protection Against Injuries



Do not insert any part of your body in the operating range of moving parts, such as work unit and cylinder, or machine and work unit. Never stand in a hazardous area. Distances vary when the work unit or steering are operated, this may lead to serious injuries.

Working at High Temperatures



- Directly after operating the machine, the engine coolant, the engine oil, and the hydraulic oil are extremely hot and under pressure. Do not try to unscrew caps, drain water or oil, or replace filters directly after operating the machine, since this may lead to severe burns due to hot fluids or hot machine parts. Wait until the temperature has fallen. Strictly adhere to the described procedures when performing the required measures.
- Lower the work equipment.
- Switch off the engine and wait for the radiator to cool down before you unscrew the radiator cap. Slowly turn the radiator cap until it reaches the first catch to let the pressure escape. Then, proceed turning the cap further and remove it. If you do not let the pressure escape, boiling water may spurt out when you remove the radiator cap.
- Switch off the engine. Allow the hydraulic oil to cool down before you unscrew the cap of the hydraulic tank to drain the hydraulic oil. Slowly turn the cap of the hydraulic tank to let the pressure escape from the tank. If you do not let the pressure escape, oil may spurt out when you remove the cap of the hydraulic tank.

Roll-Over Protection System (ROPS)

- The roll-over protection system (ROPS) protects the operator and absorbs load and impact energy, if the machine should roll over.
- The ROPS is a fixed component of the cab. The machine must not be operated without this roll-over protection system.
- The ROPS meets the regulations of all member states of the EU. If, however, the ROPS is modified, damaged, or repaired without permission, its stability is impaired. In this case, the ROPS must be replaced, since its correct function can no longer be guaranteed.
- The ROPS can only provide maximum protection, if the driver wears the safety belt correctly. For this reason, the safety belt is to be worn when the machine is in operation.

Attachment for Protection Against Falling Objects (FOPS)

IMPORTANT

FOPS is a fixed component of the cab.

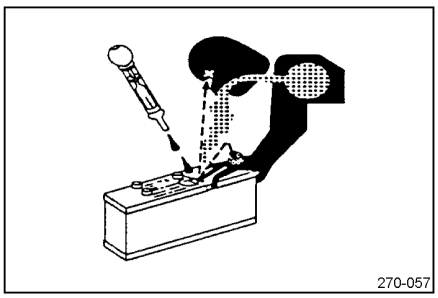
When you work on a site where there is danger of falling rocks or other objects, the machines must be equipped with a FOPS. If the FOPS is modified without permission or damaged, its stability is impaired. In this case, the FOPS must be replaced, since its correct function can no longer be guaranteed.

Attachments

Prior to assembly and operation of an additional attachment, read the attachment's manual and strictly adhere to the instructions on assembly and operation.

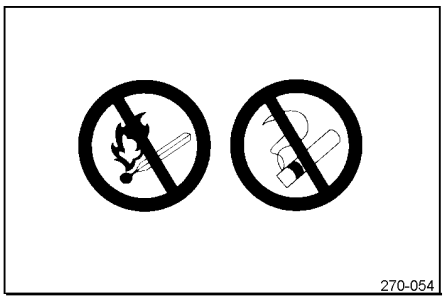
- Do not use attachments that have not been approved of by Komatsu Hanomag or the responsible Komatsu dealer. If you use attachments which have not been approved of, safety, correct operation, and service life of the machine may be impaired.
- Komatsu Hanomag are not liable for injuries, accidents, and damage resulting from the use of attachments that have not been approved.

Battery

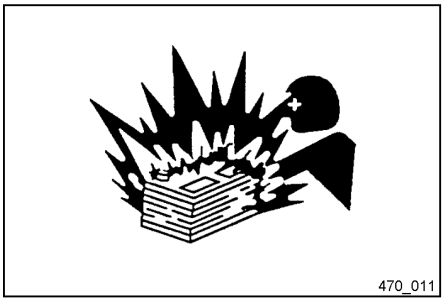


The batteries are filled with sulphuric acid (battery acid).

- **Always** wear safety goggles when handling batteries.
- Contact of battery acid with eyes can cause blindness. If acid should get into your eyes, immediately rinse your eyes with ample water and call for medical help. Rinse your eyes with water until a doctor arrives or you are able to visit an ophthalmologist or go to a hospital.
- Sulphuric acid that gets into contact with skin or clothing may cause acid burns. Immediately rinse the area that has come into contact with the acid with ample water.
- When working in the area of the battery, your hands may unintentionally get in touch with acid. For this reason, do not touch your eyes while working in the area of the battery. Always wash your hands after work.

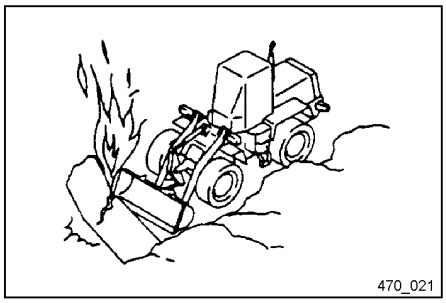


- Batteries produce detonating gas. Detonating gas is extremely **explosive** and may be ignited even by the smallest spark.
- Do **not** disconnect the battery while the engine is still running.
- Prior to start of work on batteries, set the start switch to '0'. Set the main switch of the battery (if installed) to 'Off'.
- Avoid any short-circuits via the poles or the pole terminals of the battery due to unintentional touching with metal objects, such as tools.
- When removing or inserting the battery, note which of the poles is the positive (+) and which is the negative (-) one. Always disconnect the mass cable first and reconnect it last.
- Tightly fasten the pole terminals. Loose pole terminals may produce sparks and thus cause explosions. Ensure that the cover of the positive pole (+) is always mounted.
- Tighten the cover caps.
- When repairing the electrical system or performing electric welding, disconnect the negative (-) pole terminal from the battery to interrupt the electric circuit.



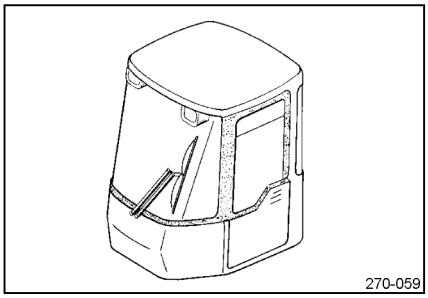
Before You Start the Engine

Workplace Safety



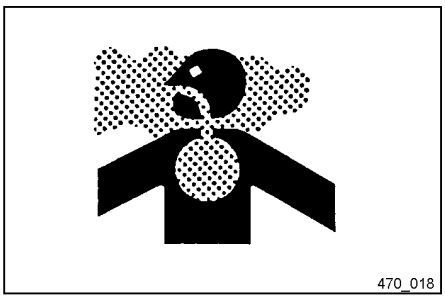
- Before you start operation, check the working area for dangerous working conditions.
- Inspect the surface of the soil in the working area and determine the optimum and safest procedure.
- Determine the required safety measures against dangers on public roads in co-operation with the owners, users, and responsible authorities.
- On sites where there are underground water pipes, gas pipes, or conduits for high voltage cables, contact the responsible supply company to determine the lines' positions. Ensure that these facilities will not be damaged.
- When working with water or crossing sand banks, first check the subsoil and depth and flow rate of the water. Ensure that the permitted water depth will not be exceeded.

In the Driver's Cab



- Do not leave any tools or spare parts lying around in the cab. These may actuate, damage, or block control levers, pedals, or switches. Store these parts in the tool box.
- Keep the cab floor, the control elements, the tread steps, and the handrails free of oil, grease, and excessive dirt.
- Immediately repair any damage. Tighten loose screw connections.
- Check the safety belt, the belt buckle, and the fastening elements for damage and wear. Replace worn or damaged parts.

In-Door Operation



Do not operate machines in-door unless these areas are sufficiently ventilated (e.g. workshops).
Caution - Danger of intoxication!

Gas, Dust, and Inflammable Vapours

Do not operate combustion engines in an environment that may contain inflammable gases or vapours. These gases, dusts, or vapours may ignite or be sucked in by the suction system, thus causing a rise in engine speed or an exceeding of the engine's maximum rpm. This may lead to a fire, an explosion, and major damage to property. It may also happen that the engine cannot be switched off anymore. Also refer to chapter "Operation in Closed Areas".

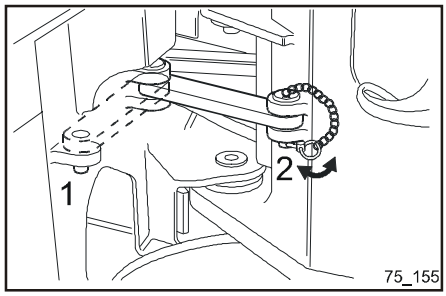
Mirrors, Windows, and Lighting

- Clean the windows and the headlights to ensure maximum sight.
- Adjust the rear-view mirror in such a way that you have an excellent view of the rear from the driver's seat. Keep the mirrors clean.
- Ensure that the complete lighting system operates properly and that it is correctly adjusted.
- Immediately replace broken window panes by new ones.

Machine Operation

Before You Start the Engine

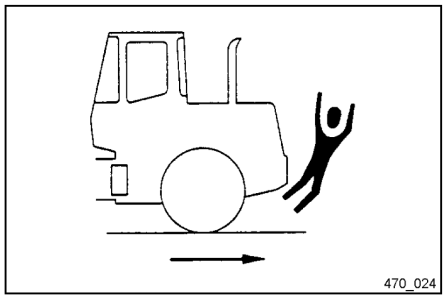
- Walk around the machine to check whether persons or objects are in the way before you get on the machine.
- Do not start the engine, if a warning sign has been attached to the control lever or another point.
- Sound the horn just before you start the engine.
- Start and operate the machine only from the driver's seat.
- Apart from the operator, no other person is permitted in the driver's cab or the vicinity of the machine.
- If the machine is provided with a reversing warning system, you must ensure that it operates correctly.
- Before you start the machine, check that the articulated steering is unlocked (position '1') and that the locking bar is attached to the frame by means of bolts and spring bolts.
- Always wear the safety belt when operating the machine.



Reversing

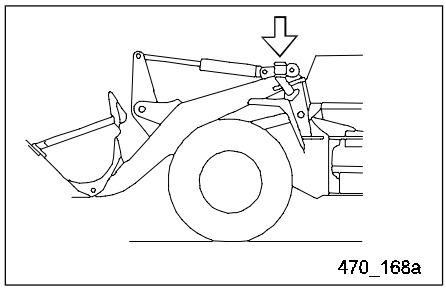
These rules must be observed for all machines, i.e. also for those machines equipped with a reversing warning system:

- Check that there is nobody near the machine or in the way.
- Before you start reversing, sound the horn to warn persons within or near the operating area.
- When working in potentially dangerous areas or areas with obstructed view, ask another person to regulate and supervise traffic.

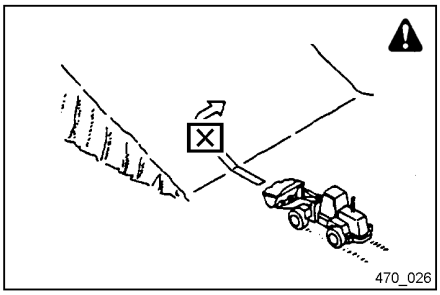


Driving

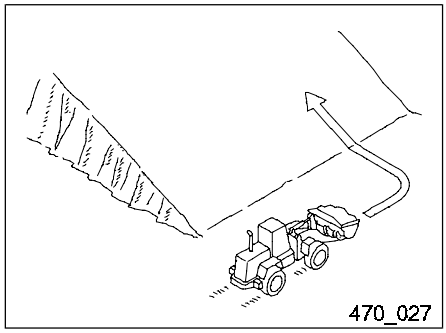
- During driving, the bucket is in its transport position. Make sure to heed the transport position indicator for this purpose.
- When driving on uneven ground, drive slowly and avoid sudden steering movements.
- If the engine goes out while driving or if the hydraulic pump breaks down, you may no longer steer the machine. An emergency steering system will only be available, if the machine is moved with a speed of min. 2 km/h. (2 km/h is the max. permitted tow-off speed)



Driving On Slopes

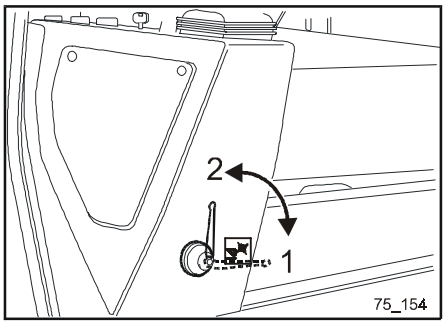


- Keep sufficient distance to ridges and steep slopes. There is danger of the machine tipping over or sliding down on steep slopes, embankments, or hill flanks. The limiting values are defined in chapter "Limiting Values for Slopes".
- To keep the centre of gravity as low as possible when driving on slopes, embankments, and hill flanks, you must set the bucket to a position just above the ground (approx. 200 to 300 mm). In an emergency, quickly lower the bucket to the ground to stabilise the machine.
- Do not turn on a slope or drive across a slope. Turn or cross the section only level ground.
- When driving on slopes, avoid driving on grass, fallen leaves, or steel plates. Driving sideways on these surfaces may result in the machine sliding. Drive very slowly and carefully.
- When driving down a slope, use the braking power of the engine and drive slowly.
- If the engine stops while you are driving on a slope, immediately apply the service brake to stop the machine. Then apply the parking brake. Lower the work unit.
- When driving on a hill with a load, drive
  uphill: in forward direction
  downhill: in reverse direction



Emergency Lowering System

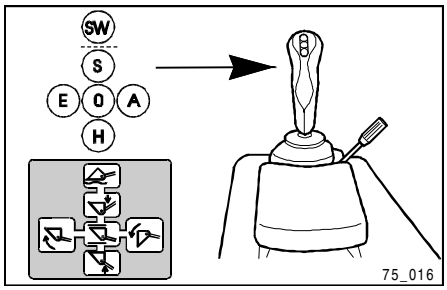
The machine is provided with a pressure accumulator for the work hydraulic system. If the engine is not running, you can lower the work unit with the multi-function lever.



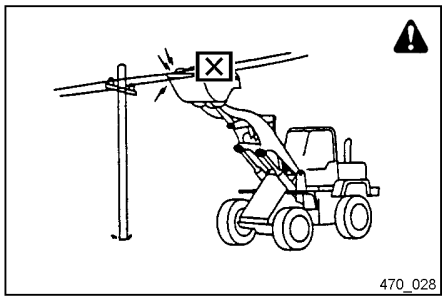
NOTE

If you have secured the work hydraulic system with the locking lever of the work hydraulic system, you cannot lower the work unit.

1. Make sure that nobody is standing below the work unit.
2. Press slowly the multi-function lever into position ‘’P”. The work unit is lowered.



Working Close to Overhead Power Transmission Lines



- A voltage overspill may occur, if you or the machine get too close to overhead power transmission lines. For this reason, always heed the required safety distance between the machine and the overhead power transmission lines.

Nominal Voltage		Safety Distance
	up to 1000 V	1 m
over 1 kV	up to 110 kV	3 m
over 110 kV	up to 220 kV	4 m
over 220 kV	up to 380 kV	5 m
with unknown nominal voltage		5 m

- The safety distances given here reflect the German safety standards. You can find the safety distances applying to your country in the relevant national regulations.
- Before you start work, obtain information about line voltages from your supply company.
- When estimating the distance, take into account all possible movements of the machine, the work unit, and the line. An uneven surface may result in the machine swaying, or wind may move the lines, etc.
- Should the work unit come into contact with a power transmission line, proceed as follows:

1. Do not leave the driver's cab. The driver's cab is a "Faraday cage" protecting you from electric shock.
2. Warn other persons and tell them to stay far away from both the power line and your machine.
3. Try to move the machine out of the range of influence of the overhead power transmission line by moving it away from the line, moving away the work unit, etc.
4. Have the power in the line switched off.

Loading

- Proceed as follows to fill embankments, to backfill ditches, or to deposit earth over the edge of a hill:
  1. First, dump a heap of earth in front of the hill.
  2. Fill the bucket with earth again and drive the machine into the heap of earth. Dump the bucket contents behind the first heap of earth.
- The load is relieved very suddenly when the heap of earth is pushed over the edge of the hill or when the machine reaches the edge of the hill. If this happens, the driving speed may suddenly increase. For this reason, drive particularly slowly and carefully at these points.
- If possible, perform all load operations with a following wind to protect yourself against dust and impaired vision.
- Avoid sudden starts, turns, or stops when the bucket is full.

Good Vision

- When working in dark areas, switch on the working lights of the machine and provide additional lighting for the working area.
- If vision is impaired, e.g. due to mist, snow, or rain, interrupt work and wait until vision has improved to such an extent that safe work is ensured again.

Working On Snow

- When working on snow or ice-covered surfaces, there is danger of the machine starting to skid even at a very flat angle. For this reason, drive slowly and avoid sudden starts, turns, or stops.
- Very often snow hides the edges of roads and other objects. For this reason, proceed very carefully when removing snow.
- When driving on hill flanks covered with snow do not brake abruptly to stop the machine. To stop the machine, lower the bucket onto the ground.
- The load may vary considerably, depending on the structure of the snow. For this reason, reduce the load and pay attention that the machine does not start to skid.

Height Limitation

When working in areas with height limitations, e.g. in tunnels, beneath bridges or power transmission lines, or in garages, pay attention that the work unit does not touch or damage these facilities.

Brakes

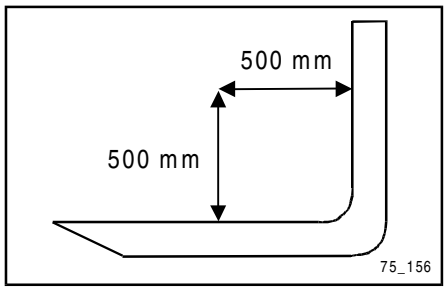
- Use the brake pedal only for braking, do not use the brake pedal as a foot rest.
- When you are driving downhill you can use the braking force of the engine by reducing the speed (rpm) of the engine. If required, you can additionally press down the braking pedal for braking.

Working On Loose Soil

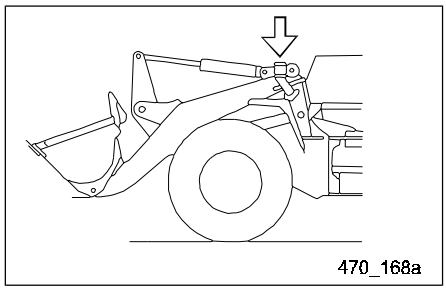
Do not drive the machine too close to edges of hills, overhangs, and deep ditches. If the soil starts to sag at these locations, the machine may tip over, fall down, or roll over, thus injuring you severely. Take into account that the soil is wet and soft after heavy rainfall, or very loose after blasting.

Working with the Forklift Truck Attachment

- Check daily, before starting operation, the fork tines of the machine for visual damages (e.g. fissures, cracks, abrasion). Also the protective device for unintentional removing or shifting of the fork tines may have no faults. Never operate with a damaged forklift truck attachment.
- Before inserting the forklift truck attachment into the quick-change unit, check whether it is appropriately locked in.
- Make sure that the distance between the individual fork tines is sufficient.
- Never exceed the maximum permitted loading capacity of the forklift truck attachment. It depends on the condition of the ground on which the work is to be performed and the stroke height. The values specified in chapter "CE-Conforming Equipment" refer to the most unfavourable stroke position with the boom in horizontal position. The centre of gravity of the load lies 500 mm from the fork back and the fork tines(see drawing).

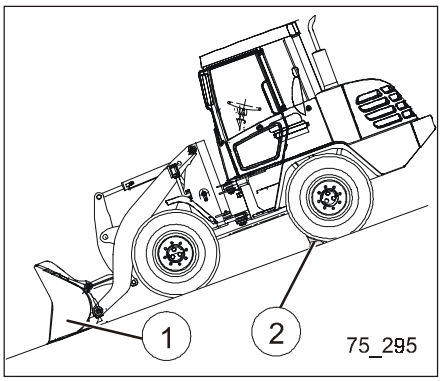


- Transports palettes only individually. If you are instructed by the responsible colleague to transport more than one box palette, which are also piled up, you must make sure in any case that the locations under which the forklift truck attachment is gripping for transporting are in perfect condition. The overall height of the palette pile must not exceed 2 m.
- Make sure that the fork tines are adapted to the length of the load. Move the fork tines so far under the load that the load comes to a rest at the fork back.
- If you are transporting a load which is impairing your sight on the route, you must drive the machine into a direction in which you have free sight. If it cannot be avoided, drive backwards. If this is not possible, ask a colleague to assist you by clearing your way and indicating to you any obstacle. In this case, drive very slowly and extremely careful.
- During transporting, lower the boom to its transport position. Both red arrows of the transport position marking (see adjacent figure) on the left lifting cylinder must be next to each other. Incline the load slightly to the back during the transport. You may only lift the load above the pile during the lowering or lifting procedure.



- Always drive slowly when you are transporting loads (speed range 1).
- If you are driving on slopes or hills, transport the load always in such a way that it is pointing to uphil.
- The boom performs a semicircular movement during the lifting. Lift the boom to the desired transporting height only shortly before approaching the deposit surface. This prevents that the load is damaged during the lifting.
- Lower the forklift truck attachment completely to the ground before quitting the driver's cab.

Parking the Machine



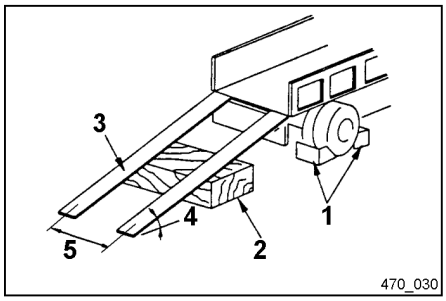
- If possible, park the machine on an even surface. If you have to park the machine on a slope, you must park the machine with the work unit pointing down the slope. Lower the work unit (1) until it firmly touches the ground, or let the cutting edge of the bucket sink deeply into the soil. Block the wheels with wheel chocks (2) to ensure that the machine cannot roll away.
- When parking the machine on public roads, ensure that it does not obstruct traffic. Put up signal lamps and required warning signs to ensure that passing traffic can clearly see the machine.
- Adhere to all regulations on parking vehicles and securing building sites.
- Before you leave the machine, completely lower the work unit onto the ground. Secure the control lever of the work hydraulic system against accidental operation. Switch off the motor. Lock all points that can be locked and store the key in a safe place.

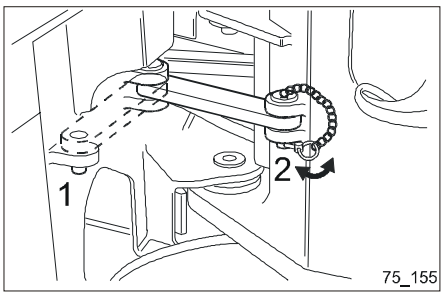
Transport

Loading and Unloading the Machine

Loading and unloading is potentially dangerous. For this reason, proceed with extreme care.

- Load and unload the machine only on solid and level ground. Keep a safety distance to the edge of the road.
- Block the wheels of the transport vehicle (1) and place support blocks (2) under both ramps before driving the machine onto the transport vehicle.
- Only use ramps (3) with appropriate carrying capacities and widths. The ramps must be long enough to ensure that the maximum loading gradient (4) of 15% is not exceeded.
- Ensure that the ramps are positioned and fastened safely and that both sides have the same height. Set the distance between the ramps to the distance between the wheel tracks (5).
- Ensure that the surfaces of the ramps are clean and free of grease, oil, ice, and loose material. Remove any dirt adhering to the wheels.
- When loading and unloading the machine, keep the engine speed low and drive slowly.
- Do not carry out steering movements on the ramps. If required, drive off the ramps again, correct alignment of the machine, and drive up again.
- After loading, i.e. when the machine is on the transport vehicle, apply the parking brake.
- Block the wheels of the machine with wheel chocks.
- Set the steering wheel of the machine to straight driving.
- Secure the articulated steering with the locking bar.
  Position '1' Articulated steering unlocked.
  Position '2' Articulated steering locked.
  Always secure the locking bar with the bolt and the spring bolt in both positions.
- Secure the machine on the transport vehicle by means of appropriate fastening equipment. Only use the attachment points on the machine for lifting and securing. For safety reasons, do not use any other points for fastening (e.g. axle, cardan shaft, articulated steering, bucket teeth, or strapping around the cab).





Transport

- When moving the machine on a transport vehicle, adhere to all applicable motor vehicle traffic regulations.
- Determine the transport route, taking into account the width, length, height, and weight of the load and, if necessary, have this approved by the responsible authorities.

Safety Measures During Maintenance

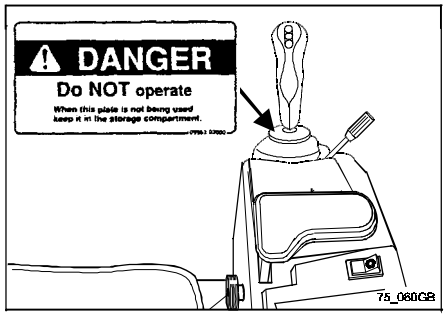
Personnel

Do not service or repair the machine unless you are an appropriately qualified technician or have been appropriately instructed by a qualified technician.

Prior to Start of Maintenance Measures

Warning Sign

While the machine is being serviced, the engine must not be started and the control elements must not be actuated without prior agreement, since this could cause accidents with serious injury.

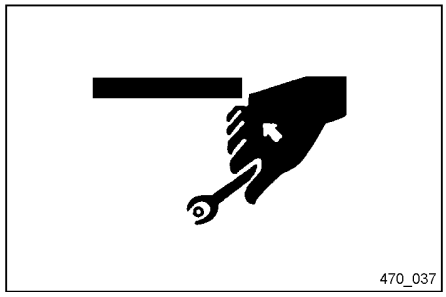


Always attach the **warning sign** to the control lever for the work hydraulic system to warn other persons that work is being carried out on the machine. If required, put up additional warning signs around the machine.

You may purchase these warning signs from your Komatsu dealer.

Tools

Only use tools which are suitable for the task you want to carry out. If you use damaged or makeshift tools or tools which are of inferior quality, injuries may occur.



Safety-Related Parts

The quality of these parts is subject to normal wear and tear. For this reason, replace safety-related parts by new ones at regular intervals, regardless of whether they are defective or not.

Safety-related parts are:
Fuel system: fuel hose, overflow hose, and tank cap
Hydraulic system: all hydraulic hoses

Immediately replace defective parts, even if the interval for replacement has not elapsed.
Replace hydraulic hoses every 6 years.

Prior to Start of Inspection and Maintenance

Prior to start of inspection and maintenance operations, park the machine on solid, even ground. Lower the work unit. If your machine is provided with ALS Electronics, you must switch off the ALS Electronics. Switch off the engine (start switch to position '0') and safeguard the machine.

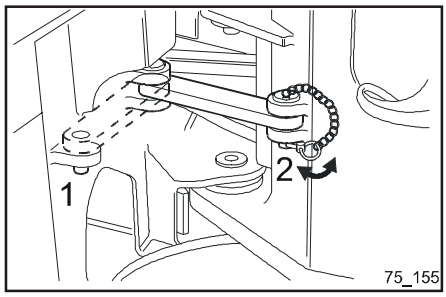
If the engine has to be running during maintenance, e.g. for pressure checks of the hydraulic system, proceed with particular care. Carry out such measures with two persons with whom you have arranged clear hand signs beforehand.

One person must be seated on the driver's seat to ensure that the engine can be immediately switched off, if required. This person must always ask the second person before actuating the control levers.

The person performing the maintenance measures must take care not to touch or get caught by moving parts.

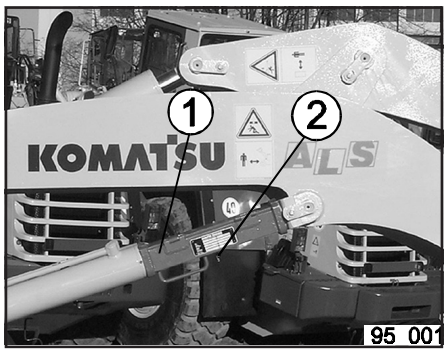
Securing the Articulated Steering

Before starting maintenance, secure the articulated steering against accidental movement using the locking bar (position '2').



Supporting the boom

When work needs to be conducted under a raised boom then the boom must be supported against the danger of suddenly falling. For this purpose you should use either a jack stand, which should be positioned below the boom, or a support device (1) which is mounted over the piston rod.

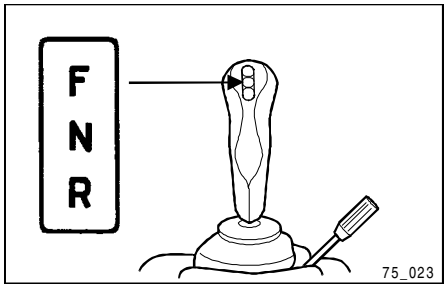


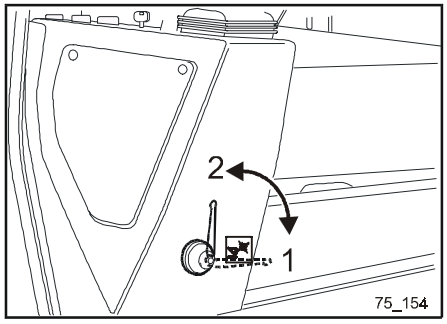
The support device is available as an optional extra.

Order No: 42U-98-12030

When using the support device the following procedure must be adhered to at all times.

1. Park the machine on a piece of level, solid ground.
2. Put the parking brake on.
3. Place the wheel chock in front of the wheels to prevent the machine from rolling away.
4. Lift the boom up sufficiently far so that the supporting device (1) can be installed over the lifting ram's piston rod.
5. Switch the engine off.
6. Position the supporting device (1) over the piston rod without standing under the boom and tighten the bolt (2) by hand.
8. With the engine off, lower the boom slowly until it rests on the support device (1).
9. Set the drive direction selector to "N" and move the working hydraulic's catch lever to position "1".

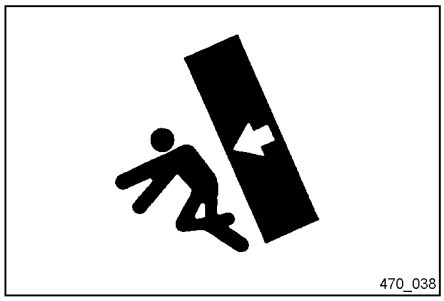




During Maintenance

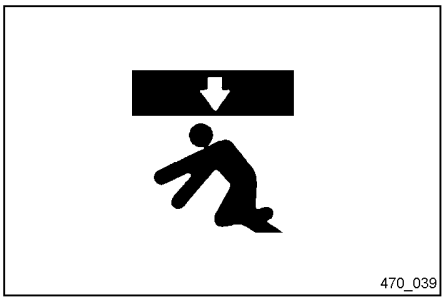
Attachments

Attachments removed from the machine must be put down in a safe location in such a way that they cannot tip over.
Caution - risk of injury!



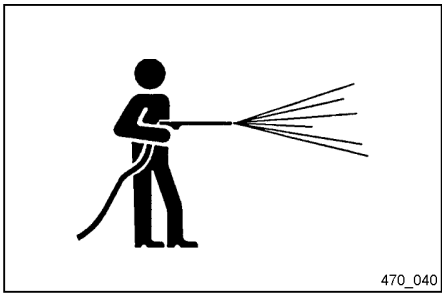
Working Under the Machine

- Always lower all movable work units onto the ground or set them to their lowest positions before you start to perform maintenance or repair measures under the machine.
- Block the wheels of the machine using wheel chocks.
- Do not work under a machine that is not appropriately supported.



Keeping the Machine Clean

- Always keep the machine clean and tidy.
- Oil, grease, and tools lying around involve danger, since they may cause slipping or tripping over.
- Do not clean sensors, plugs, and the interior of the driver's cab with water or steam. If water seeps into the electric system, there is danger of uncontrolled and unintentional movement of the machine which may cause accidents.

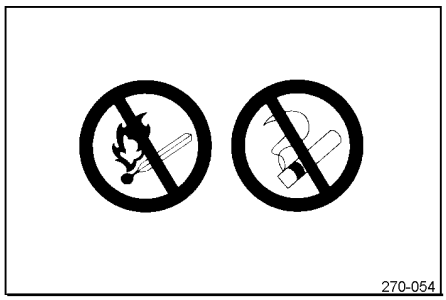


Specific Measures

Always wear appropriate safety clothes and safety goggles when you perform grinding, welding, use a sledge hammer or carry out similar work.

Refuelling and Topping Up of Oil

- Spilled fuel or oil involves danger of slipping and fire. For this reason, immediately remove any spilled liquid.
- Always refuel and top up oil in a place that is sufficiently ventilated.
- After refuelling and topping up, close the filling openings with cover caps.
- Do not use fuel for rinsing or cleaning of components.
- Ensure that neither oil nor fuel can seep into the soil or water. Dispose of used substances according to the relevant environmental regulations.
- If the machine is provided with a fuel sieve in the tank opening, do not remove this fuel sieve before you start refuelling.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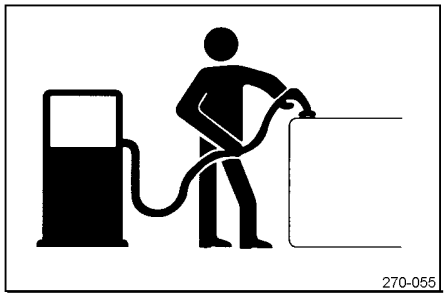
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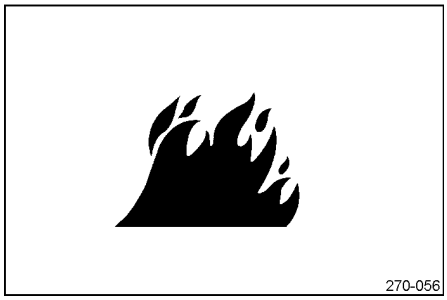
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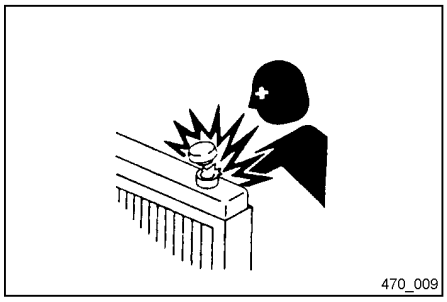
Coolant

- The machine is provided with an aluminium cooling system. Apply only coolants in the prescribed mixing ration.
- Caution, antifreeze is highly inflammable.
- To check the coolant level, first switch off the engine and wait for the cooling system to cool down. Then, check the coolant level in the expansion tank.
- Slowly unscrew the cap to let the pressure escape.
- If required, top up water in the expansion tank.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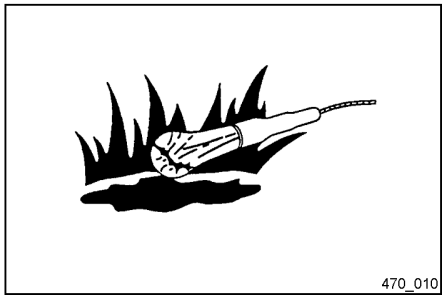
Use of Lighting

Always use explosion-proof lighting when checking fuel, oil, coolant, or battery acid.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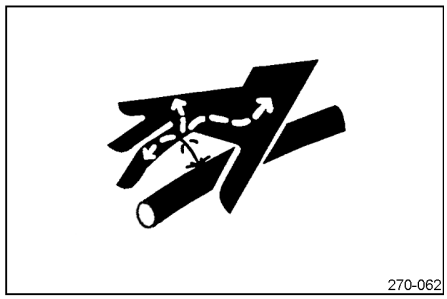
High-Pressure Hoses

Neither bend high-pressure hoses nor hit them with hard objects. Do not use piping or hoses with fissures, cracks, or bends, since they may burst during operation.
Immediately replace any loose or damaged fuel or oil hoses. Leaking fuel or oil involves danger of fire and slipping.
Replace all hoses every six years at the latest.

Handling High-Pressure Oil

- Always take into account that the hydraulic lines are subjected to high pressure.
- Do not top up oil, drain oil, or perform maintenance or inspection measures unless the work unit is completely lowered and the system is depressurised.
- If oil comes out under high pressure, this involves danger of an oil jet penetrating the skin or getting into the eyes. For this reason, always wear safety goggles and thick safety gloves, and use a piece of cardboard or wood when checking for oil leaks.
- If you have been hit by an oil jet, immediately go and see a doctor and explain what has happened.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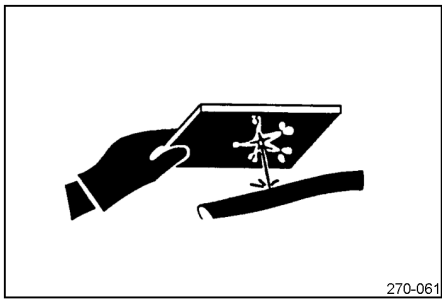

270-061

Handling of the Pressure Accumulator

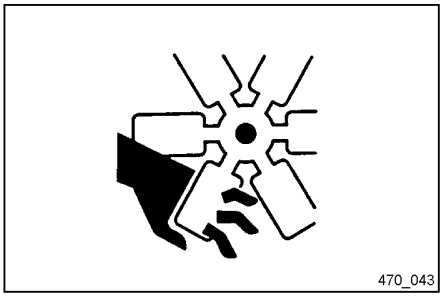
WARNING

Danger of injury! Pressure accumulator is filled with highly pressurised nitrogen.
Do not open or damage the pressure accumulator.

- Immediately inform your Komatsu dealer, if you detect malfunctions or defects of pressure accumulators.
- Filling the pressure accumulator with gas or topping up gas in the pressure accumulator is strictly limited to persons authorised to handle highly pressurised gas.
- Do not hit against the pressure accumulator.
- Keep naked light and sources of heat away from pressure accumulator.
- Do not drill holes into the pressure accumulator.
- Do not weld parts to the pressure accumulator.
- The service technicians must depressurise the hydraulic system before they can remove the pressure accumulator.
- The service technician must let the gas escape before they can disassemble the pressure accumulator.

Fan and Belts

- Always keep sufficient distance from rotating parts and pay attention that nothing gets within the operating range of rotating parts.
- There is danger that parts getting caught by the fan or the belt are cut off or hurled away.
- Do not wear loose clothing, neckerchiefs or the like, or open, long hair that might get caught.



Waste Material

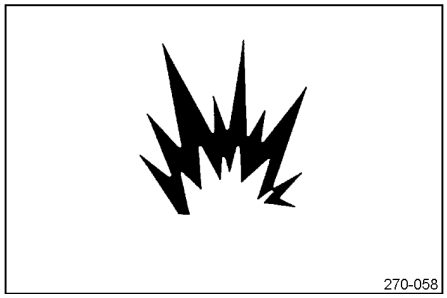
- Do not pour used oil into the sewage system, rivers, etc.
- Collect used oil of the machine in appropriate containers. Do not let oil flow out onto the ground.
- Adhere to all applicable laws and regulations when disposing of harmful substances, such as oil, fuel, coolant, solvents, filters, batteries, etc.

Tyres

Handling of Tyres (also refer to chapter "Tyres")

Tyres may burst and the resulting blast wave or parts whirling around may cause severe injury or damage. Make sure that the applicable procedures for servicing and replacing of wheels or tyres are fully understood and that only correct procedures are used.
To ensure safety and reduce wear and tear, always adhere to the following instructions:

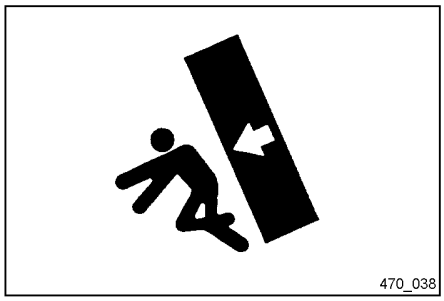
- Inflate tyres up to the defined pressure. If the tyre pressure is too low, the tyres may heat up and burst. If the tyre pressure is too high, there is also danger that the tyre may burst.
- If a tyre heats up considerably, inflammable gases are produced. A burning tyre may burst very easily, thus spreading fire over a large area.
- Check the tyre pressure when the tyres are still cold. Do not let off pressure, when the pressure in a warm tyre has increased.
- Do not light a fire and do not carry out welding near the tyre.
- Keep the working area free of pointed or sharp objects that may damage the tyre.
- Avoid any overload.

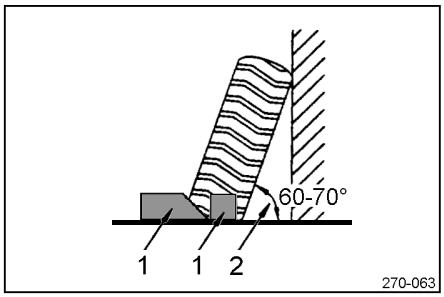


The values for the tyre pressure and for the permitted speed correspond to the manufacturer specifications and refer to standard operations. If you want to perform special operations, contact the responsible Komatsu dealer or the tyre manufacturer.

Storing Tyres

- Basically, tyres must be stored in a protected room that cannot be accessed by unauthorised persons. Otherwise, playing children may be injured.
- Place the tyres on an even surface and incline them 60° to 70° (2) against a solid stopper. Secure the tyres with wheel chocks (1) so that they cannot roll away, tip over, or slip.
- If, however, a tyre tips over despite this safety measure, do not try to stop it, but get out of the way as quickly as possible, since tyres for construction machines are very heavy and may cause serious injuries.

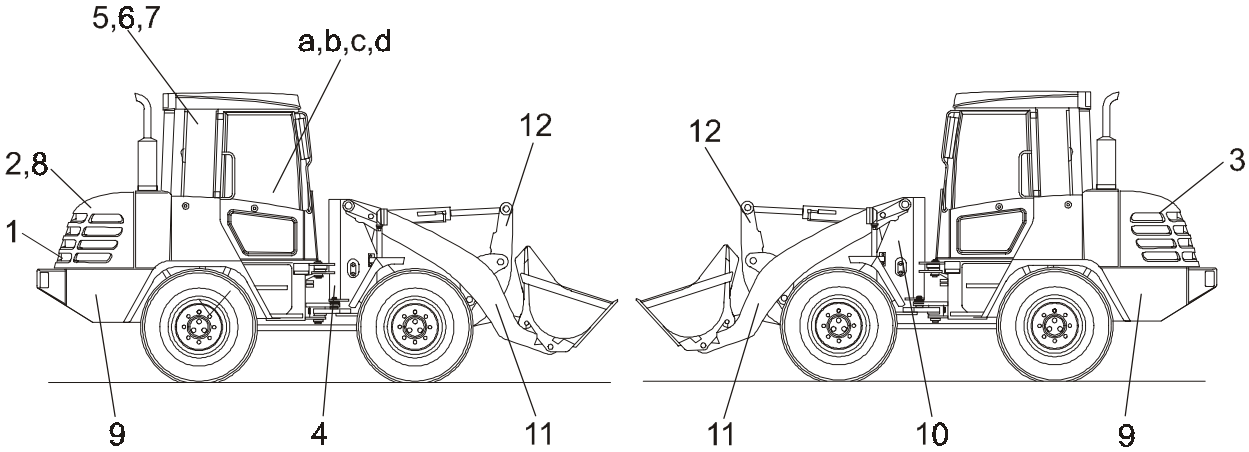


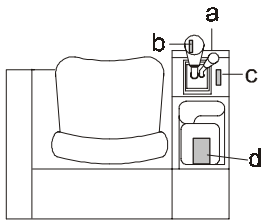


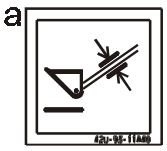
Labeling

- All safety labels must be kept clean all times. Missing or damaged safety labels must be replaced.

Positions of Safety Labels



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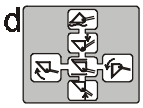
b
(42U-93-11A90)

c
(42U-93-11A80)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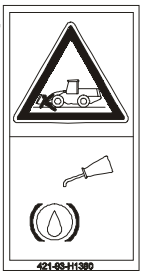
(421-93-H1280)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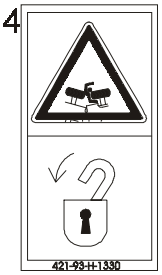
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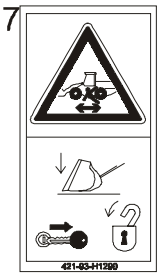
(421-93-H1250)

6
(421-93-H1340)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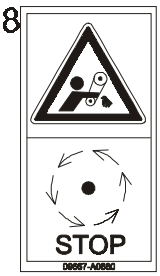

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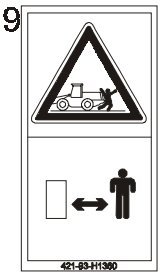
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(421-93-H1380)

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(421-93-H1370)

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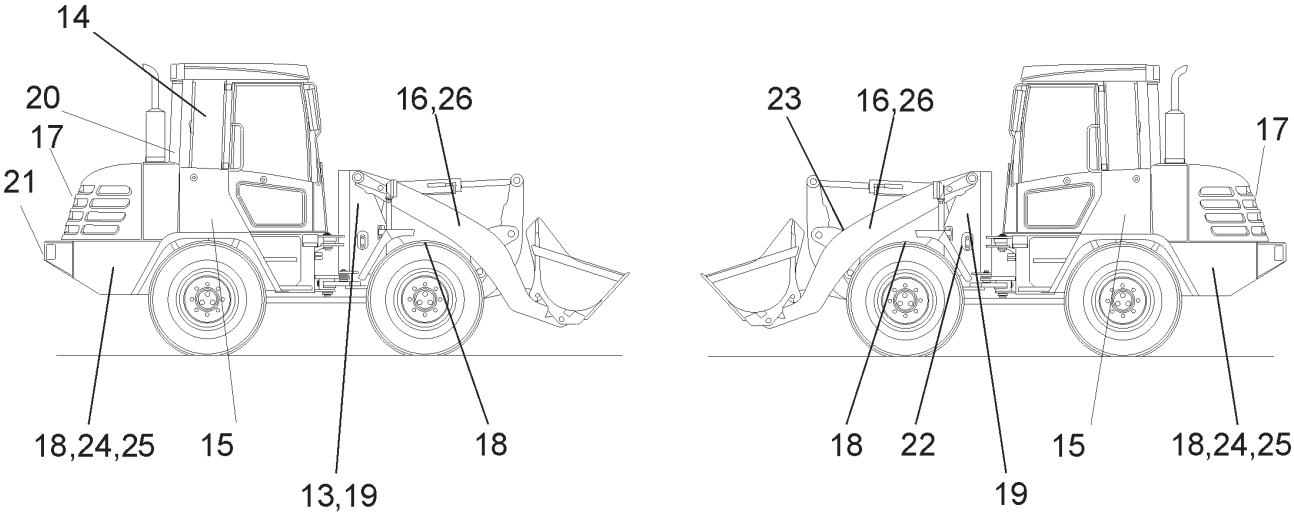
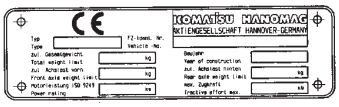
Information Labels



13 

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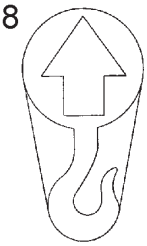
18 

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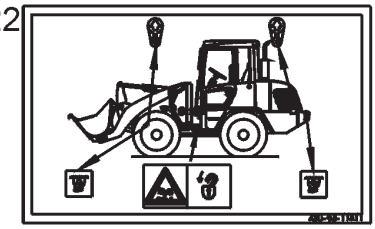
(42U-93-11A60)

22 

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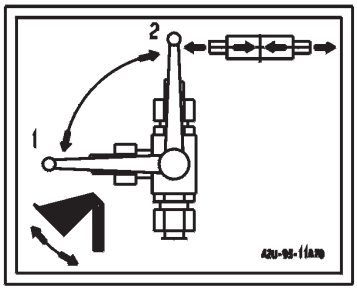
23 

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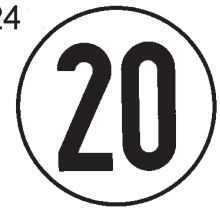
24 

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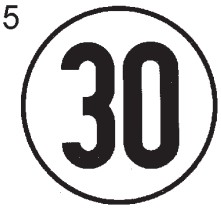
25 

(42U-93-11080)

High Speed version only

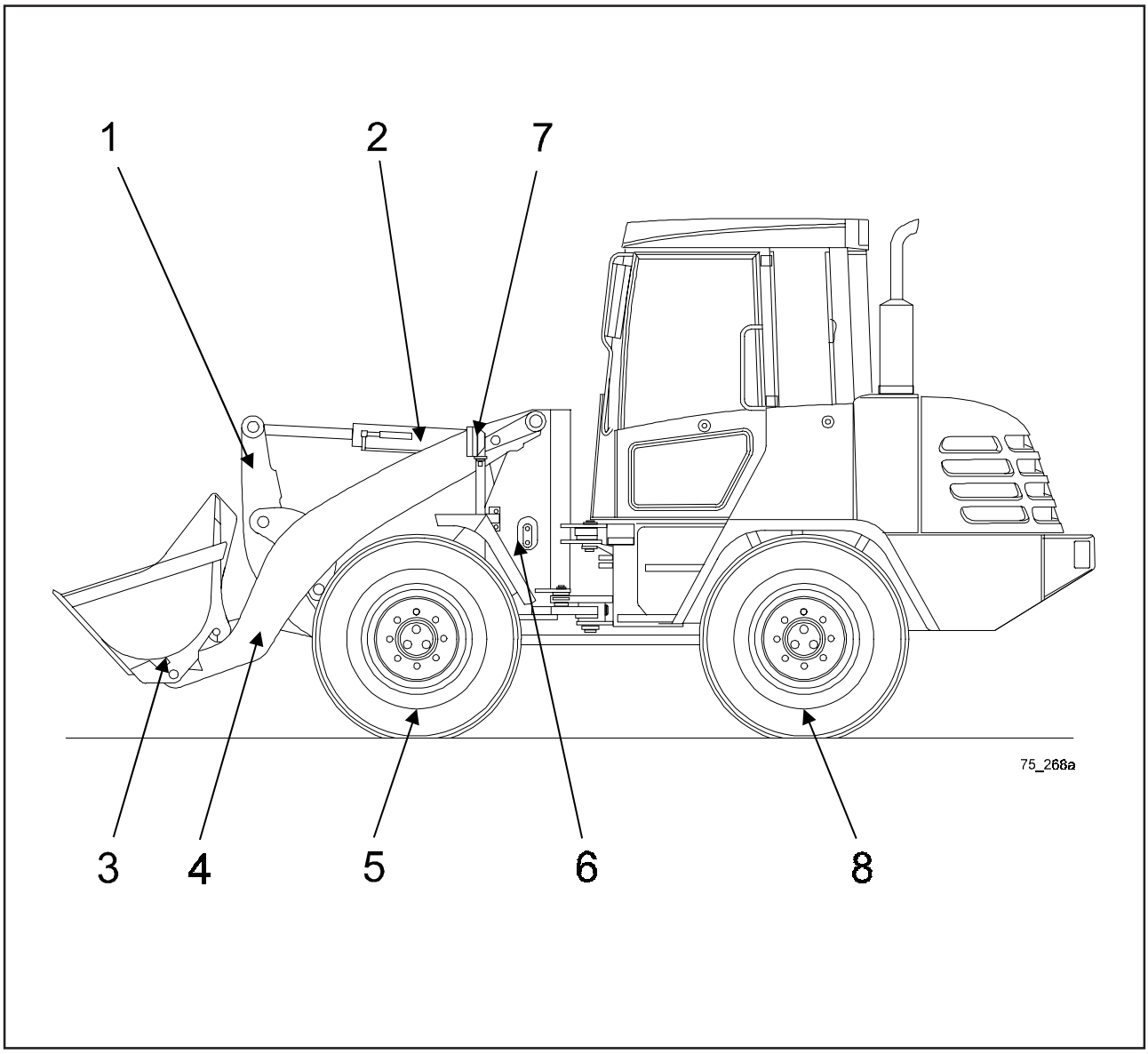
26

(42U-93-11B30)

95MC_label2

Controls and Indicators

Overall View of the Machine



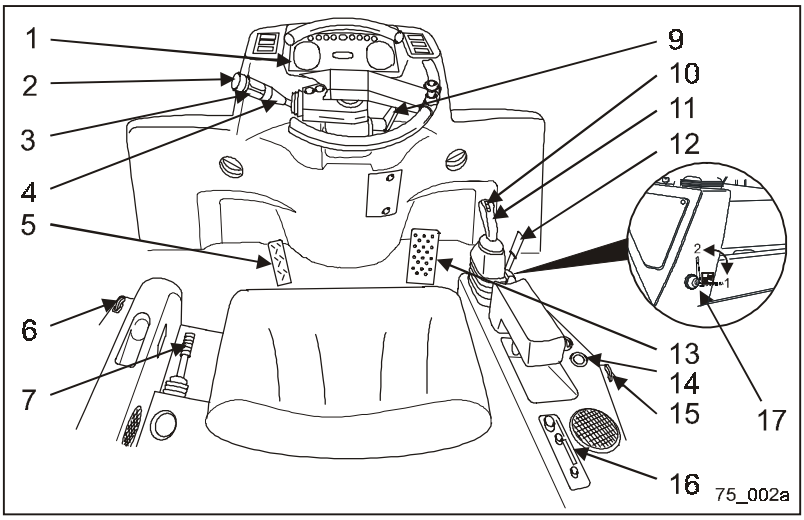
1 Tumbler
2 Bucket cylinder
3 Bucket
4 Boom
5 Front wheel
6 Lifting cylinder
7 Headlight
Direction indicator
8 Rear wheel

Controls and Indicators

Overall View

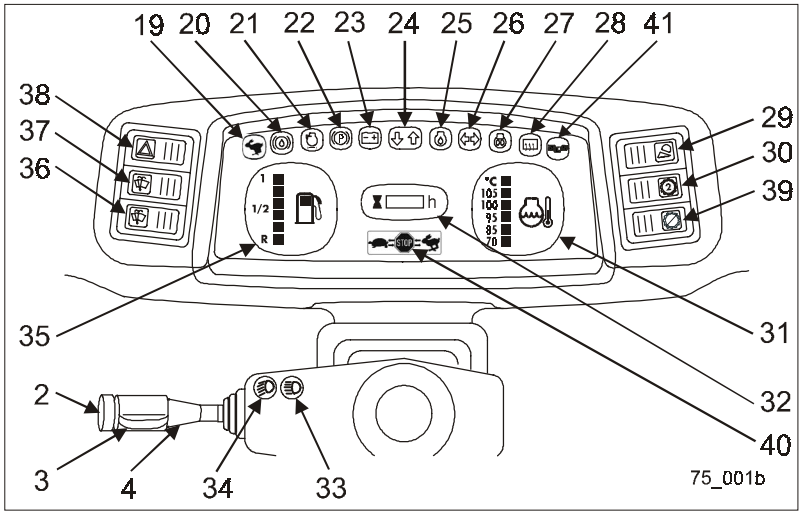
1 Instrument panel
2 Horn button
3 Light switch
4 Direction indicator lever
5 Inch-Brake pedal
6 Unlocking system of left door
7 Parking brake

9 Steering column adjustment
10 Driving direction switch
11 Multifunctional lever
12 Control lever for special equipment
13 Accelerator pedal
14 Socket
15 Unlocking system of right door
16 Car radio (Option)
17 Safety lever for work hydraulic system

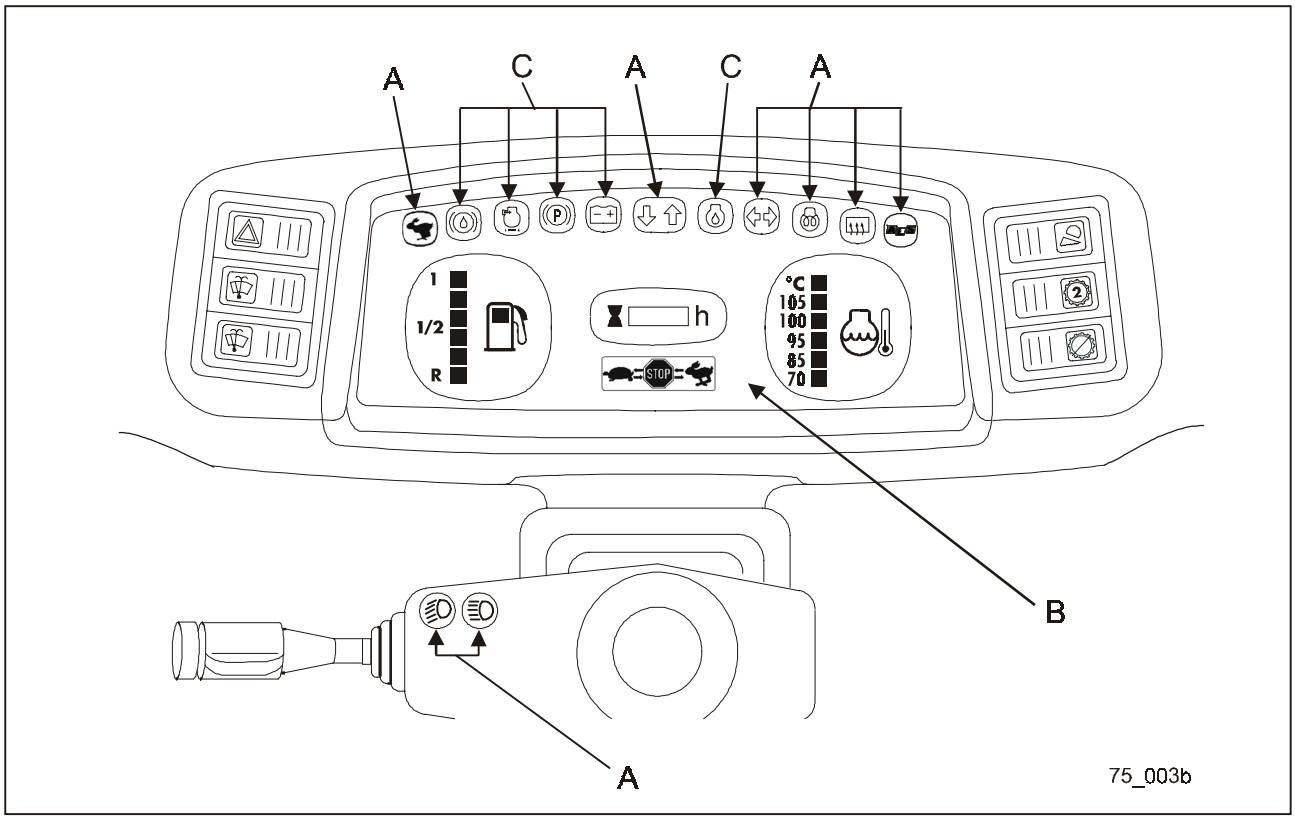


Switches and controls

19 High-speed gear control lamp (high-speed gear switched on, option)
20 Brake fluid warning light
21 Air filter warning light
22 Parking brake warning light
23 Charging current warning light
24 Driving direction switch indicators
25 Engine oil-pressure warning light
26 Direction indicator control lamp
27 Air preheater control lamp
28 Heated rear windscreen indicator
29 Working lights switch and control lamp
30 Driving range switch and control lamp up to 20 km/h
31 Coolant temperature indicator
32 Operating hour meter
33 High beam control lamp
34 Low beam control lamp
35 Fuel supply indicator
36 Rear windscreen wiper switch and washer
37 Front windscreen wiper switch and washer
38 Hazard flasher switch and control lamp
39 High-speed gear switch with control lamp (high-speed gear switched off, option)
40 High-speed gear information sign
41 ALS-Electronics control lamp (option)



Instrument Panel



The instrument panel can be divided in

(A) Control lamps
(B) Measuring indicators
(C) Warning lights

In the following sections of this chapter, all elements required for an efficient machine operation are explained in detail.

Control lamps

This group comprises the control lamps for high beam, low beam, heated rear windscreen, air preheater, direction indicator, driving direction switch, ALS-electronics (option) and control lamps for the high-speed gear (option).

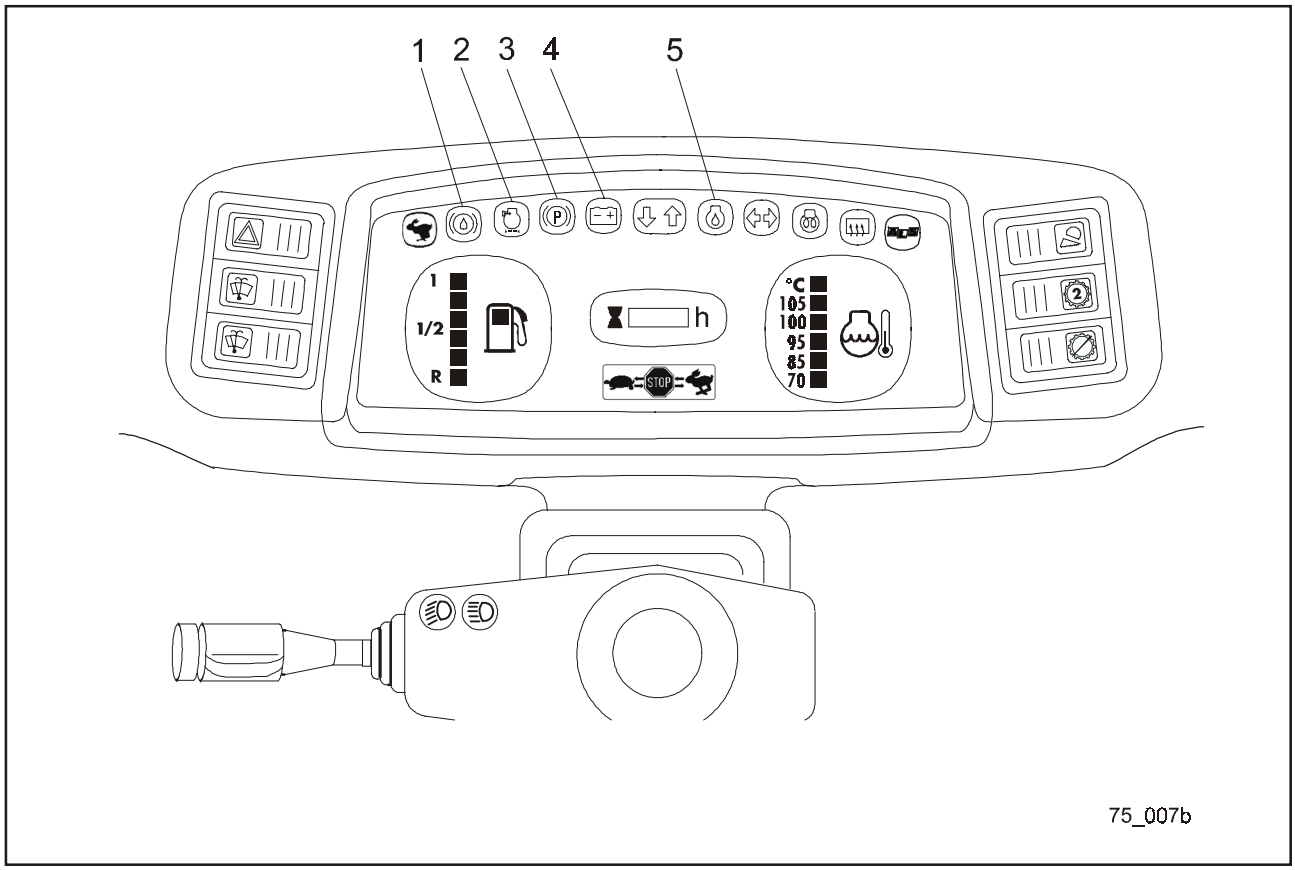
Measuring indicators

This group comprises the fuel gauge, the operating hour meter and the temperature indicator of the coolant.

Warning lights

This group comprises the warning lights for charging current, parking brake, air filter, engine oil-pressure and brake fluid supply.

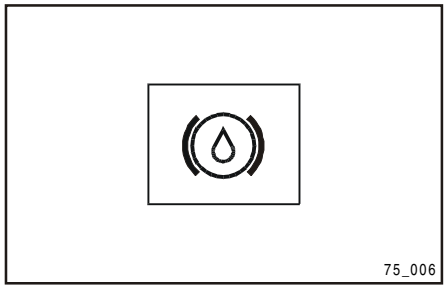
Warning Lights



(1) Brake fluid warning light
(2) Air filter warning light
(3) Parking brake warning light
(4) Charging current warning light
(5) Engine oil-pressure warning light

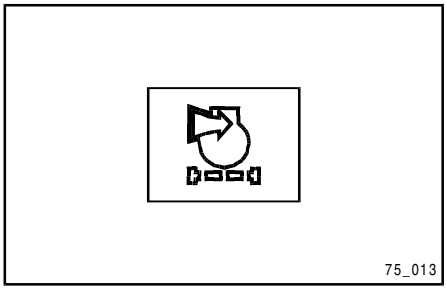
(1) Brake fluid warning light

If the brake fluid supply is too low, the brake fluid warning light lights up in red.
In this case you must immediately stop the machine and switch off the engine. Proceed as described in chapter "Troubleshooting“.



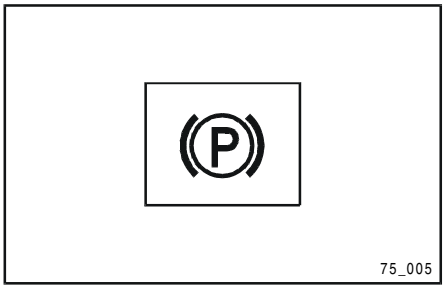
(2) Air filter warning light

If the air filter is polluted, the air filter warning light lights up in red.
In this case, you must clean or exchange the air filter. Proceed as described in chapter "Maintenance Every 250 Hours; Air Filter“.



(3) Parking brake warning light

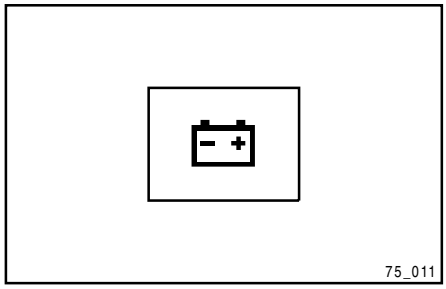
The parking brake warning light lights up in red if you set the start switch to the ‘I’ operating position while the parking brake is applied. In addition, the acoustic warner sounds if you set the driving direction switch to forward or reverse driving with the parking brake applied.



(4) Charging current warning light

Before you start up the engine:
The charging current warning light must light up if you set the start switch to the ‘I’ operating position.

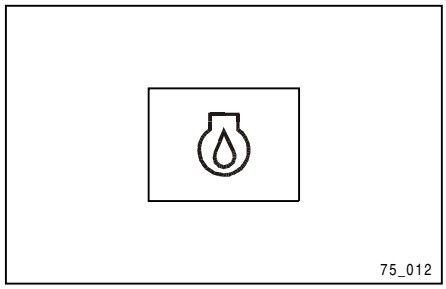
With the engine running:
As soon as the engine runs, the generator starts to generate current and to charge the battery. At the same time, the charging current warning light will go out. A fault is present, if the charging current warning light does not go out while the engine is running.
In the latter case, proceed as described in chapter "Troubleshooting“.



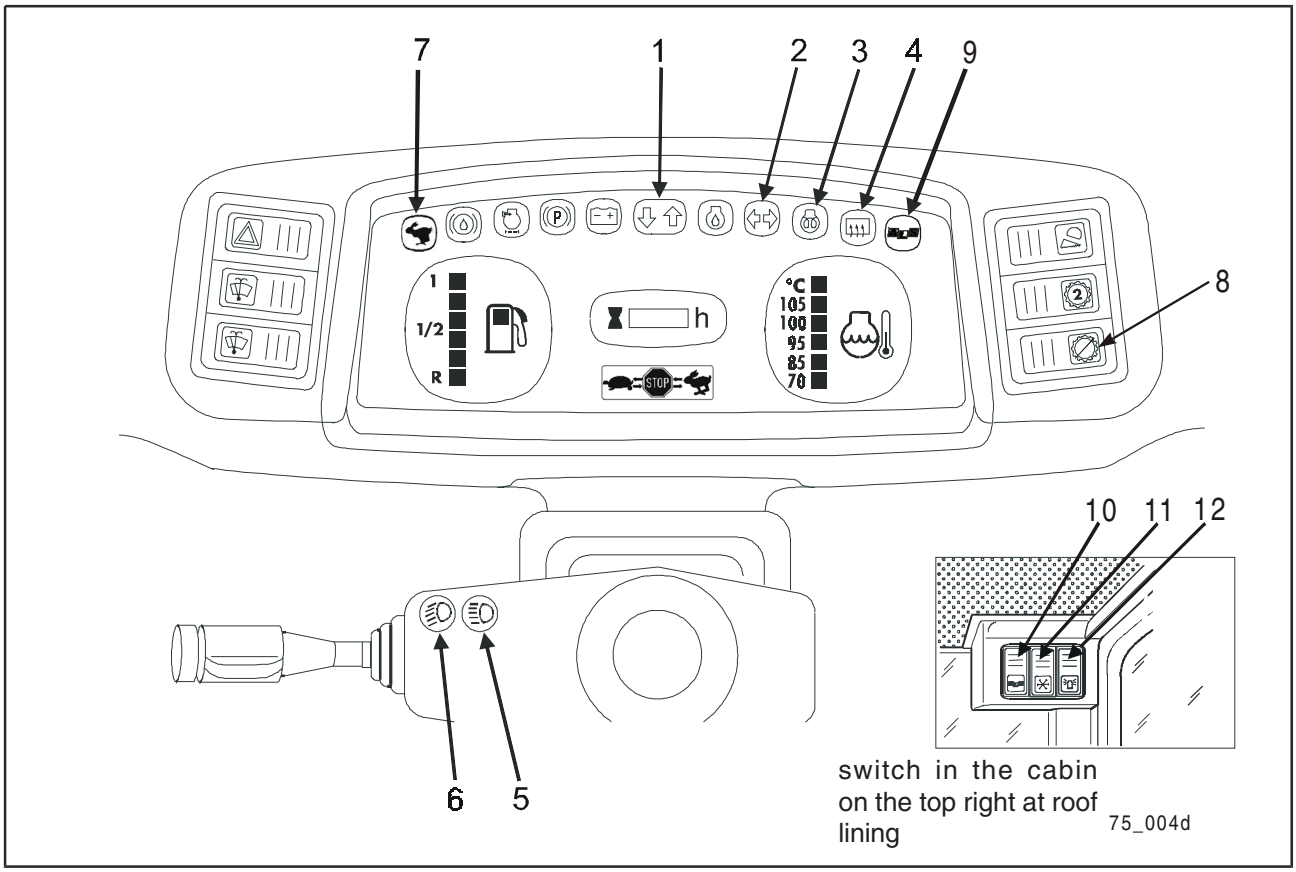
(5) Engine oil-pressure warning light

Before you start up the engine:
The engine oil-pressure warning light must light up if you set the start switch to the ‘I’ operating position. At the same time, the acoustic warner will sound.

With the engine running:
After starting the engine, the lubricating pressure builds up and the lamp goes out. If the engine oil-pressure warning light does not go out with the engine running or if it suddenly lights up during operation, while the acoustic warner sounds at the same time, a fault has occurred in the oil-pressure system.
IIn both cases, you must immediately stop the machine and switch off the engine. Proceed as described in the chapter "Troubleshooting".



Control Lamps



(1) Driving direction switch indicator
(2) Direction indicator control lamp
(3) Air preheater control lamp
(4) Heated rear windscreen indicator
(5) High beam control lamp
(6) Low beam control lamp
(7) High-speed gear control lamp, high-speed gear switched on (active only with high speed version)
(8) Control lamp in the high-speed gear switch, high-speed gear switched off (option)
(9) ALS-Electronics control lamp (active only with built in ALS-Electronics)
(10) Control lamp in the ALS-Electronics switch (option)
(11) Control lamp in the air conditioning switch (option)
(12) Warning beacon control lamp (option)

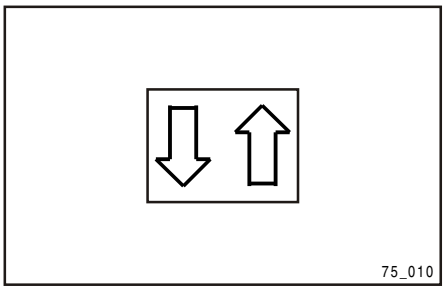
(1) Driving direction switch indicators

The indicators of the driving direction switch indicate which driving direction you have selected:

left arrow lights up: Machine drives backwards (driving direction switch in ‘R’ position)

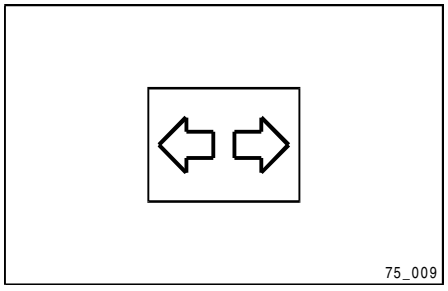
right arrow lights up: Machine drives forward (driving direction switch in ‘F’ position)

If the driving direction switch is set to the ‘N’ neutral position, both control lamps will go out.



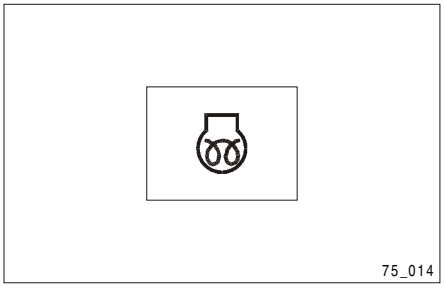
(2) Direction indicator control lamp

The direction indicator control lamp flashes if you have switched on the right or left direction indicators or the hazard flashers.
If the direction indicator control lamp flashes in very short intervals, a fault has occurred in the direction indicator system. In this case, proceed as described in chapter "Troubleshooting".



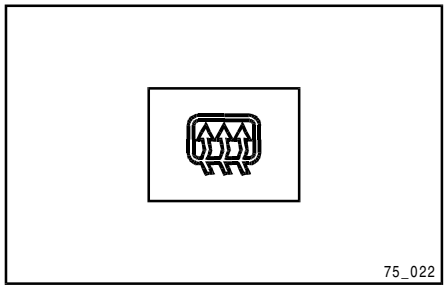
(3) Air preheater control lamp

The control lamp lights up, if you set the start switch to the ‘I’ operating position and if the air preheater is running. It will go out if the heating cycle is over. The running period of the air preheater depends on the ambient temperature. You can start the engine, after the control lamp has gone out.



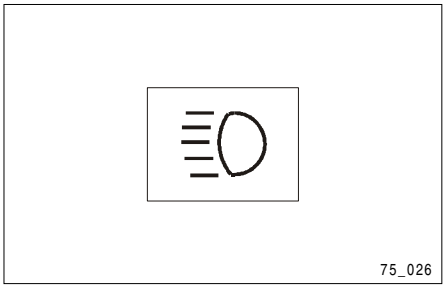
(4) Heated rear windscreen indicator

The control lamp of the heated rear windscreen lights up, if you have switched on the heated rear windscreen.



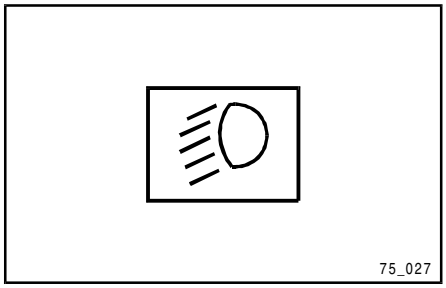
(5) High beam control lamp

The high beam control lamp lights up if you change from low beam to high beam. It also lights up if you flash your lights.



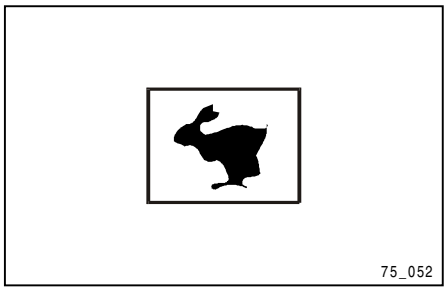
(6) Low beam control lamp

The low beam control lamp lights up if you have switched on the low beam.



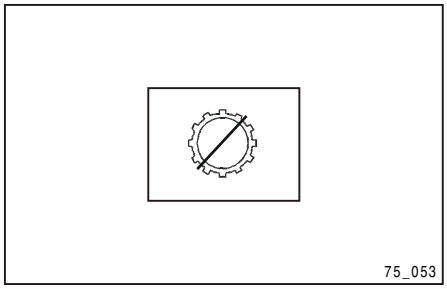
(7) High-speed gear control lamp (option)

The high-speed gear control lamp is a feature of machines from the “high-speed version” series. It lights up if the high-speed gear is switched on.



(8) Control lamp in the high-speed gear switch (option)

The high-speed gear switch with control lamp is a feature of machines from the “high-speed version” series. It lights up if the high-speed gear is switched off.

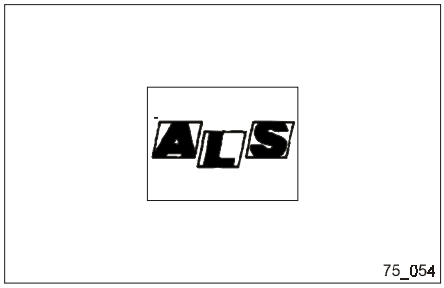


(9) ALS-Electronics control lamp (option)

The ALS-Electronics control lamp on the instrument panel is only active if the ALS-Electronics is installed. It lights up, when the ALS-Electronics is switched on and when the machine drives faster than 5 k.m.h..

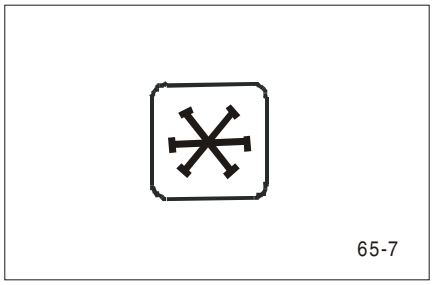
(10) Control lamp in the ALS-Electronics switch (option)

The ALS-Electronics switch with control lamp is only installed in machines which are provided with the ALS-Electronics. The control lamp in the switch lights up in green when the ALS-Electronics is switched on.



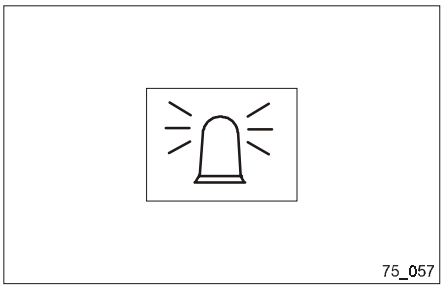
(11) Control lamp in the air conditioning switch (option)

The air conditioning switch with control lamp is only installed on machines which have been fitted with air conditioning. The control lamp shines blue when the air conditioning is switched on.

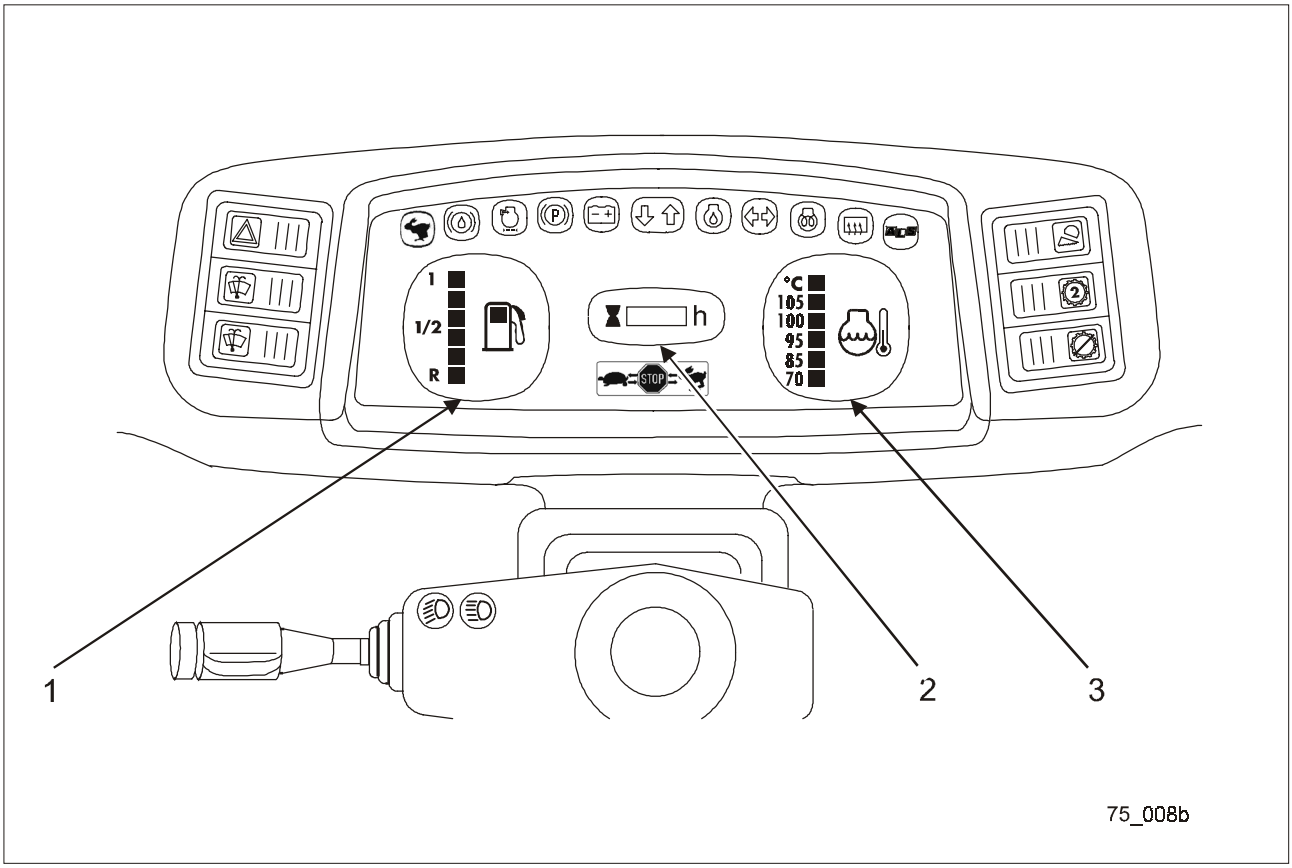


(12) Control lamp in the warning beacon switch (option)

The warning beacon switch with control lamp is only installed in machines which are provided with a warning beacon. The control lamp in the switch lights up in green when the warning beacon is switched on.

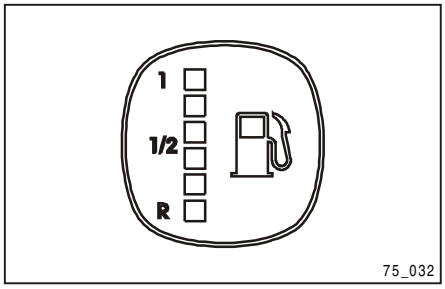


Measuring Indicators



(1) Fuel level indicator
(2) Operating hour meter
(3) Coolant temperature indicator

(1) Fuel level indicator

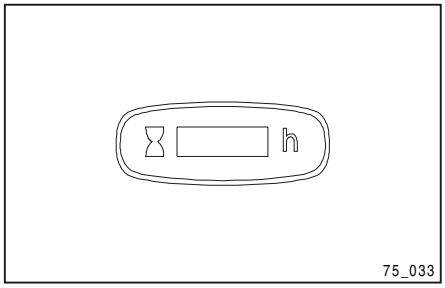


If you set the start switch to the ‘I’ operating position, the fuel gauge indicates the available fuel supply.

1: The tank is full
R: The tank is in the critical range

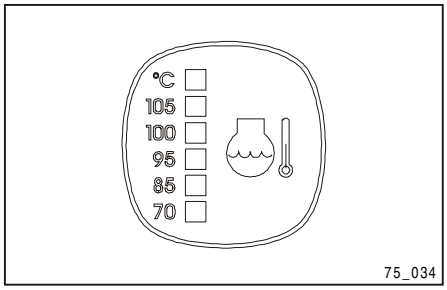
During operation, it is recommended to keep the fuel supply between ‘R’ and ‘1’. If only the lowest ‘R’ LED lights up, it is time to refill fuel. If there is no electric contact between the fuel gauge and the fuel level indicator, only the top LED lights up.

(2) Operating hour meter



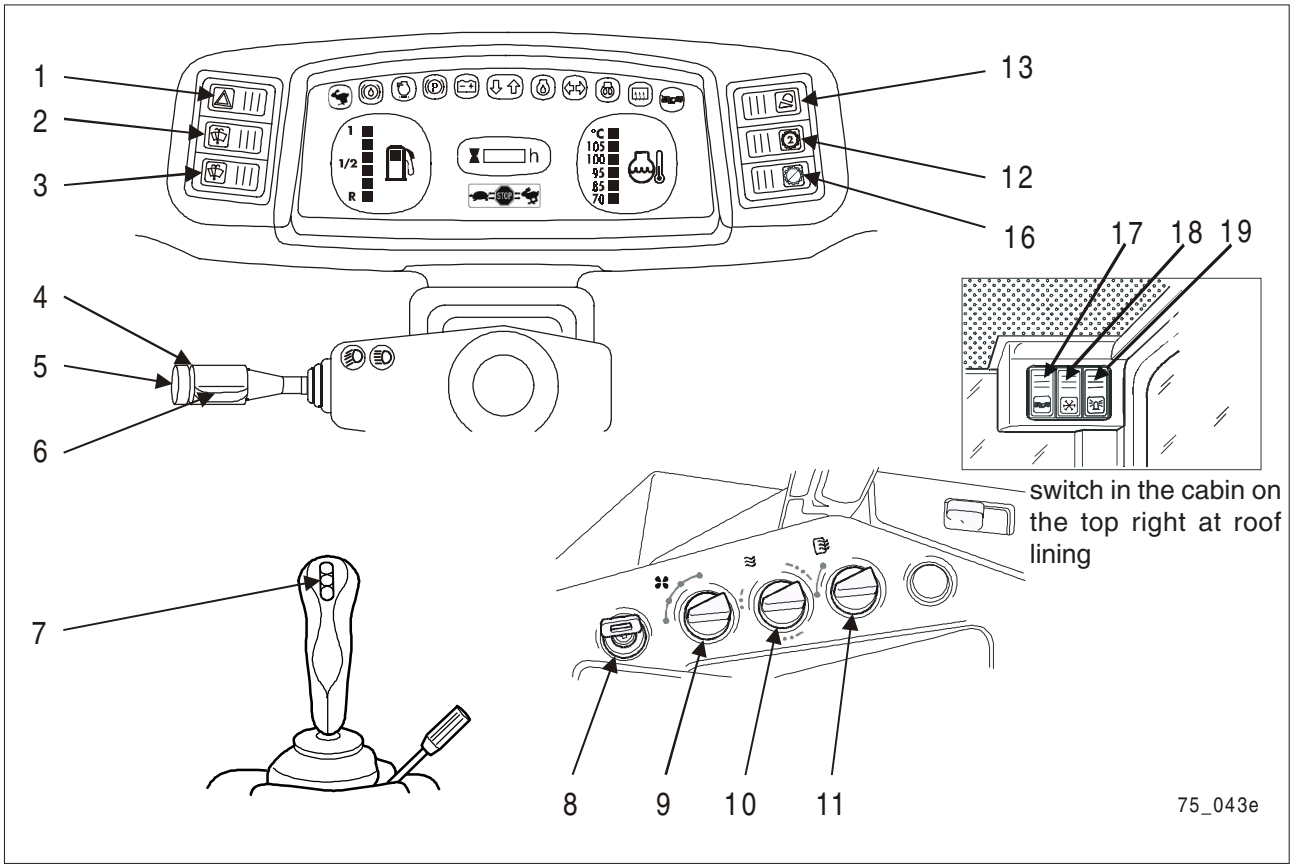
The operating hour meter indicates the total hours of operation. It only counts the hours with the engine running, no matter whether the machine is actually driving or not. If the operating hour meter is ON, the icon on top of the operating hour meter is flashing.

(3) Coolant temperature indicator



The coolant temperature indicator shows the temperature of the coolant. If you set the power switch to the ‘I’ position with the coolant being warmer than 70° C, the temperature indicator will show the current coolant temperature. If the temperature is normal during operation, the green range of the temperature indicator lights up. If the coolant is too hot, the top red LED of the temperature indicator starts to flash. At the same time, the acoustic warner starts to sound.
In this case, you must stop the machine and let the engine run idle at medium speed until the indicator returns to the green range. Proceed as described in chapter "Faults“. If there is no electric contact applied to the sensor, only the top LED lights up.

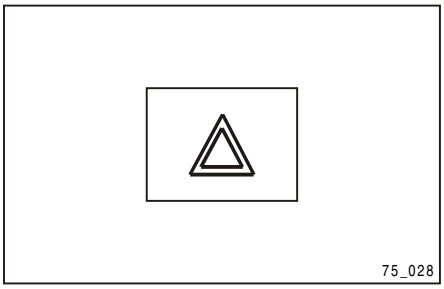
Switches



(1) Switch and control lamp of hazard flashers
(2) Switch of front windscreen wiper and washer
(3) Switch of rear windscreen wiper and washer
(4) Direction indicator lever
(5) Horn button
(6) Light switch
(7) Driving direction switch
(8) Start switch
(9) Fan rotary switch, for ventilation and heating
(10) Heating temperature switch
(11) Heated rear windscreen switch
(12) Switch and control lamp for driving range up to 20 km/h
(13) Working lights switch and control lamp
(14) Switch for inside lighting (without fig.)
(15) Battery main switch (option, without fig.)
(16) High-speed gear switch with control lamp (option)
(17) ALS-Electronics switch with control lamp (option)
(18) Air conditioning switch with control lamp (option)
(19) Warning beacon switch with control lamp (option)

(1) Hazard flasher switch

This switch is used to switch on/off the hazard flasher.



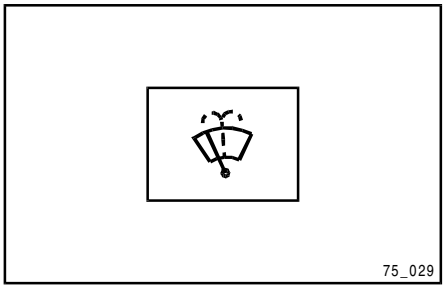
NOTE

You may switch on the hazard flasher only in an emergency situation.

If you switch on the hazard flasher, all direction indicators of the machine will start to flash. At the same time, the control lamp of the hazard flasher switch and the direction indicator control lamp start to flash.

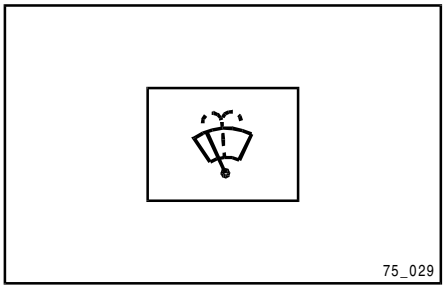
(2) Switch of front windscreen wiper and washer

This switch is used to switch on/off the front windscreen wiper and washer. The switch has two switching stages:
Switching stage 1 locks in permanently and is used to switch on/off the windscreen wiper.
If you hold the switch pressed in switching stage 2, the windscreen washer is only operated for the time you keep the switch pressed.



(3) Switch of rear windscreen wiper and washer

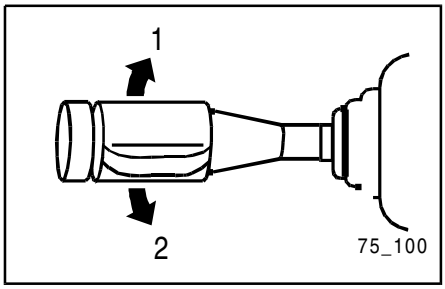
This switch is used to switch on/off the rear windscreen wiper and washer. The switch has two switching stages:
Switching stage 1 locks in permanently and is used to switch on/off the windscreen wiper.
If you hold the switch pressed in switching stage 2, the windscreen washer is only operated for the time you keep the switch pressed.



(4) Direction indicator lever

The direction indicator lever is used to switch on/off the direction indicators.

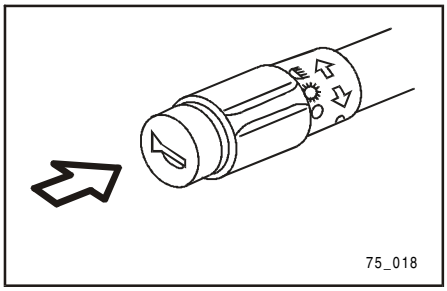
Switching on the right direction indicators:	Press direction indicator lever to the front (‘1’)
Switching on the left direction indicators:	Draw direction indicator lever to the back (‘2’)



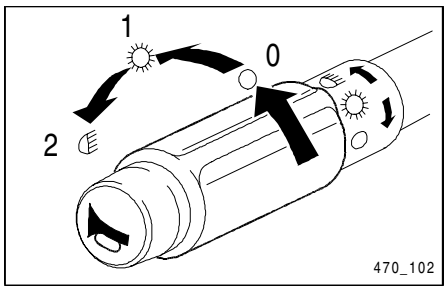
After you have passed the bend, the direction indicator lever automatically returns to its home position and the direction indicator will be switched off.

(5) Horn button

The horn sounds when you press the horn button.



(6) Light switch

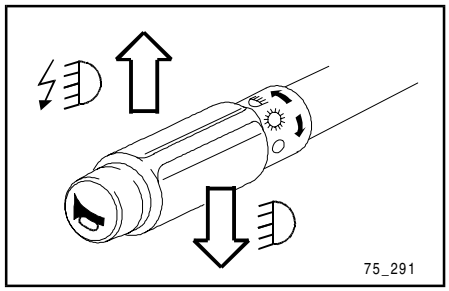


The light switch is used to switch on/off the main headlights, the side lamps and the taillights.

Switching off the lights
Switch in ‘0’ position

Switching on the parking light
Turn the light switch to the front until it reaches position ‘1’. The side lamps and the taillights light up.

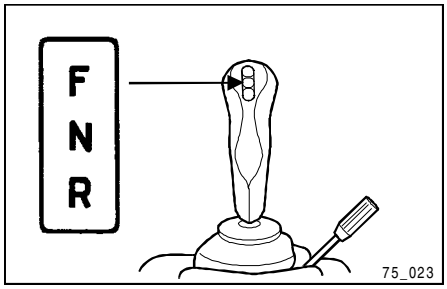
Switching on the low beam
Continue to turn the light switch until it reaches position ‘2’. All lights which were already switched on in position ‘1’ (parking light) remain lit. In addition, the low beam is switched on. The low beam control lamp lights up.



How to flash one’s lights (high beam)
In order to flash your lights, you need to draw the lever briefly in the direction of the steering wheel. The high beam is only switched on as long as you draw the lever. The high beam control lamp will also light up for that time.

Switching on the high beam
In order to switch on the high beam you must press the lever completely down. In this position the lever locks in and the high beam control lamp lights up.

(7) Driving direction switch



You can change the driving direction of the machine with the driving direction switch.

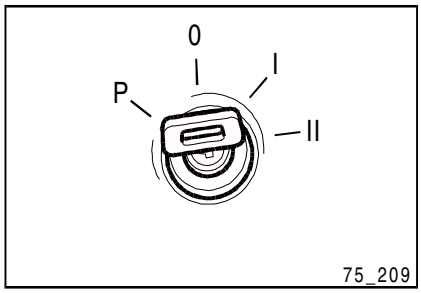
Position ‘F’: Forward driving
Position ‘N’: Neutral position
Position ‘R’: Reverse driving

NOTE:

You can only start the engine if the driving direction switch is switched to the neutral position ‘N’.

(8) Start switch

You can start and switch off the engine with the start switch.



'0'': Stop position
In this position, the engine is switched off, permitting you to remove the ignition key. All functional circuits are interrupted in the stop position.

'I': Operating position
The control lamps light up in the operating position 'I' and the air preheater is in operation. All functional circuits are activated. The ignition key remains in this position with the engine running.

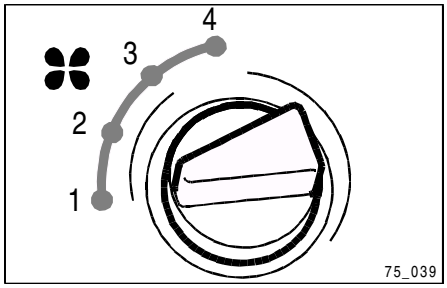
'II': Start position
In start position 'II', the engine starts.

IMPORTANT

You may only start the engine, if the driving direction switch is set to the neutral position 'N'.

(9) Fan rotary switch for ventilation and heating

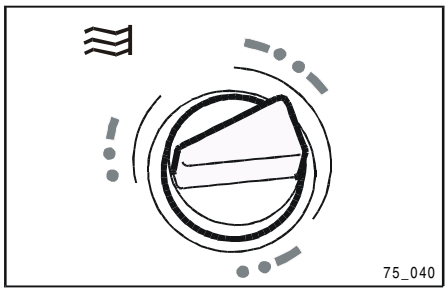
This rotary switch permits to regulate the fan step by step.



Switch setting 1: Fan off
Switch setting 2: Low air flow
Switch setting 3: Medium air flow
Switch setting 4: High air flow

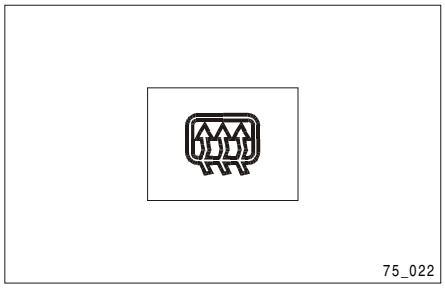
(10) Temperature rotary switch

The temperature rotary switch permits to adjust continuously the capacity of the heating system from 'cold' (heating OFF) to 'warm'.



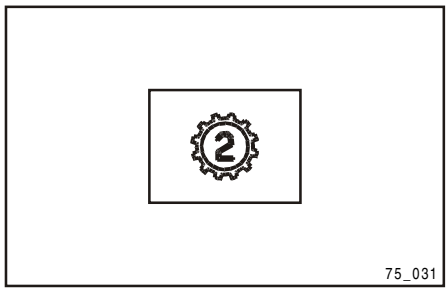
(11) Heated rear windscreen switch

This rotary switch is used to switch on/off the heated rear windscreen.



(12) Switch for driving range up to 20 km/h

This switch is used to change between the machine's two speed ranges. If you operate the switch, the machine will drive in speed range 2 (up to 20 km/h). If the switch is set to OFF, the machine drives in speed range 1 (up to 7.5 km/h).

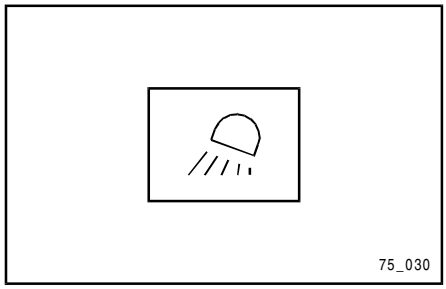


(13) Working lights switch

CAUTION

The front working lights may blind oncoming traffic!
Before driving on public roads, turn off the working lights.

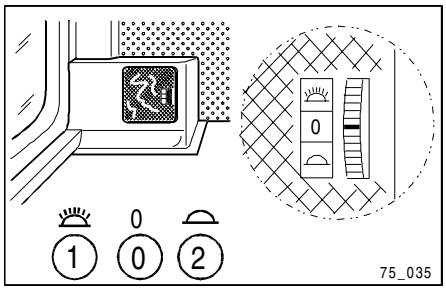
This switch is used to switch on/off the working lights.



(14) Switch for inside lighting

The inside lighting has three different switch settings:

Switch setting 1: Steady light
Switch setting 0: Off
Switch setting 2: Steady light



NOTE

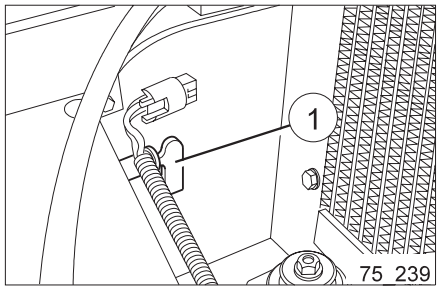
You can also switch on the inside lighting, if the start switch is in stop position '0'. For this reason, switch off the inside lighting before you leave the driver's cab.

(15) Battery main switch (option)

NOTE

Do not operate the battery main switch with the engine running!

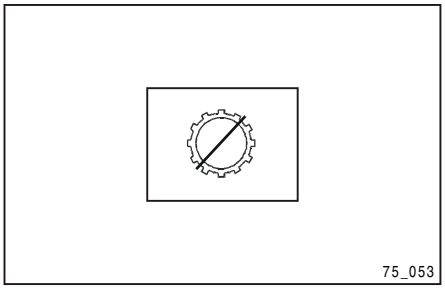
The battery main switch (1) disconnects the power supply of the machine's electrical system. The switch is situated next to the battery in the rear section of the machine.



If the machine is to be taken out of service for a longer time, you must switch off the battery main switch and remove the ignition key.

(16) High-speed gear switch with control lamp (option)

The high-speed gear switch is a feature of machines from the “high-speed version” series.
This switch is used to change between the machine’s standard speed ranges and the high-speed gear. If you switch on the high-speed gear, the control lamp in the switch goes out and the machine can be driven up to a speed of 30 k.p.h. in the high-speed gear. If the high-speed gear is switched off, the control lamp lights up in the switch and the machine can be driven up to a speed of 20km/h. in the standard speed-range.

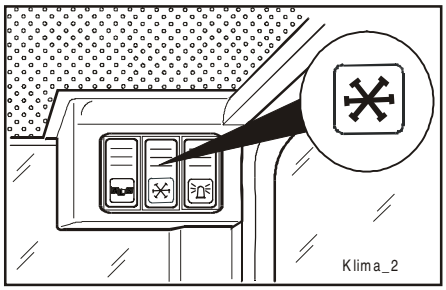


(17) ALS-Electronics switch with control lamp (option)

The ALS-Electronics switch is only installed in machines which are provided with ALS-Electronics.
If you switch on the ALS-Electronics with this switch, the green control lamp lights up in this switch. If the machine drives faster than 5 k.m.h., the ALS-Electronics is automatically activated and the ALS-Electronics control lamp lights up on the instrument panel. If the machine drives slower than 5 k.m.h., the ALS-Electronics is switched off and the control lamp on the instrument panel goes out. However, the control lamp in the ALS-Electronics switch remains lit in green.

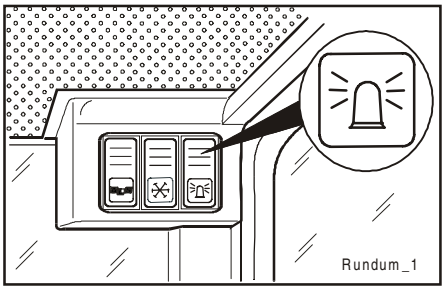
(18) Air conditioning switch with control lamp (option)

The air conditioning switch with control lamp is only installed on machines which have been fitted with air conditioning.
If you turn the air conditioning and the blowers on with this switch, the control lamp shines blue and the air conditioning is in operation. If the blowers are switched off, the blue control lamp in the switch goes out and the air conditioning is no longer in operation.

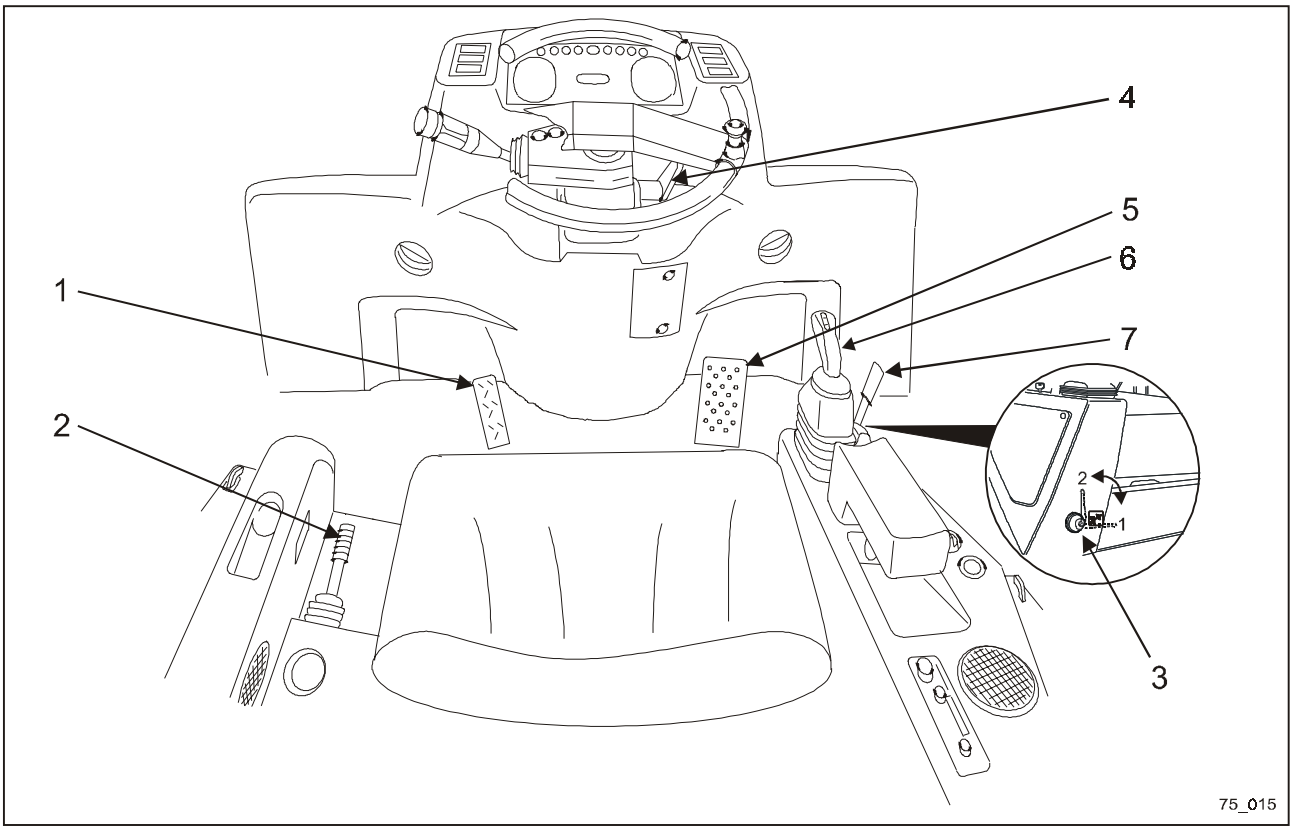


(19) Warning beacon switch with control lamp (option)

The warning beacon switch is only installed in machines which are provided with a warning beacon. If you switch on the warning beacon, the green control lamp in the switch lights up.

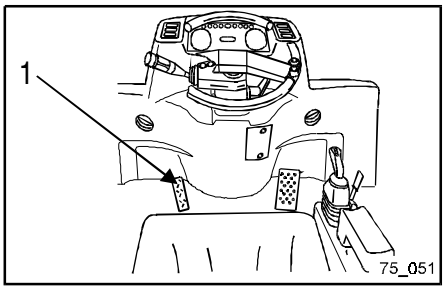


Control Levers, Pedals



(1) Brake pedal
(2) Parking brake
(3) Safety lever for the work hydraulic system
(4) Steering column adjustment
(5) Accelerator pedal
(6) Multifunctional lever
(7) Control lever for special equipment
(8) Switching lever for bucket (without fig.)

(1) Brake pedal

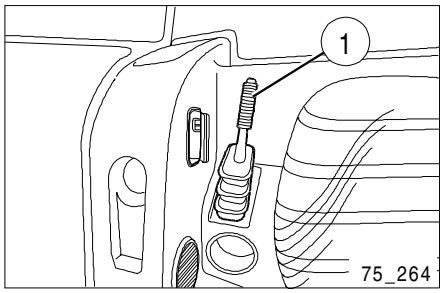


ATTENTION

- **If you are driving downhill, let the engine run and use the braking effect of the engine. If required, brake additionally using the brake pedal.**
- **Danger of accidents due to unintentional braking! Do not use the brake pedal as a foot rest.**

The brake is operated via a combined brake/inch pedal. The brake has an effect on the two multi-disk brakes in the rear axle. The inching exerts an additional braking effect on the hydrostatic drive system.

(2) Parking brake

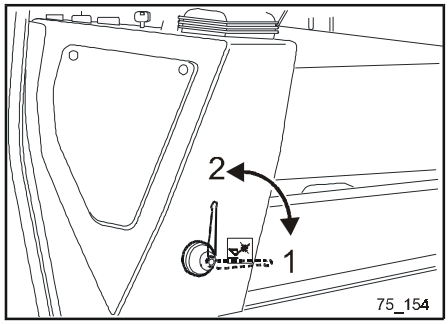


The parking brake is a mechanical device for operating the two multi-disk brakes in the rear axle.
As soon as you pull the parking brake lever from its normal position, the braking action comes into effect. If the start switch is set to the ‘I’ operating position, the parking brake warning light lights up in the instrument panel. The machine will drive again, if you re-loosen the parking brake.

IMPORTANT

You cannot start the machine with the parking brake being applied. If you set the driving direction switch to the ‘F’ position (forward driving) or ‘’R’’ (reversing) with the parking brake still being applied, the alarm buzzer will sound.

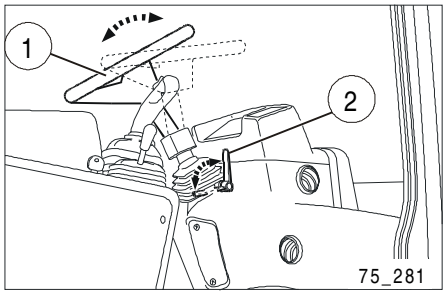
(3) Safety lever for the work hydraulic system



The safety lever for the work hydraulic system protects the work hydraulic system against unintentional activation. Before driving on streets or beginning maintenance operations, it is required to block the work hydraulic system with this safety lever.

Position '1': boom secured
Position '2': Operating position

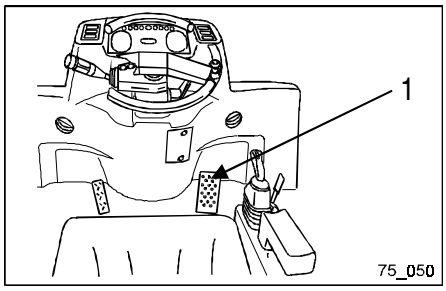
(4) Steering column adjustment



The lever for adjusting the steering column position permits to incline the steering column smoothly in two directions (front or back). The adjustment range is 125 mm.
Proceed as described in chapter "Settings Before Start-Up“.

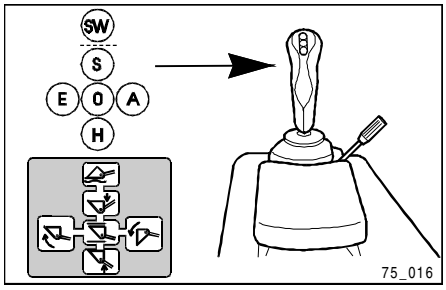
(5) Accelerator pedal

The accelerator pedal regulates the speed (r.p.m.) and performance of the engine.



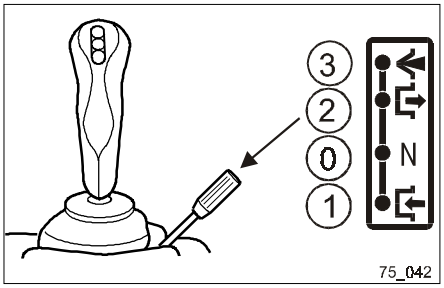
(6) Multifunctional lever for the work hydraulic system

The work unit is operated with the multifunctional lever. The multifunctional lever has 6 positions which control the work unit as follows:



SW	Float		The multifunctional lever is locked in this position. The floating position is provided for planing operations (removing subsoil). In this switch position, the work unit is lowered by its own weight, and can be freely operated by external parties.
S	Lower		The boom is lowered in this position. If the engine is switched off, you can lower the boom in this position.
0	Hold		The boom is held in position.
H	Raise		The boom is raised in position.
E	Tilt		In this position, the bucket is tilted.
A	Dump		In this position, the bucket is dumped.

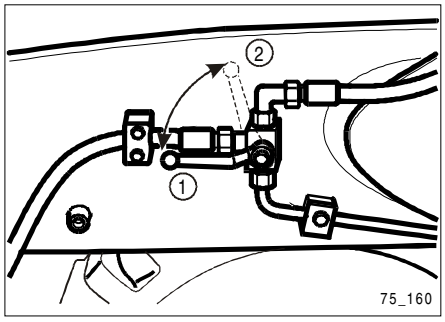
(7) Control lever for special equipment



The control lever for special equipment has three switch settings whose functions depend on the type of the used special equipment.

If the standard bucket, the light-weight material bucket or the forklift truck attachment is attached to the quick-change unit, the control lever for special equipment provides the following functions:

Position '1': Locking pins for work unit are drawn in
Position '0': Neutral position (locking pins are drawn in; you can pick up the work unit in this position)
Position '2': Locking pins for work unit are extended



If the multi-purpose bucket is attached to the quick-change unit, the control lever has the functional assignment described above. If the switching lever for the bucket is in position ‘1’, the multi-purpose bucket is active. You can then operate the multi-purpose bucket via the control lever for special equipment. It then has the following functions:

Position '1': Close multi-purpose bucket
Position '0': Neutral position
Position '2': Open multi-purpose bucket

If you use attachments requiring a steady oil flow (e.g. brush, snow remover), the control lever has the following functions:

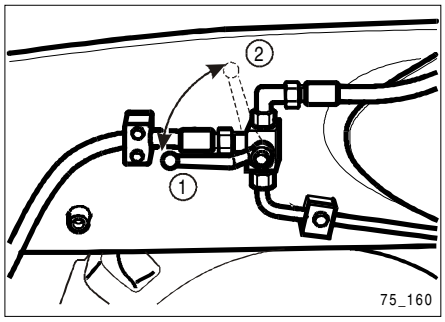
Position '1': Work unit turns backwards
Position '0': Neutral position
Position '2': Work unit turns forward
Position '3': Work unit turns forward in permanent operation (locks in)

For permanent operation, you must set the control lever to position ‘3’. The control lever locks in this position.

NOTE

Without connected special equipment, you must not set the control lever for special equipment to switch settings ‘1’, ‘2’ or ‘3’. If you do not heed this note, the work hydraulic system will operate in order to counteract overpressure thus unnecessarily heating up the oil.

(8) Switching lever of bucket

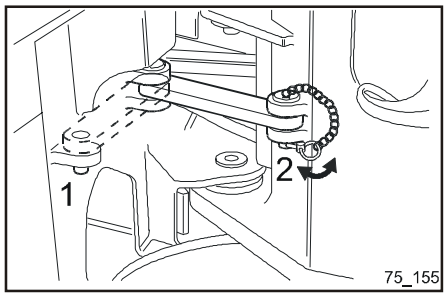


If you have the multi-purpose bucket attached to the machine, you can use this switching lever to change the function assignment of the control lever for special equipment (see "(7) Control lever for special equipment“).

Position '1': the control lever for special equipment operates the multi-purpose bucket.
Position '2': the control lever for special equipment operates the quick-change unit.

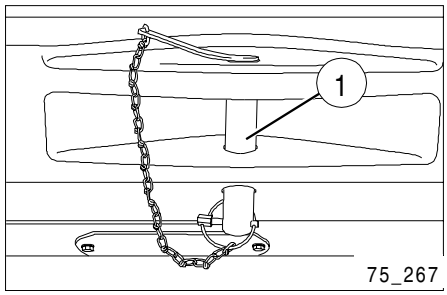
Articulated Steering Catch

The articulated steering catch is used to join rigidly the front and rear part of the machine, thus preventing the articulated steering from bending. You must block the articulated steering before the machine is hoisted or before repairs or maintenance operations are being performed.



Traction Device

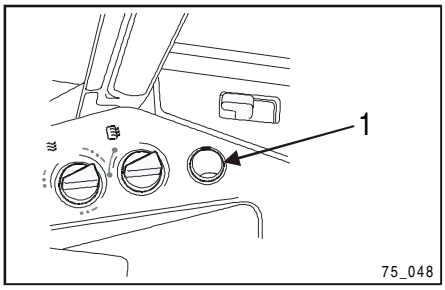
You can use the traction device (hitch) to tow off, e.g., another machine or trailer. You must also fix the machine at the tie bolt during transport. Always secure the bolt of the traction device, which is fixed to a chain, with the spring bolt.



Socket

CAUTION

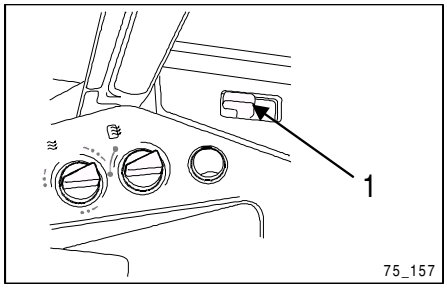
Danger of accidents!
Electrical devices may interfere with the on-board electronics.
For this reason, connect only the working lamp to the socket.



You may connect a working lamp to the socket (1).

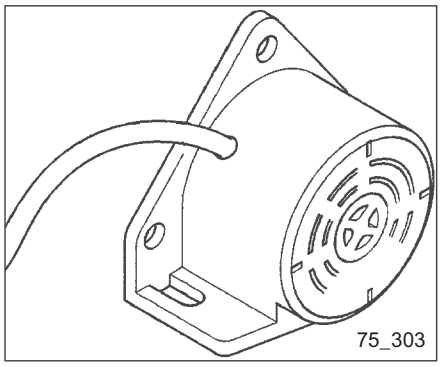
Door Unlocking System

Both doors have a locking mechanism which locks in if you open the door completely, preventing that the door closes while driving. In order to be able to re-close the door, you must draw the respective door unlocking system (1) to the back.



Alarm Horn for Reverse Driving (Option)

The horn sounds if you have set the driving direction switch to the reverse/ backwards position.



Operation

Running in the Machine

Before the shipment, each machine was carefully checked and adjusted. A machine that is to be newly commissioned has to be treated with utmost care during its first 100 operating hours. If the machine is used for work involving loads exceeding the specified maximum load for the running-in period, its performance may be impaired prematurely and its service life may be shortened. A new machine must be run in and maintained very carefully and thoroughly. The following points are particularly important:

- After the engine has been started, it must run in idle for 5 minutes.
- Operation with heavy loads or at high speeds is to be avoided.
- Sudden starts, sudden acceleration, jerky steering and stopping is to be avoided; this does not apply to emergency situations.

Note that particular maintenance measures apply only to a machine during its running-in period (see chapter "Maintenance During Running-In“).

Preparing the Machine Start

Visual Checks (also refer to chapter "Maintenance Prior to Machine Start")

WARNING

Danger of fire! Oil or fuel leaking out or accumulated combustible materials may catch fire at hot parts of the machine, e.g. the exhaust!
Prior to starting the machine, check the oil and fuel lines for leaks and immediately repair any leaks. Store combustible material in a safe place.

Before you start the engine

Check that there are no loose nuts or screws lying around the machine. Check that neither oil, nor fuel nor coolant are leaking out. Check the condition of the work unit and the hydraulic system. Check that there are no loose cables and accumulated dirt. Remove accumulated dirt and eliminate faults.

Before starting working with the machine

Perform daily the following measures:

1. **Check work unit**
   Check work unit, cylinder, connecting rods, and hoses for cracks, premature wear and tear, and play. Repair damaged parts.

2. **Remove dirt and dust**
   Check the area around the engine and the radiator for accumulated dirt or dust. Additionally check whether combustible material has accumulated near the battery or near hot parts of the machine, e.g. the exhaust. Remove completely any accumulated dirt or dust.

3. **Check engine and cooling system**
   Check that there is no oil leaking out of the engine and that the cooling system and the fuel supply system are not leaking. Repair damaged parts.

4. **Check the gear unit, axles, hydraulic tank and hoses and the connecting points**
   Check whether oil is leaking out of the gear unit, axles, hydraulic tank and hoses, and connecting points Repair damaged parts.

5. **Check brake hoses**
   Check that there is no oil leaking out at the brake hoses. Repair damaged parts.

6. **Check wheels**
   Check the tyres for cracks, damages and wear and tear. Check the wheel rims and lock rings for cracks, damage, and wear and tear. Tighten loose wheel nuts. Repair damaged parts. Replace missing valve caps.

.

7. **Check handrails**
   Check handrails for damage and loose screws. Repair damaged parts and tighten loose screws.

8. **Check measuring and control indicators**
   Check measuring and control indicators for damage and loose screw connections. Replace defective parts. Remove dirt from surfaces.

9. **Check air filter**
   Check the fastening screws of the air filter. Tighten loose screws.

10. **Check battery terminals**
    Tighten loose battery terminals.

11. **Check safety belt**

WARNING

After extreme load of the seat belt, e.g. strong brake or roll-over of the machine, the seat belt must be renewed.

Check the belt, the brackets and the buckle of the seat belt.
If the bellt, the brackes or the buckle of the seat belt are damaged, the seat belt must be renewed.
Check the tightening screws of the brackets for tightness.
Tight loose screws. Tightening torque: 25-30 Nm.

12. **Check ROPS**
    Check whether screws are loose or damaged. Have loose screws tightened and damaged screws replaced by a Komatsu-dealer. Loose screws must only be tightened with the specified tightening torque. Damaged screws must only be replaced by original parts.

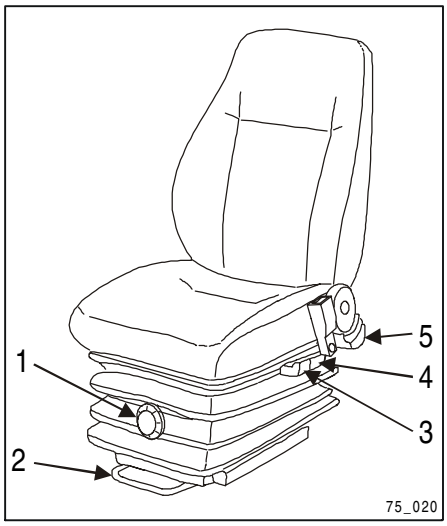
13. **Check cab windows**
    Prior to start of work, clean the cab windows.

14. **Perform the operations indicated under "Maintenance Prior to Machine Start".**
    (See maintenance schedule in section 3).

Adjustments Prior to Machine Start

Adjusting the Driver's Seat

After each change of the driver, newly adjust the driver's seat. Before you start operation, check that the seat is adjusted in such a way that you can fully floor the brake pedal when you lean against the backrest. Proceed as follows to adjust the seat according to your requirements:



(1) Weight adjustment

Turn the handwheel (1) to set the vibration absorbing system to the weight of the driver.

(2) Adjustment of horizontal position

To adjust the horizontal seating position, pull the lever (2) and slide the seat forward or backward. To lock the position of the seat, release the lever again.

(3/4) Adjusting height and angle of inclination

You may adjust the height and the angle of inclination of the driver's seat with the spring-supported levers (3) and (4). Use lever (3) to set the front part of the seat, use lever (4) to set the rear part of the seat.

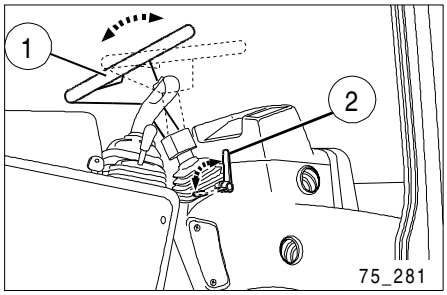
Adjusting the seat's height
Adjust the front and the rear section of the seat uniformly.
For this purpose, pull lever (3) and hold it in this position. To lift up the front part of the seat, it is necessary to relieve your weight from the front section of the seat cushion by standing up. Then, sit down on the front part in order to press down the front section of the seat. Release the lever if you have reached the right position. The seat is now locked in its position.
Then, pull lever (4) and hold it in this position. To lift up the rear part of the seat, it is necessary to relieve your weight from the rear section of the seat cushion by standing up. Then, sit down on the rear part in order to press down the rear section of the seat. Release the lever if you have reached the right position. The seat is now locked in its position.

Adjusting the angle of inclination of the seat
Adjust the front and rear section of the seat with different settings. Proceed as described above.

(5) Adjusting the backrest

To adjust the position of the backrest, slightly lean against the backrest, pull lever (5) and hold it in this position. Relieve the backrest in order to bend it to the front. Press it to the back in order to bend it to the back. Release lever (5) if the backrest is in the desired position. The backrest will lock in automatically in this position.

Adjusting the Steering Column



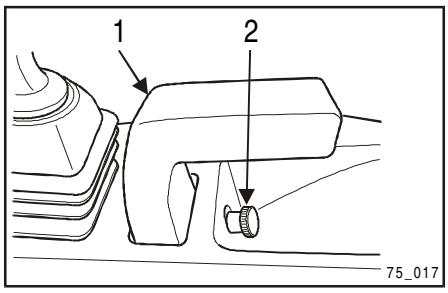
WARNING

Do not change the angle of inclination of the steering column while you are driving, since this may lead to severe accidents! Stop the machine, before you change the angle of inclination of the steering column.

You may use this lever for continuous adjustment of the steering column's (1) angle of inclination. (Adjustment range 125 mm)
Proceed as follows:

1. Push down the locking lever.
2. Adjust it in such a way that you can reach the steering wheel from a comfortable seating position while at the same time having an optimum view of the work unit. Hold the steering wheel in this position.
3. Pull up the locking lever again to lock the steering column in this position.

Adjusting the Armrest



Proceed as follows to adjust the height of the armrest (1):

1. Loosen the screw (2).
2. Either pull out or push back the armrest to reach the multifunctional lever. Your forearm should rest on the armrest at an angle of 90° to your upper arm.
3. Re-tighten the screw.

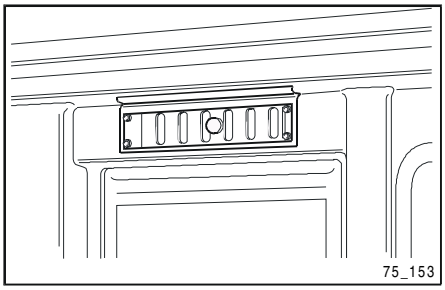
Adjusting the Rear-View Mirrors

Sit down on the driver's seat and adjust the rear-view mirrors to their required positions. You should be able to view the traffic coming from behind without having to change your seating position.

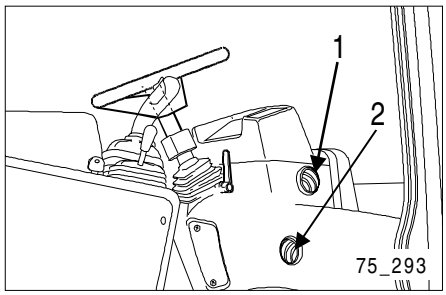
Adjusting the Heating and Ventilation System

Adjusting the ventilation system

When the ventilation system is operated, air is blown into the driver's cab. If the cabin is closed, a light overpressure is built up, preventing dust from outside to settle down in the cab. To increase the volume of filtered fresh air, you can open the ventilation grid a little.



The air is distributed via the air ventilation nozzles (1 and 2) on the left-hand and right-hand side of the steering column. You may open or close the nozzles individually. The exhaust direction can be varied using the diffusing disks. You can direct the air ventilation nozzles (1) onto the front windshield and the air ventilation nozzles (2) onto the side windows.

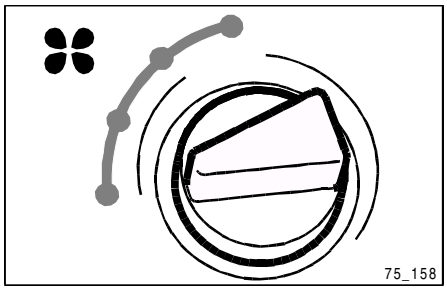


Adjusting the heating system

IMPORTANT

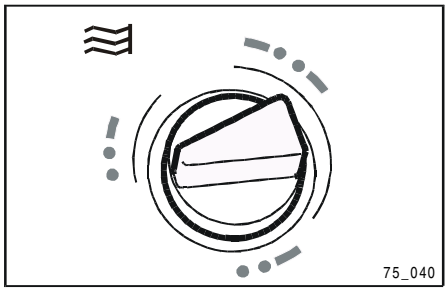
The heating capacity depends on the coolant temperature of the engine. Full heating capacity is only realised, if the engine is completely warmed up.

You can realise maximum heating inside the cabin, if you open all air ventilation nozzles, set the temperature rotary switch to maximum heating power while switching on the fan with its highest level.



You may realise a comfortable temperature, if you open all air ventilation nozzles, set the temperature rotary switch to a comfortable temperature and set the fan to an appropriately low air throughput.

To cool down the temperature inside the cabin, open all air ventilation nozzles, set the temperature rotary switch to position 'Cold' and set the fan to its highest level.



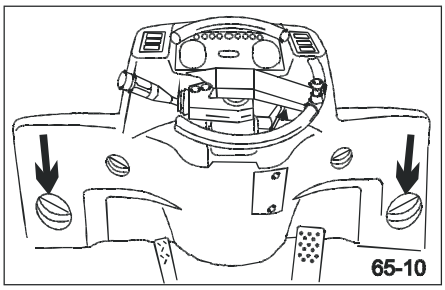
To prevent premature tiredness due to lack of oxygen, it is recommended to open the door a little from time to time and to lock it in this position. Optionally, you may leave open the ventilation grid above the side window.

Operating the Air Conditioning

NOTE

- **Only operate the air-conditioning with the engine running.**
- **Run the air-conditioning for at least 10 minutes every month irrespective of season. This prevents the compressor shaft seal from drying out.**

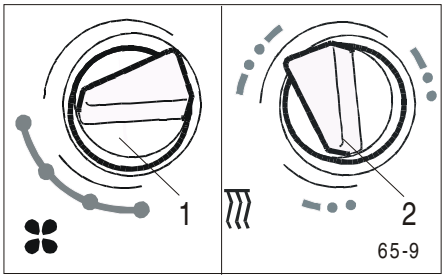
The windows and doors of the operator's cab must be closed when operating the air conditioning.
The circulating air jets (arrow) must be open.
We recommend ventilating the operator's cab thoroughly first when starting the machine and switching on the air conditioning if the machine has been standing in bright sunshine for any length of time.



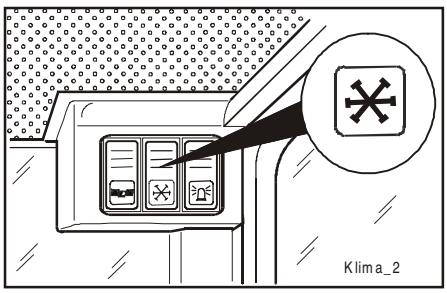
Switching on the air-conditioning

1. Turn the rotary switch (1) of the fan to position '4'.

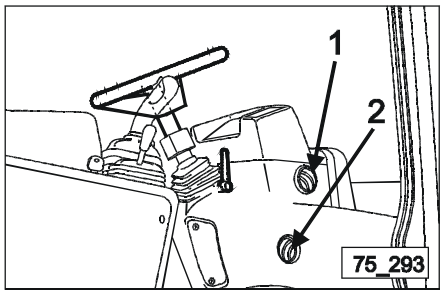
2. Set the temperature control lever (2) to 'cold'.



3. Press the switch for the air conditioning. The air conditioning system is now switched on and the control lamp in the switch shines blue. The greatest cooling effect is achieved with this setting, particularly if the engine is running at high revs. As soon as the required temperature has been reached, turn the blowers down by one stage and carry out any further adjustment of the temperature using the temperature control. The lowest blower setting can be used if only a low cooling effect is required.



4. The air is distributed via the air ventilation nozzles (1 and 2) on the left-hand and right-hand side of the steering column. You may open or close the nozzles individually. The exhaust direction can be varied using the diffusing disks. You can direct the air ventilation nozzles (1) onto the front windshield and the air ventilation nozzles (2) onto the side windows.



Putting on the Safety Belt

WARNING

- **Danger of injury! A damaged safety belt, a safety belt that has been stretched in an accident, or a safety belt the belt fixings or fastening screws of which have not been mounted correctly will not protect you sufficiently in case of accident! Replace the safety belt, if it is damaged, or if the machine has been involved in an accident. Check that the belt fixings and fastening screws are in perfect condition, before you put on the safety belt.**
- **If you have not put on the safety belt and are involved in an accident, this may lead to severe injuries!**
  Put on the safety belt, before you start work and do not take it off during work. Put on the safety belt in such a way that it is not twisted and fits tightly.

The machine is provided with a lap belt which is automatically rolling up. When pulled slowly, automatic belts ensure full freedom of action, but block immediately, if you suddenly brake or accelerate, or if you drive downhill or take corners.

Putting on the safety belt

1. Sit down on the driver's seat.
2. Slowly and continuously pull out the belt.
3. Insert the lock tongue into the lock socket until the lock engages.
4. Then, pull the belt to check whether or not the lock tongue is fully engaged.

   IMPORTANT

   The belt cannot be pulled out unless it is completely wound up.

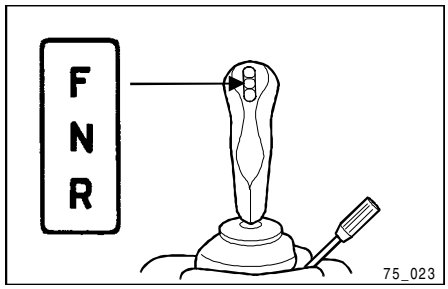
Taking off the safety belt

Press the orange button to release the lock of the safety belt and allow the belt to wind up.

Starting and Switching Off the Engine

Starting the Engine

1. Pull the parking brake lever.
2. Set the drive direction switch to its neutral position ‘N’.



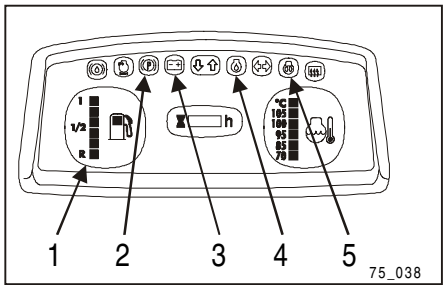
NOTE

You may only start the engine, if the driving direction switch is set to the neutral position 'N'.

CAUTION

Unintentional start-up of the engine may lead to severe accidents!
Before starting up the engine, make sure that there are no persons or obstacles near the engine. In addition, sound the horn before you start the engine.

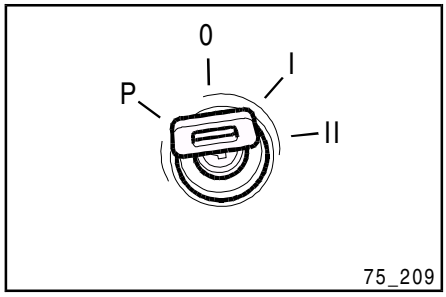
3. Turn the ignition key into the operating position ‘I’. The fuel supply (1) is indicated. The charging current (3) and engine oil-pressure (4) warning lights light up. The parking brake (2) warning light lights up, if the parking brake is pulled. The air preheater (5) control lamp lights up, if the air preheater is in operation.



IMPORTANT

The running period of the air preheater depends on the ambient temperature. If the ambient temperature is low, the preheating process may take more time.

4. Press down slightly the accelerator pedal.
5. If the control lamp of the air preheater has gone out, you can turn the ignition key to the start position ‘II’ in order to start up the engine.



NOTE

Do not operate the starter for longer than 15 seconds. If the engine does not start up, wait at least two minutes before trying a restart. If the engine does not start up after several tries, find out the cause using the information indicated in the chapter "Troubleshooting“.

6. Release the ignition key as soon as the engine started. It automatically returns to the operating position ‘I’.
7. Check whether all warning lights have gone out.

For starting up the engine in cold weather, see section: "Winter Operation“.

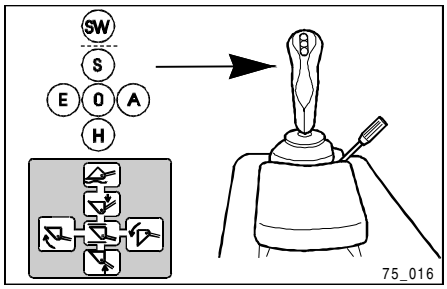
Warming up the engine

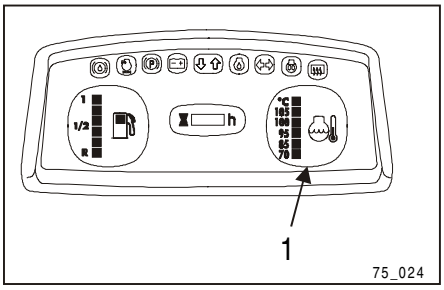
NOTE

- **You must not accelerate the engine abruptly before the warm-up phase is finished.**
- **Do not let the engine run idle for longer than 20 minutes at its lower or top speed. If it is necessary to let the engine run idle for a longer time, you must load the engine briefly from time to time or let it run at medium speed.**

Do not immediately begin with work after starting the engine. Prior to operation, perform the following preparations and checks:

1. Press down slightly the accelerator pedal and let the engine run without load at medium speed for approx. 5 minutes.
2. Proceed as follows in order to heat up the hydraulic oil at low ambient temperatures:
   Allow the engine to run consistently during the warm-up phase. For warming the hydraulic oil, reset the multi-function lever for the work hydraulic system in short intervals from position ‘0’ (holding) into position ‘E’ (tip-in position). Then reset it to its ‘0’ position. Make sure not to exceed the maximum time (10 seconds) permitted for the multi-function lever in the tip-in position.
3. While the engine is warming up, observe all measuring instruments and warning lights and eliminate immediately any fault.
4. Let the engine run with lightweight load further until the engine coolant temperature indicator (1) lights up in the green range.
5. Ensure that the exhaust gas colour is normal and that the exhaust pipe produces neither abnormal noises nor vibrations. Eliminate possible defects.



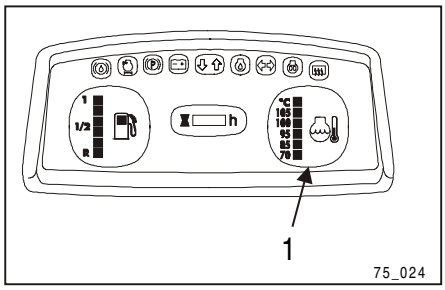


Switching Off the Engine

NOTE

If you switch off the engine abruptly after heavy operations without prior cool down period, the service life of the engine may be severely impaired. It is recommended to switch off the engine abruptly only in the event of an emergency.

1. Check the temperature of the engine with the help of the coolant temperature indicator (1).
2. If the engine is overheated, you must let it run at medium speed or 5 minutes before you switch it off, so that the engine can cool down sufficiently.
3. Lower the work unit.
4. Turn the ignition key into its stop position ‘0’ in order to switch off the engine.
5. Pull the key from the start switch.

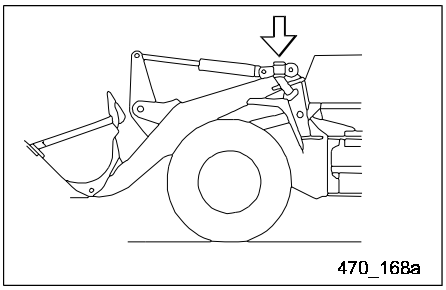


Driving

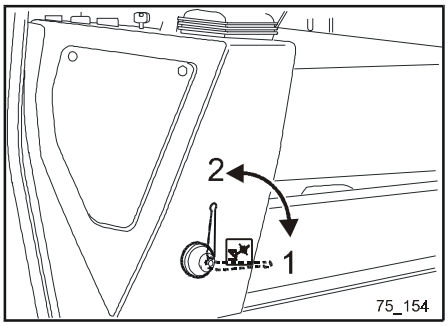
Start-Up

CAUTION

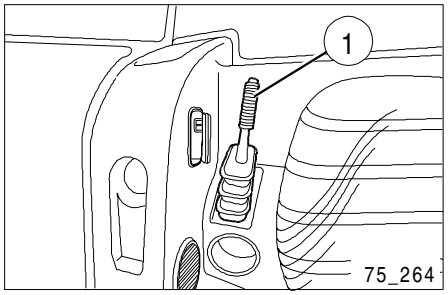
Careless driving may lead to accidents!
Before starting to drive, ensure that no persons are near the machine and sound the horn before you drive up.



1. Start up the engine as described in chapter "Starting up the engine".
2. Raise the work unit into its transport position. If the work unit is in transport position, the two red arrows of the transport position marking on the lifting cylinder are next to each other.
3. Turn the lock lever for the work unit to position '1'. The boom will then be blocked during rides on public roads and cannot be moved.
4. Press down the brake pedal and hold it in this position.



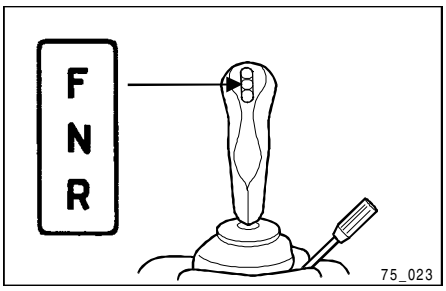
5. Release the parking brake. Press the celebration adjustment knob to this at the parking brake lever. Press down the locking button of the parking brake lever. The, release the locking button. The parking brake warning light goes out.



6. Set the drive direction switch to the desired direction setting.
   Position 'F' Driving forward
   Position 'N' Neutral
   Position 'R' Reversing

   NOTE

   If you set the drive direction switch in to forward or reverse driving, without having released the parking brake , the horn will sound.



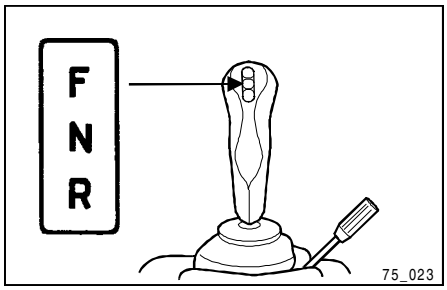
7. Release the brake pedal and press down the accelerator pedal at the same time in order to start the machine.

Starting the machine on slopes

CAUTION

Careless driving may lead to accidents!
Before starting up, ensure that no persons are near the machine and sound the horn before driving.

1. Start up the engine as described in chapter "Starting and switching off the engine“.
2. Make sure that the parking brake is pulled. The parking brake warning light lights up.
3. Press down the brake pedal.
4. Release the parking brake.
5. Set the drive direction switch to the desired direction setting.
   Position 'F' Driving forward
   Position 'N' Neutral
   Position 'R' Reversing
6. Press down the accelerator pedal and release slowly the brake pedal at the same time in order to start the machine.



Driving with the high-speed gear

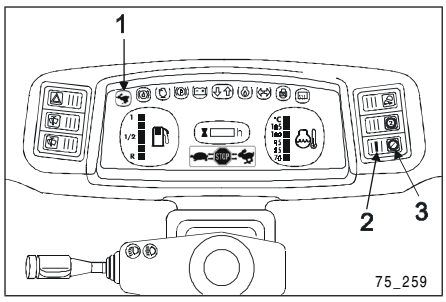
CAUTION

Switching the high-speed gear on or off during driving may lead to gearbox damages!
Ensure that the machine stands still and that the engine is running, before you switch the high-speed gear on or off.

Switching on the high-speed gear

Push the switch lock (2) to the right, hold it in this position and press the switch. If the high-speed gear is switched on, control lamp (3) goes out and control lamp (1) lights up.

If the high-speed gear should not engage, control lamp (1) remains unlit while control lamp (3) remains lit. In this case, repeat the switching procedure or activate briefly the control lever for the work hydraulic system.



Switching off the high-speed gear

Push the switch lock (2) to the right, hold it in this position and press the switch. If the high-speed gear is switched off, control lamp (1) goes out and control lamp (3) lights up.

If the high-speed gear should not disengage, control lamp (3) remains unlit while control lamp (1) remains lit. In this case, repeat the switching procedure or activate briefly the control lever for the work hydraulic system.

Changing the Driving Direction

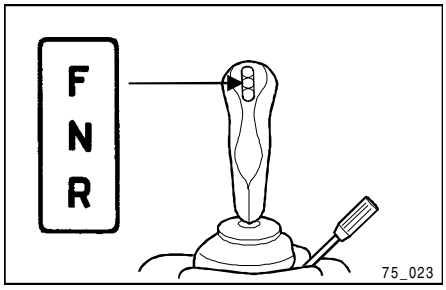
WARNING

Careless changes of the driving direction may cause severe accidents!
Before you change the driving direction from forward to reverse driving or vice versa, you must make sure that no persons or obstacles are in your way.

CAUTION

The engine may be damaged if you are driving at a high speed and then change abruptly from forward to reverse driving or vice versa!
Brake until the machine has nearly come to a standstill before you change the driving direction.

The drive direction switch is used to switch between forward and reverse gear or vice versa. The machine may still roll, if you change the driving direction.

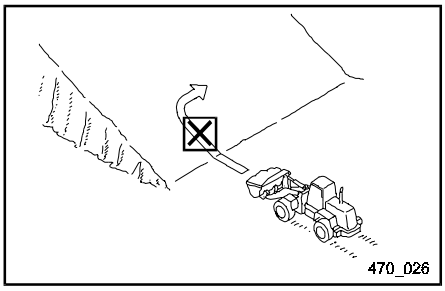


Position 'F' Driving forward
Position 'N' Neutral
Position 'R' Reversing

Reverse Driving

The machine can drive forward or backwards (reversing) at the same speed.
Before driving backwards, pay particularly that nobody is in your way. If necessary, rely on another person for aid. Sound the horn before starting to drive to make sure, that anybody who might be in your way is appropriately warned.
While driving backwards, turn your head into the driving direction. It is not sufficient to rely on the rear view mirrors.

Turning



NOTE

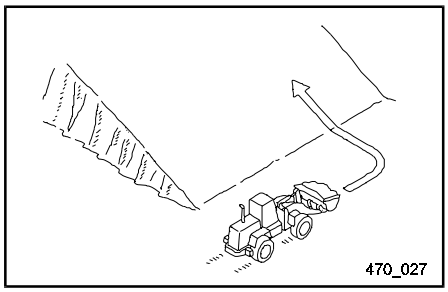
- **The machine may fall over if you turn abruptly at a high speed.**
- **If the machine is halted during the ride, the servo-assisted steering will be deactivated. You may then only proceed with steering the machine with considerably higher effort.**

Turning on slopes, dams or hills

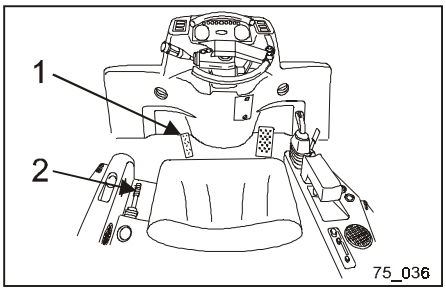
Keep sufficient distance to ridges and steep slopes. There is danger of the machine tipping over or sliding down on steep slopes, embankments, or hill flanks. The limiting values are defined in chapter "Limiting Values for Slopes“.

Do not turn on a slope or drive across a slope. Turn or cross the section only level ground. When driving on slopes, avoid driving on grass, fallen leaves, or steel plates. Driving sideways on these surfaces types may result in the machine sliding. Drive very slowly and carefully.

To keep the centre of gravity as low as possible when driving on slopes, embankments, and hill flanks, you must set the bucket to a position just above the ground (approx. 200 to 300 mm). In the event of an emergency, displace the bucket fast on the bottom in order to stabilise the engine.



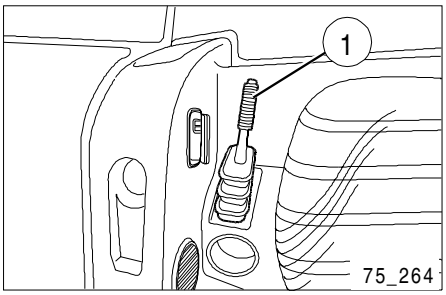
Braking



While driving, you may reduce your speed with the service brake (1). After the machine has stopped, you must secure it with the parking brake (2).

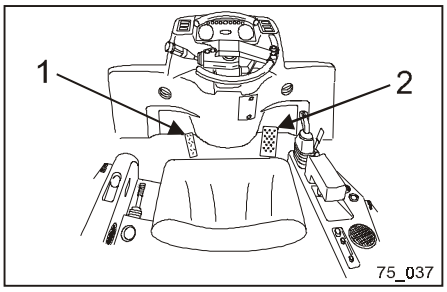
Pulling the parking brake

1. Press the locking button.
2. Pull up the parking brake lever.
3. Release the locking button. The control lamp of the parking brake lights up.



Releasing the parking brake

1. Lift up the parking brake lever a little.
2. Press the locking button.
3. Push the parking brake lever down.
4. Release the locking button. The control lamp of the parking brake goes out.



Braking with the service brake

If the braking delay is not sufficient by relieving the pressure from the accelerator pedal, you must brake the machine with the service brake. For this purpose, press down the brake pedal.
The service brake (1) can also be used to adapt the driving speed to the respective driving and operating situation (2), independent of the accelerator pedal position.
If it is required to press down the accelerator pedal completely, in order to be able to use the full-load output of the engine of the work hydraulic system, you can nevertheless use the brake pedal to reduce the speed of the machine or to stop it completely.

If the service brake breaks down

If the machine is not stopped after pressing down the brake pedal, you must use the parking brake.

Braking on slopes

CAUTION

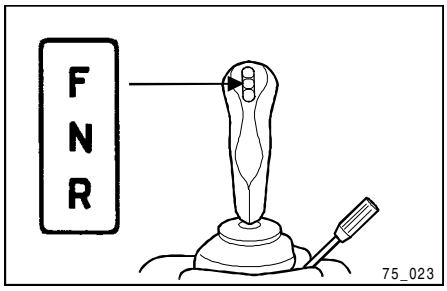
- **The service brake may overheat and be damaged while driving downhill!**
  Let the engine run while driving downhill. If required, brake in addition using the brake pedal.
- **Danger of accidents due to unintentional braking!**
  Do not use the brake pedal as a foot rest.

If you use the service brake too often while driving downhill, it may overheat and be damaged. You can avoid this by driving downhill in the lower speed range and by using the braking effect of the engine. (In the lower speed range the driving range switch will be switched off and the control lamp will go out.)

Stopping

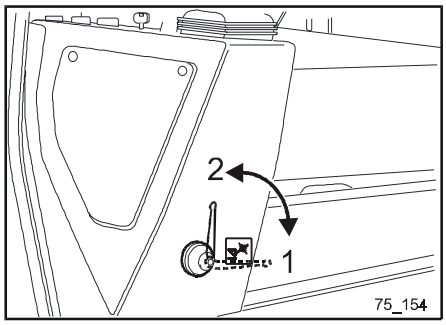
Avoid abrupt stopping. Proceed as follows, if you want to stop the machine:

1. Release the accelerator pedal and press down the brake pedal.
2. Set the drive direction switch into its neutral position ‘N’.
3. Apply the parking brake.
4. Lower the work unit onto the ground.



WARNING

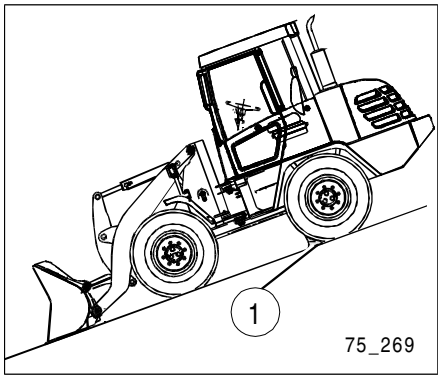
Unintentional activation of the multifunctional-lever or moving of the equipment may lead to accidents!
Before you leave the cab, turn the locking lever for the work hydraulic system into position ‘1’. As a result, the work hydraulic system is blocked.



5. Protect the work hydraulic system against unintentional activation by turning the locking lever of the work hydraulic system into position ‘1’.

Parking the machine on a slope

Whenever possible, stop the machine on level ground. If you have to park the machine on a slope, it is required that you park it in such a way that the front section (work unit) points downhill. Lower the work unit onto the ground. Block the wheels with wheel chocks (1).



Longer-Distance Driving

If the machine is driven over long routes at a high speed and without having adapted the tyre pressure, the tyres will become very hot. This leads to premature wear and tear of the tyres which should be avoided if possible. Adhere to the following instructions if you must drive the machine over a long distance:

- Perform all pre-start checks before starting to drive (see chapter "Preparing the Machine for the Start“).
- Fix supplementary hand tools before starting to drive.
- The required tyre pressure, the driving speed or the tyre type may vary depending on the condition or structure of the road o be used. Contact the responsible Komatsu trader or the tyre dealer to obtain the required information.
- The required tyre pressure can be found in the tyres and tyre pressure table in chapter "Maintenance Basics“.
- Check the tyre pressure with the tyres being cold before driving.
- Lower the work unit to its transport position and move it completely to its rear limit stop position.
- Always drive with empty bucket or empty forklift truck attachment.
- Adhere to the valid motor vehicle traffic regulations and drive very careful. Make sure that the working lights and the warning beacon are turned off while driving on public roads.
- Make a break of 30 minutes after driving for one hour. Check the tyres and all particularly strained parts during driving on public roads whether they are still fully functioning or damaged.

Operating the Machine

Selecting a work unit

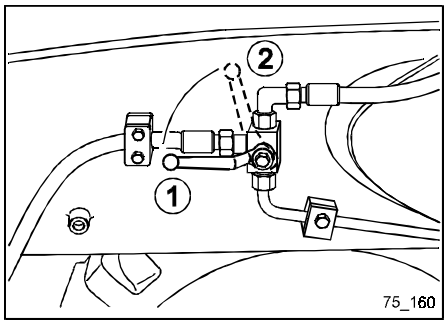
Refer to chapter "CE-Conforming Equipment“ for information on the work units registered.

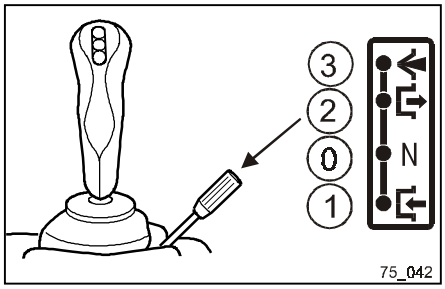
Picking up the work unit (except multi-purpose bucket)

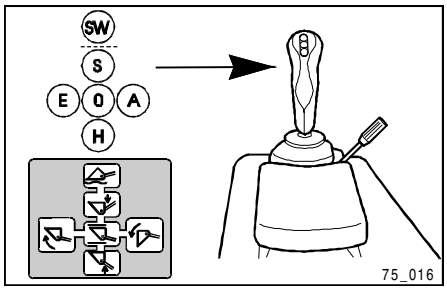
Connect the multi-purpose bucket as described in section "Picking up the multi-purpose bucket“, page 5-20.

1. Make sure that the change-over lever for the additional control unit is in position '2' (fig. 75_160).
2. Start the engine.
3. Unlock the quick-change unit by setting the control lever for special equipment into position ‘1’ (fig. 75_042).
4. Lift the boom a slightly by setting the multi-function lever into position ‘H’ (fig. 75_016).
5. Tilt the quick-change unit a slightly to the front by setting the multi-function lever into position ‘A’ (fig. 75_016)
6. Drive the machine to the work unit until the quick-change unit (1) is below the pickup hooks of the work unit. Then, lift the boom until the work unit catches the quick-change unit.
7. Tip in the quick-change unit until the work unit is connected to the limit stops on the the quick-change unit by setting the multi-function lever into position ‘E’ (fig. 75_016).
8. Lock the quick-change unit by setting the control lever for special equipment into position ‘2’ (fig. 75_042).

   The interlocking pins (2) will then be visible (fig. 75_280).



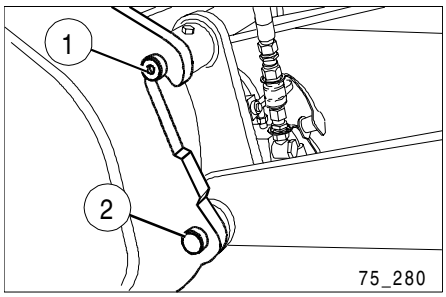




WARNING

If the work unit is not properly attached, it can suddenly fall down and cause severe accidents!
Carefully lift the work unit and check whether it is completely locked in by tipping it in and then dumping it.

9. Check whether the work unit is completely locked by tipping it in and then dumping it.



Removing the work unit

1. Lower the work unit onto level ground.
2. Unlock the quick-change unit by setting the control lever for special equipment into position ‘1’ (fig. 75_042).
3. Set the quick-change unit into the dumping position ‘A’ using the multi-function lever, until the quick-change unit is unhooked of the work unit's pickup hooks.
4. Make sure that nobody is behind the machine and drive the machine away from the work unit.

Picking up the multi-purpose bucket

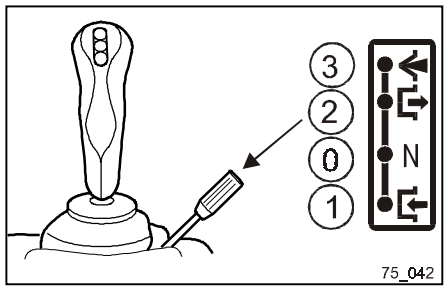
1. Set the change-over lever for the additional control unit into position '2' (fig. 75_160).
2. Start the engine.
3. Unlock the quick-change unit by setting the control lever for special equipment into position ‘1’ (fig. 75_042).
4. Lift the boom slightly, by setting the multi-function lever into position ‘H’ (fig. 75_016).
5. Tilt the quick-change unit slightly to the front by setting the multi-function lever into position ‘A’ (fig. 75_016)
6. Drive the machine to the work unit until the quick-change unit (1) is below the pickup hooks of the work unit. Then, lift the boom until the work unit catches the quick-change unit.
7. Tip in the quick-change unit until the work unit is connected to the limit stops on the the quick-change unit by setting the multi-function lever into position ‘E’ (fig. 75_016).
8. Lock the quick-change unit by setting the control lever for special equipment into position ‘2’ (fig. 75_042).
9. Switch off the engine.
10. Set the change-over lever for the supplementary control circuit in position ,1' to its limit stop (figure 75_160).
11. Set the control lever for special equipment to position ,1' (figure 75-_042).
12. Connect the hydraulic hoses of the multi-purpose bucket to the quick couplings (2) (figure 75_161) and (3) (figure 75_275).
13. Start the engine.
    You can now operate the multi-purpose bucket with the control lever for special equipment (figure 75_042).

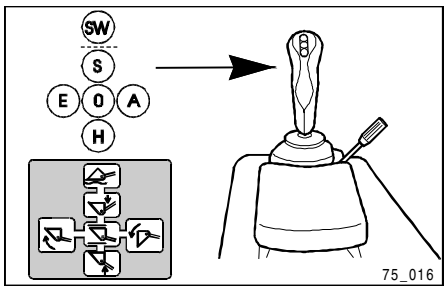
    Position '1': Close multi-purpose bucket
    Position '0'. Neutral position
    Position '2': Open multi-purpose bucket

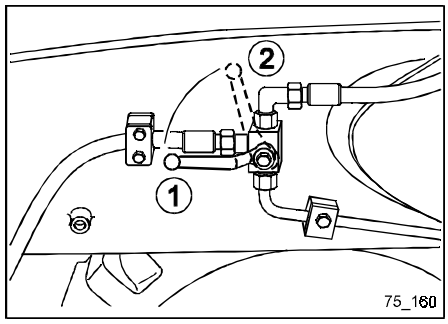
WARNING

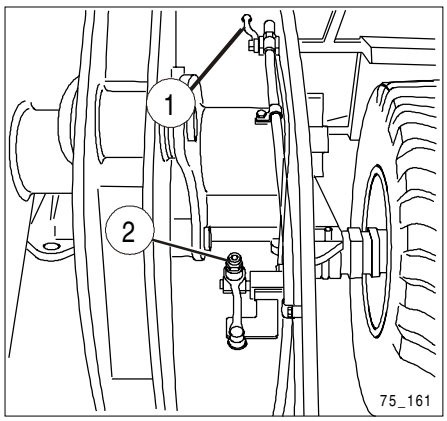
If the work unit is not properly attached, it can suddenly fall down and cause severe accidents.
Carefully lift the work unit and check whether it is completely locked in by slowly tipping it in and dumping it.

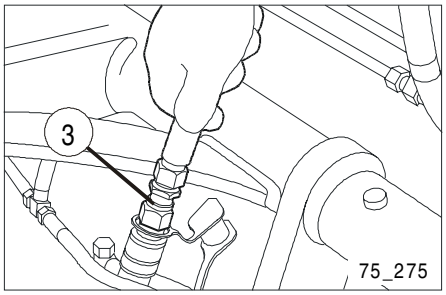
14. Check whether the work unit is completely locked by tipping it in and then dumping it.





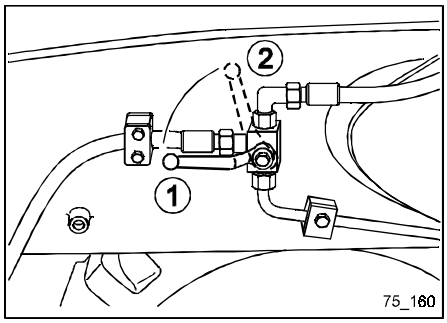


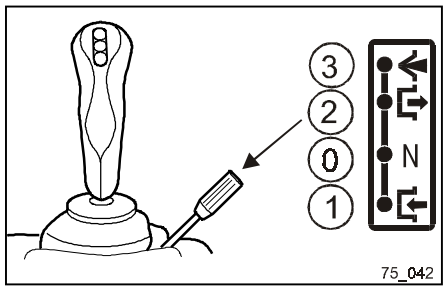


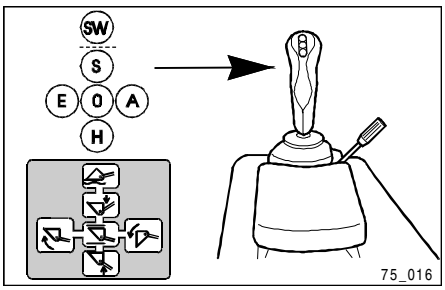


Removing the multi-purpose bucket

1. Lower the multi-purpose bucket onto level ground.
2. Switch off the engine.
3. Set the control lever for special equipment first to position ‘1’ and then to position ‘2’ (figure 75_042).
4. Turn the change-over lever for the supplementary control circuit to position ‘2’ until it reaches the limit stop (figure 75_160).
5. Disconnect the multi-purpose bucket hoses from the quick couplings.
6. Restart the engine.
7. Unlock the quick-change unit by setting the control lever for special equipment into position ‘1’ (fig. 75_042).
8. Set the quick-change unit into the dumping position ‘A’ (fig. 75_042) using the multi-function lever, until the quick-change unit is unhooked of the work unit's pickup hooks.
9. Make sure that nobody is behind the machine and drive the machine away from the work unit.



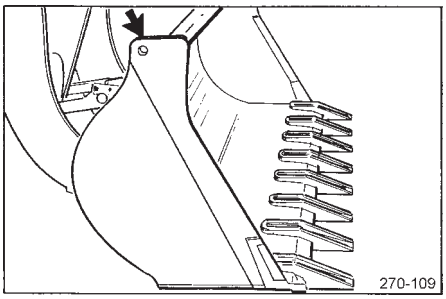




Tyre-Appropriate Operation

Removing heaps of loose soil or rock debris may cause premature wear and tear of the tyres due to cracks and small fissures. As a result, the service life of the tyres is reduced. Proceed as follows to avoid unnecessary wear and tear of the tyres:

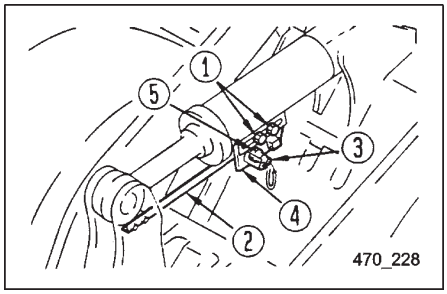
- Try to work on level ground and remove any rocks and large stones which are sticking out of the surface.
- Always drive in straight direction into the heap or slope. This ensures that you have always the largest intrusive force while reducing tyre wear and tear at the same time.
- For removing operations, lift the bucket as soon as you drive into the heap or slope. This procedure permits to increase the load of the front wheels, prevents slipway of the front wheels and reduces wear and tear of the tyres.
- Lower the bucket slowly onto the ground. If the bucket touches the ground too fast, the front wheels may be lifted from the ground, thus leading to premature wear and tear of the rear tyres.
- To prevent the front wheels from skidding, it is recommended to set the ground pressure of the front wheels as high as possible. Therefore, immediately lift the bucket a little after running into the heap or slope.



Level indicator for the bucket

On both sides of the bucket the upper edges (see arrow) are arranged in parallel to the bucket edge and can be used as a level indicator for the bucket.
You can recognise the position of the cutting edge of the bucket from the driver’s seat with the help of the level indicators.

Adjusting the Bucket Positioner



1. Lower the bucket to the ground and set the bucket to the desired digging angle. Set the bucket control lever to HOLD, stop the engine and adjust as follows.

2. Loosen two bolts (1) and adjust mounting bracket (4) of the proximity switch so that the rear tip of angle (2) is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the bracket in position.

3. Loosen two nuts (5) and adjust to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between bar (2) and the sensing surface of proximity switch (3). Then re-tighten the nuts.

   Tightening torque: 15 - 20 Nm

4. After the adjustment, start the engine and raise the lift arm. Operate the bucket control lever to the DUMP position, then operate it to the TILT position and check that the bucket control lever is automatically returned to HOLD when the bucket reaches the desired angle.

Loading

CAUTION

Danger of accidents! The machine may fall over if you transport a load with the bucket lifted too high!
Lower the bucket during transporting loads in order to lower the centre of gravity of the machine.

The loading operation of wheel loaders is based on the following cycle:

Removing or digging → Transport → Dumping

In the following sections, the individual operation steps of this cycle are explained.

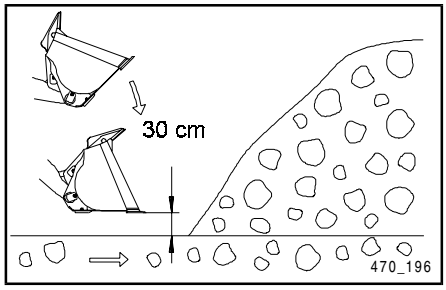
Removing piled up soil

CAUTION

If you perform removal operations with bent machine, you may damage the articulated steering and the cardan shaft!
Always drive into the material which you want to remove in straight direction.

For removal operations, adhere to the instructions in section "Tyre-appropriate operation“. For removal operations, proceed as follows:

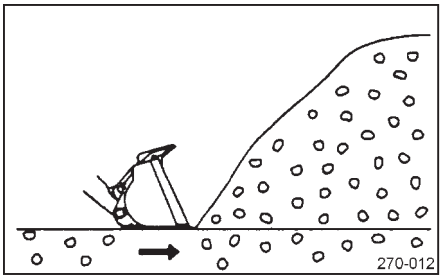
1. Drive in straight line to the piled up soil.
2. While driving forward, lower the bucket rapidly until it reaches a height of approx. 30 cm over the ground and hold the bucket in this position.

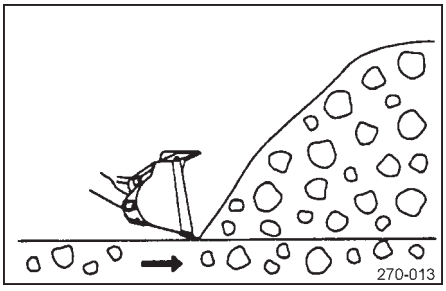


NOTE

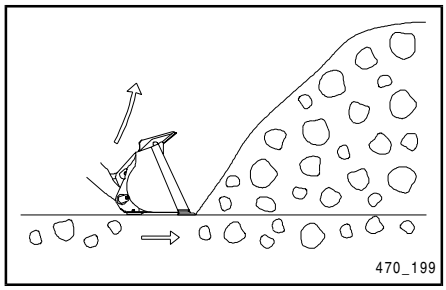
If the bucket touches the ground, the front wheels may be lifted from the ground, resulting in premature wear and tear of the rear wheels.

3. Then, proceed with slowly lowering the bucket onto the ground.
4. Brake right in front of the material to be removed using the service brake, while pressing down the accelerator pedal at the same time.
5. Press down the accelerator pedal and drive the bucket into the material to be removed. In order to remove the material, it is required that you align horizontally the cutting edge of the bucket while driving into the material. When you are loading rock debris, it is necessary to dump the bucket slightly down.
   While removing rock debris, ensure that no rock gets under the bucket. This may lead to the front wheels being lifted from the ground, thus resulting in premature wear and tear of the rear wheels.
   Always hold the load in the centre of the bucket. If the load is shifted to one side, the equilibrium of the machine will be impaired.

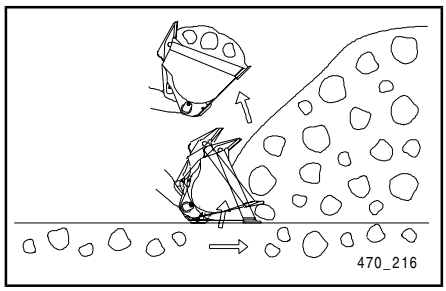




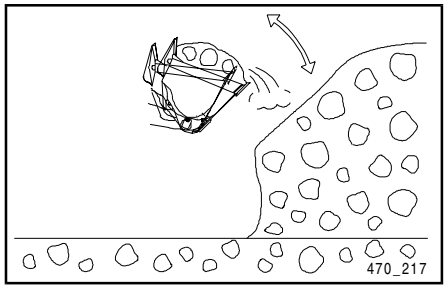
6. To prevent that the bucket dig in too deep into the material to be removed, you must lift the boom while driving into the material. Lifting the boom ensures a sufficient thrust force.



7. Tip in the bucket.



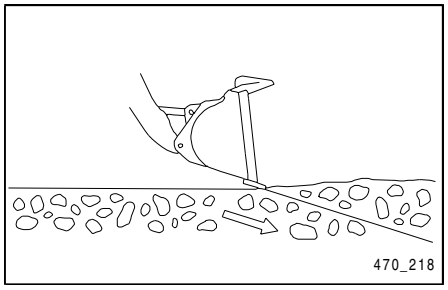
6. If there is too much material inside the bucket, you must briefly tip it in, dump it and lower it in order to reduce the load and to prevent that you lose the load during the transport.



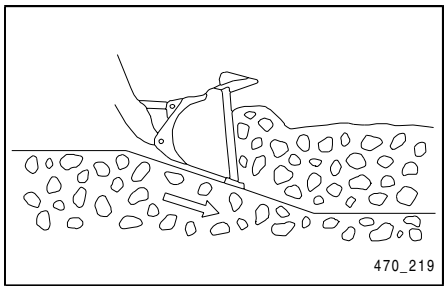
Excavation works

During excavation works, ensure that you do not load the bucket only on one side, since the equilibrium of the machine may be impaired.

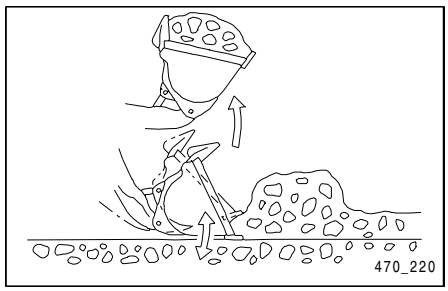
1. Drive up to the soil heap in a straight line.
2. Slow down the machine using the service brake while keeping the accelerator pedal pressed down at the same time.
3. Bend the bucket edge slightly down.



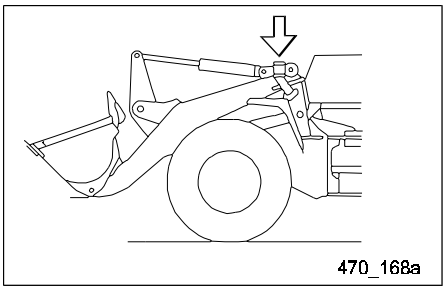
4. While driving forward, move slightly the multi-function lever of the boom in order to remove only a thin layer of the surface of the soil to be removed.



5. Move the multi-function lever of the boom slightly up and down to reduce the resistance during driving forward.
   While removing, ensure that the digging force is not applied only on one side of the bucket.



Transporting



Make sure that the transport route is in perfect condition and that nobody is in your way. Remove any rocks or large stones which have fallen down out of the operating range (see chapter „Tyre-appropriate operation“). Hold the bucket in tip-in position. Lower the boom to its transport position. If the boom is in transport position, the two red arrows of the transport position marking on the lifting cylinder will be next to each other.

Dumping/Unloading

Always select the dumping/unloading type with the smallest turning circle and driving effort in order to work as efficiently as possible.

WARNING

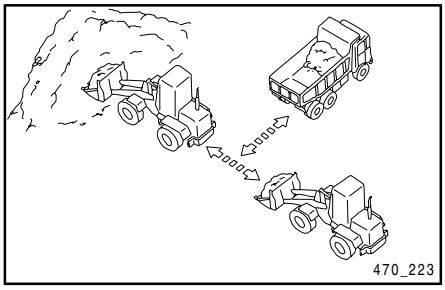
Danger of accidents! If you turn or brake abruptly with the lifted load, the load may fall out of the bucket and cause accidents! Turn slowly with the load lifted and brake cautiously.

CAUTION

The bucket and the machine are damaged if you drive into a heap of soil or rocks with high speed!
Drive slowly into a heap of soil or rocks.

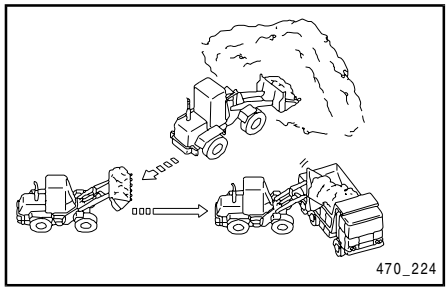
NOTE

Avoid any excessive shaking of the bucket. Always operate with respect to the condition of the tyres (see section "Tyre-appropriate operation“**.**



Loading in diagonal direction

Align the machine in rectangular position to the heap. Drive the machine backwards in straight line after you have filled the bucket. Then, let the dump truck drive between heap and machine. Drive up to the dump truck and unload the material.
This operation requires not much time and reduces considerably the cycle times.

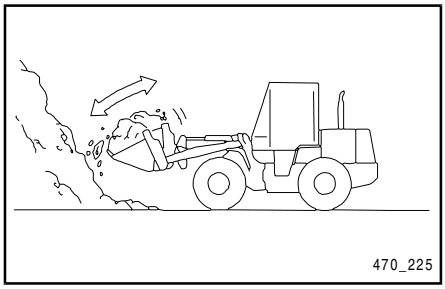


V-shaped loading

Position the dump truck in such a way that the angle between the dump and the dump truck is approx. 60°. Fill the bucket and shake it. This leads to a better distribution of the cargo in the bucket and prevents that material falls down to the back. Drive the machine backwards from the heap and align the machine with the dump truck. Raise the bucket to its maximum height. Drive up forward to the dump truck and unload the material.
If you keep the turning angle of the machine as small as possible, the work will be more efficiently.

Piling up material

Do not position the bucket in its maximum tip-in or dumping position while piling up material. Instead, use the required mining angle. The rear counterweight must not touch the ground.



Planing

Planing operations are required for levelling the ground. For this purpose, a straight bucket without claws is suitable. Planing includes two operation steps - filling up and taking off ground.

Filling up

It may be necessary to fill up the uneven ground in front of the machine with soil. Proceed as follows:

NOTE

For fill-up operations, lower the bucket max. by 15° to the front.

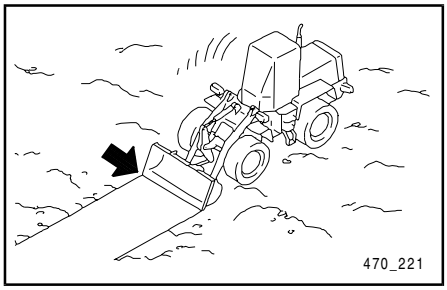
Fill the bucket with soil. Drive slowly forward with the machine and distribute the soil little by little from the bucket. If you must fill up particularly large uneven surfaces, you should place additional soil in front of the bucket, which will be distributed when the machine is driving forward.

Taking off soil

If the surface is filled up, you may level the ground.

WARNING

Danger of accidents! Careless reverse driving may lead to severe accidents!
Before you drive backwards, make sure that nobody is behind the machine. Warn persons who are in your way by sounding the horn.



Dump the bucket slightly down. Drive backwards and draw the bucket over the ground.
In order to receive a particularly even surface, you must lower the boom to its floating position. Drive slowly backwards and draw the bucket with its plane underside over the ground.

Prospecting

Prospecting is a special type of planing. It is used to wear off the top layer of soil.

CAUTION

The bucket teeth and bucket are damaged if you mine with the bucket in dumping position!
For prospecting operations, align the underside of the bucket until it is in parallel to the ground surface.

Always drive in the lower speed range while performing prospecting operations.

Working With the Forklift Truck Attachment

Operations with an forklift truck attachment on a wheel loader differ from operations with the bucket or a forklift truck. Take into account the following notes and the instructions indicated in the chapter "Safety“:

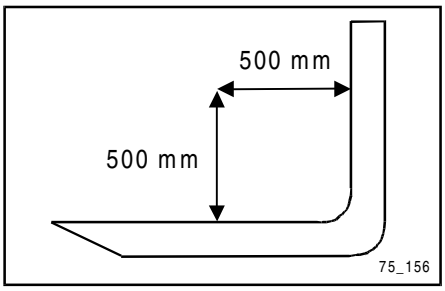
- Do not take up loads which are so high that you cannot see onto the route.
- Hold the fork tines of the forklift truck attachment as horizontal as possible when you take up the load.
- During the ride, hold the load as low as possible in order to have free sight onto the route.
- Always drive slowly (speed range 1) with the load.
- The boom performs a semicircular stroke while performing the lifting movement. Raise the boom only immediately in front of the place at which you want unload to the height at which you want to unload. In such a way, you prevent that you damage the load while lifting it.
- Hold the forklift truck attachment as horizontal as possible while piling up.

Picking up the load

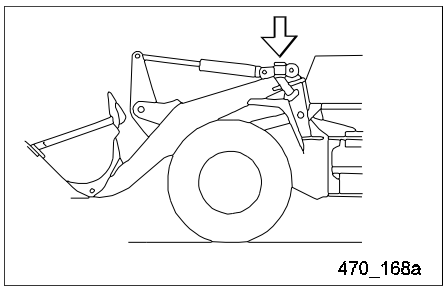
1. Drive slowly up to the load to be picked up.

CAUTION

Danger of accidents! If the load does not lie in centre of gravity, the stability of the machine is impaired.
Drive under the load until it is touching the fork back of the forklift truck attachment.



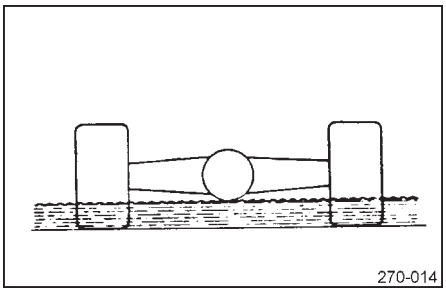
2. Drive so far under the load until it touches the fork back of the forklift truck attachment.
3. Tip in slightly the forklift truck attachment so that the load cannot fall down.
4. Lower the boom to its transport position. The two red arrows of the transport position marking on the lifting cylinder will then be next to each other.
5. Then lift the load to the appropriate height only shortly before you reach the stacking surface. Raise the load a little higher than necessary.
6. Set the load surface slowly and from above onto the stacking.
7. Slowly lower the boom so far that you can pull out the fork tines below the load.
8. Make sure that nobody is behind the machine and drive off backwards from the stacking surface.



Precautions For Special Operations

Working in water

While operating in water or on swampy ground, the water must not reach the underside of the axle housing. Wash the machine after the work has been finished and check the lubricating points.



Working on snow

Adhere to the instructions in the chapter "Safety“, "Working On Snow“.

Dumping on steep slopes

Adhere to the instructions indicated in the chapter "Safety“, "During Loading“.

Working in the vicinity of electrical overhead lines

Adhere to the instructions indicated in the chapter "Safety“, "Working in the vicinity of electrical overhead lines“.

Operation on slopes

Adhere to the instructions indicated in the chapter "Safety“, "Driving on slopes“.

Working on loose soil

Adhere to the instructions indicated in the chapter "Safety“, "Working On Loose Soil“.

After the work is finished

1. Walk around the machine and visually inspect the work unit, the car body and the chassis. In addition, pay attention to emerging oil and water. Eliminate immediately any fault or defect.
2. Fill up the fuel tank.
3. Remove highly flammable material from the engine room since it represents a fire risk.
4. Clean the chassis landing gear roughly.

Instructions for Winter Operation

Before the cold season

Before the cold season begins, you should perform the following preparatory measures to ensure troublefree operation also in the winter months.

- The machine is provided with a aluminium radiator. Therefore, the cooling system must be set to -37°C for the whole year.
- VUse oils with the prescribed viscosities which are suitable for the cold weather to be expected in your region (see "Lubricants and Operating Agents“).
- Fill up with winter diesel fuel. At low temperatures, paraffin deposits of diesel fuel may block the filters and lines (see „Lubricants and Operating Agents“).
- If the injection system, the starter, the battery and the generator are in perfect condition, it is ensured that the engine can be easily started and that the machine can be operated troublefree even in extremely cold weather. Let these important components be checked at an authorised garage before the winter starts.
- Insufficient compression pressure impairs the start-up behaviour of the engine, especially at low temperatures. Let the compression pressure be measured at an authorised garage.
- If the speed is continuously increased, the starter may remain switched on until the engine finally starts up.
- Let the engine warm up with increased idle speed for some minutes before starting to work. During the warm-up phase, operate the hydraulics devices several times without load.
- Add a standard antifreeze to the water in the windshield washer assy. If required, add 25 vol. % of alcohol (spirit) to the water.

After Operation

Realise the following actions to make sure that the machine can be started the next time without problems:

- Remove mud and water from the car body. This prevents that sealings are damaged due to freezing.
- Park the machine on hard and dry ground. If this is not possible, you must park the machine on wooden planks. The planks prevent that the wheels are freezing to the ground.
- Drain off collected water from the fuel system.
- The battery capacity drops clearly at low temperatures. Therefore, dismount the battery in frost periods and store it in a warm place. Re-install it the next morning, before starting to work.

After the cold season

If the weather becomes warmer, you must fill up the prescribed fuel and use oils with prescribed viscosities (see table "Lubricants and Operating Agents“ in the chapter "Maintenance Basics“).

Longer Standstill Periods of the Machine

Before the standstill

Perform the following actions, if the machine is to be shut down over a longer period of time:

- Clean the entire machine, including the engine room, and let it dry.
- If possible park the machine at a dry, roofed location. A supplementary cover with a canvas cover is recommended.
  If the machine must be parked outside, you need to put wooden planks on the ground on which the machine is to be parked and covered with a canvas cover.
- Fill up the fuel tank. Lubricate the machine and change the oils.
- Apply a thin grease film to the piston rods of the hydraulic cylinders.
- Disconnect the negative terminals of the battery. Cover the battery or remove it and store filled up and completely charged it in a dry room which is frost-free in winter.
- Check whether the coolant is set to a temperature of -37° C. Refill antifreeze, if necessary.

During the standstill

Perform the following actions in order to keep the machine in operating condition during the standstill:

WARNING

Danger of poisoning, if the engine is run in-doors!
Open the windows and doors before you start the engine in-doors.

- Let the engine run once a month.
- Wipe away the grease from the piston rods of the hydraulic cylinders.
- Drive the machine over a short route so that the movable parts are coated with a new oil film.
- Recharge the battery.

After the standstill

NOTE
If the machine was not moved once a month, contact the responsible Komatsu trader to arrange a maintenance appointment.

After a longer standstill period, perform the following works before starting up the machine:

- Remove the grease from the piston rods of the hydraulic cylinders.
- Check the oil levels and, if necessary, refill oil. Lubricate the machine.

Troubleshooting

Troubleshooting

Have all malfunctions and causes of malfunctions that are not given in the tables below remedied by your responsible Komatsu dealer.

Warning Lights and Indicators

The following list contains the troubleshooting tables with explanations of warning lights and indicators:

Charging current warning light	see "Electrical System"
Engine oil pressure warning light	see "Engine"
Brake oil warning light	see "Brakes"
Air filter warning light	see "Engine"
Parking brake warning light	see "Brakes"
Coolant temperature indicator	see "Engine"
Fuel level indicator	see "Engine"

Electrical System

Electrical System		
Fault	**Causes**	**Remedy**
Warning light charging current: warning light charging current is off, when the engine is switched off and the start switch is set to its operating position 'I'	Electrical connection without function	*) Check terminals, connections, and cables
Warning light charging current: warning light charging current does not go out when engine is running	Electrical connection without function	*) Check terminals, connections, and cables
	Generator without function	*) Check function of generator; replace defective generator
	Tension generator drive belt to low	Tension drive belt
Generator produces unusual noise	Generator defective	Replace generator
Starter does not start the engine	Electrical connection without function	*) Check terminals, connections, and cables
	Battery charge insufficient	Re-charge battery *) Check function of battery; replace defective battery
Starter pinion repeatedly engages and disengages	Battery charge insufficient	Re-charge battery
	Starter defective	*) Replace starter
Starter turns engine only slowly	Battery charge insufficient	Re-charge battery
	Starter defective	*) Replace starter
Starter disengages before engine is started	Battery charge insufficient	Re-charge battery
	Starter defective	*) Replace starter
75FAUL03.TBL		

*) These measures must be performed by the responsible dealer.

Engine

Engine		
Fault	**Causes**	**Remedy**
Warning light engine oil pressure: with the engine running the warning light is on and an acoustic alarm signal is given	Oil level in engine too low	Top up engine oil
	Engine oil filter (filter cartridge) dirty	Replace engine oil filter (filter cartridge)
	Lines or hoses of engine lubricating system damaged	Check lines and hoses (visual check: oil leaks) *) Replace defective lines and hoses
	Line or hose connections of engine lubricating system leaky	Check line and hose connections (visual check: oil leaks) *) Repair leaky line and hose connections
	Oil pressure switch without function	*) Check function of oil pressure switch; replace defective oil pressure switch
Vapour is let off at the pressure valve of the radiator cap	Coolant level in radiator too low	Top up coolant (ensure correct mixing ratio)
Coolant level too low	Leaks in the cooling system	Check lines and hoses (visual check: coolant leaks) *) Replace defective lines and hoses
		75FAUL01.TBL

*) These measures must be performed by the responsible dealer.

Engine (Continued)		
Fault	**Causes**	**Remedy**
Temperature display coolant: temperature display coolant in red zone, top LED is flashing, acoustic alarm is given	Engine is overheated	Let the engine run idle without load, until the engine has sufficiently cooled down and the temperature indicator of the coolant has returned to the green range
	Tension of fan's drive belt too low	Tension drive belt
	Internal surface of engine cooling system furred or dirty	*) Clean internal surface of engine cooling system
	Radiator (radiator surfaces, fins) dirty	Clean radiator (radiator surfaces, fins)
	Thermostat without function	*) Check function of thermostat; replace defective thermostat
	Radiator cap either defective or loose	Replace defective radiator cap; re-tighten loose radiator cap
Temperature display coolant: with the engine at operating temperature, the temperature display coolant does not indicate a temperature	Temperature display without function	*) Check function of temperature display; replace defective temperature display
Engine does not start	Fuel tank empty	Refill fuel and bleed fuel system
	Air in fuel system	Bleed fuel system
	Injection pump or injection nozzles without function	*) Replace injection pump or injection nozzles
	Starting speed too low	See "Electrical System"
	Engine compression too low	*) Check tappet clearance
Exhaust fumes colour white or blue	Oil level in engine too high	Correct oil level
	Wrong fuel	Use prescribed fuel
Exhaust fumes colour temporarily black	Air filter insert dirty	Clean or replace air filter insert
	Injection nozzle defective	*) Replace injection nozzles
	Engine compression too low	*) Check tappet clearance
		75FAUL02.TBL

*) These measures must be performed by the responsible dealer.

Engine (Continued)		
Fault	**Causes**	**Remedy**
Temporarily, combustion sounds like breathing	Injection nozzles defective	*) Replace injection nozzles
Unusual combustion noise	Wrong fuel	Use prescribed fuel
	Engine temperature too high (engine overheated)	Allow engine to cool down See "Engine - temperature display coolant"
Unusual mechanical noise	Defective silencer	*) Replace silencer
	Tappet clearance too wide	*) Adjust tappet clearance
Engine does not start or stops during operation; top LED of fuel level indicator flashes	Fuel tank empty	Refill fuel and bleed fuel system
Warning light air filter: warning light air filter is on when engine is running	Air filter of filter insert dirty	Clean or replace filter insert of air filter
		75FAUL04.TBL

*) These measures must be performed by the responsible dealer.

Hydraulic System

Hydrostatic Drive Unit		
Fault	**Causes**	**Remedy**
Machine does not drive	Parking brake applied	Release parking brake
	Driving direction switch in position 'N'	Set driving direction switch to either position 'F' or 'R'
	Driving direction switch without function	*) Check function of driving direction switch
	Oil level in hydraulic oil tank too low	Top up hydraulic oil
Machine does only drive slowly and performance is poor	Hydrostatic motor motor does not swivel	Check hydrostatic motor for contamination; clean dirty hydraulic motor *) Check function of hydrostatic motor
	On-off-valve without function	*) Check function of on-off valve; replace defective on-off-valve
	Hydrostatic pump defective	*) Replace hydrostatic pump
	Wrong control pressure	*) Check control pressure; reset, if required
	Wrong high pressure	*) Check high pressure; reset, if required
	Inch valve defective or set incorrectly	*) Check setting of inch valve *) Replace defective inch valve
	Hydraulic filter dirty	Replace filter element of hydraulic filter
	Switching relay without function	*) Check function of switching relay; repair or replace defective switching relay
Hydrostatic drive unit overheated	Faulty operation of charge pump	*) Check function (pressure) of charge pump
	Hydraulic oil radiator (radiator surfaces, fins) dirty	Clean hydraulic oil radiator (radiator surfaces, fins)
	Faulty operation of radiator	Check tension of drive belt
	Hydraulic filter dirty	Replace filter element of hydraulic filter
	Oil level in hydraulic oil tank either too high or too low	Correct oil level in hydraulic oil tank
		75FAUL05.TBL

*) These measures must be performed by the responsible dealer.

Hydrostatic Drive Unit (Continued)		
Fault	**Causes**	**Remedy**
Unusual noise	Oil level in hydraulic oil tank too low	Top up hydraulic oil
	Inclusions of air in lines and units of the hydraulic system (faulty bleeding)	Bleed hydraulic system
		75FAUL06.TBL

Work Hydraulic System		
Fault	**Causes**	**Remedy**
Lifting power too low	Oil level in hydraulic tank too low	Top up hydraulic oil
Lifting power too slow	Filter insert of hydraulic oil filter dirty	Replace filter insert of hydraulic oil filter
Air bubbles in hydraulic oil	Wrong hydraulic oil quality	Fill in prescribed hydraulic oil
	Oil level in hydraulic oil tank too low	Top up hydraulic oil
Cylinders move jerky	Oil level in hydraulic oil tank too low	Top up hydraulic oil
		75FAUL08.TBL

*) These measures must be performed by the responsible dealer.

Brakes

Brake		
Fault	**Causes**	**Remedy**
Brake has no effect	Multi-disks of brake worn	*) Replace multi-disks of brake
	Air in brake system	*) Bleed brake system
Warning light brake oil reserve: warning light brake oil reserve is on	Brake oil level in brake oil tank too low	Top up brake oil Check brake system for damage and leaks (visual check: brake oil leaks)
		75FAUL09.TBL

Parking Brake		
Fault	**Causes**	**Remedy**
Brake is ineffective	Parking brake's brake lever is too loose	*) Adjust parking brake
	Brake's multi-disks are worn	*) Replace multi-disks
		75FAUL10.TBL

Steering		
Fault	**Causes**	**Remedy**
Steering reacts slowly	Hydrauliksystem arbeitet fehler-haft	*) Check function of hydraulic system
Steering wobbles	Clearance of steering cylinder bolt too large	*) Check fastenings of steering cylinder; replace defective cylinder bolts
	Faulty operation of hydraulic system	*) Check function of hydraulic system
		75FAUL11.TBL

*) These measures must be performed by the responsible dealer.

Axles

Axles		
Fault	**Causes**	**Remedy**
Noise	Oil level in axle too low	Top up oil
		75FAUL07.TBL

Driver's cab

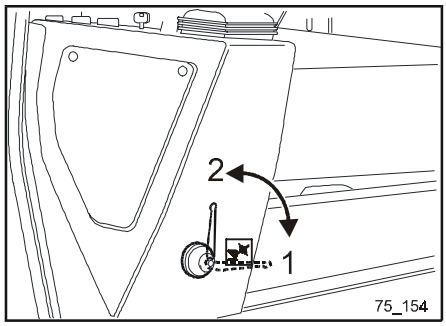
Driver's Cab		
Fault	**Causes**	**Remedy**
Blower: insufficient air flow	Blower filter clogged	Clean or replace filter
		75FAUL12.TBL

*) These measures must be performed by the responsible dealer.

Emergency Steering Characteristics

If the engine breaks down during driving, you may proceed with steering the machine. However, you will need considerable more effort.
If the engine breaks down, immediately drive to the roadside, switch on the hazard flasher and secure the machine.

Emergency Lowering System

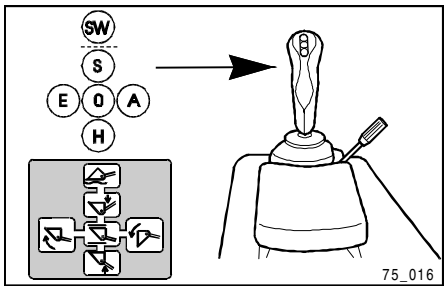


The machine is provided with a pressure accumulator for the work hydraulic system. If the engine is not running, you can lower the work unit with the multi-function lever.

NOTE

If you have secured the work hydraulic system with the locking lever of the work hydraulic system, you cannot lower the work unit.

1. Make sure that nobody is standing below the work unit.
2. Press slowly the multi-function lever into position ‘’P”. The work unit is lowered.



Starting the Engine with a Battery Jumper Cable

NOTE

- **The current-supplying battery and the discharged battery must have identical nominal voltages.**
- **The capacity of the current-supplying battery must not be significantly lower than the capacity of the discharged battery.**
- **The cross-sections of the battery jumper cable and the cable clamps must be suitable for the battery type.**

Connecting the Jumper Cable

CAUTION

A short-circuit may damage parts of the electrical system. A short-circuit may occur, if:

- **the positive (+) and negative (-) clamps touch each other when you connect them to the battery, or if they are conductively connected (e.g. by a tool),**
- **the operational and the defective machine touch each other and current is already flowing when the positive poles are connected,**
- **a clamp slips off and touches the machine!**

Firmly connect the clamps. When connecting and disconnecting the cables, pay attention that

- **the cable ends neither touch each other nor the machine,**
- **the two machines do not touch each other.**

1. Turn the start switch of the defective machine to '0' (OFF).
2. Connect one clamp of the battery jumper cable to the positive terminal (+) of the discharged battery.
3. Connect the other clamp of the battery jumper cable to the positive terminal (+) of the charged battery.
4. Connect one clamp of the battery jumper cable to the negative terminal (-) of the charged battery.

WARNING

Danger of explosion! When you connect the last clamp to the engine block of the defective machine, sparks are produced which may ignite the gas produced in the battery!
Connect the last clamp as far away from the battery as possible.

5. Connect the other clamp of the battery jumper cable to the engine block of the machine with the discharged battery.

Starting the Engine

The engine of the machine with the charged battery must run at high idle-running speed. Start the engine of the machine with the discharged battery. If the engine does not start up immediately, wait at least two minutes, before you make a second attempt.

Disconnecting the Battery Jumper Cable

CAUTION

Danger of short-circuit! When disconnecting the cables, pay attention not to let the cable ends touch each other or the machine. When the cable ends touch each other or the machine, a short-circuit is produced which may damage parts of the electrical system!
When disconnecting the cables, pay attention not to let the cable ends touch each other or the machine.

After starting of the engine, disconnect the battery jumper cables by reversing the steps you performed to connect the cables.

1. Disconnect one clamp of the battery jumper cable from the engine block.
2. Disconnect the other clamp of the battery jumper cable from the negative terminal (-) of the charged battery.
3. Disconnect the clamp of the battery jumper cable from the positive terminal (+) of the charged battery.
4. Disconnect the other clamp of the battery jumper cable from the positive terminal (+) of the discharged battery.

Towing the Machine

WARNING

Towing with a tractor of insufficient weight may cause accidents! Perform towing using a machine weighing at least as much as the machine that you want to tow off.

CAUTION

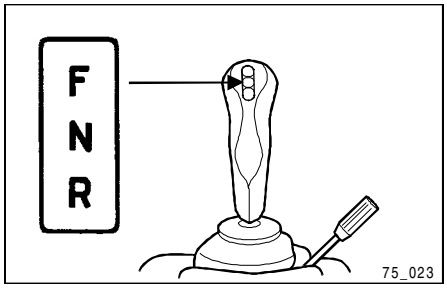
Towing to start the engine will damage the hydrostatic drive system!
Do not give the machine a tow to start the engine. This will not start the engine, but may damage the hydrostatic drive system.

To avoid damage to the hydrostatic drive system, do not tow the machine for more than 1 km. The towing speed must not exceed 2 km/h.
Perform towing using a machine weighing at least as much as the machine that you want to tow off. Connect both machines with appropriate towing attachments.

CAUTION

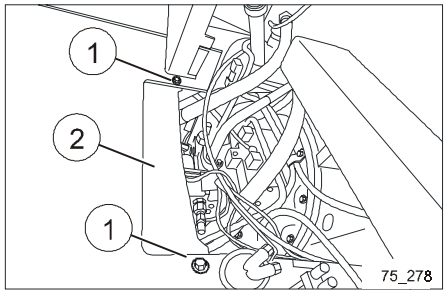
Towing attachments fastened to inappropriate points may damage the machine!
Only fasten the towing attachment to the points provided for this purpose.

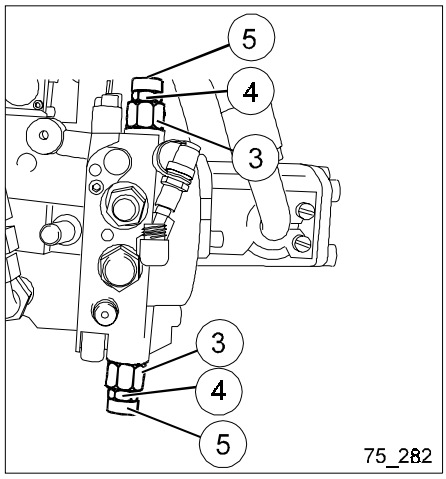
At the front part of the machine, fasten the towing attachment at the marked eyes. At the rear part of the machine, fasten the towing attachment at the hitch.



Before you tow a machine with a hydrostatic drive system, establish a short-circuit connection between the high-pressure side and the low-pressure side of the variable pump. For this purpose, turn the high-pressure valves in the valve block about 2 revolutions. Proceed as follows:

1. Set the driving-direction switch to position 'N'.
2. Loosen both screws (1) and remove the cover plate (2).
3. Remove protecting caps from the valves.
4. Hold the valve (3) in position, using a wrench.
5. Loosen the counter-nut (4) an re-insert the threaded stud (5) clockwise, using a hexagonal socket head wrench, until it reaches the top edge of the counter-nut (4).
6. Re-tighten firmly the counter-nut (4). Perform these operations on both valves.





After having town another machine loosen the counter-nut (4) and the threaded stud (5) by turning it anti-clockwise until it reaches the limit stop. Hold the valve (3) in position using a wrench an re-tighten firmly the counter-nut (4). Perform these operations on both valves.

NOTE

When the engine is switched off, the power-assisted steering is not operational, i.e. you have to apply much more force to steer the machine.

If you lift up the rear axle of the machine with a lorry-mounted crane, you can tow off the machine over longer distances and at speeds exceeding 2 km/h. Before you do this you must, however, remove the cardan shaft of the front axle. In addition, secure the articulated steering with the locking bar, in the same way as it is required for transport of the machine on a low bed loader or by train.

Towing a Machine with Defective Brakes

WARNING

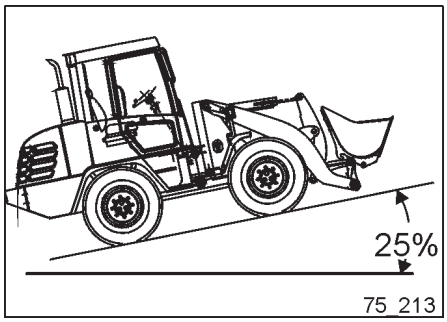
If the brakes of the machine that you want to give a tow are defective, uncontrolled movement of the machine may cause a crash while it is being towed!
Always use two machines to tow off a machine with defective brakes. Connect all three machines with appropriate towing attachments.

If you want to tow machine a with defective brakes, or if you have to tow a machine driving downhill, use two machines for towing. Attach the machine that you want to give a tow to a larger machine with sufficient tractive and braking force. Attach a second machine to the rear part of the machine that you want to give a tow. In this way, you avoid uncontrolled movement of the machine.

Towing can be performed under various conditions. Thus, it is impossible to determine all the requirements that may apply to a particular condition. When towing on an even and horizontal surface, the tractive force that you need is much less than the tractive force that you need when towing on a slope or uneven surface.

Please aks your responsible Komatsu dealer for details, if you want to give a particular machine a tow.

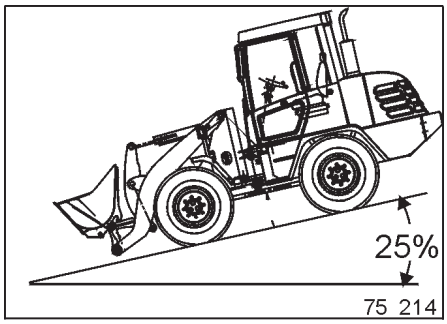
Inadequate Braking Effect



Checking the Parking Brake

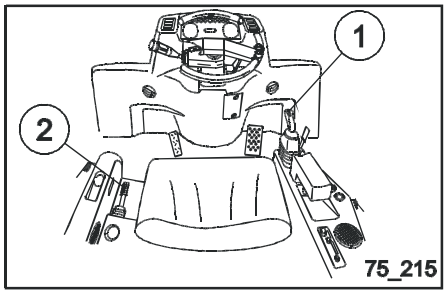
Test Conditions

- Tyre pressure: according to specification
- Road surface: dry, solid surface with a gradient of 25%
- Machine: ready for operation



Test Procedure

1. Start the engine, set the machine to straight driving, and drive the machine with an empty bucket up a gradient of 25%.
2. Stop the machine with the service brake and do not release your foot again to keep the service brake applied.
3. Lower the bucket.
4. Set the driving direction switch (1) to its neutral position 'N'.
5. Switch off the engine.
6. Apply the parking brake (2) and slowly release the pedal of the service brake.
   The machine must stand still.



NOTE

All repairs on the brake system must be performed by a garage which is authorised by Komatsu.

Checking the Service Brake

WARNING

Danger of accidents!
Always put on the safety belt.

Drive the machine on a flat, dry and solid road at a speed of 20 km/h and apply brakes. For this purpose, release the accelerator pedal and quickly step on the brake pedal. The braking distance must not exceed 5m.

NOTE

All repairs on the brake system must be performed by a garage which is authorised by Komatsu.

Maintenance

Maintenance Basics

CAUTION

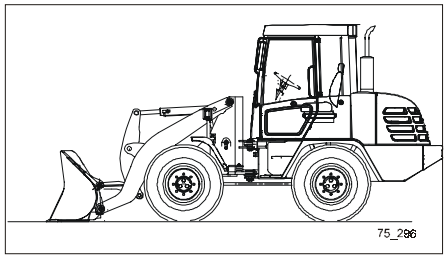
Maintenance work must only be performed by trained and qualified personnel. Also refer to chapter " Safety Measures During Maintenance".

To ensure troublefree operation of the machine, it must be serviced at regular intervals. Control daily the operating hour meter to determine which of the maintenance measures is required.
When performing maintenance work, do not keep loose items in your pockets. Loose items could fall into the machine during maintenance work.

Preparing the Machine for Maintenance

Before you start maintenance or repair work, position the machine as follows, unless stated otherwise:

1. Park the machine on solid and level ground.
2. Set the machine to the specified position for maintenance and repair.
3. Lower the work unit to the ground and position it as shown in the drawing.
4. Set all control levers to either the neutral or the hold position '0'.
5. Turn the safety lever of the work hydraulic system to position '1'.
6. Take out the start key and store it in a safe place.
7. Apply the parking brake.
8. Apply the warning sign you received together with the tools at the start switch.
9. Put wheel chocks in front and behind the wheels.
10. Secure the articulated steering with the articulated steering catch.
11. If required, remove dirt.



Cleaning the Machine

Always keep the machine clean. Ensure that grease nipples, air vent holes, and oil level indicators are always clean. Avoid contamination of operating agents with impurities. This will reduce malfunctions to a minimum.

WARNING

If somebody accidentally lowers the bucket while cleaning is being performed under the boom, this may lead to severe accidents!
Before you start performing of cleaning work under the boom, either support the bucket or lower it onto the ground.

If you have to perform cleaning work under the boom and you cannot support the bucket, park and secure the machine as follows:

1. Park the machine on level ground.
2. Apply the parking brake.
3. Place wheel chocks in front of the wheels to prevent the machine from rolling away.
4. With the bucket in its dumping position, lower the bucket onto the ground with either its cutting edge or teeth.

Precautionary Measures When Cleaning the Machine

- Do not point a water or steam jet directly at the radiator.
- Pay attention that water does not get into the electrical system.

Fire Prevention

Do not use any highly inflammable cleaning agents for cleaning of parts. If –by way of exception –you have to use inflammable cleaning agents, keep the cleaning agent away from fire and do not smoke while you are working.

Working-Area-Dependent Maintenance

Muddy or Wet Working Areas

- Immediately clean the machine after work to protect the components against corrosion.
- Perform maintenance and lubrication measures more frequently when working in areas with unfavourable working conditions.
- Daily lubricate the bolts of the work unit, if it is often used in water.

Dusty Working Areas

Adhere to the following measures when working in dusty working areas:

- Pay attention to the warning lamp of the air filter to detect a blocked air filter insert in time. In addition, clean the air filter insert more frequently than specified in the maintenance schedule.
- Frequently clean the external surfaces of the radiator to ensure unobstructed flow of air.
- Replace the fuel filter cartridge more frequently than specified in the maintenance schedule.
- Clean all electrical components, especially the starter and the generator.

Lubricants and Operating Agents

Draining Off Hot Operating Agents

There is danger of scalding, when you drain off hot oils or hot coolant and remove the corresponding filters immediately after you have switched off the engine. For this reason, wait until the engine has cooled down to approx. 60° C, before you start to perform maintenance work.
But: Do not remove oils when the engine is cold.

Checking the Oil Level and Changing Oil

Check the oil level and change the oil or oil filter in a dust-free place to avoid contamination of service fluids by undesired material.
After an oil change or oil filter change, check the oil or oil filter for an unusual high number of metal parts or other undesired material. In case you detect an unusual high contamination, inform your responsible Komatsu dealer.

Changing the Filter

Filters avoid introduction of undesired material into the individual cycles and the equipment where they may cause malfunctions.

- Regularly replace all filters. For details refer to the following description of maintenance work in these operating and maintenance instructions.

  Replace the filters more often, if you work under difficult conditions, depending on the oil and fuel that you use (e.g. high sulphur content).
- Do not try to clean filter cartridges for re-use. Always replace used filter cartridges by new ones.
- Do not open the packages containing the spare filters unless you will mount them immediately.
- Always use Komatsu original spare filters.

Refuelling and Topping Up of Oil

Always refuel and top up oil in a sufficiently ventilated place. If the machine is equipped with a fuel strainer in the tank filler neck, do not remove the fuel strainer when refuelling. After refuelling or topping up of oil, close the filler openings again.
Spilled fuel or oil involve danger of slipping and fire. For this reason, immediately remove any spilled fuel or oil.
Do not let oil or fuel seep into soil or water. Dispose of oil and fuel according to applicable environmental regulations.

Oil

The oil in the engine and the hydraulic system is subjected to extreme conditions (high temperatures, high pressure). Thus, its quality deteriorates the longer it is used.

- Always use the types of oil specified for the particular use and temperature in the operating and maintenance instructions. Always adhere to the specified intervals for oil changes.
- Pay particular attention not to contaminate oil and grease when topping them up. A lot of malfunctions are caused by contaminated oil.
- Do not mix oils of different types or makes.
- Always top up with the required volume of oil. If the volume of oil used for topping up is too high or too low, this may lead to malfunctions.
- If the oil in the work hydraulic system is not clear but milky, it is very likely that there is either water or air present within the system. In this case, inform the responsible Komatsu dealer.
- Always replace the oil filter when you perform an oil change.
- We recommend that you have the engine oil and the hydraulic oil checked at regular intervals by the responsible Komatsu dealer to get an impression of the machine's condition.

Lubricating Grease

Lubricating grease reduces wear and operating noise.

- The grease nipples not specified in the maintenance schedule are only to be used for overhauling purposes; for this reason, they do not have to be lubricated.
- Lubricate parts heavily moving - due to a long service life - with grease.
- Remove old grease which is pressed out during lubrication. Ensure that the lubricating grease is not contaminated with sand or dirt, since this would result in premature wear and tear.

Biodegradable Hydraulic Oil and Lubricating Grease

Biodegradable hydraulic oil and lubricating grease - based on synthetic esters - can be used for Komatsu machines. Please contact our factory representatives for information about the products which suit best your type of application which are approved by Komatsu.

Fuel

The fuel injection pump is a precision device. If the fuel in the fuel injection pump contains water or dirt, this will damage the fuel injection pump.

- Proceed with utmost care when storing or refuelling, to avoid intrusion of impurities into the fuel.
- Always use the fuel specified in the operating and maintenance manuals.
- If the temperature of diesel fuel falls below -15℃, paraffin may precipitate, blocking filters and hoses. For this reason, always use a diesel fuel appropriate for these temperatures.
- To prevent humidity from condensing in the fuel tank, always refill the fuel tank after daily work has been finished.
- After refuelling, wait at least ten minutes before draining off dirt precipitations and water. Swirled up impurities will precipitate again during this period of time.
- If the fuel tank has been "run empty" or filters have been replaced, ventilate the fuel system. Refer to chapter "Maintenance Every 500 Operating Hours".
- If you use fuels with a sulphur content between 0.5 and 1.0%, cut in half the interval for an oil change. If you use fuels with a sulphur content of over 1.0%, quarter the interval for an oil change.

Storage of Oil and Fuel

- Store oil and fuel in-doors in sufficiently ventilated rooms to avoid contamination with water, dirt, or other impurities.
- Position barrels which you want to store over longer periods of time sidewards. Store them in such way that the feed opening is on the side. In this way, you avoid formation of humidity in the barrel.
- Cover barrels that you want to store in the open with a watertight foil or take other appropriate measures to protect the barrels.
- To avoid a negative influence on the quality during long-time storage, always proceed according to the "first in - first out" principle, i.e. use first that oil or fuel which is stored longest.

Coolants

- Always prepare coolants as described in the maintenance instructions.
- River water contains large amounts of calcium and other substances. If you use river water, scale will deposit in both the engine and the radiator, impairing heat exchange, which may lead to overheating.
- Only use drinking water.
- Always adhere to the information given in the operating and maintenance instructions when using antifreeze.
- Our machines are delivered with original Komatsu antifreeze. This antifreeze does, among other things, protect against corrosion in the cooling system, it lubricates moving parts, and it increases the coolant's boiling point. For this reason, it must also be used when working in hot working areas.
- Antifreeze is highly inflammable. For this reason, take care that antifreeze does not come into contact with naked light.
- If the coolant level is too low, the air in the cooling system may lead to overheating and corrosion in the cooling system.
- If the engine is overheated and you have to top up coolant, allow the engine to cool down before you fill in the coolant.

Windscreen Washer Liquid

Only use clean windscreen washer liquid approved for use in automobiles.

Table of Lubricants and Operating Agents

WA95-3	Lubricants and Operating Agents BI-Codes*), Specifications, and Filling Volumes					
	Lubricants and Operating Agents	**BI-Codes**	**Quality Classes**	**Temperature Ranges**	**Viscosity Classes**	**Filling Volume in Litres approx.**
Engine	Engine Oil EO	EO 1540 A EO 1030 A NRS	CCMC D4 or, if not available: API CE oder API CF -4[2])	-15° to 45° C -20° to 30° C -15° to 20° C	SAE 15W-40 [1]) SAE 10W-30 SAE 05W-30	12.5
Transfer Gear Box Standard Type High Speed Version	Gear Oil GO	GO 90 LS	API-GL5 +LS or MIL-L-2105D +LS	- -	SAE 90LS	1.0 3.0
Front Axle	Gear Oil GO	GO 90 LS	API-GL5 +LS or MIL-L-2105D +LS	-	SAE 90 LS [1]) SAE 85W-90LS SAE 80W-90LS	Planet Gear: 2 x 1.0 Differential: 4.5
Rear Axle	Gear Oil GO	GO 90 LS	API-GL5 +LS or MIL-L-2105D +LS	-	SAE 90 LS [1]) SAE 85W-90LS SAE 80W-90LS	Planet Gear: 2 x 1.0 Differential: 7.5
Hydraulic System, Steering	Hydraulic Oil HYD	HYD 0530 HYD 1030 HYD 1540	HVLP HVLP D	15° to 20° C -20° to 30° C -15° to 45° C	ISO VG 46 [1]) ISO VG 68 ISO VG 100	94.0
	or Engine Oil EO	EO 1540 A EO 1030 A NRS	CCMC D4 or, if not available: API CE oder API CF -4[2])	-15° to 45° C -20° to 30° C -15° to 20° C	SAE 15W-40 [1]) SAE 10W-30 SAE 05W-30	
	or Hydraulic Oil BIO-E-HYD	BIO-E-HYD 0530	HEES (acc. to VDMA fluid technology)	-15° to 20° C	ISO VG 46	
Service Brake	Automatic Transmission Gear Oil	ATF	ATF, Type A, Suffix A	-	-	0.6
Cooling System	Long-Time Coolant	SP-C	Antifreeze and Corrosion Protection	Proportion of Mixture: 50% Coolant : 50% Water Min. Freeze Proofing: -34° C		17.0
Fuel Tank	Diesel Fuel[3])	CFPP Class B CFPP Class D CFPP Class E CFPP Class F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to -20°C		130.0
Grease Nipple	Lithiumsoap-Based Multi-Purpose Grease	MPG-A	KP2N-20	-	NLGI 2	
Air conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (polyalkyleneglycol)			1200 g 180 cm ³

The specified filling volumes represent approximate values; the testing devices are binding. The selection of a viscosity class depends on the ambient temperature prevailing over a longer period of time. The temperature limits are to be regarded as guiding values; for a brief period, the actual temperature may be higher or lower than these guiding values.

[1]) Factory filling

[2]) If engine oil of either the API CE or the API CF - 4 specification is not available, engine oil of either the API CC or the API CD specification may be used. In these cases, the oil change intervals must be cut in halves.

[3]) If fuels with a sulphur content between 0.5 and 1.0 % are used, the oil change intervals for the engine must be cut in halves; if the sulphur content exceeds 1.0 %, the oil change intervals must be quartered.

*) BI-codes are the "standard lubricants" (Regelschmierstoffe) for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V. (BI) (head association of the German construction industry). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (standard lubricants for construction machinery and vehicles" can be obtained from bookstores or the German Bauverlag GmbH Wiesbaden und Berlin under the ISBN-No. 3-7625-3102-1.

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Replacing Safety-Related Parts

WARNING

Worn safety-related parts may cause accidents!
Have parts which are important for machine safety and fire protection replaced in a Komatsu garage at regular intervals.

Have the following parts replaced in the Komatsu garage at regular intervals, even if they are not visibly worn:

- Have the safety belt replaced at least every three years.
- Do not use hoses longer than six years under normal operating conditions. Have hoses replaced, if you detect one of the following damages:
  - damage to the outer layer reaching down to the lining,
  - embrittlement of the outer layer,
  - deformations that do not correspond to the normal shape of the installed hose, when the hose is pressurised and depressurised,
  - leaks,
  - damage to hose fittings or connections between fittings and hoses,
  - damage due to storage (the storage time for hoses should not exceed two years).

  When replacing hoses, do not forget to replace also all accessory O-rings, gaskets, and similar parts.

Welding Instructions

- Set the engine start switch to switching position '0' (OFF).
- Apply only briefly a voltage of more than 200 V.
- Connect the earthing cable at a distance of max. 1 m to the area to be welded.
- There must be no gaskets or bearings between the welding area and the mass point.
- There must be a minimum distance of 1 m between the welding area and the battery.
- Do not weld lines or pipes containing fuel or oil.

Spare Parts and Consumable Components

- Replace parts which are subjected to wear and tear, such as filter elements, air filter insert, etc., when performing the regular maintenance work or when the limiting value for wear and tear and contamination is reached.
- Perform this work at regular intervals and as prescribed to ensure an efficient use of the machine.
- Only use original Komatsu spare parts.
- After removing the gaskets, clean the sealing surfaces. Replace gaskets and O-rings by new ones. Pay attention not to forget any gaskets and O-rings when re-assembling the parts.
- Use the part numbers specified in the spare parts catalogue for ordering of spare parts.

Position	Part No.	Part Designation	Quant.	Replacement Interval
Engine Oil Filter	YM119005-35100	Cartridge	1	First maintenance after 50 operating hours Maintenance every 250 operating hours
Fuel Filter	YM119000-55600	Cartridge	1	Maintenance every 500 operating hours
Hydraulic Oil Filter	42U-62-13150 (42U-62-H0P01) (42U-62-H0P02)	Filter Element (O-Ring) (O-Ring)	1 (1) (1)	First maintenance after 50 operating hours Maintenance every 500 operating hours
Engine Valve Cover Gasket	YM123900-11310 YM24311-000120	Gasket O-Ring	1 4	Maintenance every 1000 operating hours
Air Filter	42U-01-H0P02 42U-01-H0P01	Filter Insert Safety Filter	1 1	Maintenance every 500 operating hours
				SPAREP95.TBL

Electrical System

- Do not remove or modify electrical components installed in the machine.
- Only install Komatsu Hanomag-approved electrical components.
- When cleaning the machine or during heavy rainfall, pay attention that water does not get into the electrical system.
- If the wiring is wet or the insulation damaged, insulation faults will occur in the electrical system leading to dangerous malfunctions of the machine.
- When working in coastal areas, clean the system very thoroughly to avoid corrosion.
- Do not connect an external power source to fuses, the start switch, or the battery relay.
- **Maintenance of the electrical system comprises:**
  1. Checking the tension of the generator belt,
  2. Checking the generator belt for damage and wear, and
  3. Checking the acid level in the battery.

Fuses

CAUTION

- **Parts of the electrical system may be damaged, if you replace fuses with the ignition switched on!**
  Turn the start switch to switching position '0' (OFF), before starting to replace fuses.
- **Fuses with wrong amperages may cause fires due to electrical faults or may immediately blow again!**
  Only replace defective fuses with fuses of the same rating.

The fuses protect the electrical system. Replace defective, corroded, or loose fuses.

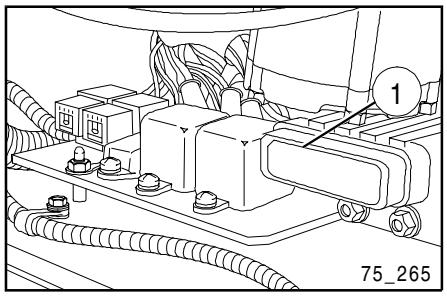
The fuses are located under the cover. To access the fuses, remove the screws fixing the cover and remove the cover. Then remove the cover caps of the fuse boxes.

Fuse Assignment

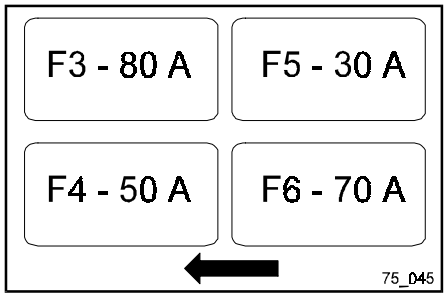
1	Starter stop magnet, socket	10A	Solenoid valves gear unit	10A
2	Inside lighting, radio	10A	Direction indicator, horn	10A
3	Hazard flasher	10A	Instrument lighting	10A
4	Windscreen wiper and windscreen washer front and rear	20A	Working light	20A
5	Brake light, reversing warning system, warning beacon	10A	Side lamp left, lamp registration number	10A
6	Fan, ventilation, heating	20A	Side lamp right	10A
7	Heated rear windscreen	20A	High beam	10A
8	Tank sensor, solenoid valves high-speed motor, ALS (option)	10A	Low beam	10A
				fuses75.tbl

Slow-Blowing Fuses

If the power supply fails, the reason for this may be that one of the slow-blowing fuses (1) has blown. Check the electrical system and replace defective fuses.



F3 80A: Main Power Supply / Starter
F4 50A: Intake Air Heater
F5 30A: Engine Stop
F6 70A: not assigned

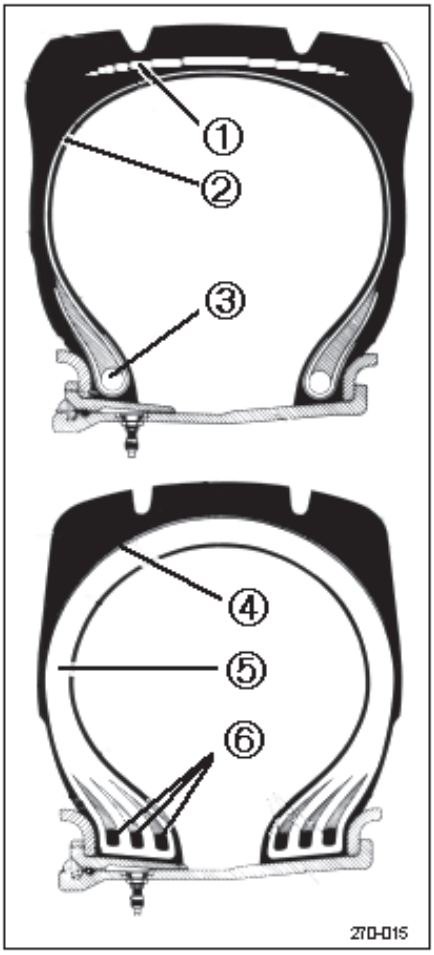


Front of machine

Tyres

Tyre Components

1 Steel Cord Belt	4 Liner
2 Radial Carcass	5 Diagonal Carcass
3 Bead Core	6 Bead Cores



Checking the Tyres

Particularly after work on rocky surfaces, check the tyres for damage, wear and tear, and fissures. Tighten loose screws and nuts.
For reasons of safety, replace the tyres, if you detect one or several of the following faults:

- The bead core (3) is torn or buckled.
- The tyre is excessively worn and more than a quarter of the carcass (5), not the liner (4), is exposed.
- The damage to the carcass (5) exceeds one third of the tyre width.
- The single plies of the tyre are separated.
- Radial fissures down to the carcass (5).
- Deformation or damage to such an extent that the tyre cannot be used anymore.

Checking the Tyre Pressure

When checking the tyre pressure, pay attention to fissures, peeling, and unusual wear and tear. Remove nails, pieces of metal, and other undesired material from the tyre.

WARNING

- **If the tyre bursts or if the parts of a rim consisting of several parts come apart while the tyre is being inflated, parts of the tyre or rim may cause injury or damage to property! Use a tyre-inflating hose with clamping device to inflate the tyre. The hose must be long enough to ensure that you can stand erect next to the tyre's tread. Stand next to the tyre's tread when you inflate the tyre. Before you inflate a removed tyre, secure it by means of ropes, chains, or a protecting cage.**
- **Improper work at tyres and rims may cause severe injury or damage to property due to the high tyre pressure! Repairs at wheels and tyres must only be performed by trained experts.**

The service life and performance of a tyre depend very much on the tyre pressure. Only correct tyre pressures will protect the tyres from damage.

NOTE

- **Check that the machine is unloaded before you check the tyre pressure.**
- **Prior to start of work, measure the tyre pressure of the cold tyres.**

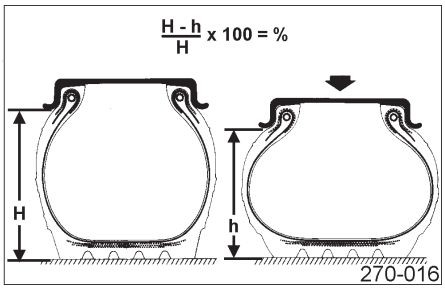
If the tyre pressure is too low, the tyre will be overloaded. If the tyre pressure is too high, this will lead to formation of notches in the tyre resulting in bursting of the tyre when it is subjected to shock load. To avoid such damage, set the pressure of the tyres according to the values given in the following table. If you are not sure, ask your tyre dealer.
Do not deflate the tyre when the tyre pressure increases due to a rise in temperature. For this reason, check and set the tyre pressure before you start work, i.e. when the tyres are still cold.

TYRES			RECOMMENDED TYRE PRESSURE							
			for driving on roads				for operation			
Manufacturer	Size	Type	Front axle		Rear axle		Front axle		Rear axle	
			bar	psi	bar	psi	bar	psi	bar	psi
DUNLOP	405/70 R24	SP T9	1.5	22	2.0	29	2.5	37	2.0	29
DUNLOP	16/70- 20	E 91-2	1.5	22	1.5	22	2.0	29	1.5	22
DUNLOP	455/70 R20	SP T9	1.5	22	2.0	29	2.25	33	2.0	29
DUNLOP	14.5 - 20	E91	1.5	22	2.25	33	3.5	51	2.25	33
DUNLOP	405/70 R20	SP T9	1.5	22	2.25	33	2.75	40	2.25	33
MICHELIN	425/75 R20	XM 27	1.5	22	1.25	18	2.0	29	1.25	18
BARUM	405/70 - 24	NB 38	1.75	26	1.75	26	2.5	37	1.75	26
BARUM	14.5 - 20	NB 38	1.75	26	2.25	33	3.0	44	2.25	33

TYRE95.TBL

If the tyres are too soft, increase the tyre pressure accordingly.
The following degree of resilience (tyre loaded/unloaded) of the front tyres can be used as the guideline for the visual check.

- Transport of normal loads
  (horizontal position of boom): approx. 15 - 25%.
- Digging
  (rear wheels lifted off the ground): approx. 25-30%.

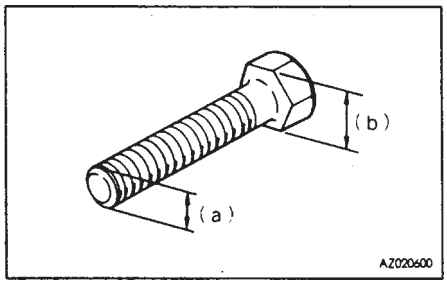


Tools

No.	Designation	Part No.	Remark
1	Set of Double-Ended Ring Spanners	42T-09-H0450 42T-09-H0460 42T-09-H0470 42T-09-H0440	Spanner Openings: 8/10 mm 13/15 mm 17/19 mm 24/27 mm
2	Screwdriver	421-98-H1120	
3	Screwdriver	421-98-H1110	
4	Hammer	421-98-H1140	
5	Bag	421-98-H1130	
6	Lever Type Hand Gun (Grease)	424-98-H1010	
			TOOLS75.TBL

Torque for Standard Nuts and Bolts

Provided that no other values are given, tighten the metric screws with a strength value of 10.9 and the nuts with a strength value of 10 applying the torques given in the tables.
The torque that must be applied depends on the diameter of the thread (a) and the size of the spanner (b) of both the nut and the screw.
Always replace nuts and screws by original parts. Dimensions and quality of replaced parts and original parts must be identical.



NOTE

Do not apply excessive torque to plastic parts. Tighten plastic parts only manually.

Metric Bolts Coarse-Pitch-Thread - Strength Class 10.9					
Thread diameter of the bolt (mm)	Wrench Size (mm)	Steel		Aluminium Cast	
(a)	(b)	Nm	kpm	Nm	kpm
M6	10	14	1.4	7.7	0.77
M8	13	35	3.5	19.0	1.9
M10	17 (15)	70	7.0	37.0	3.7
M12	19	115	11.5	64.0	6.4
M14	22	185	18.5	101.5	10.15
M16	24	280	28.0	158.0	15.8
M18	27	390	39.0	218.0	21.8
M20	30	560	56.0	306.5	30.65
M22	32	750	75.0	416.0	41.6
M24	36	960	96.0	528.5	52.85
M27	41	1400	140.0	774.0	77.4
M30	46	1900	190.0	1053.0	105.3
M33	50	2600	260.0	-	-
M36	55	3300	330.0	-	-
M39	60	4300	430.0	-	-
TORQU75A.TBL					

Metric Fine Screw Thread - Strength Class 10.9					
Thread diameter of the bolt (mm)	Wrench Size (mm)	Steel		Aluminium Cast	
(a)	(b)	Nm	kpm	Nm	kpm
M8 x 1	13	35	3.5	20.0	2.0
M10 x 1	17 (15)	75	7.5	42.0	4.2
M10 x 1.25	17 (15)	70	7.0	39.0	3.9
M12 x 1.25	19	125	12.5	70.0	7.0
M12 x 1.5	19	120	12.0	67.0	6.7
M14 x 1.5	22	200	20.0	110.0	11.0
M16 x 1.5	24	300	30.0	167.5	16.75
M18 x 1.5	27	440	44.0	243.0	24.3
M18 x 2	27	420	42.0	230.0	23.0
M20 x 1.5	30	620	62.0	338.5	33.85
M20 x 2	30	-	-	322.5	32.25
M22 x 1.5	32	820	82.0	454.5	45.45
M22 x 2	32	-	-	436.0	43.6
M24 x 1.5	36	1090	109.0	596.0	59.6
M24 x 2	36	1040	104.0	573.0	57.3
M27 x 2	41	1500	150.0	832.0	83.2
M30 x 2	46	2120	212.0	1158.0	115.8
M33 x 2	50	2800	280.0	-	-
M36 x 3	55	3500	350.0	-	-
M39 x 3	60	4600	460.0	-	-
					TORQU75B.TBL

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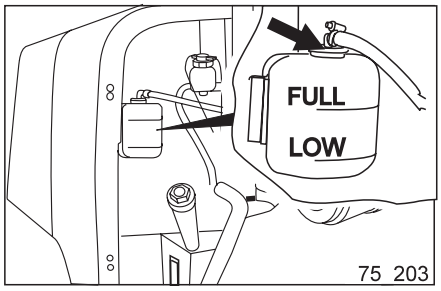
Maintenance Prior to Start

Cooling System, Checking the Coolant Level, Topping Up Coolant

CAUTION

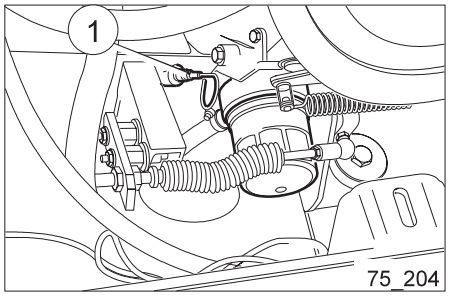
- **A wrong water/coolant mixing ratio will damage the radiator! Always mix water and coolant in the ratio 50:50. This also applies to countries with a hot climate.**
- **Danger of fire! Coolant may ignite at hot engine! Do not top up coolant, unless the engine has cooled down sufficiently.**



1. Open the bonnet.
2. Check that the coolant level in the expansion tank is between the FULL and LOW markings.
   If the coolant level does not reach up to the LOW marking, top up coolant.
3. Therefore remove the cover cap of the expansion tank.
4. Top up coolant until the level reaches up to the FULL marking.
5. After topping up, firmly close the cover cap.
6. Usually, the radiator needs not to be opened. However, for safety reasons it is required to check the refrigerant level in the radiator after 50 operating hours (see chapter "Maintenance Every 50 Operating Hours").

If the expansion tank is empty again after a short period of time, immediately have the cooling system checked for leaks and have any leaks repaired in the garage.

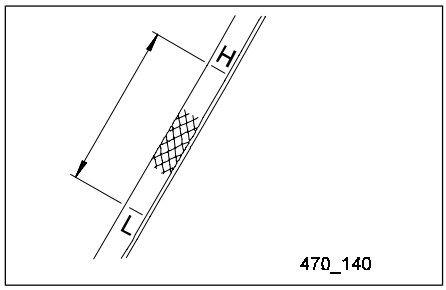
Engine, Checking the Oil Level, Topping Up Oil



NOTE

After you have switched off the engine, wait at least 5 minutes before you check the engine oil level. The machine must stand on an even surface.

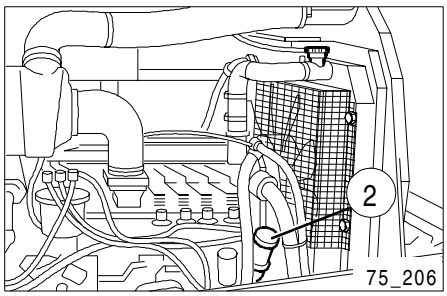
1. Pull out the oil dipstick (1) and wipe off the oil with a clean cloth.
2. Completely re-insert the oil dipstick and pull it out again after a few seconds. The oil level must be between the (H) and (L) markings on the oil dipstick.
3. If the oil level does not reach up to the (L) marking, top up engine oil. For detailed information on recommended oils, see section "Lubricants and Service Fluids".



NOTE

Do not fill in too much oil in one go via the filler!

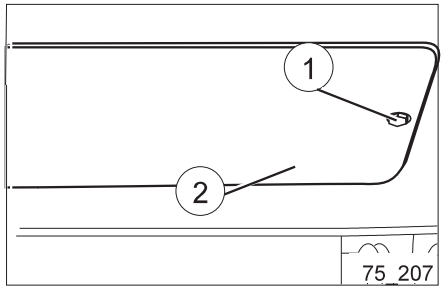
4. Wait three minutes before you check the oil level again.
   If the oil level is above the (H) marking, drain off some oil (see "Engine, Draining Off Oil").
5. Close the oil filler (2).

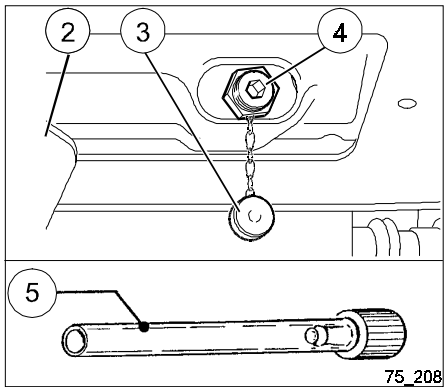


Engine, Draining Off Oil

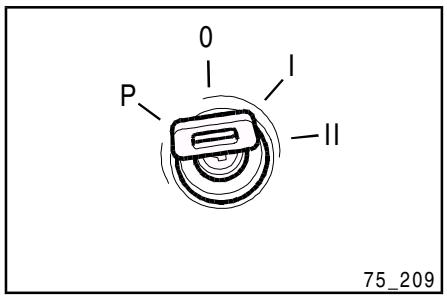
If you have topped up too much oil, you must drain off the excess oil. Have an oil trough with a sufficient capacity ready.

1. Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".
2. Loosen the screw (1) at the bottom cover plate (2) and swivel the cover plate to the side.
3. Put the oil trough under the drain screw (4).
4. Remove the cover cap (3) from the drain valve.
5. Screw on the drain hose (5) on the drain valve (4). This will cause the drain valve to open.
6. Drain the oil.
7. Check the removed oil for metal parts or undesired material. If the oil contains such particles, inform the responsible Komatsu dealer.
8. Remove the cover cap (3) from the drain valve.
9. Remove the drain hose (5) from the drain valve (4). This will cause the drain valve to close.
9. Fasten the bottom cover plate with the screw.





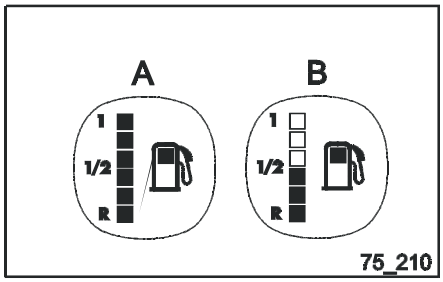
Checking the Fuel Level, Refuelling

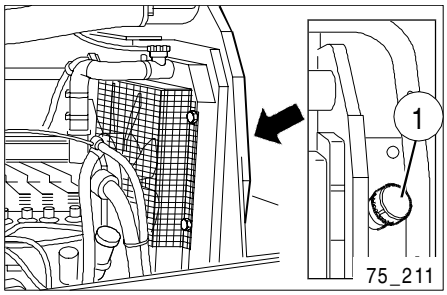


WARNING

Danger of fire! Fuel that has spilled over may ignite! Immediately remove fuel that has spilled over.

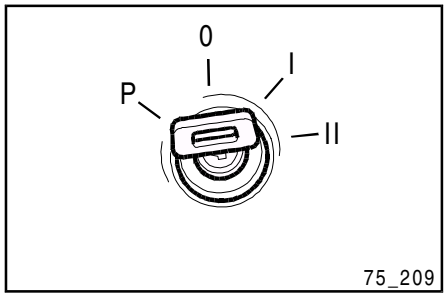
1. Turn the start switch to the operating position 'I' and check the fuel level indicated on the fuel level indicator.
   A - fuel tank full
   B - fuel tank half-full
2. Then, return the start switch to the stop position '0'.
3. If required, refuel via the filler (1).
   For detailed information on fuels, see section "Lubricants and Service Fluids".
4. After refuelling, firmly close the filler.





Checking the Controls

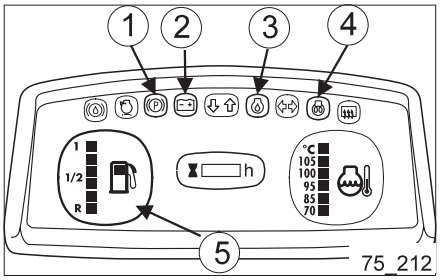
1. Turn the start switch to the operating position 'I'.
   An alarm buzzer sounds until the machine is started.
2. Check that the following alarm and control indicators are on until the engine is started:
   Charging current (1)
   Engine oil level (2)
   Parking brake (3)
   Intake air preheater (4)
3. Check that the fuel level indicator (5) indicates the fuel level in the fuel tank.



NOTE

Contact your responsible Komatsu dealer, if one or several of the indicators do not light up.

Do not only use the indicators to perform the checks prior to start. Always perform the work described as regular maintenance, too.



Checking the Electrical Connections

CAUTION

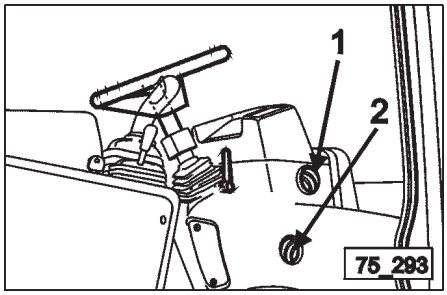
Danger of ignition! Inflammable material (leaves, twigs, grass, etc.) may ignite within the electrical system!
Remove inflammable material from the electrical system.

NOTE

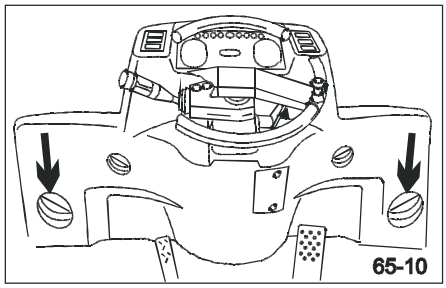
If a fuse blows, or if there are any signs of a short-circuit within the electrical system, inform your responsible Komatsu dealer.

Regularly check that the terminals are fastened tightly, retighten loose terminals.

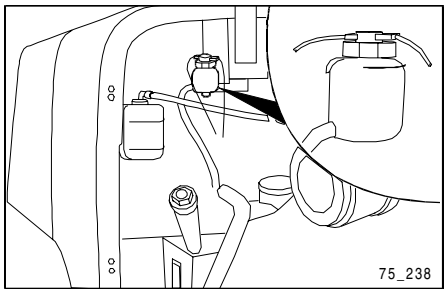
Heater / Air conditioning: checking rate of air flow



1. Turn start switch to position '1'.
2. Switch blower on.
3. Check if air flow at the air-outlet nozzles (1) and (2) to the right and left of the steering column is strong enough.
   Attention: The circulating air jets (arrow) must be open.
4. If insufficient air is coming out of the jets, either the filter fleece in the heating/air conditioning unit is dirty and will have to be cleaned or replaced or the condenser in the air conditioning system is dirty and will have to be cleaned; see **"Maintenance every 500 operating hours"** .



Other Maintenance Measures Prior to Start

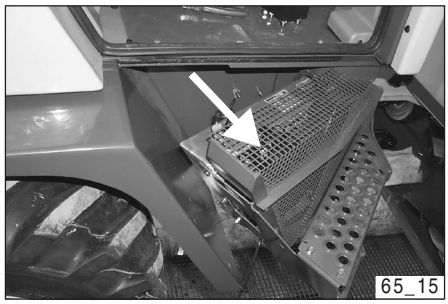


- Check that the brake oil level reaches up to the marking.
- Check that the contacts at the float of the brake oil container are tightened correctly.
- Check that the lighting equipment operates correctly; check it for dirt and damage.
- Check the measuring instruments.
- Check both the horn and the reversing warning horn.
- Check both clearance and operation of the steering wheel.
- Check the function of the rear-view mirror; check it for dirt and damage.

Maintenance upon Demand

Checking the Air Conditioning System

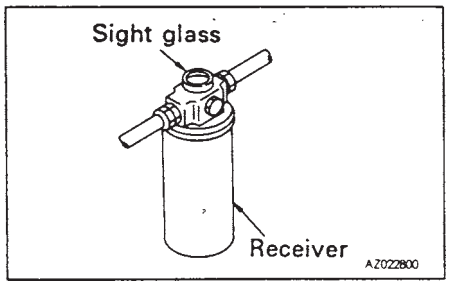
Check the air-conditioning system twice a year, in spring and autumn.



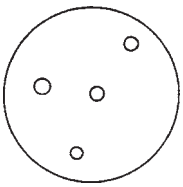
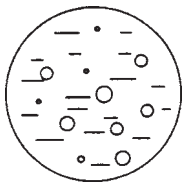
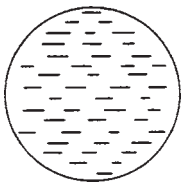
Checking the coolant level

DANGER

If the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite: Therefore never loosen any part of the refrigerant circuit.



Operate the cooler of the air-conditioning system for 5 - 10 minutes, then touch the high pressure portion and low pressure portion of the compressor (or high pressure hose and low pressure hose joint) with your hand. At the same time, inspect the flow of coolant (R134a) through the sight glass to check the gas level.
Contact your Komatsu dealer for this inspection.
The sight glass is installed next to the receiver at the side of the condenser. The steps on the right have to be unscrewed and the condenser swung out for access.

Cooler condition	Normal	Abnormal	
Temperature of high and low pressures pipes	High pressure pipie is hot. Low pressure pipe is cold. Clear difference in temperature	High pressure pipe is warm. Low pressure pipe is cold. Little difference in temperature	Amost no difference in temperature between high and low pressure pipes.
Sight glass	Almost transparent. All bubbles disappear if the engine speed is increased or reduced. 	Bubbles are always visible. Sometimes becomes transparent, or white bubbles appear. 	Opaque substance is visible in the fluid. 
Pipe connections	Properly connected	Some parts contaminated with oil.	Some parts heavily stained with oil.
General condition of cooler	Coolant level correct, no abnormalities. Ready for use.	There may be a leak somewhere. Call service repair shop for inspection.	Almost all coolant has leaked out. Contact service repair shop immediately.

Maintenance Every 10 Operating Hours

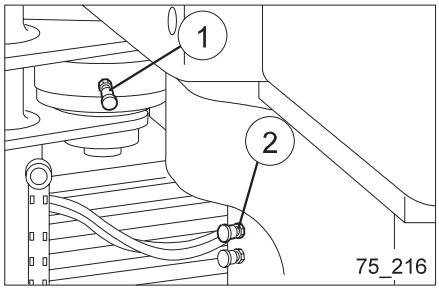
Lubrication

DANGER

There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.

1. Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".
2. Clean the grease nipples marked by arrows.
3. Use a grease gun to fill the grease nipples with a sufficient volume of lubricating grease.

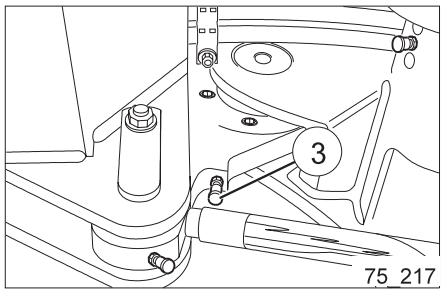
   Articulated steering (3 points)



4. Remove the used lubricating grease that is pressed out of the bearings.

   NOTE

   Perform lubrication more frequently, when working in a continually wet or salty environment.



Maintenance After the First 50 Operating Hours

Engine, Changing Oil and Replacing the Oil Filter Cartridge

WARNING

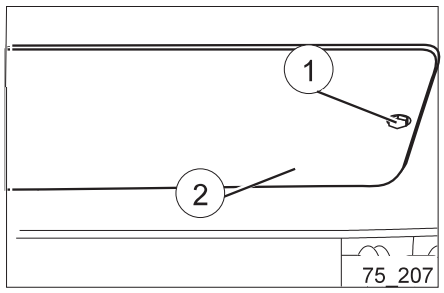
- **Frequent skin contact with used engine oil may cause skin lesions!**
  Thoroughly remove any engine oil adhering to your skin.
- **Hot engine oil may cause scalding!**
  Wear rubber gloves and place the oil trough under the discharge opening in such a way that you do not get in contact with the oil when it is running out.

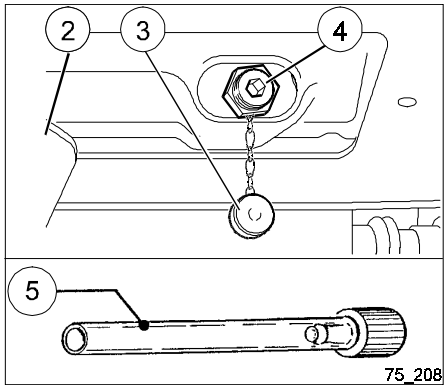
NOTE

Do not perform an oil change, unless the engine is switched off and at operating temperature.

DANGER

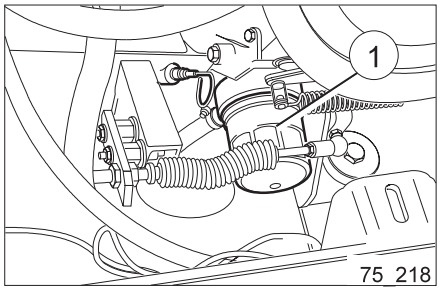
There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.





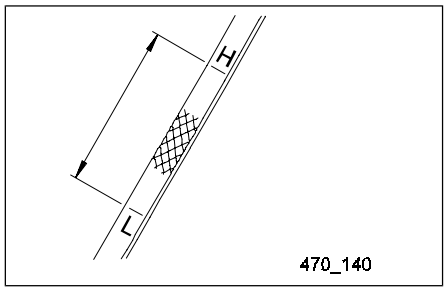
1. Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".
2. Loosen the screw (1) at the bottom cover plate (2) and swivel the cover plate to the side.
3. Put the oil trough under the drain screw (4).
4. Remove the cover cap (3) from the drain valve.
5. Screw on the drain hose (5) on the drain valve (4). This will cause the drain valve to open.
6. Drain the oil.
7. Check the removed oil for metal parts or undesired material. If the oil contains such particles, inform the responsible Komatsu dealer.
8. Remove the cover cap (3) from the drain valve.
9. Remove the drain hose (5) from the drain valve (4). This will cause the drain valve to close.
9. Fasten the bottom cover plate with the screw.

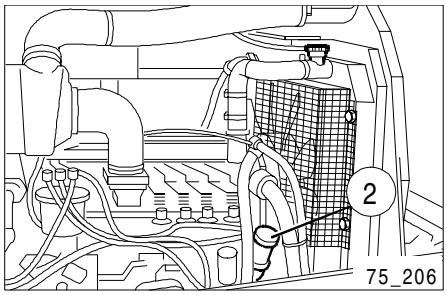
Replacing the Oil Filter Cartridge



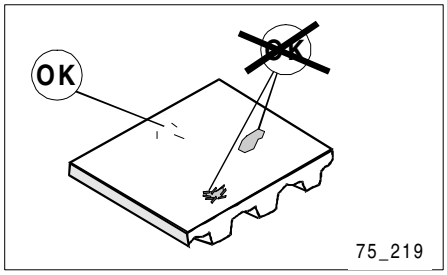
10. Turn the filter screwdriver anti-clockwise to unscrew the filter cartridge (1).
11. Clean the filter holder. Completely fill up the new filter cartridge with engine oil. Slightly oil both the gasket and the thread of the cartridge with engine oil. Screw in the filter cartridge again.
12. When installing the filter cartridge, make sure that the sealing surface of the cartridge slightly touches the filter holder. Then, tighten the filter cartridge according to the filter manufacturer's specification.
13. After replacing the filter cartridge, fill in clean engine oil until the oil level reaches up to the (H) marking on the oil dipstick.

    For details on recommended engine oils see section "Lubricants and Service Fluids".
14. Close the oil filler (2).
15. Let the engine run in idle for about five minutes and check whether oil is leaking out.
16. Switch off the engine.
17. Wait about ten minutes, then check the oil level again. The oil level must be between the 'H' and 'L' markings on the oil dipstick.
    For further details see section "Checks Prior to Start".





V-Belt, Checking the Condition



Check the drive belt for fissures. Transversal fissures in direction of the belt width are permitted. Longitudinal fissures in direction of the belt length crossing transversal fissures, missing parts, or damaged tissue layers are not permitted. In these cases, replace the drive belt.

V-Belt, Checking and Adjusting the Tension

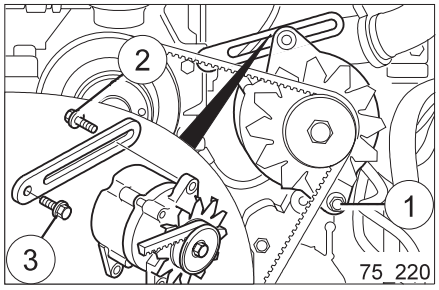
DANGER

There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.

1. Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".

WARNING

Danger of injuries! When the engine is in operation, there is danger of severe injuries by moving parts within the engine compartment!
Do not work within the engine compartment, while the engine is in operation.



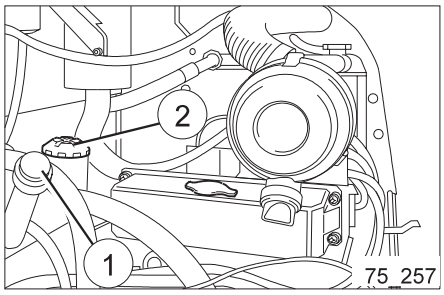
2. Press down the V-belt in the middle of the longest straight part. You should be able to press the V-belt down about 10-15 mm.
   If you can press down the V-belt more than 10-15 mm, adjust the tension as follows:
3. Loosen the fastening screw (1) at the generator.
4. Loosen the connecting screw (2) between the generator and the guide rail.
5. Loosen the fastening screw (3) at the guide rail.
6. Tilt the generator to adjust the tension of the V-belt.
7. Fasten the generator and the guide rail.
8. Check the tension of the V-belt and re-adjust it, if required.

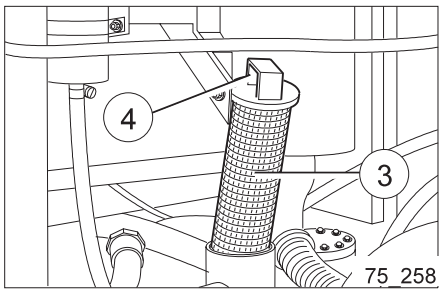
Hydraulic System, Replacing the Filter Insert

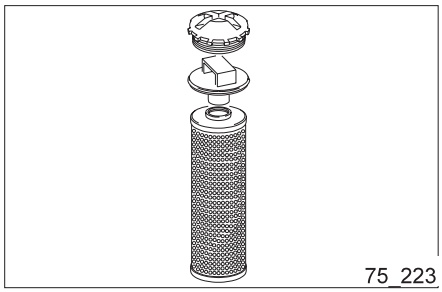
WARNING

Frequent contact between used hydraulic oil and skin may cause skin lesions and other physical damage!
Wear rubber gloves when changing the filter. Thoroughly wash off any hydraulic oil adhering to your skin.

1. Lower the work unit onto the floor.
2. Park the machine.
3. Turn the inlet and ventilation screw (1) several revolutions to let the pressure escape.
4. Clean the surface of the filter cap (2) and the area around the filter cap.
5. Unscrew the filter cap.
6. Pull out the filter element (3) at the handle (4) .
7. Pull the filter element off the handle and dispose of the filter element.
8. Clean the inner surface of the filter housing. Before you start cleaning, check that there is no undesired material in the filter housing.
9. Put the handle onto the new filter element.
10. Insert the new filter element into the housing.
11. Screw on the filter cap and tighten it with 20 Nm.
12. Ventilate the system at the tank according to the specification (see "Hydraulic System, Ventilation of Hydraulic Tank").
13. Perform a test run and check that the system is tight.







Checking and Tightening the Wheel Nuts

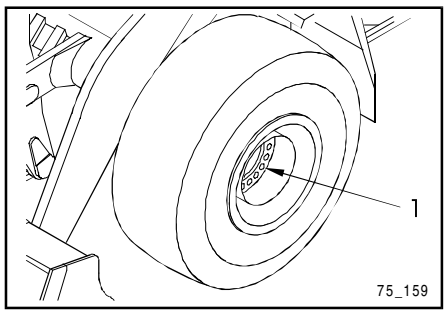
WARNING

Loose wheel nuts may cause severe accidents!
Regularly check and tighten the wheel nuts.

Tightening of loose nuts. **Nut torque: 450 - 500 Nm**

NOTE

If a threaded bolts breaks, replace all threaded bolts of the respective wheel.



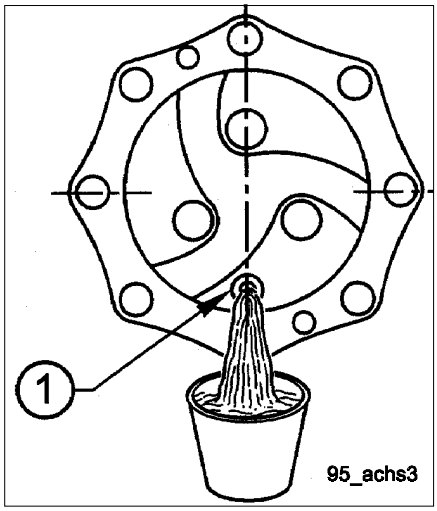
Front and Rear Axle, Oil Change

WARNING

Frequent contact between used hydraulic oil and skin may cause skin lesions and other physical damage!
Wear rubber gloves when changing the oil. Thoroughly wash off any hydraulic oil adhering to your skin.

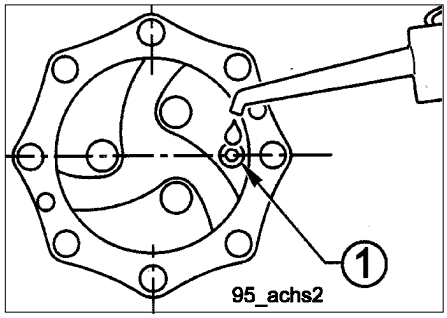
DANGER

There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.



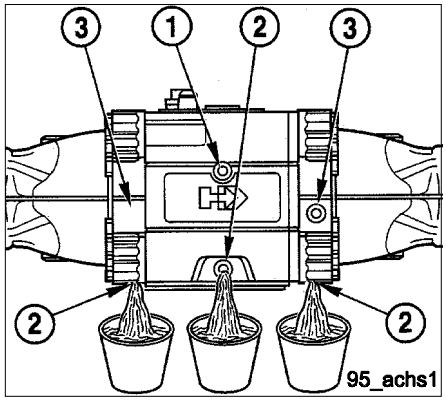
Planetary gearing

1. Start engine. Raise work unit and drive the machine until the drain plug (1) for the planetary gearing on the wheel where you want to change the oil has reached its lowest point. Switch off engine. Lower work unit and apply parking brake.
2. Place drip pan or container underneath the drain plug (1).
3. Unscrew drain plug (1) and drain oil into container.
4. Drive machine until the planetary gearing drain plug hole (1) is in a horizontal ("3 o'clock") position.
5. Fill planetary gearing with oil until the oil reaches the lower lip of the drain plug hole (1).
6. Clean drain plug and attach clean, undamaged (or new) washer.
7. Screw drain plug in tight.
8. Change oil in other wheels of the front and rear axle following the same procedure as described under no. 1 - 7 above.



Differential

1. Place a drip pan or container underneath the oil drain opening (2).
   Remove the filler screw (1), the 3 drain plugs of the drain holes (2) and the 2 inspection hole screws (3). Drain off oil.
2. Clean drain plugs and attach clean, undamaged (or new) washers.
3. Screw drain plugs (2) in tight.
4. Pour oil in through the filler hole (1) until it reaches the lower lip of the inspection holes (3).
5. Insert filler screw (1) and inspection hole screws (3) and screw tight.



Transfer Box Gearing - Changing Oil

WARNING

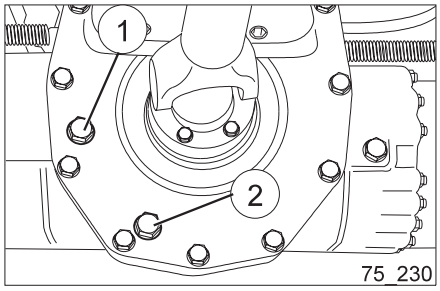
Frequent contact between used hydraulic oil and skin may cause skin lesions and other physical damage!
Wear rubber gloves when changing the oil. Thoroughly wash off any hydraulic oil adhering to your skin.

DANGER

There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.

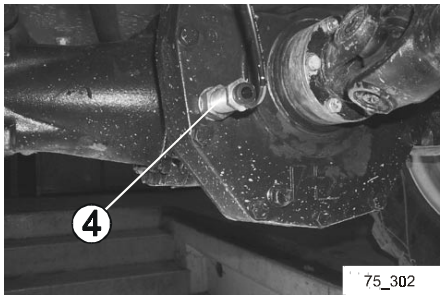
Have an oil trough with a sufficient capacity ready.
Perform an oil change with the gear unit at operating temperature.

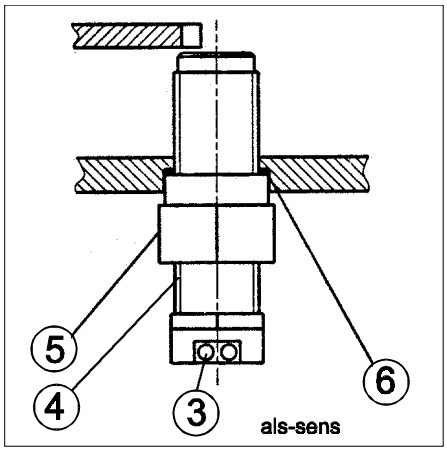
1. Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".
2. Unscrew the screw plugs (1) and (2) .
3. Drain the oil.
4. Clean the screw plugs and replace the gaskets.
5. Tightly screw in the screw plug (2).
6. Fill in oil via the check drill hole (1), until the oil reaches up to the bottom edge of the check drill hole.
7. Tightly screw in the screw plug (1).



Standard machine "20 kph" with ALS:

1. Pull cable (3) off speed sensor (4).
2. Unscrew and remove speed sensor (4).
3. Carry out steps no. 2 to 6.
4. Replace sealing ring (6).
5. Undo counternut (5) a little.
6. Screw speed sensor (4) in completely but not tight.
7. Undo by about 1 turn.
8. Hold speed sensor (4) tight and tighten counternut (5).
   + torque = 50 - 70 Nm.
9. Connect cable (3) to speed sensor (4).





Maintenance Every 50 Operating Hours

All maintenance operations to be performed after 10 hours of operation also fall into this maintenance category.

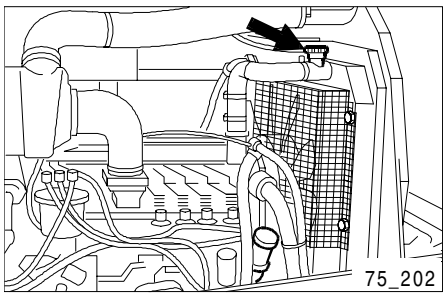
Checking the Cooling System, Coolant Level in the Radiator and expanion tank

WARNING

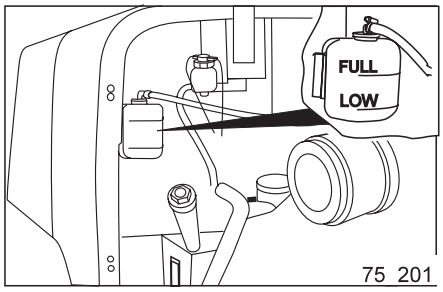
Danger of being burnt! The coolant is under pressure if the engine is hot. Hot coolant may squirt out during opening. Check the coolant level only after the engine has sufficiently cooled down. Open the cover of the radiator (arrow) by turning it slowly so that the pressure can escape.

DANGER

Danger of fire! Antifreeze may ignite at the hot engine! Wait until the engine has cooled down, before refilling antifreeze.



1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance".
2. Stop the engine and let it cool down.
3. Open the engine cover.
4. Turn the radiator cap (arrow) slowly to the first stop and let the pressure escape. Then press the cap down and turn further to remove.
5. Check that the radiator is filled up to the overflow with coolant. If not then top up to the overflow with coolant.
6. After tooping up, fit the radiator cap and tighten.
7. Check that the coolant level in the expansion tank is between the marks FULL and LOW.
8. Top up to the full mark if required.
7. After tooping up, refit the tank cap and tighten.



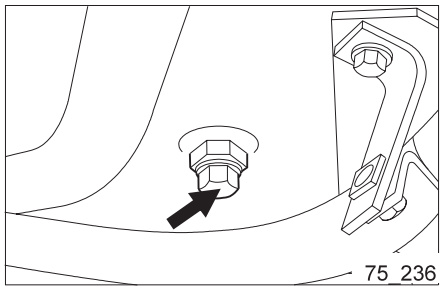
If coolant has been topped up:

10. Start the engine fully and open the heater.
11. Run the engine until warm.
12. Check points 2. to 5. again.

NOTE

If coolant has been toppe up regualry in the radiator or expansion tank, then the system should be checkesd by your local Komatsu dealer an repaired if required.

Draining Off Water and Dirt Deposits From the Fuel Tank

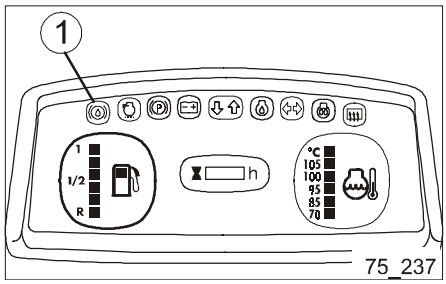


1. Place a container under the drain plug of the fuel tank (see arrow).
2. Open the drain plug, drain off water and dirt.
3. Close the drain plug when clean fuel starts to leak out.

Checking the Service Brake and Oil Level, Refilling Oil

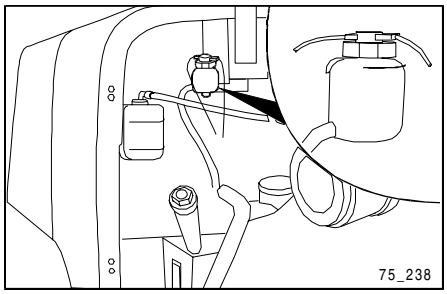
WARNING

Danger of accidents! If the oil level is too low, the service brake may break down!
If the brake fluid supply control lamp (1) lights up, you must immediately stop and check the oil level.



CAUTION

Danger of accidents! If you use usually available brake fluid for filling up, the operational efficiency of the brake system may be impaired!
Use only the prescribed oil for filling up! Do not use brake fluid!
Pay attention to utmost cleanness!



1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance“.
2. Check the brake fluid level at the expansion tank (2). The oil level must be 10-20 mm below the upper edge of the expansion tank (marking).
3. If the oil level is too low, fill prescribed oil into the expansion tank. For detailed specifications, see section "Lubricants and operating agents“.
4. If you detect a significant oil loss, inform the responsible Komatsu dealer.

Checking the Battery and Acid Level

WARNING

- **Danger of injury! The battery contains strongly aggressive battery acid which may squirt out and burn your eyes! Carry goggles and rubber gloves if you work on the battery. Immediately rinse your eyes or skin using plenty of water and go to see a doctor.**
- **Gases which may explode can form inside in the battery! Do not come with open fire or sparks into proximity of the battery. Do not smoke.**

1. For maintenance operations, park and secure the machine as described in chapter "Preparing the Machine for Maintenance“.
2. Check the battery and pole terminals for proper fit.
3. Clean the environment of the plugs.
4. Remove all plugs and check whether the battery acid is at the acid level markings. Refill distilled water if the acid level is too low.

   NOTE

   In cold weather, refill distilled water only immediately before the starting the machine. The water can then mix with the battery acid and does not freeze.

5. Measure the specific density of the battery acid and read off the battery charging using the following conversion table.

Battery	Temperature			
	20°C	5°C	-10°C	-25°C
Charge	Specific Density (kg/l)			
full	1.28	1.29	1.30	1.31
half	1.20	1.21	1.22	1.23
empty	1.12	1.13	1.14	1.15

6. Recharge insufficiently charged batteries.
7. Lock the cells with the cleaned plugs.

Re-Charging the Battery

Re-charging a built-in battery

- Disconnect the cable of the negative pole before re-charging or pull the battery main switch, in order to interrupt the power supply. Otherwise, the alternator is damaged due to high voltage peaks.
- Remove all battery plugs before re-charging to ensure sufficient ventilation.

  To prevent gas explosions, do not come near the battery with fire and do not produce any sparks.
- Interrupt the charging process if the temperature of the battery acid exceeds 45° C.
- Switch off the battery charger, as soon as the battery is re-charged.

  If the battery is overloaded, the following situations may occur:
  1) The battery may be overheated
  2) Decrease in the battery acid volume
  3) Damage of the electrode plates.
- Do not mix up the cables (positive (+) and negative (-)).
- Before performing maintenance operations, remove all cables from the battery poles. Only exceptions: acid level check or the measurement of the specific density.

Lubrication

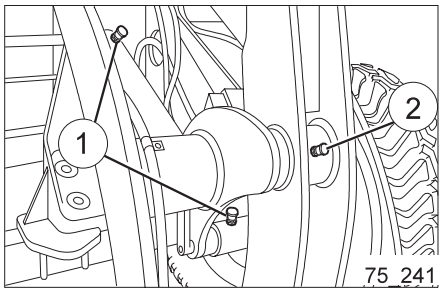
Lubricating points of the work unit

DANGER

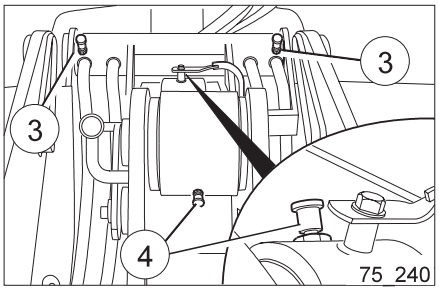
If you perform maintenance operations at a machine which is not properly parked and secured, severe accidents may occur! ark the machine on firm, level ground and secure it before starting the maintenance operations.

1. Park and secure machine for the maintenance operations as described in chapter "Preparing the Machine for Maintenance“.
2. Clean the grease nipples which are indicated by the arrows.
3. Use a grease gun to press sufficient grease into the grease nipples.

Lifting cylinder (1) right and left side	(2 locations each)
Rocker arm (2)	(1 location)
Boom (3)	(2 locations)
Tipping cylinder (4)	(2 locations)
Quick-change unit (5)	(3 locations)
Clamshell bucket (6)	(3 locations)

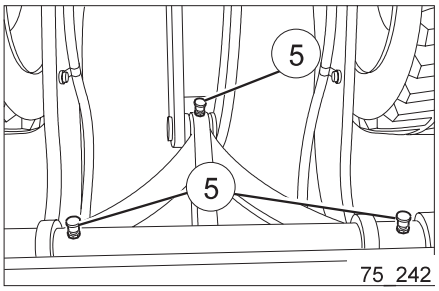


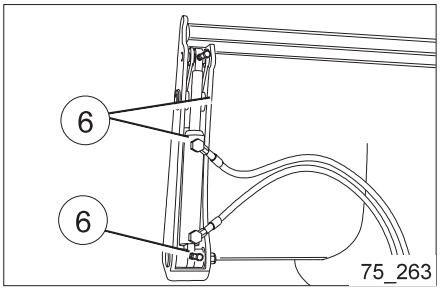
4. Remove the old grease which is extruding at the bearings.



NOTE

If you operate in humid conditions or in a salty environment, you must reduce the lubricating intervals.





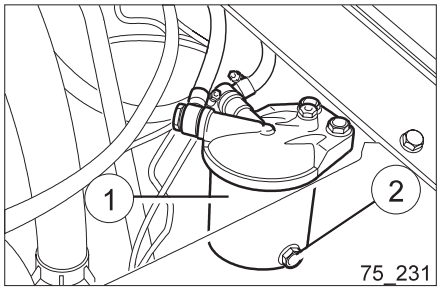
Maintenance Every 100 Operating Hours

All maintenance operations to be performed after 10 and 50 hours of operation fall also into this maintenance category.

Draining the Water Separator, Removing Water and Dirt Deposits

Keep a container ready for collecting the liquid from the water separator (1).

1. Loosen the drain plug (2).
2. Let the water run off.
3. Screw in and tighten the drain plug.
4. Check for leaks.



Maintenance Every 250 Operating Hours

All maintenance operations to be performed after 10, 50 and 100 hours of operation fall also into this maintenance category.

Changing the Engine Oil and Oil Filter Cartridge

See chapter "Maintenance After the First 50 Operating Hours".

Checking the V-Belt Condition

See chapter "Maintenance After the First 50 Operating Hours".

Checking and Adjusting the V-belt Tension

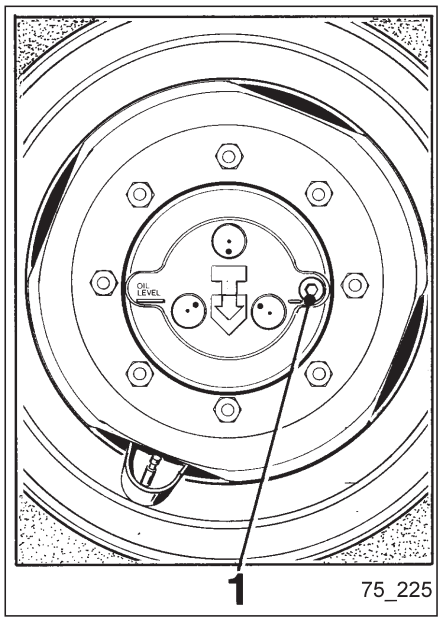
See chapter "Maintenance After the First 50 Operating Hours".

Front and Rear Axle, Checking the Oil Level

DANGER

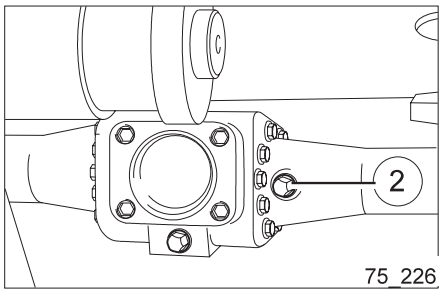
There is danger of severe accidents, if you perform maintenance work at a machine that has not been parked and secured correctly!
Park the machine on a solid, even surface and secure it, before you start to perform maintenance work.

Before you start maintenance work, park and secure the machine as described in the chapter "Preparing the Machine for Maintenance".



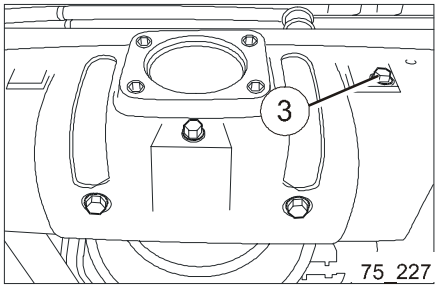
Planet gear

1. Start engine, raise work unit and drive the machine until the oil level marking at the planetary gearing of the wheel which you are checking is in horizontal position. Switch off engine. Lower work unit and apply parking brake.
2. Unscrew the locking screw (1) of the drill hole.
3. Check the oil level. The oil level must reach up to the bottom edge of the check drill hole.
4. If the oil level is too low, top up oil via the check drill hole of the screw plug.
   For details on recommended oils, see section "Lubricants and Operating Agents".
5. Tightly screw in the screw plug.
6. Check the oil level at the other wheel of the front and rear axle. For this purpose, proceed as described under points 2 through 5.



Differential

1. Unscrew the locking screw (2) of the drill hole at the front axle. Check the oil level as described under points 3 through 5 in section "Planet gear".
2. Unscrew the locking screw (2) of the drill hole at the rear axle. Check the oil level as described under points 3 through 5 in section "Planet gear".



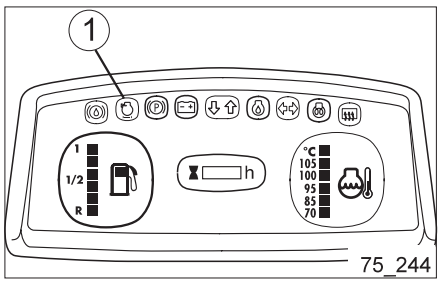
Air Filter, Removing and Re-Installing the Filter Insert, Checking and Cleaning the Filter Insert

Structure of the air filter

The air filter consists of the air filter housing, the dust exhaust valve, the filter cartridge and the safety filter.

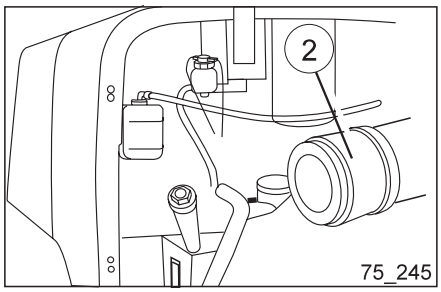
Maintenance demand

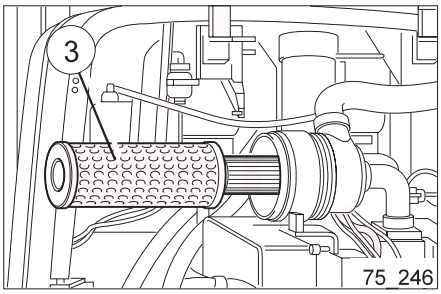
If the air filter warning indicator (1) lights up, the air filter cartridge is dirty. You must clean or exchange it immediately.



The filter insert has to be checked for perfect condition and be cleaned every 250 operating hours, no matter whether the control light is lit or not. If the filter insert is damaged or deformed, it must be exchanged.
A dirty safety filter indicates that the filter cartridge is damaged. In this case, both - filter cartridge and safety filter - must be exchanged.

Removing the filter cartridge





WARNING

Danger of injury! When the engine is running, you may hurt yourself on the movable components inside the engine room! Do not perform any operation in the engine room with the engine running!

1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance".
2. Open the twistlocks on the cover of the air filter housing (2).
3. Remove the cover of air filter housing.
4. Pull out the filter cartridge (3).
5. Clean thoroughly the interior of the filter housing with a cloth.

Cleaning or exchanging the filter cartridge

Depending on the degree of contamination, the air-filter insert can be cleaned using compressed air or water to which a mild detergent can be added.

NOTE

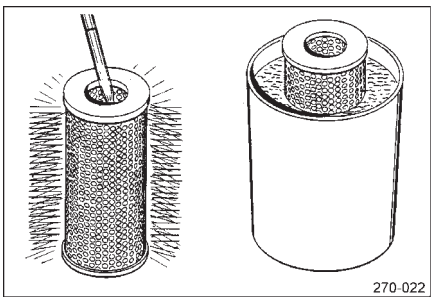
- **The air-filter insert must be replaced, if the air-filter control light lights up only short time after cleaning.**
- **Do not clean the safety filter (refer to chapter "Air Filter, Replacing the Filter Insert, Replacing the Safety Filter").**

a) Cleaning with compressed air

CAUTION

- **Whirled up dust particles may hurt the eyes!**
  Carry goggles if you clean the filter cartridges with compressed air.
- **Dangerous dust particles may irritate the lung!**
  Carry a dust-protection mask if you clean the filter cartridges with compressed air.

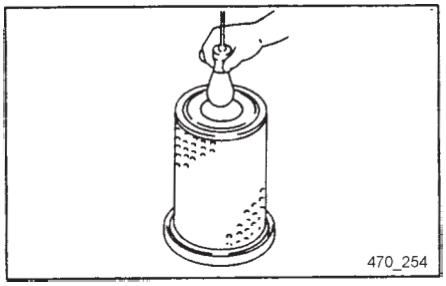
Blow out the air filter cartridge with dry compressed air (max. 6 bars) starting with the interior and then proceeding to the outside. The air nozzle is to be moved up and down the paper with a minimum distance of 3 cm. You can stop the cleaning if no more dust comes out.
Do not clean the cartridge by hitting it or by beating it against other objects.



b) Cleaning with water and cleaning agents
After the dust has been blown out, the filter cartridge can also be additionally cleaned using warm water with a mild cleaning agent (max. 50°C) to remove adhering oil, grease, soot, etc. For this purpose, swing the cartridge back and forth in the solution.
Then, rinse the filter cartridge with clean water starting with the inside and then proceeding to the outside (max. 3 bars) and let it dry at a temperature of max. 50°C.

Checking the filter cartridge

Usually, it is required to check each air filter cartridge before it is re-installed. For this purpose, insert a into the cartridge and visually check the filter paper against the transmitted light. If you detect small holes or spots on which the paper is thin, the insert is defective and must be replaced.
Check filter cartridges for damaged seals.



NOTE

Also new filter cartridges must be checked before they are assembled.

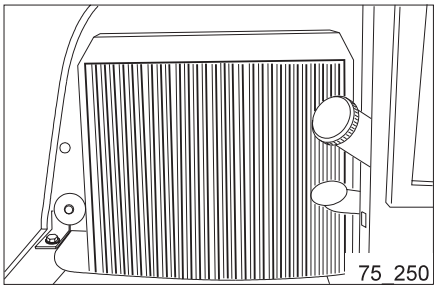
Assembling the air filter cartridge

1. Check the safety filter for proper fit.
2. Insert the filter cartridge into filter housing in such a way that the seal of the insert locks firmly on the collar of the housing rear panel.
3. Assemble the air filter cap.

   NOTE

   If the control lamp lights up again after a short time, you must replace both, the air filter cartridge and the safety filter (refer to chapter "Air Filter, Replacing the Filter Insert, Replacing the Safety Filter").

Cleaning the Radiator Segments



The radiator segments must be checked daily and cleaned with compressed air, if required.

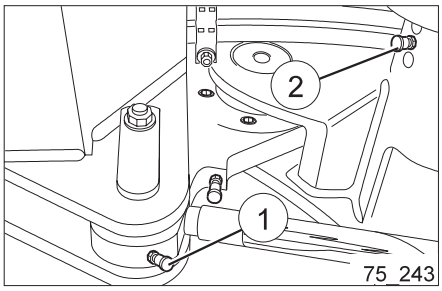
NOTE

Do not hold the compressed air nozzle or water nozzle too close to the radiator segments. Use no scrubber for cleaning since the plates may be damaged.

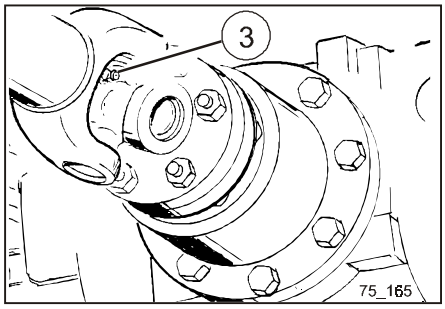
Lubrication

DANGER

If you perform maintenance operations at a machine which is not properly parked and secured, severe accidents may occur! Park the machine on firm, level ground and secure it before starting the maintenance operations.



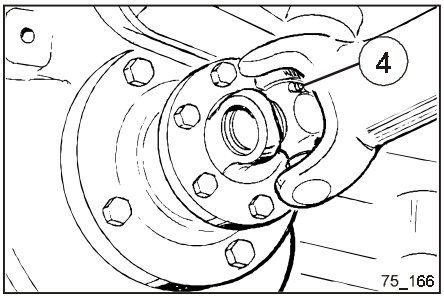
1. For maintenance operations, park the machine as described in chapter "Preparing the Machine for Maintenance".
2. Clean the grease nipples which are indicated by the arrows.
3. Use a grease gun to press sufficient grease into the grease nipples.
4. Remove the old grease which is extruding at the bearings.



Front steering cylinder (1) right and left side	(1 location each)
Rear steering cylinder (2) right and left side	(1 location each)
Front universal shaft (3)	(1 location)
Rear universal shaft (4)	(1 location)

NOTE

If you operate in humid conditions or in a salty environment, you must reduce the lubricating intervals.



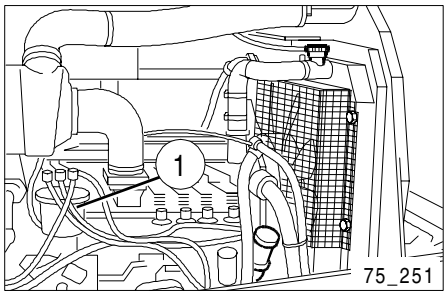
Maintenance Every 500 Operating Hours

All maintenance operations to be performed after 10, 50 and 250 hours of operation also fall into this maintenance category.

Changing the Fuel Filter and Filter Element

DANGER

Danger of fire! Fuel may ignite on hot surfaces!
Only change the filter elements if the engine has sufficiently cooled down. Stay away with open fire or sparks while handling with fuel. Do not smoke.

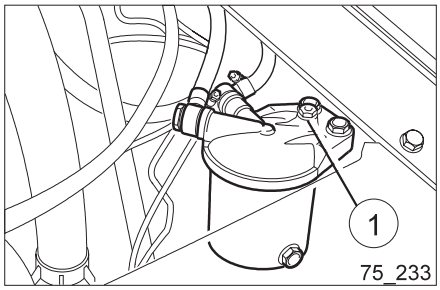


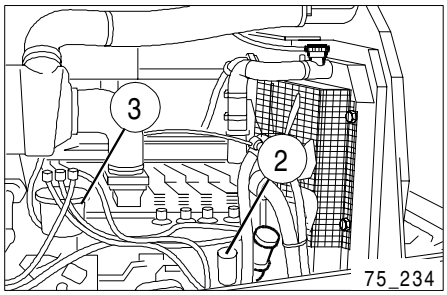
1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance“.
2. Clean the area around the fuel filter (1).
3. Unscrew the filter element counterclockwise with the filter screwdriver.
4. Clean the filter head.
5. Fill up the new filter element with clean fuel.
6. Lubricate the sealing faces of the filter element lightly with engine oil.
7. During reassembly, re-tighten the filter element manually, until the seal is fitting. Then re-tighten the filter element.
   (Consider the specifications of the filter manufacturer on the filter).
8. Then purge the fuel system
   (see section "Purging the Fuel System“).
9. Start the engine and check for leaks.

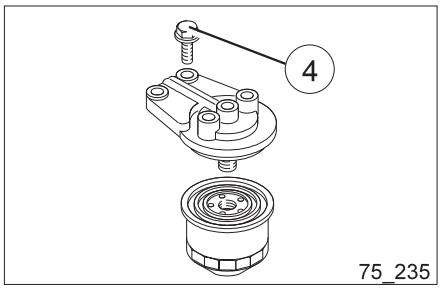
Purging the Fuel System

DANGER

Fuel in the injection system is under pressure.
Carry goggles and rubber gloves if you work on the injection pump. If you are hit by a high-pressure fuel beam, immediately go into medical treatment.







1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance".
2. Loosen the vent screw (1) at the water separator.
3. Unlock the fuel pump (2) by pressing the cover down and swivelling it out of the way.
4. Operate fuel pump until bubble-free fuel leaks out at the vent screw.
5. Re-tighten the vent screw.
6. Loosen the vent screw (4) at the fuel filter (3).
7. Operate the fuel pump until bubble-free fuel leaks out at the vent screw.
8. Re-tighten vent screw.
9. Re-lock the cover of the fuel pump.

WARNING

Danger of injury! When the engine is running, you may hurt yourself on the movable components inside the engine room. Do not perform any operation in the engine room with the engine running.

10. Start up the engine and purge the lines, one after the other, with the engine running until the engine is running regularly.

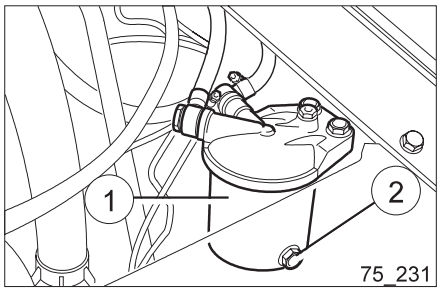
    IMPORTANT

    If the fuel system has run empty during driving, or if repairs or maintenance operations are to be performed, it is necessary to purge the system.

Changing the Filter Cartridge of the Hydraulic System

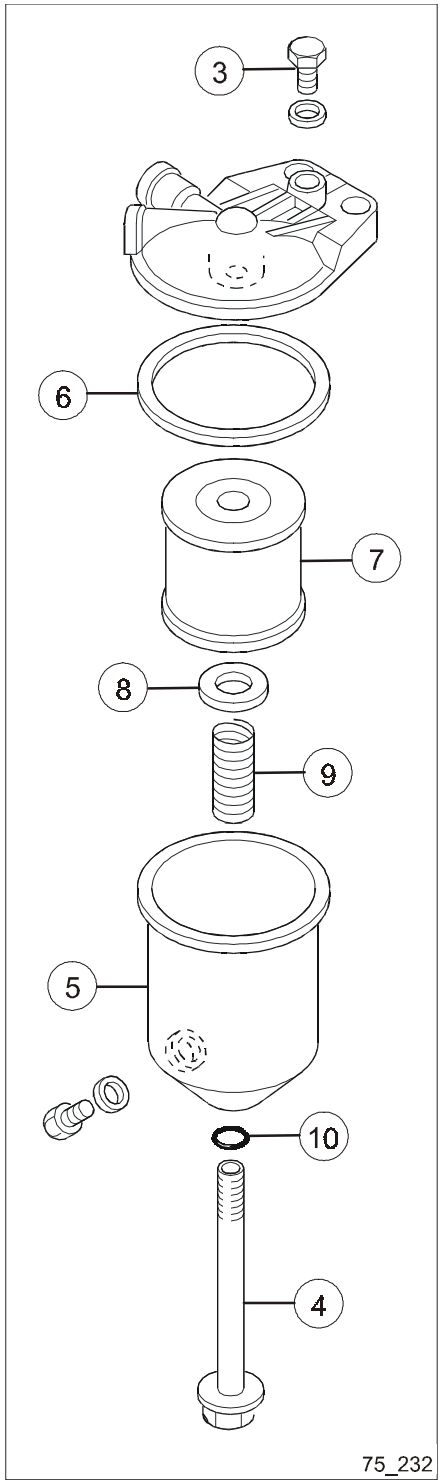
See chapter "Maintenance After the First 50 Operating Hours".

Cleaning the Water Separator



Keep a container ready for collecting the liquid from the water separator (1).

1. Loosen the drain plug (2).
2. Let the water and fuel run off.
3. Loosen the screw (4) at the bottom side.
4. Remove the housing (5) from the cover.
5. Remove the gasket (6).
6. Remove the filter element (7), the gasket (8) and the spiral spring (9).
7. Remove water and dirt from the housing.
8. Clean the filter element and blow-dry it with compressed air.
9. Check the filter element and replace it, if it is damaged.
10. Re-insert the spiral spring, the gasket (8) and the filter element.
11. Position the gasket (6) and the housing.
12. Insert a new o-ring (10).
13. Re-tighten the drain plug at the bottom side.
14. Remove the attachment screw (3).
15. Fill up the water separator with fuel.
16. Re-tighten firmly the attachment screw.



Lubrication

DANGER

If you perform maintenance operations at a machine which is not properly parked and secured, severe accidents may occur! Park the machine on firm, level ground and secure it before starting the maintenance operations.

1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance“.
2. Clean the grease nipples.
3. Use a grease gun to press sufficient grease into the grease nipples.
4. Remove the old grease which is extruding at the bearings.
   Door hinges (4 locations)
   Bonnet hinges (2 locations)

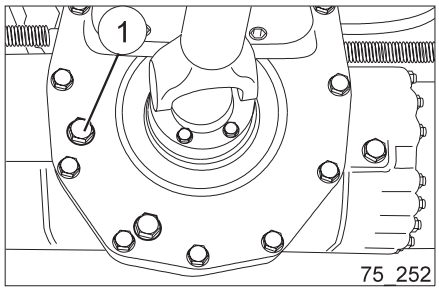
Transfer Box Gearing, Checking the Oil Level and Refilling Oil

NOTE

If the engine is not running, the oil level in the transfer box can significantly rise. Therefore, only check the gear oil level with the engine running idle at operating temperature. The gearshift assembly must be in neutral position.

DANGER

Danger of injury! When the engine is running, you may hurt yourself on the movable components inside the engine room! Do not perform any operation in the engine room with the engine running.



1. For maintenance operations, park and secure machine as described in chapter "Preparing the Machine for Maintenance“.
2. Clean the screw plug (1) and the adjacent environment.
3. Unscrew the screw plug.
4. Check the oil level. The oil level must be at the lower edge of the control drill hole of the screw plug.
5. If the oil level is too low, fill up with oil using the control drill hole of the screw plug.
6. Clean the screw plug and insert a new packing ring.
7. Re-tighten firmly the screw plug.

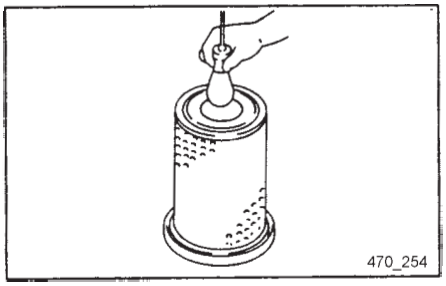
Air Filter, Replacing the Filter Insert, Replacing the Safety Filter

Replacing the Filter Insert

NOTE

If the filter element is replaced for the third time in sequence, it is required to replace also the safety filter.

1. Open the air filter and remove the air-filter insert (1). Proceed as described in chapter "Air Filter, Removing and Re-Installing the Filter Insert, Checking and Cleaning the Filter Insert".
2. Use a source of light (e.g. torch) to check the new air filter for damages.
3. Re-install the air-filter insert as described in chapter "Air Filter, Removing and Re-Installing the Filter Insert, Checking and Cleaning the Filter Insert".

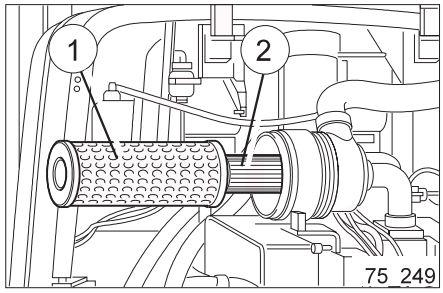


Replacing the Safety Filter

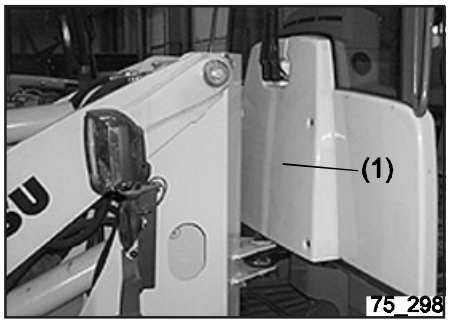
NOTE

If the filter element is replaced for the third time in sequence, it is required to replace also the safety filter.

1. Open the air filter and remove the air-filter insert (1). Proceed as described in chapter "Air Filter, Removing and Re-Installing the Filter Insert, Checking and Cleaning the Filter Insert".
2. Pull out the safety filter (2).
3. In order to prevent that dust enters the interior of the engine, it is required to the air aspiration opening of the engine with a clean cloth or similar.
4. Clean the interior of the air-filter enclosure and **remove the cloth from the air aspiration opening.**
5. Use a source of light (e.g. torch) to check the new safety filter for damages. If it is in perfect condition, press it firmly into place.
6. Re-install the air-filter insert as described in chapter "Air Filter, Removing and Re-Installing the Filter Insert, Checking and Cleaning the Filter Insert".



Heater/Air Conditioning: cleaning/replacing Filter Fleece or cleaning Condenser

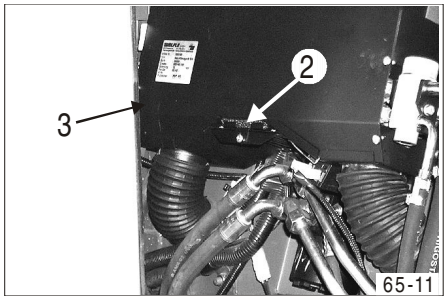


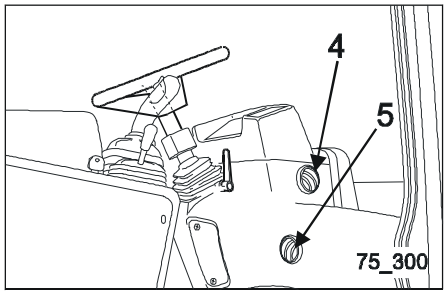
Clean Filter Fleece of Heater Unit

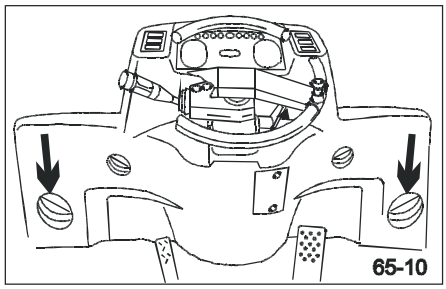
NOTE

If the filter fleece is too dirty it must be replaced.

1. Remove screws on the front cover (1) on the driver's cab (4 screws).
2. Withdraw filter (2) from the heater unit (3).
3. Clean the filter in warm water (30 - 40°C) which has had a little household cleaning solvent added to it.
   Caution: Neither rub the filter fleece nor wring it out.
4. Allow the filter fleece to dry.
5. Insert dried filter fleece (2) back into the heater unit (3).
6. Switch on the blower and check the air flow at the air-outlet nozzles (4) and (5) to the right and left of the steering column.
   Caution: The circulating air jets (arrow) must be open.
7. If the air flow is still too weak the filter fleece must be replaced.
8. Screw front cover (1) back on.







Cleaning the Condenser of Air Conditioning

DANGER

Do not wash the condenser with a steam cleaner. Otherwise, the condenser will get hot and may break down.

If there is mud or dust sticking to the air conditioner condenser, clean it with water.
If the water pressure is too high, the fins may get deformed. When washing with a high pressure washing device, apply the water from a reasonable distance.

Cleaning

1. Unscrew the steps on the right side (2 screws).
2. Swing out the steps together with condenser as far as it will go.
3. Clean the condenser with water.
4. Screw the steps and condenser back into place (2 screws).

Checking the ALS-Accumulator Gas Pressure (Option)

Each time you perform the operations described in the sections Every 500 Service Hours, you should ask your Komatsu dealer to check the accumulator gas pressure.(Pressure: 24 bar)

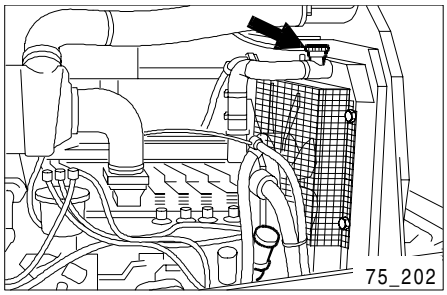
Maintenance Every 1000 Operating Hours

All maintenance operations to be performed after 10, 50, 250 and 500 hours of operation fall also into this maintenance category.

Cooling System, Exchanging Coolant and Cleaning the System

WARNING

Danger of being burnt! The coolant is under pressure if the engine is hot. Hot coolant may squirt out during opening. Check the coolant level only after the engine has sufficiently cooled down. Open the cover of the radiator (arrow) by turning it slowly so that the pressure can escape.



DANGER

Danger of fire! Antifreeze may ignite at the hot engine! Wait until the engine has cooled down, before refilling antifreeze.

NOTE

The coolant must be exchanged after max. two years.

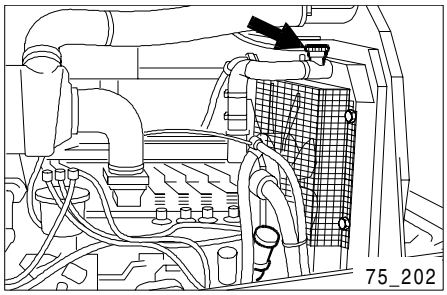
NOTE

While preparing the coolant, make sure to adhere to the prescribed mixing proportions to ensure a freezing protection up to -37°C! This is also valid for countries with moderate climate.

The coolant has to consist of 50 vol.% coolant additive and 50 vol.% water. Only monoethylene glycol and dieethylene glycol are permitted as coolant additives which are both contained in commercially available standard coolants.
If the water contains too much lime, the cooling system may be impaired. In this case, use a mixture of potable water and distilled or deionized water.

Draining off the coolant

1. Switch off the engine and let it cool down.
2. Swivel the radiator cap (arrow) slowly to the side, up to the first fixed stop, and let the pressure escape. Then press down the cover, while proceeding with swivelling. Then, remove the cover.
3. Stretch a tube onto the drain opening (1) of the discharge cock and insert the other tube end into the collecting container.
4. Open the discharge cock and let the coolant run off.
5. Close the discharge cock.

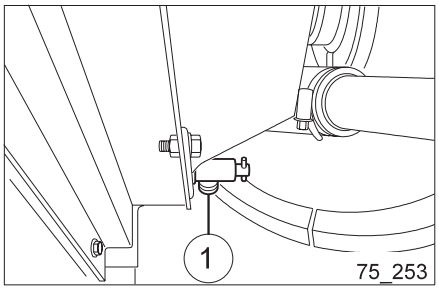


Cleaning the Cooling System

NOTE

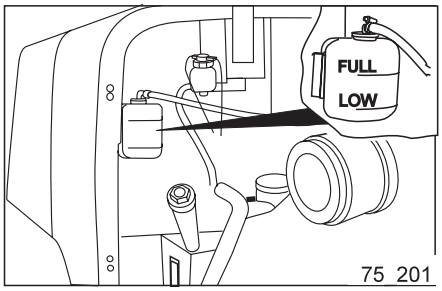
The cooling system may only be filled slowly since otherwise the included air cannot escape completely. After filling up, wait approx. 3 minutes and refill liquid, if required.

6. Fill up the cooling system slowly with cleaning fluid (Adhere to the specifications of the cleaning agent manufacturer).
7. With the radiator cap opened, let the engine run for 5 minutes with a coolant temperature of approx. 80°C.
8. After the cleaning, switch off the engine and open the drain valve to let the entire cooling system run empty. Re-lock the drain valve and slowly fill the cooling system with clean water.
9. Let the engine run for five minutes with a coolant temperature of approx. 80° C.
10. Then, let the cooling system run empty again. If the extruding water is not clean, the cooling system must be re-flushed until the extruding water is clean.
11. Close the drain valve.



Filling Up Coolant

12. Empty and clean the expansion tank.
13. Prepare the coolant as prescribed.
14. Fill up the coolant slowly into the cooling system up to the overflow shoot of the radiator.
15. To purge the cooling system while the radiator cap is removed, let the engine run idle for five minutes with its lower speed (rpm) and then for another five minutes with its top speed. Fill up with coolant if the coolant level in the radiator is dropping.
16. Switch off the engine, wait approx. three minutes and then refill coolant up to overflow shoot of the radiator. Re-lock the radiator.
17. Fill up coolant into the expansion tank, until the coolant level is between the FULL and LOW markings.



Front Axle, Oil Change

See chapter "Maintenance After the First 50 Operating Hours".

Rear Axle, Oil Change

See chapter "Maintenance After the First 50 Operating Hours".

Transfer Box Gearing, Oil Change

See chapter "Maintenance After the First 50 Operating Hours".

Service Brake

NOTE

All repairs on the brake system must be performed by a garage which is authorised by Komatsu.

Changing oil

Checking tubes and lines

Checking the brake disks for wear and tear

Adjusting the clearance of the brake disks

Checking and Adjusting System Pressures

NOTE

All repairs on the brake system must be performed by a garage which is authorised by Komatsu.

Checking and Adjusting the Valve Play

NOTE

Have the valve play checked and adjusted at an authorised Komatsu garage.

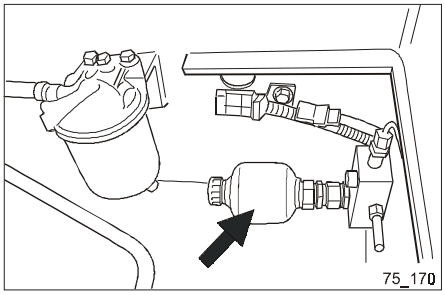
Checking and Adjusting the Injection Nozzles, Nozzle Pressure and Fuel-Jet Pattern

NOTE

Have the nozzle pressure of the injection nozzles and the fuel-jet pattern checked and adjusted at an authorised Komatsu garage.

Checking the Accumulator Gas Pressure of third Control Circuit

Each time you perform the operations described in the sections Every 1000 Service Hours, you should ask your Komatsu dealer to check the accumulator gas pressure.(Pressure: 20 bar).



Maintenance Every 2000 Operating Hours

All maintenance operations to be performed after 10, 50, 250, 500 and 1000 hours of operation also fall into this maintenance category.

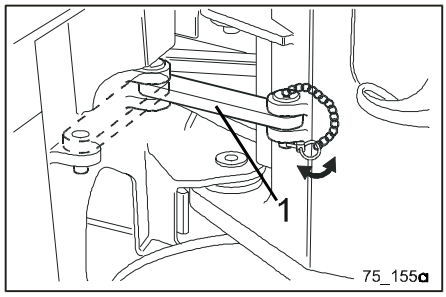
Hydraulic System, Oil Change

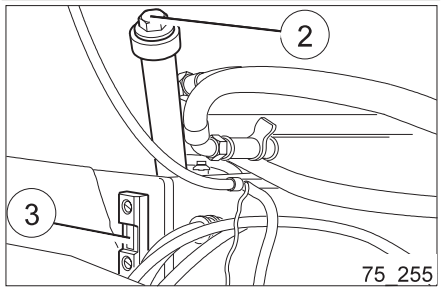
WARNING

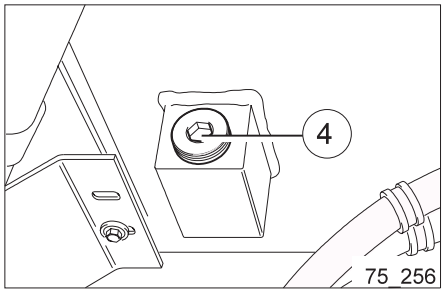
- **Frequent skin contact with used hydraulic oil may cause skin damages and other injuries!**
  Carry rubber gloves for exchanging the filter. Wash any spilled hydraulic oil thoroughly from your skin.
- **Danger of being burnt! The hydraulics tank is under pressure. Hot hydraulic oil may squirt out and cause injuries!**
  Carry rubber gloves and hold the oil trough under the discharge hole in such a way that you cannot come into contact with the extruding oil.

Keep a collecting container with sufficient capacity ready.

1. Park the machine on level ground.
2. Lower the work unit onto the ground.
3. Switch off the engine.
4. Secure the articulated steering with the articulated steering lock (1).
5. Unlock the feeding and ventilation screw (2) by turning it slowly to let the pressure escape.
6. Loosen the screw plug (4) of the hydraulic oil tank and let the oil run off.
7. Re-tighten the screw plug with its seal being in perfect condition.
8. Unscrew the feeding and ventilation screw.
9. Fill up oil until the oil level is between the centre and top edge of the inspection glass (3).
10. Start up the engine.
11. Raise and lower the work unit several times, while operating the bucket at the same time.
12. Lower the bucket onto the ground and bring it into mining position.
13. Check the oil level with the engine running idle in its low speed position.
14. Ventilate the hydraulic oil tank (see section "Ventilating the hydraulic oil tank“).







NOTE

Do not fill up with too much hydraulic oil!
Otherwise, the pressure in the hydraulic oil container increases inadmissibly high.

Ventilating the Hydraulic Oil Tank

1. Loosen the feeding and ventilation screw by turning it a couple of rotations.
2. Start up the engine.
3. Bring the boom into its highest position.
4. Bring bucket into its tip-in position (up to its limit stop).
5. Re-tighten the feeding and ventilation screw.

Cooling System, Checking the Antifreeze Content of the Coolant

Check the antifreeze content of the coolant. The mixing proportion must always be adjusted to a temperature of -37°C - even in countries with moderate climate. During filling up, pay attention to the prescribed mixing proportion.

NOTE

The coolant must contain antifreeze in all climate regions. The antifreeze does not only decrease the freezing point but also increases the boiling point. It lubricates movable components and lip seals and prevents corrosion and foam formation.

Checking the Cooling System

NOTE

Let the cooling system check be performed at a garage which is authorised by Komatsu.

Checking the Fuel Pump

NOTE

Let the fuel pump be checked at a garage which is authorised by Komatsu.

Checking the Fuel and Coolant Tubes, Replacing the Tubes (if required)

NOTE

Have the fuel and coolant tubes checked and replaced, if required, at an authorised Komatsu garage.

Checking the Water Pump

NOTE

Let the water pump be checked at a garage which is authorised by Komatsu.

Checking and Adjusting the Fuel Injection and Injection time

NOTE

Let the injection time be checked at a garage which is authorised by Komatsu.

Technical Data

Technical Data

Specifications		
Engine	Model	Komatsu 4D 106E - 2 HC
	Engine Output, (ISO 9249)	55 kW (75 PS) / 2500 min-1
	Torque, max.(DIN 70020)	263 Nm / 1500 min-1
	Starter	12 V - 3.0 kW
	Three-Phase Generator	12 V - 60 A
	Battery	12 V - 92 Ah
Driving Speed forward and backwards	1st Driving Range	5.7 km/h
	2nd Driving Range	20.0 km/h
Driving Speed forward and backwards: High speed version overdrive switched off	1st Driving Range	5.4 km/h
	2nd Driving Range	14.0 km/h
Driving Speed forward and backwards: High speed version overdrive switched on	1st Driving Range	11.6 km/h
	2nd Driving Range	30.0 km/h
Tractive force, max.		48.9 kN
Turning radius	Outside Counterweight	4100 mm
	Outer Edge Bucket, Standard	4455 mm
Bucket, Standard		1.1 m^3
		Data95_s.TBL/26.6.99

Noise Emission Levels

Two rating plates with details of the machine's noise level must be mounted on the machine:

In compliance with EC directive 95/27/EC
1 plate for sound pressure level L_{pA} = 73 dB/A
1 plate for sound power level L_{WA} = 98 dB/A

No alterations may be made to the machine which could have an influence on the noise emission levels

Vibration Level

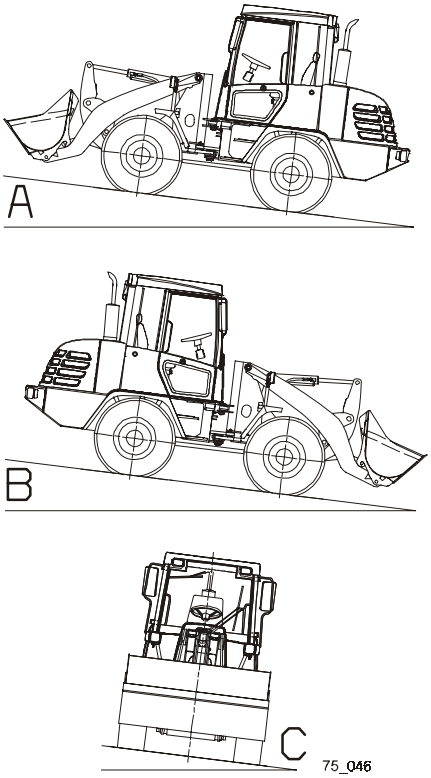
When used for its intended purpose, levels of vibration for the earthworking machine transmitted from the operator's seat are lower or equal to the test vibrations for the relative machinery class in compliance with ISO 7096. The actual acceleration value of the upper limbs is less than 2.5 m/s^2. The actual acceleration value for the body is less than 0.76 m/s^2. These values were determined using a representative machine and with the help of the measurement procedures that are defined in the directives ISO 2631/1 and ISO 5349.

Limit Values for Slopes

Maximum slope angle for operating the machine

If operating the machine on a slope, its angle must not exceed 30° uphill, downhill or sideways. If you angle the machine at more than 30° during operation, the motor, transmission, hydraulic system or axles, will not be supplied with sufficient oil and can be damaged.

A	uphill	30°
B	downhill	30°
C	sideways	30°



Special Equipment and Attachments

ALS-Electronics

Always read this section before installing and operating the ALS-Electronics as safe as possible.

Structure and Functioning Principle of the ALS-Electronics

The ALS-Electronics uses the hydraulic shock-absorbing effect of the pressure accumulator (integrated into the circuit at the piston head end of the lifting cylinder) to absorb vibrations during driving. This procedure permits quiet driving with higher speed.

The ALS-Electronics consists of the ALS-Electronics switch, the pressure accumulator and the solenoid valve. If the ALS-Electronics switch is switched on, the solenoid valve is being opened and the circuit at the piston head end of the lifting cylinder is connected to the pressure accumulator.

Precautionary Measures for Switching on the ALS-Electronics

WARNING

If the ALS system is switched on during a journey, or when the working attachment is in raised position, it may move up or down depending upon the bucket load.
For this reason, extreme caution is advised when operating the switch.

- When inspecting and servicing the machine, also lower the work equipment to the ground then turn the ALS-Electronics switch OFF before beginning to service.

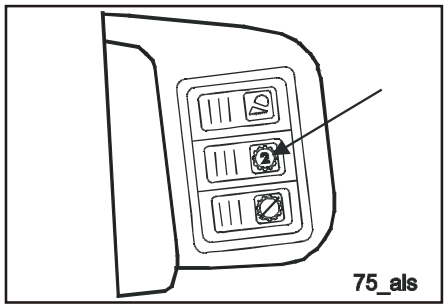
NOTE

The ALS system is activated when the transmission is shifted into 2nd gear and the machine is traveling at a speed higher than 5 km/h.

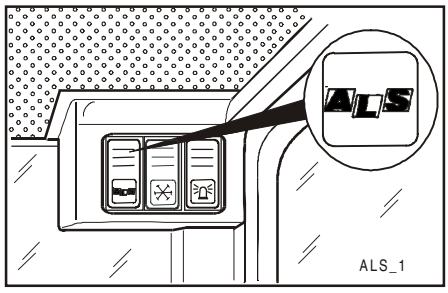
Operation of the ALS-Electronics

Switching on the ALS-Electronics

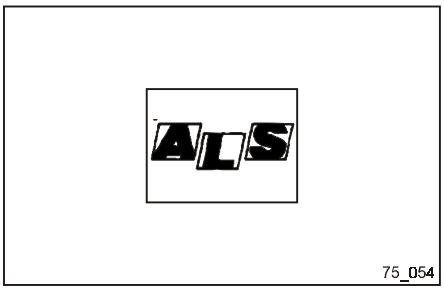
1. Precondition:
   Speed range No. 2 must be switched on in order to ensure that the ALS system can be activated.
   To do this, press the "Driving range up to 20 km/h" button.



2. Press the ALS-Electronics switch. The green control lamp in the switch lights up.
   If the machine drives faster than 5 k.p.h., the ALS-Electronics is automatically activated and the ALS-Electronics control lamp lights up on the dash panel. If the machine drives slower than 5 k.p.h., the ALS-Electronics is switched off and the control lamp on the dash panel goes out. However, the control lamp in the ALS-Electronics switch remains lit in green.



   NOTE
   - **To ensure that the ALS system can remain fully effective when the machine is underway, do not tilt the bucket all the way through till it touches the limit stops.**
   - **Do not support the boom when on the road.**



Switching off the ALS-Electronics

Press the ALS-Electronics switch. The control lamp in the switch goes out.

Handling of the Pressure Accumulator

WARNING

Danger of injury! Pressure accumulator is filled with highly pressurised nitrogen.
Do not open or damage the pressure accumulator.

- Immediately inform your Komatsu dealer, if you detect malfunctions or defects of pressure accumulators.
- Filling the pressure accumulator with gas or topping up gas in the pressure accumulator is strictly limited to persons authorised to handle highly pressurised gas.
- Do not hit against the pressure accumulator.
- Keep naked light and sources of heat away from pressure accumulator.
- Do not drill holes into the pressure accumulator.
- Do not weld parts to the pressure accumulator.
- The service technicians must depressurise the hydraulic system before they can remove the pressure accumulator.
- The service technician must let the gas escape before they can disassemble the pressure accumulator.

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