Operation & Maintenance Manual

VEAM340200

WA270-3H

WHEEL LOADER

SERIAL NUMBERS WA270H20564 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

Contents

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 maximum speed of 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.

THE WA 270-3 - YOUR ECONOMIC MIRACLE

The WA 270-3 is a wheel loader with ideal features for a completely rounded off application.

The fast, two-stage work hydraulic system and the first-rate acceleration of the turbo diesel-engine permit short cycle times, thus increasing productivity. At the same time, the WA 270-3's small fuel consumption turns it into an economical wheel loader with excellent fuel efficiency.

THE REMARKABLE ERGONOMICS OF THE WA 270-3

The cab is connected to the chassis via a hydraulic bearing. The transmission is suspended floating on rubber bumpers; important tubes and clamps are also mounted on rubber. These measures considerably reduce the vibrations which can be perceived in the cab. Also the noise level on the ear of the driver is brought down to 74 decibels (A). The Automatic Load Stabilising electronics (ALS) is available as a special accessory, helping to reduce oscillations and vibrations starting from speeds above 5 k.p.h., thus protecting driver and machine.

The monitoring system is arranged centrally and consists of the main and the maintenance control panel. Around the monitoring system, the operating elements are positioned in such a way that you have free sight onto the monitoring system during all operations. The steering wheel and the gearshift lever only require small effort for operation so that they both can be used at the same time. Together with the work unit, you can operate the KICK-DOWN switch which is integrated into the working lever.

The control panel and the steering column are encased. The result is a clearly arranged foot compartment without sharp edges and recesses, contributing to the high standard of driving conveniences.

The rear cabin tie-bar is mounted very deep on the cab wall, thus ensuring excellent visual conditions also to the back.

TECHNOLOGY WHICH INSPIRES

The wheel loader WA 270-3 has a dumping height of 2940 mm and a top dumping angle of 53.5°. These features allow it to load almost every dump truck. The lifting limit of the boom, which you can use to pre-select the desired lifting height, additional reduces the cycle time. The bevelled rear permits to drive into the material, which you want to pile up, right up to the rear wheels of the machine.

The fully hydraulic oil-bath brakes cannot freeze and require no longer any draining of the brakes. The service life of the brakes increases considerably. A drum brake is used as parking brake.

The WA 270-3 is provided with novelties which are helping to reduce clearly the time needed for maintenance. EDIMOS II, the electronic defect diagnosis system, and the centrally arranged lubricating points make maintenance. much easier for you. The integrated mudguard engine-shutter units permit easy access to all maintenance locations.

AND WHAT ABOUT ENVIRONMENTAL CARE?

The low-exhaust engine of the WA 270-3 fulfills the EU standard planned for 1998. The air-conditioning (special equipment) is filled with R134a, a non-polluting refrigerant.

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-Hanomag 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 maximum speed of 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 270-3H	1	2	3	4	5	--
	Type	Part No.	Volume m³	Load capacity kg	Hydraulic pressure bar	Weight kg
Bucket	WA270-3H	42Y-70-H2720	2	-	-	870
		42Y-70-H2730	2	-	-	910
		42Y-70-H2640	2,1	-	-	880
		42Y-70-H2650	2,1	-	-	920
		42Y-70-H2660	2,2	-	-	1000
		42Y-70-H2741	2,4	-	-	988
		42Y-70-H2671	2,4	-	-	960
		42Y-70-H2681	2,4	-	-	1000
		42Y-71-H2A51	2,4	-	-	
		42Y-71-H2B21	2,4	-	-	
		42Y-71-H2B41	2,5	-	-	
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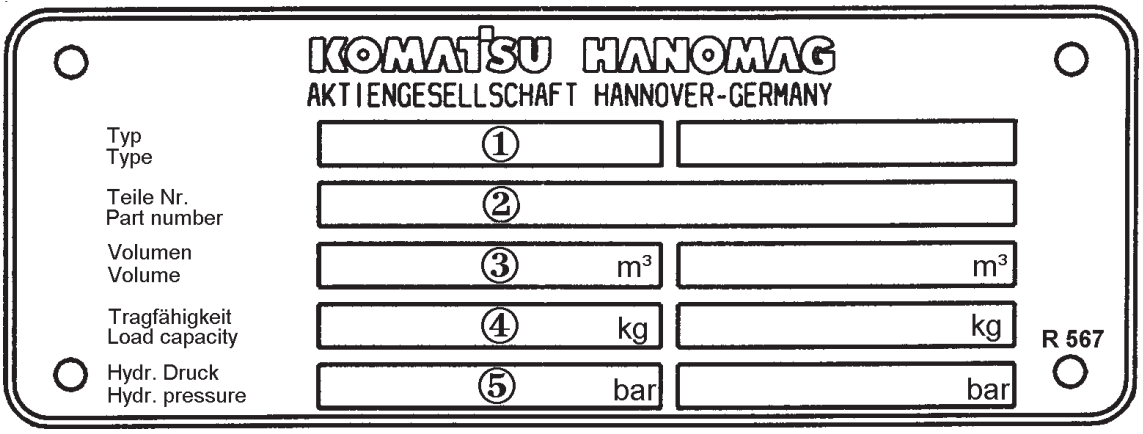
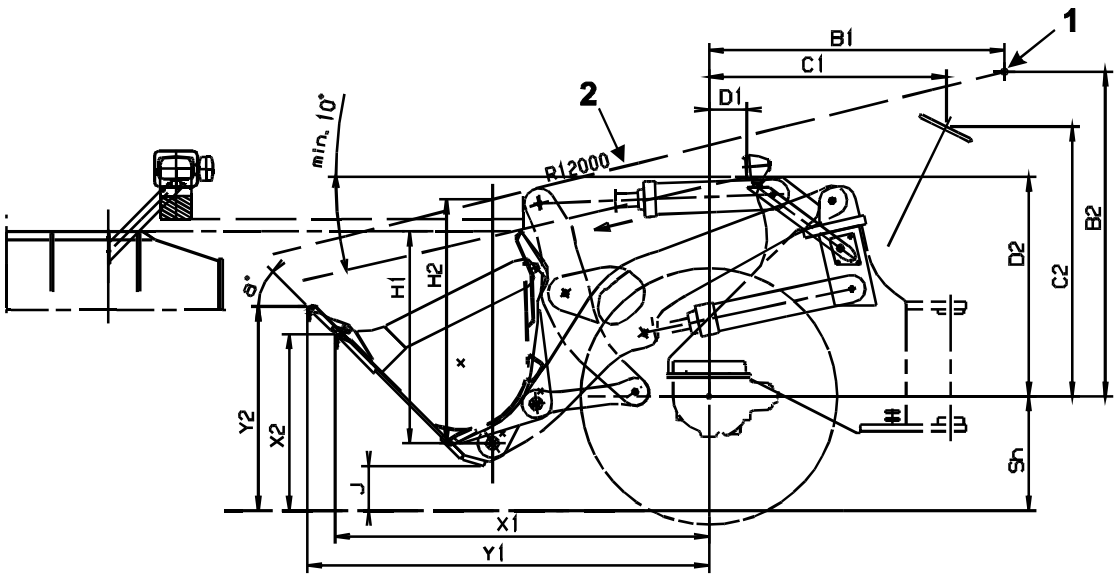
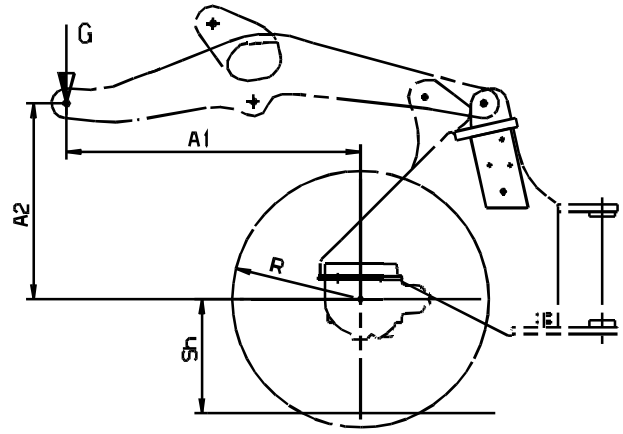
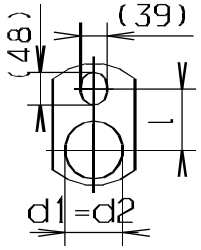
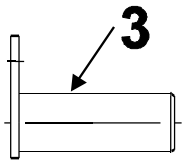


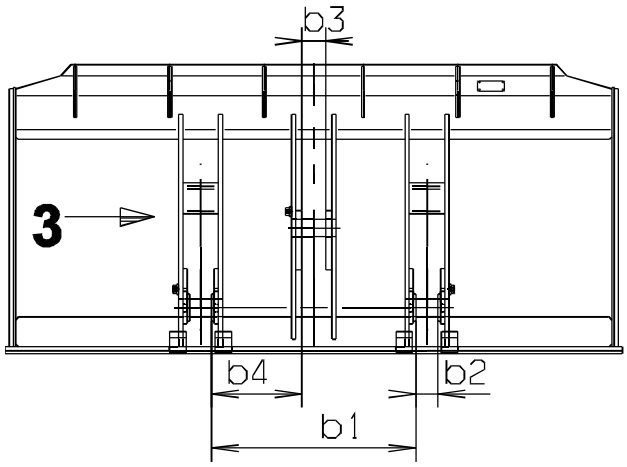
CE-CONFORMING EQUIPMENT OF THE MANUFACTURER ACCORDING TO DOCUMENT 419-93-H1160

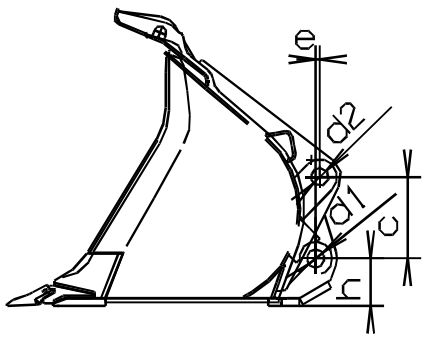












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CE-CONFORMING EQUIPMENT OF THE MANUFACTURER ACCORDING TO DOCUMENT 419-93-H1160

The responsibility for observing the regulations which are valid for wheel loaders with "interchangeable equipment" (e. g. bucket or forklift), which was not supplied from works lies with the supplier of the equipment 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 form 419-93-H1160 alongside.

The certification 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. *)

15° are required for use on public roads; the dimension **J** is decisive in this respect.

The dimension **Sh** (samllest tyre radius) must be added to the dimension **D2**.

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
Sh Distance: road level - front axle
B1 Distance: driver's eye (1) - front axle, horizontal
B2 Distance: driver's eye (1) - front axle, vertical
C1 Distance: center steering wheel - center front axle, horizontal
C2 Distance: center steering wheel - center front axle, vertical
D1 Distance: headlights - center front axle, horizontal
D2 Distance: headlights - center front axle, vertical
G Weight of the equipment and working load
H1 Distance: bucket pivoting point - upper edge od bucket, vertical (carrying position)
H2 Distance: bucket pivoting point - to visual line, vertical (carrying position)
J Distance: road level - bucket bottom edge (carrying position)
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
b1 Bucket connection dimension, boom width inside
b2 Bucket connection dimension, boom arm
b3 Bucket connection dimension, tilt rod
b4 Bucket connection dimension, temporary size
c Bucket connection dimension between d1 and d2, vertical
d1 Bucket connection dimension, bolt (3) for boom
d2 Bucket connection dimension, bolt (3) for tilt rod
e Bucket connection dimension d1 - d2, horizontally displaced
h Distance: bucket bottom edge - boom bolt hole
l Distance: centre of bolt -- centre of fastening screw

WA 270-3H	419-93-H1160
A1	1,187
A2	1,260
Sh	700
B1	1,930
B2	2,077
C1	1,421
C2	1,725
D1	380
D2	1,572
G	4,107
H1	1,240
H2	1,610
J	270
X1	
X2	
Y1	
Y2	
b1	922
b2	94
b3	92
b4	415
c	350
d1	75
d2	75
e	40
h	260
l	80
1	Driver's Eye
2	Vision line
3	Bolts
tyres	DUNLOP 20,5 R25 SPT7LD
bucket	2.1 m³ 42Y-70-H2650 37334C02

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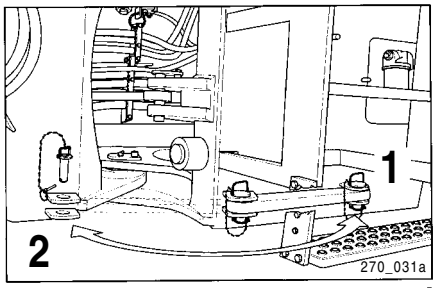
LOADING AND TRANSPORTING THE MACHINE

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

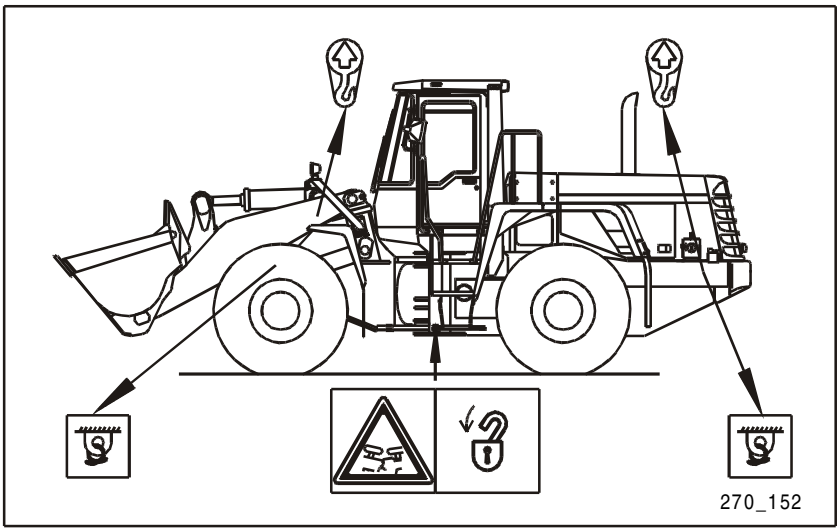
DANGER

- **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.
- **Danger of accidents! 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 mark the attachment points.To avoid damage to the machine, attach the eye hooks only to the attachment points.
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

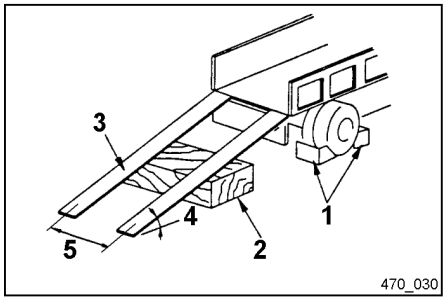
WARNING

Danger of accidents! 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

Danger of accidents! 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

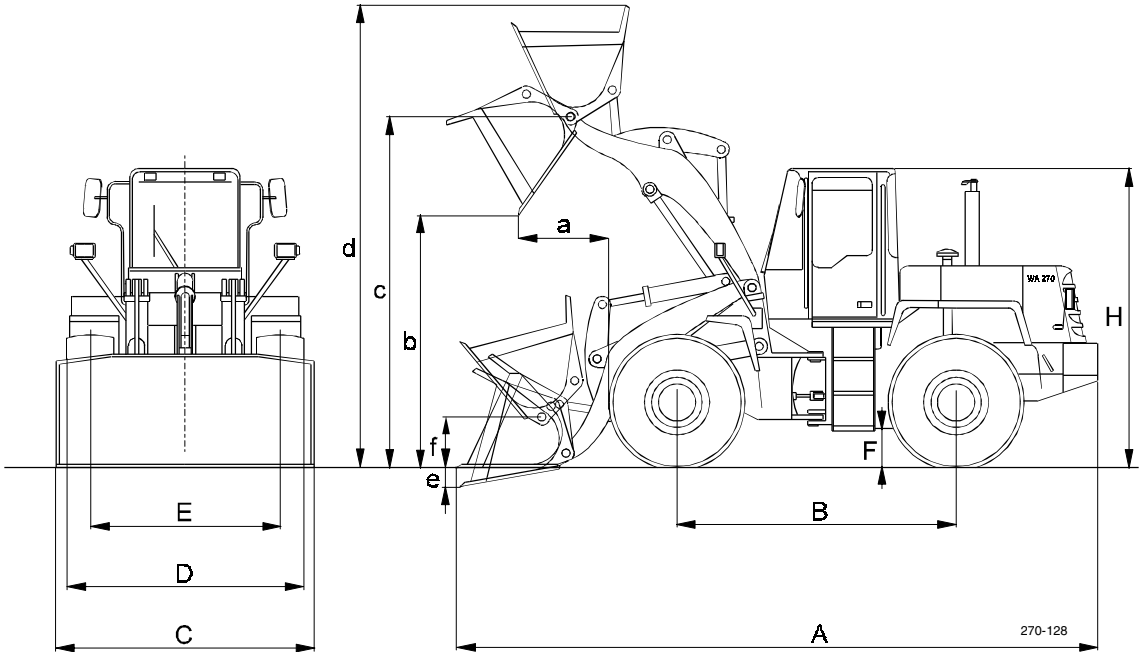
Stay ropes that are incorrectly attached may damage the machine!
Only fasten the eye hooks of the stay ropes at the marked attachment points.

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 Data				
Buckets (capacities in accordance with ISO 7546)	**m³**	**2.1**	**2.4**	
Specific density	t/m³	1.8	1.6	
Bucket weight without teeth	kg	950	1,050	
Static tipping weight, straight	kg	9,800	9,600	
Stat. tipping weight, 40° articulated	kg	8,600	8,500	
Breakout force, hydraulic	kN	107	101	
Hydraulic lifting capacity, on ground	kN	112	110	
Operating weight	kg	12,300	12,350	
a Reach at full lift at 45°	mm	950	1.000	
b Dumping height at 45°	mm	2,900	2,860	
c Lift height, hinge pin	mm	3,78	3,782	The 2.1/2.4 m³ standard buckets shown in the table can also be delivered with bolt-on cutting edges, 2.2/2.5 m³.
d Height at bucket upper edge	mm	5,075	5,075	
e Digging depth, 0°	mm	27	27	
f Carry height, hinge pin	mm	460	460	
A Overall length	mm	7,060	7,120	Special buckets: 3.4 m³ light material bucket
B Wheelbase	mm	2,900	2,900	
C Bucket width	mm	2.550	2.550	These values refer to 20,5 R25 tyres.
D Width over tyres	mm	2,440	2,440	
E Track width	mm	1,880	1,880	
F Ground clearance	mm	460	460	Machine without additional counterweight
H Overall height	mm	3,250	3,250	
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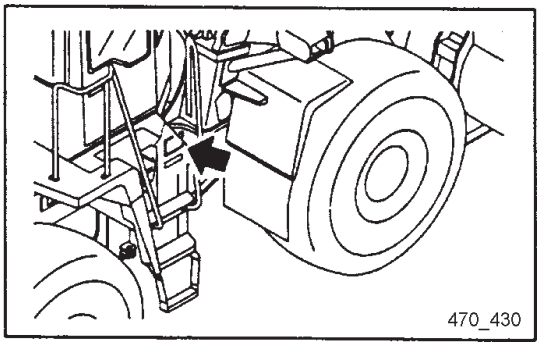
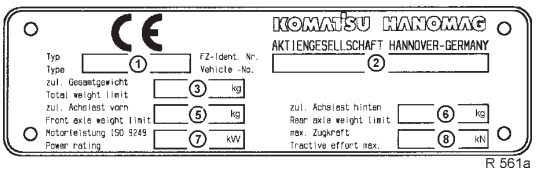
MACHINE RATINGS

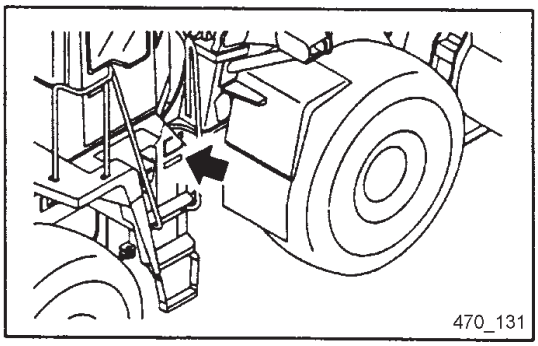
Machine name-plate position



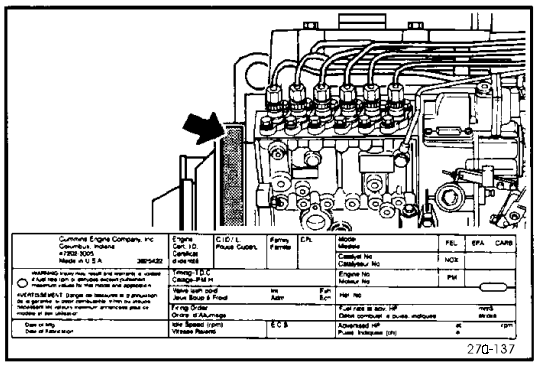
Machine name-plate with serial no.



Serial no. stamp plate



Machine name-plate with serial no.



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**

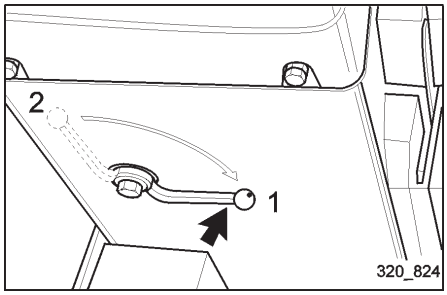
Failure to adhere to these safety instructions can lead to accidents with serious injuries!
Read and adhere to all safety instructions.

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

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

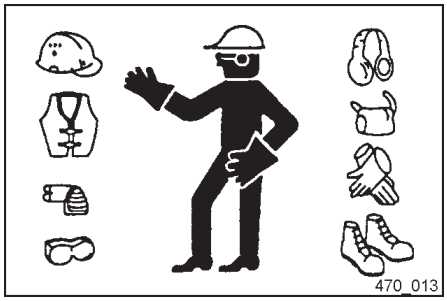


- Check that all safety devices and covers of the machine are correctly installed.
- Ensure that damaged safety devices and covers are repaired before you start the machine.
- Use all safety devices as prescribed, e.g. the safety lever for the work hydraulic system (see opposite figure) and the safety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

EMERGENCY EXIT

In an emergency situation, you can use the rear window as an emergency exit. For this purpose, use the emergency hammer.

CLOTHING AND PERSONAL PROTECTION

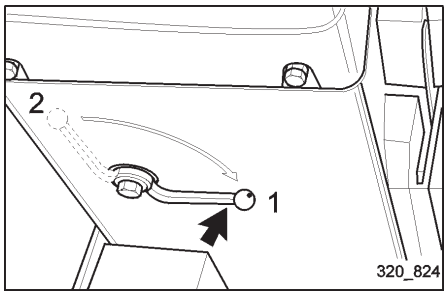


- Do not wear loose-fitting clothing, jewellery, or open long hair. There is danger that you get caught by control elements or moving parts leading to serious injuries.
- Immediately replace clothing stained with highly inflammable substances.
- When operating and servicing the machine, wear the appropriate 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

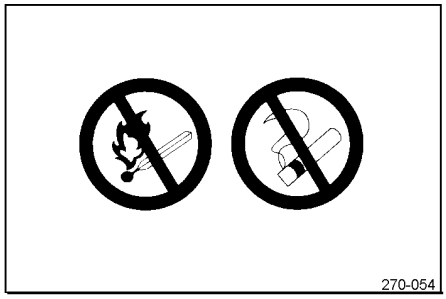


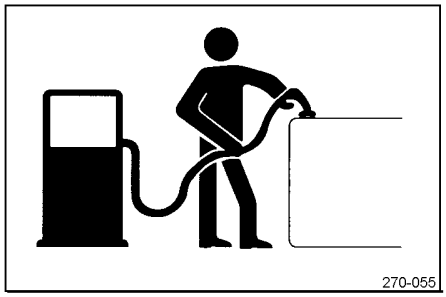
1. Lower the work unit onto the ground.
2. Use the safety lever to secure the work hydraulic system against unintentional operation (lever position '1'). If the lever for the hydraulic system is not secured and accidentally touched, uncontrolled movements of the work unit may lead to accidents with injuries or damage.
3. Switch off the engine.
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.

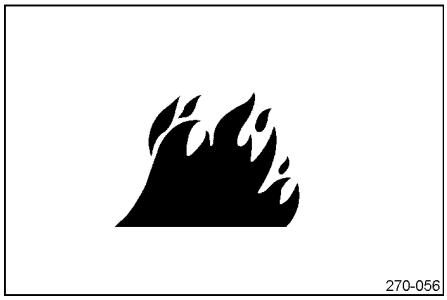
MOUNTING AND DISMOUNTING

- 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.

FIRE PREVENTION AND FIRE FIGHTING

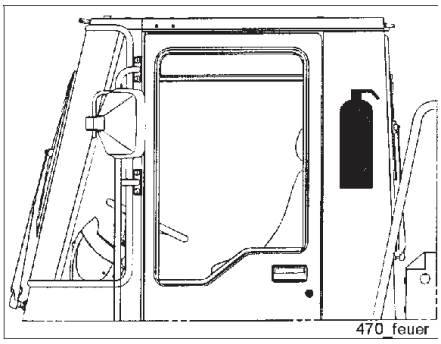






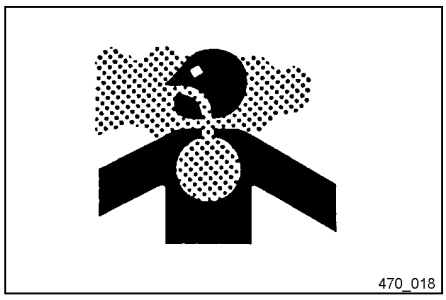
- Fuel, oil, and antifreezing compound are highly inflammable and could cause a fire.
- Do not approach inflammable material with naked light.
- Prior to refuelling, switch off the engine and stop smoking.
- Refuelling and refilling of oil are to be performed in sufficiently ventilated places.
- Store 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.
- A fully operational fire extinguisher must be available at hand.
- Do not operate the machine in the vicinity of naked light.

FIRE EXTINGUISHER AND FIRST-AID KIT



- The fire extinguisher is located on the rear cab frame on the left inside the operator’s cab. Two fasteners are provided on the lower left strut of the cab for fastening the fire extinguisher in place.
- 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 is located in the compartment under the driver's seat.
- Make sure that you know all telephone numbers of the persons that you need to contact in an emergency.

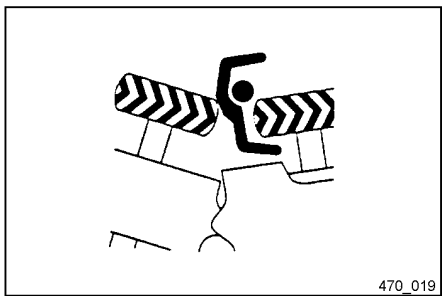
PROTECTION AGAINST ASBESTOS DUST



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:

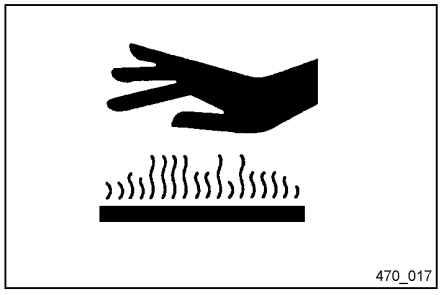
- Work, if possible, with a following wind.
- While working, wear an approved dust protection mask.
- After work, clean the machine with water to minimise formation of dust. Do not use compressed air for cleaning.

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 dangerous 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

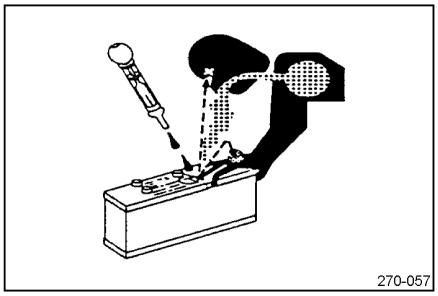
FOPS is a fixed component of the cab.

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

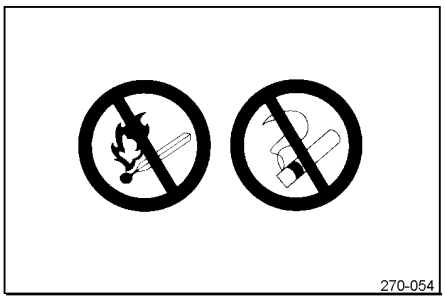
- Prior to assembly and operation of an additional attachment, read the attachment's manual and strictly adhere to the instructions on assembly and operation.
- Do not use attachments that have not been approved of by Komatsu Hanomag or the responsible Komatsu dealer. If you use attachments which have 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.

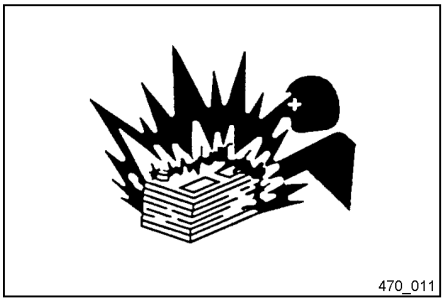
BATTERY



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

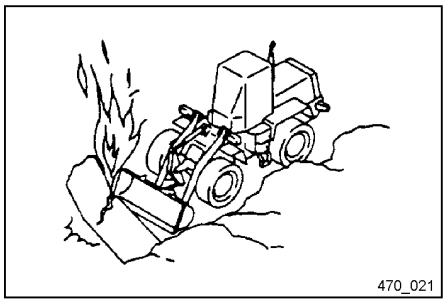
- **Always** wear safety goggles when handling batteries.
- Contact of battery acid with eyes can cause blindness. If acid should get into your eyes, immediately rinse your eyes with ample water and call for medical help. Rinse your eyes with water until a doctor arrives or you are able to visit an ophthalmologist 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.





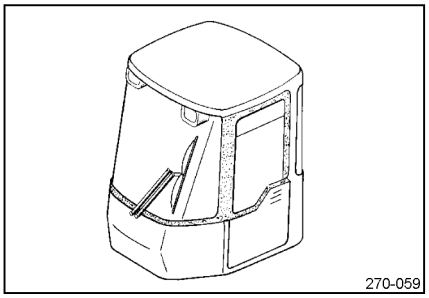
BEFORE YOU START THE ENGINE

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.

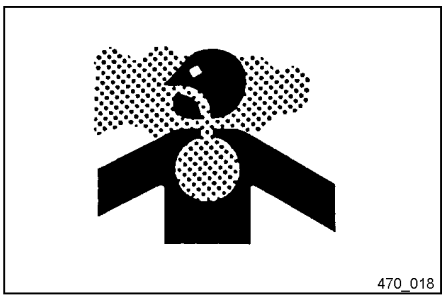
IN THE DRIVER'S CAB



- 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

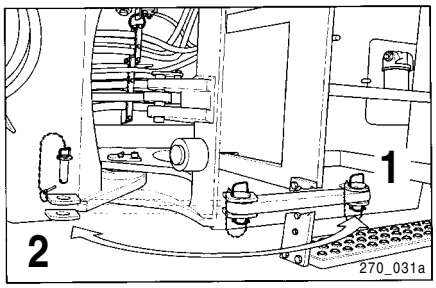
Do not operate combustion engines in an environment that may contain inflammable gases or vapours. These gases, dusts, or vapours may ignite or be sucked in by the suction system, thus causing a rise in engine speed or an exceeding of the engine's maximum rpm. This may lead to a fire, an explosion, and 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.

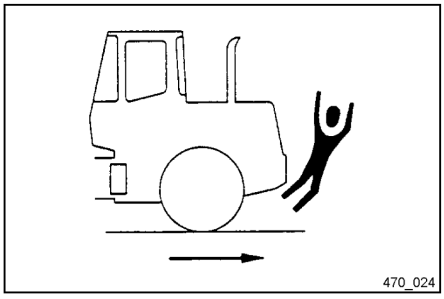
MACHINE OPERATION

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.

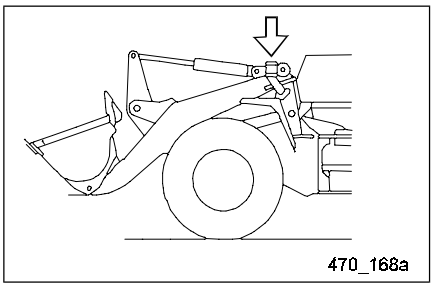
REVERSING



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

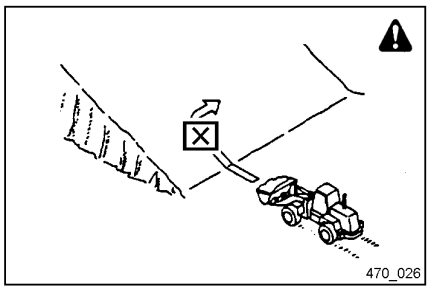
- Check that there is nobody near the machine or in the way.
- Before you start reversing, sound the horn to warn persons within or near the operating area.
- When working in potentially dangerous areas or areas with obstructed view, ask another person to regulate and supervise traffic.

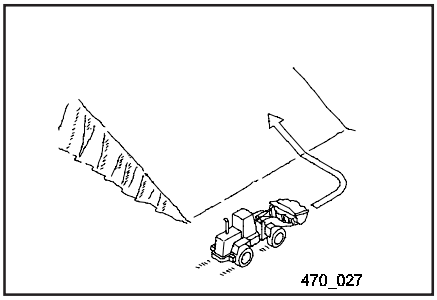
DRIVING



- When driving, set the bucket to the transport position. The bucket is in its transport position when the transport position markings on frame and boom are aligned.
- When driving on uneven ground, drive slowly and avoid sudden steering movements.
- If the motor stops while driving, you can still steer the machine. Steering the machine with the motor switched off is not possible when at a standstill.

DRIVING ON SLOPES

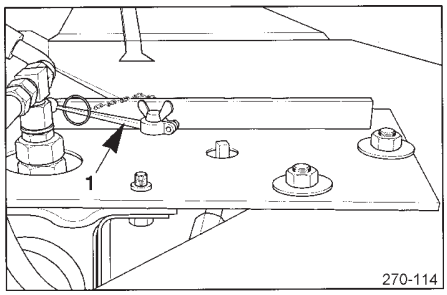


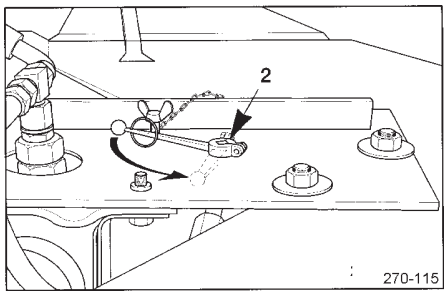


- Keep sufficient distance to ridges and steep slopes. There is danger of the machine tipping over or sliding down on steep slopes, embankments, or hill flanks. The limiting values are defined in chapter "Limiting Values for Slopes".
- To keep the centre of gravity as low as possible when driving on 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

If the engine is switched off, it is possible to lower the work unit with the emergency lowering system.





LOWERING FOR CHASSIS NUMBERS UP TO WA270H20259

WARNING

Danger of accidents! While lowering the work unit, it is not possible to see the hazardous area below the work unit. For this reason, ask somebody to secure the hazardous area below the work unit.

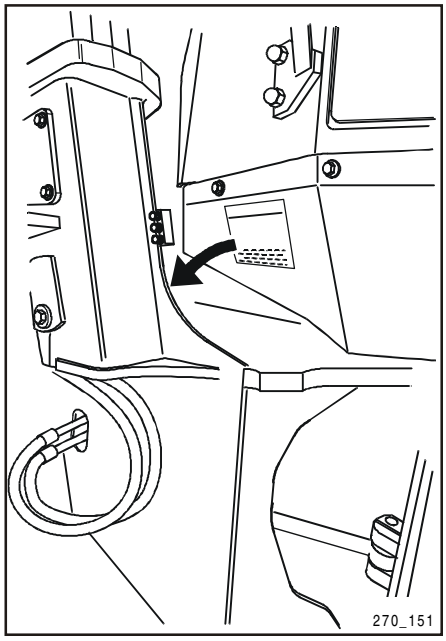
1. Unscrew the lever (1) from retainer and place on the shut-off valve (2).
2. Lowering takes place by turning the shut-off valve in the lift cylinder circuit for the boom slowly in the direction of the arrow.
3. Upon completion, close shut-off valve and return lever to retainer and screw tight for safety reasons.

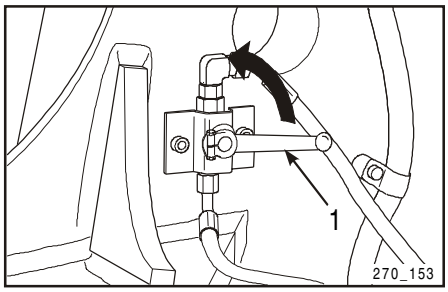
LOWERING POSSIBLE FROM CHASSIS NUMBERS FROM WA270H20260 ONWARDS

WARNING

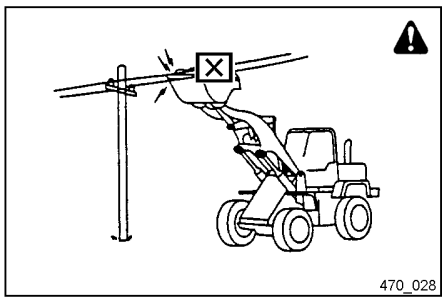
Danger of accidents! While lowering the work unit, it is not possible to see the hazardous area below the work unit. For this reason, ask somebody to secure the hazardous area below the work unit.

1. On the left-hand side, grip into the section between the articulated steering and the front part of machine (see arrow).
2. Lower the wor unit by slowly shifting upwards the shut-off valve (1) in the lifting cylinder line of the boom.
3. Then, reset the shut-off valve into the horizontal position.





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.

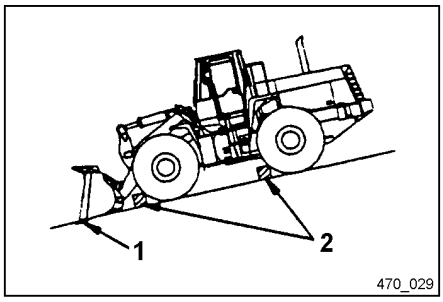
BRAKES

- Use the brake pedal only for braking, do not use the brake pedal as a foot rest.
- Do not step repeatedly onto the brake pedal, unless it is absolutely necessary.
- When driving downhill, use the engine as a brake and use the brake pedal, if necessary.

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.

PARKING THE MACHINE



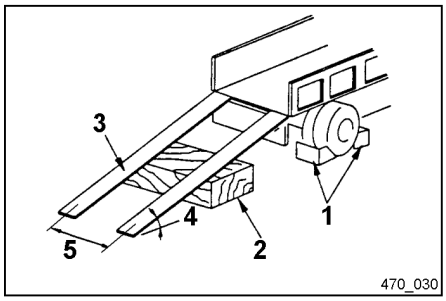
- If possible, park the machine on an even surface. If you have to park the machine on a slope, you must park the machine with the work unit pointing down the slope. Lower the work unit until it firmly touches the ground (1), or let the cutting edge of the bucket sink deeply into the soil. Block the 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.

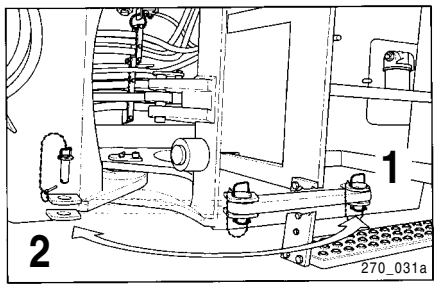
TRANSPORT

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.
  1 Articulated steering unlocked.
  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.

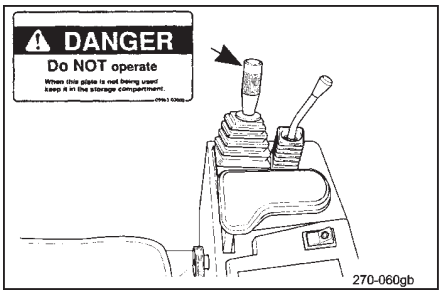
SAFETY MEASURES DURING MAINTENANCE

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

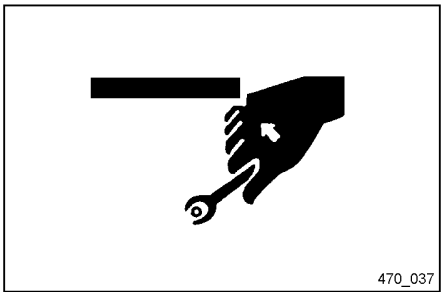


While the machine is being serviced, the engine must not be started and the control elements must not be actuated without prior agreement, since this could cause accidents with serious injury.

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

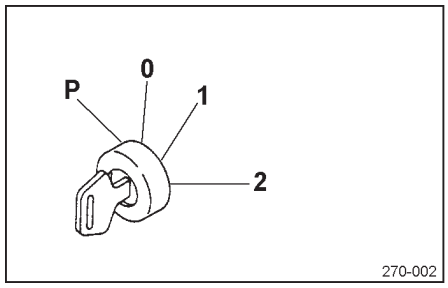
The quality of these parts is subject to normal wear and tear. For this reason, replace safety-related parts by new ones at regular intervals, regardless of whether they are defective or not.

Safety-related parts are:

Fuel system:	fuel hose, overflow hose, and tank cap
Hydraulic system:	pump outlet hose, front and rear pump branch 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



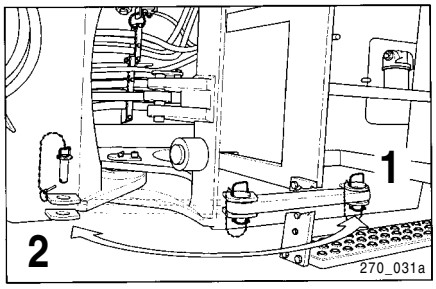
Prior to start of inspection and maintenance operations, park the machine on solid, even ground. Lower the work unit. Switch off the engine (start switch to position '0') and safeguard the machine.

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.

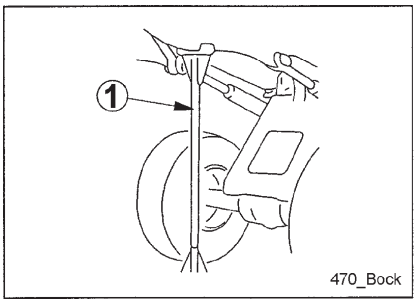
The person performing the maintenance measures must take care not to touch or get caught by moving parts.

SECURING THE ARTICULATED STEERING



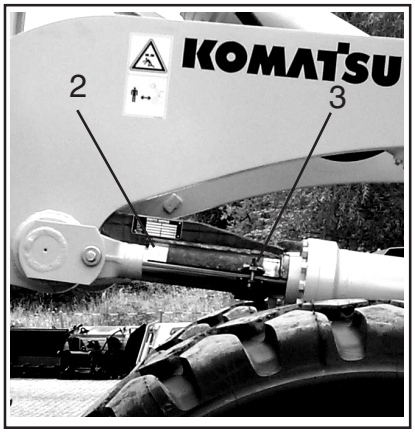
Before starting maintenance, secure the articulated steering against accidental movement using the locking bar (position '2').

Securing the working attachment



DANGER

Risk of injury! The attachment may fall suddenly when in raised position! For safety reasons, a raised attachment must be secured against dropping before you pass or stand under it.

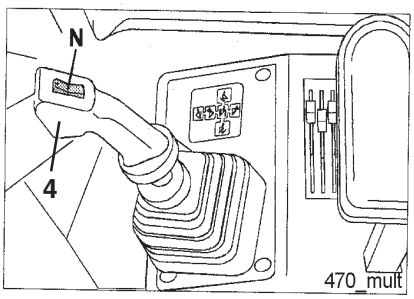


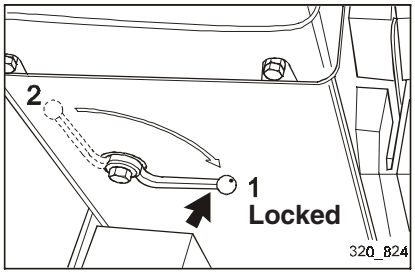
The working attachment must be secured against moving if any work is to be carried out under it when it is in a raised position. For this purpose you should use either a supporting prop (1) which is to be positioned below the lifting arms, or support braces (2) which are mounted around the piston rods. The support braces are available as optional extras.
WA270-3 Boom: P/N **42Y-98-H1100**

Important! Please note: 2 support braces are necessary for every machine; one for the left-hand lifting ram and one for the right-hand lifting ram.

When using the support braces the following procedure is to be adhered to at all times:

1. Park the machine on level, solid ground.
2. Apply the parking brake.
3. Place wheel chocks in front of the wheels to prevent the machine from inadvertently rolling away.
4. Lift the arm far enough to allow the support braces (2) to be placed on the lifting ram's piston rods.
5. Switch the engine off.
6. Mount the support braces on the piston rods without standing under the lifting arm, use a stepladder and tighten the screws (3) with your fingers.
7. With the engine switched off, lower the arm slowly until it rests on the supports.
8. Move the control lever (4) to the "NEUTRAL" position and secure it by means of the locking lever (Locked).

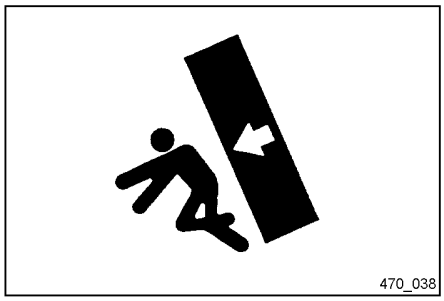




DURING MAINTENANCE

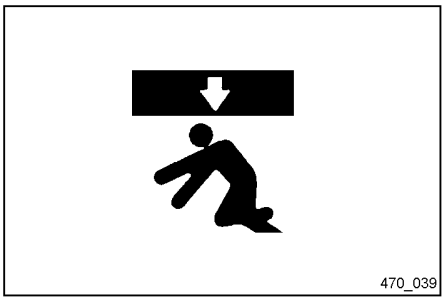
ATTACHMENTS

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!



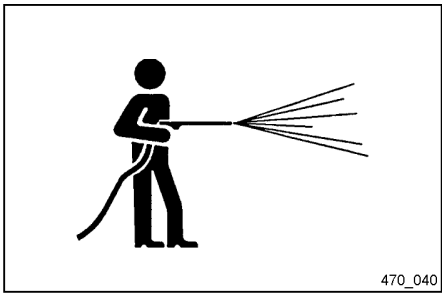
WORKING UNDER THE MACHINE

- 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.

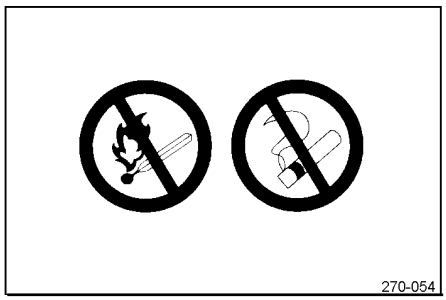


SPECIFIC MEASURES

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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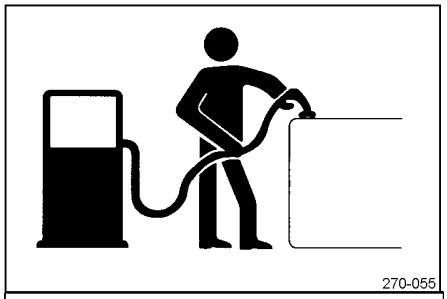
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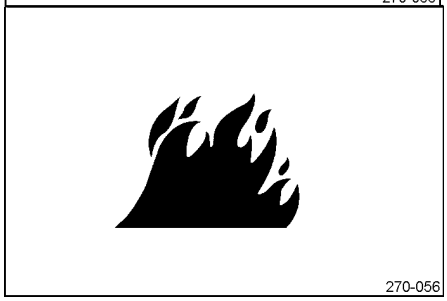
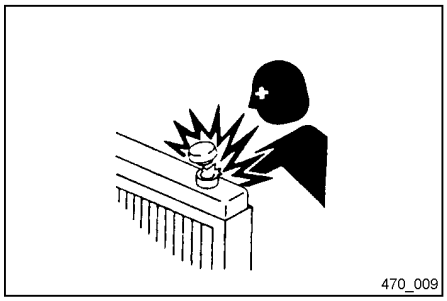

270-056

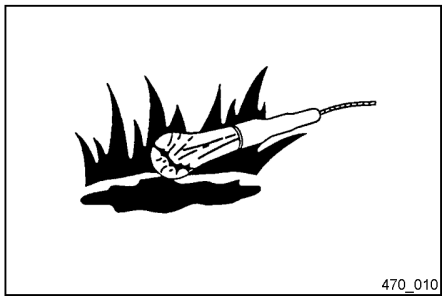
COOLANT

- 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.


470_009

USE OF LIGHTING

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

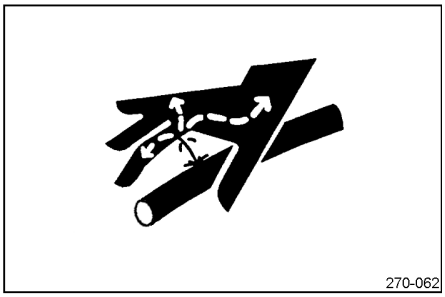

470_010

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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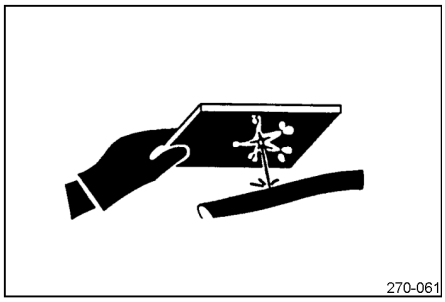

270-061

HANDLING OF ALS-CONTROL PRESSURE ACCUMULATORS

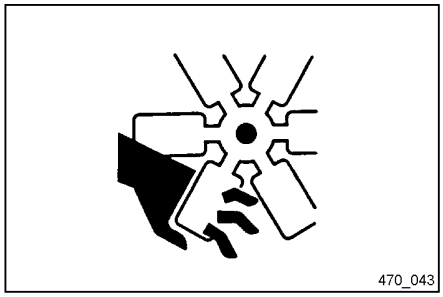
WARNING

Danger of injury! Pressure accumulators are filled with highly pressurised nitrogen.
Do not open or damage pressure accumulators.

- Immediately inform your Komatsu dealer, if you detect malfunctions or defects of pressure accumulators.
- Filling pressure accumulators with gas or topping up gas in pressure accumulators is strictly limited to either Komatsu service technicians or other persons authorised to handle highly pressurised gas.
- Do not hit against the pressure accumulator.
- Keep naked light and sources of heat away from pressure accumulators.
- 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 accumulators.
- The service technician must let the gas escape before they can disassemble the pressure accumulator.
- Have the gas pressure of the pressure accumulators checked either every 1000 operating hours or once every year.

NOTE
In countries with a hot climate, the responsible Komatsu dealer must check the gas-pressure of the pressure reservoir already every 650 hours.

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.

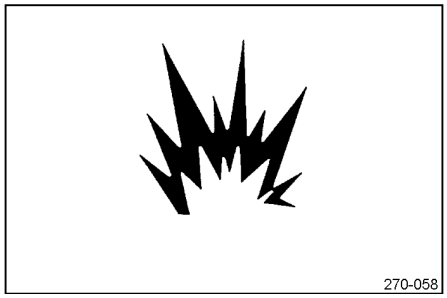
WASTE MATERIAL

- 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")

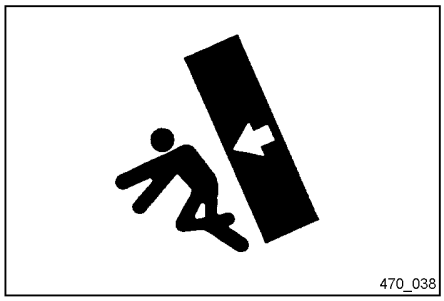
Tyres may burst and the resulting blast wave or parts whirling around may cause severe injury or damage. Make sure that the applicable procedures for servicing and replacing of wheels or tyres are fully understood and that only correct procedures are used.
To ensure safety and reduce wear and tear, always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



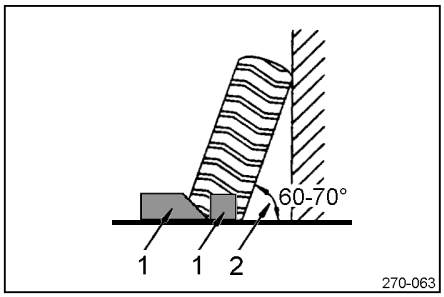
- Inflate tyres up to the defined pressure. If the tyre pressure is too low, the tyres may heat up and burst. If the tyre pressure is too high, there is also danger that the tyre may burst.
- If a tyre heats up considerably, inflammable gases are produced. A burning tyre may burst very easily, thus spreading 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 tyre pressure and permitted speed given in this manual correspond to the manufacturers' values. Please refer to your local dealer or the tyre manufacturer for details.

STORING TYRES



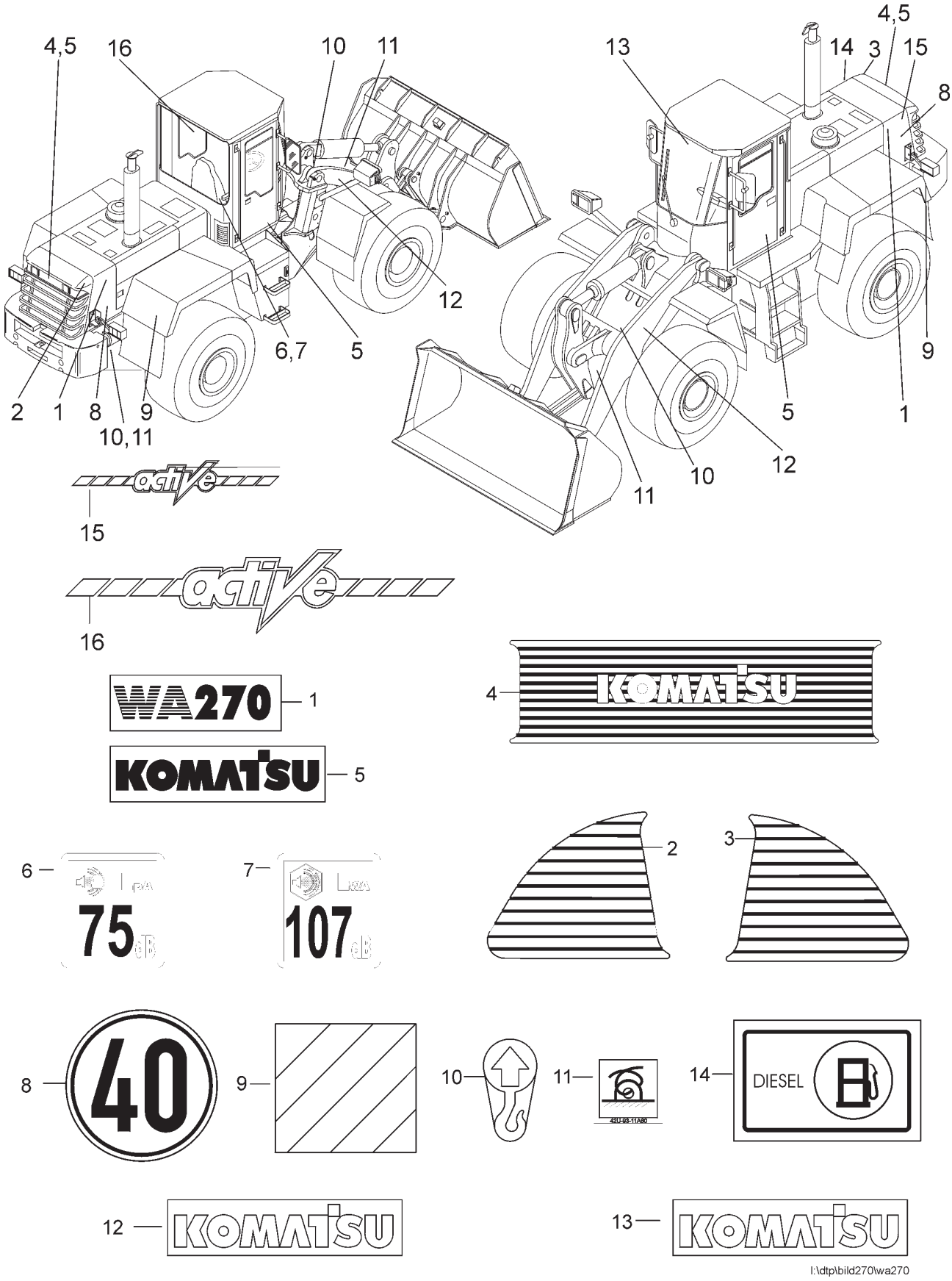
- Basically, tyres must be stored in a protected room that cannot be accessed by unauthorised persons. Otherwise, playing children may be injured.
- Place the tyres on an even surface and incline them 60° to 70° (2) against a solid stopper. Secure the tyres with wheel chocks (1) so that they cannot roll 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.

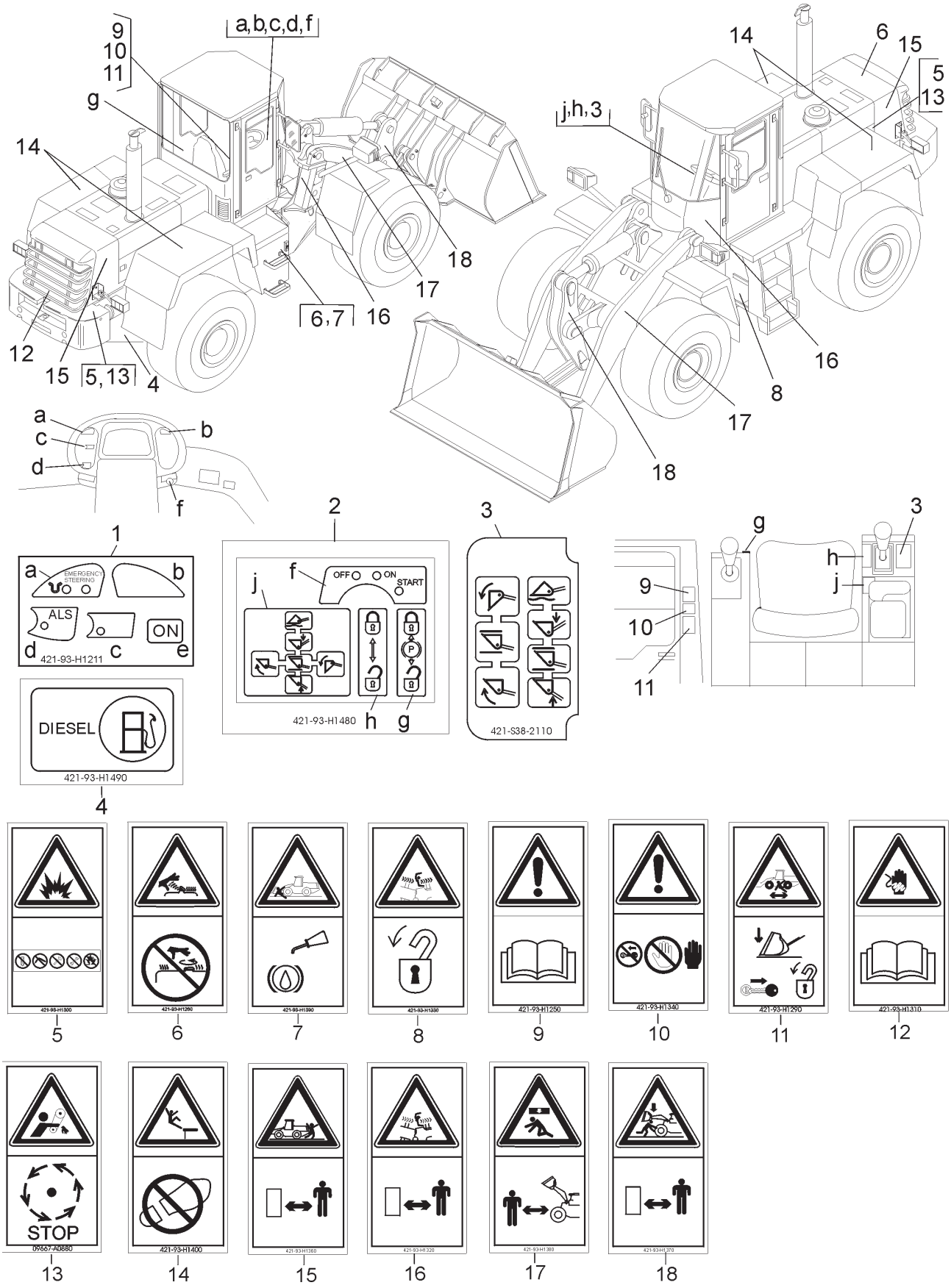


SAFETY LABELS

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

POSITIONS OF SAFETY LABELS





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1a Emergency steering
1b not used
1c not used
1d ALS-Electronic
1e ON-Emergency driving mode
P/N: 421-93-H1211

2f Starting switch
2g Parking brake
2h Control lever interlock
2j Control lever operation
P/N: 421-93-H1480

3a Control lever operation
P/N: 421-38-H2110

4 Diesel fuel
P/N: 421-93-H1490

5 Danger of explosion due to pressure accumulators
P/N: 421-93-H1300

6 Caution, hot water/oil
P/N: 421-93-H1280

7 Use Komatsu oil only
P/N: 421-93-H1390

8 Secure articulated joint during transport or when loading
P/N: 421-93-H1330

9 Instructions prior to operation/maintenance
P/N: 421-93-H1250

10 Precautionary measures before starting work
P/N: 421-93-H1340

11 Precautionary measures before leaving the machine
P/N: 421-93-H1290

12 Caution when using jump leads
P/N: 421-93-H1310

13 Do not open when engine running
P/N: 09667-A0880

14 Do not stand on fender
P/N: 421-93-H1400

15 Do not stand too close to the machine
P/N: 421-93-H1360

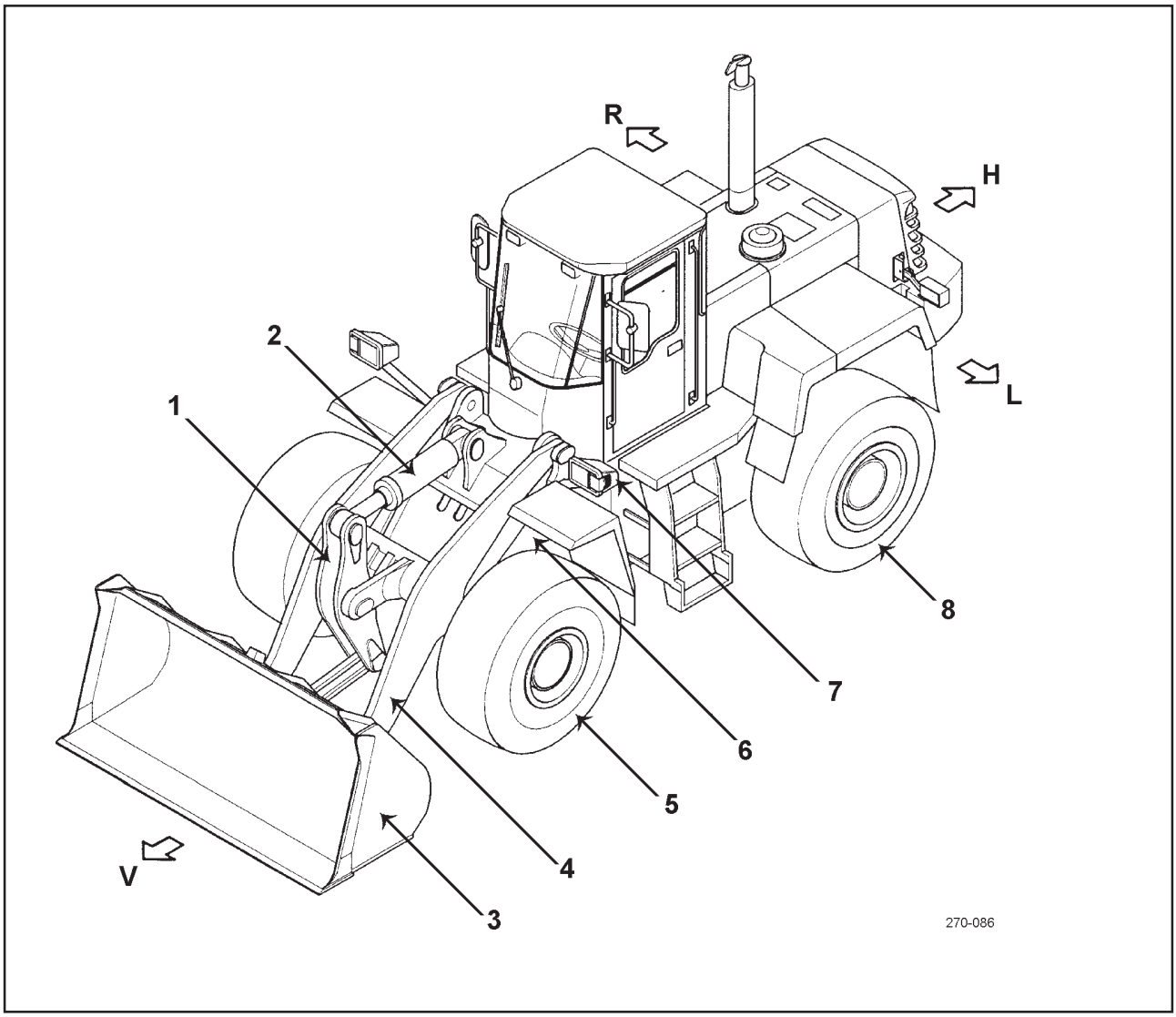
16 Keep a safe distance to the machine’s articulated joint
P/N: 421-93-H1320

17 Keep a safe distance to the attachments
P/N: 421-93-H1380

18 Do not stand/walk below the attachments
P/N: 421-93-H1370

OPERATING AND CONTROL ELEMENTS

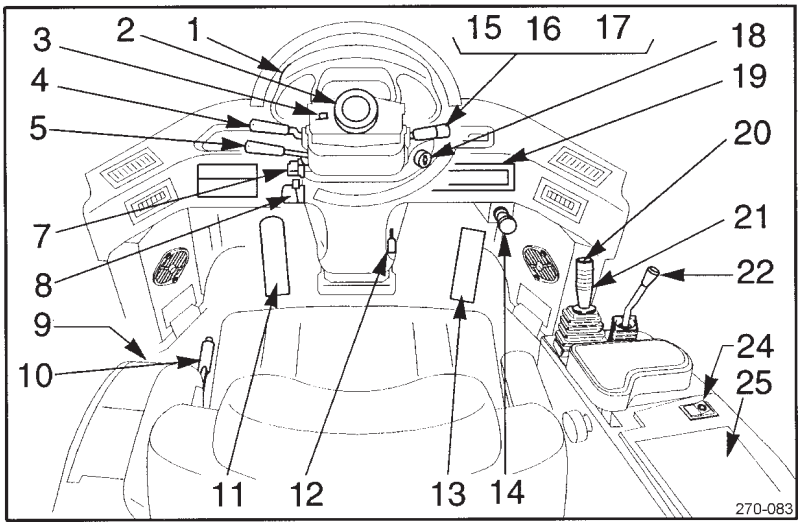
GENERAL VIEW OF THE MACHINE



1	Tumbler	6	Lifting cylinder	V	front
2	Bucket cylinder	7	Headlight	H	rear
3	Bucket		Direction indicator	R	right
4	Boom	8	Rear wheel	L	left
5	Front wheel				

OPERATING AND CONTROL ELEMENTS

GENERAL VIEW

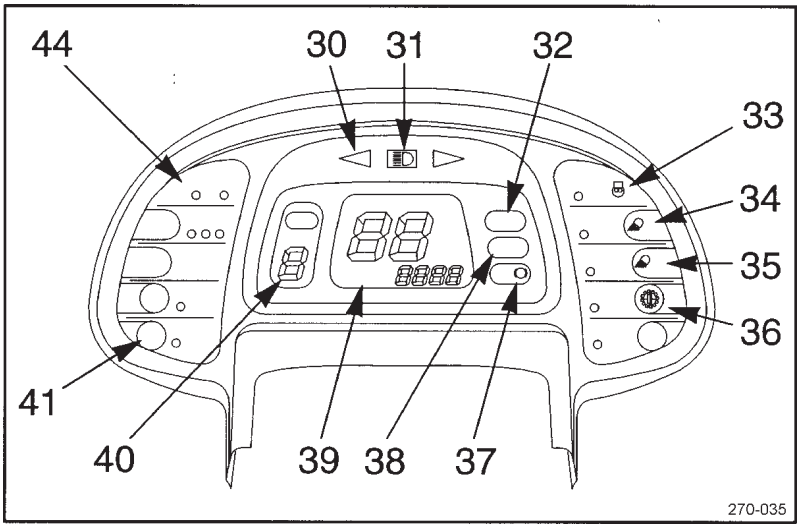


1 Main control panel
2 Horn button
3 Hazard flasher switch
4 Driving direction lever (reversing lever)
5 Gear-shifting lever

7 Switch lever limit-stop
8 Switch for windscreen wipers
9 Switch for emergency driving
10 Switch for parking brake
11 Brake pedal
12 Adjustment lever for steering column
13 Accelerator pedal
14 Cigarette lighter
15 Light switch
16 Direction indicator lever
17 Low-beam switch
18 Start switch
19 Radio
20 Kick-down switch
21 Control lever for work hydraulic system
22 Control lever for special equipment

24 Switch for air-conditioning
25 Maintenance control panel

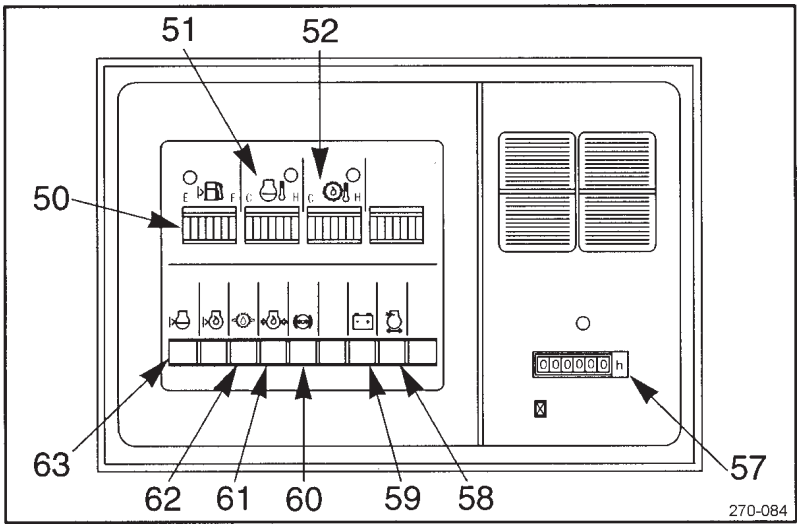
MAIN CONTROL PANEL



30 Control light for direction indicators
31 Control light for high beam
32 Central control light
33 Preheater control light
34 Switch and control light for front working light
35 Switch and control light for rear working light
36 Switch and control light for transmission cut-off
37 Control light for parking brake
38 Central warning light
39 Speedometer
40 Gear-shift status indicator
41 Switch and control light for ALS-ELECTRONIC

44 Control light for emergency steering

MAINTENANCE CONTROL PANEL

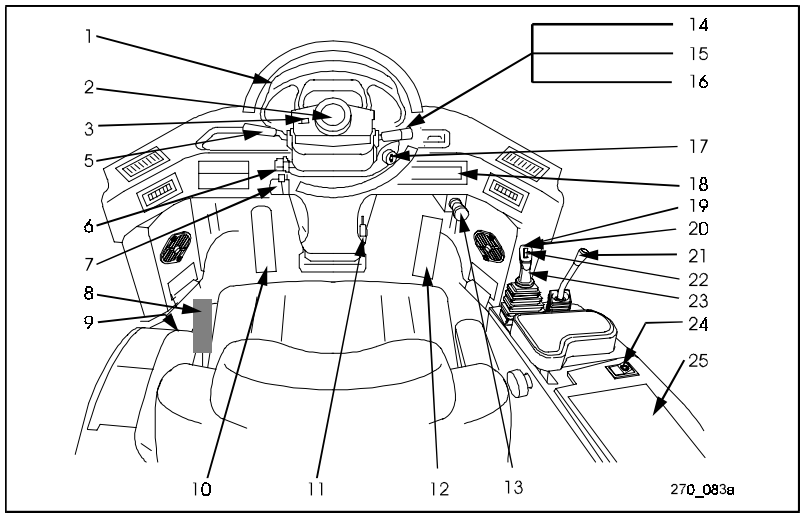


50 Fuel gauge
51 Engine coolant temperature
52 Converter oil temperature

57 Operating hours meter
58 Warning light for air filter
59 Control light for charging current
60 Warning light for brake storage pressure
61 Warning light for engine oil pressure
62 Warning light for transmission gear-shift pressure
63 Warning light for engine coolant level

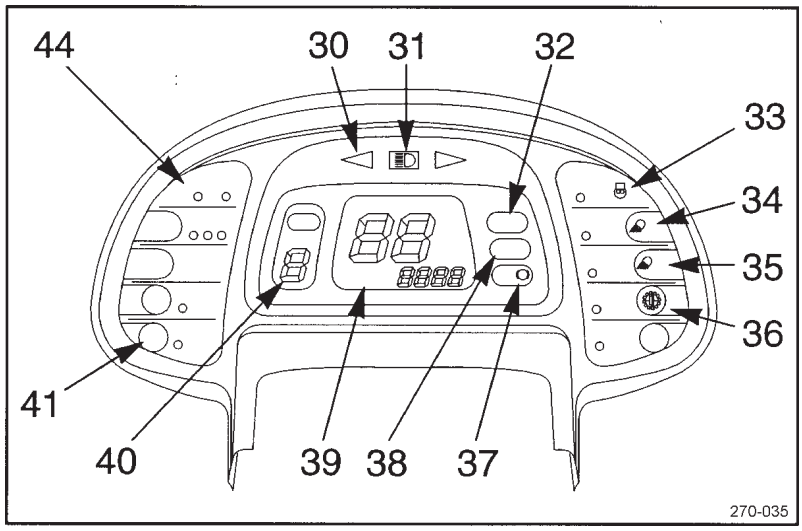
OPERATING AND CONTROL ELEMENTS

GENERAL VIEW WITH MULTIFUNCTIONAL LEVER, IF INSTALLED



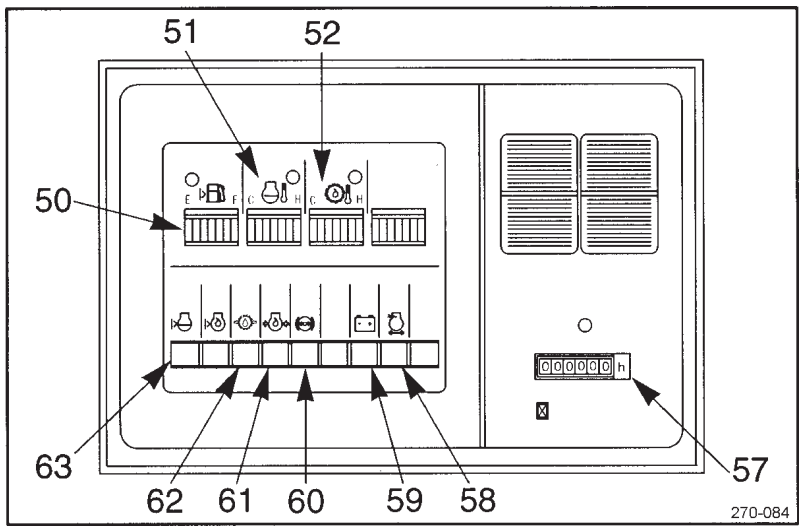
1 Main control panel
2 Horn button
3 Hazard flasher switch
5 Gear-shift lever
6 Switch lever limit-stop
7 Switch for windscreen wipers
8 Parking brake lever
9 Switch for emergency driving mode
10 Brake pedal
11 Adjustment lever for steering column
12 Accelerator pedal
13 Cigarette lighter
14 Light switch
15 Direction indicator lever
16 Low-beam switch
17 Start switch
18 Radio
19 Kick-down switch
20 Gear-shift lock
21 Control lever for special equipment
22 Driving direction switch
23 Multifunctional lever for work hydraulic system
24 Switch for air-conditioning
25 Maintenance control panel

MAIN CONTROL PANEL



30 Control light for direction indicator
31 Control light for high beam
32 Central control light
33 Preheater control light
34 Switch and control light for front working light
35 Switch and control light for rear working light
36 Switch and control light for transmission cut-off
37 Control light for parking brake
38 Central warning light
39 Speedometer
40 Gear-shift status indicator
41 Switch and control light for ALS-ELECTRONIC
43 Switch for gear-shift lock
44 Control lamp for emergency steering

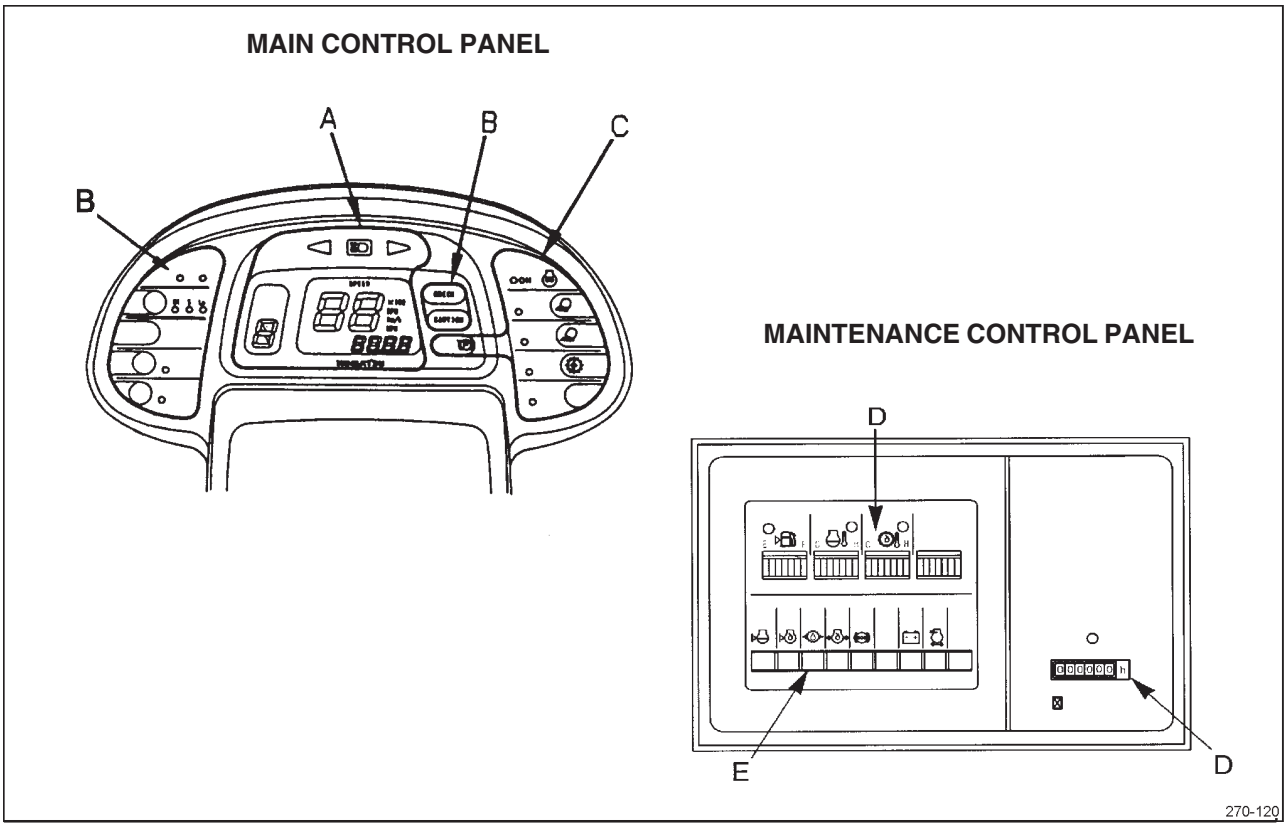
MAINTENANCE CONTROL PANEL



50 Fuel gauge
51 Engine coolant temperature
52 Converter oil temperature

57 Operating hours meter
58 Warning light for air filter
59 Control light for charging current
60 Warning light for brake storage pressure
61 Warning light for engine oil pressure
62 Warning light for transmission gear-shift pressure
63 Warning light for engine coolant level

CONTROL PANELS



The monitoring system consists of a main control panel and the maintenance control panel. Depending on the functions, the control system can be divided into the following sections:

B and E	**:**	**Warning indicators**
A, C and D	**:**	**Control and measurement indicators**
F	**:**	**Warning light and indicator for emergency-steering system**

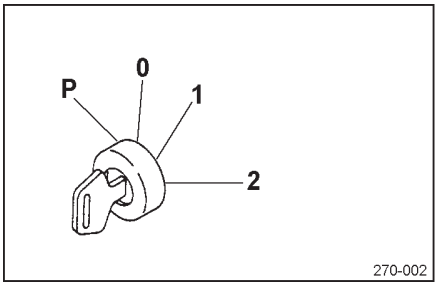
All elements which are required for efficient machine operation are described on the following pages.

WARNING INDICATORS (B AND E)
This group consists of the central control light (CHECK) and the central warning light (CAUTION) as well as the warning lights for the coolant level, brake oil pressure, engine oil pressure, battery charging status and the air filter.

CONTROL AND MEASUREMENT INDICATORS (A, C AND D)
This group comprises the speedometer, fuel gauge, temperature indicator for coolant and converter oil, operating hours meter, gear-shift status indicator, as well as the control lamps for direction indicators, high beam headlight, front and rear working lights, transmission cut-off and the preheater function.

WARNING LIGHT AND INDICATOR FOR EMERGENCY-STEERING (F)
This part comprises the warning light and the indicator for the emergency steering system.
For details see "Troubleshooting", "Emergency steering".

CHECKING THE CONTROL SYSTEM
This check can be performed 30 seconds after the engine has been switched off.
Turn the start switch to its operating position '1' before starting the engine.

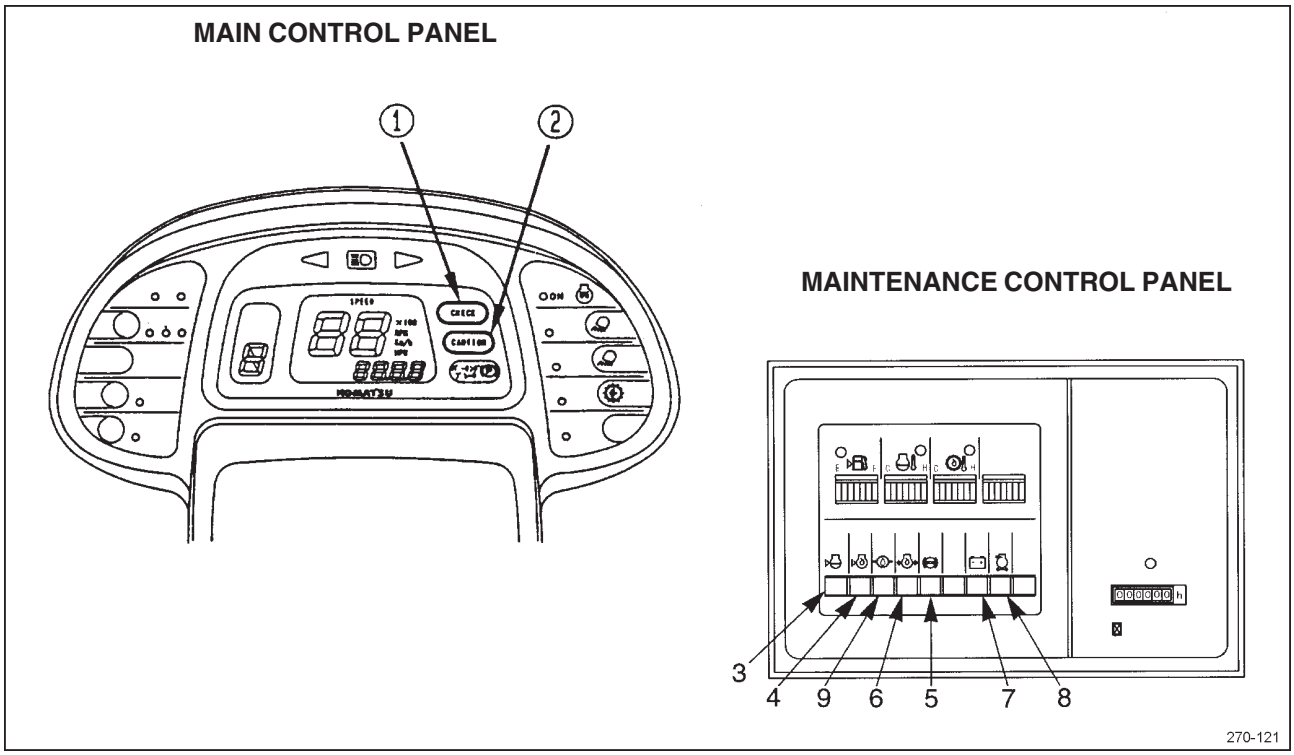


- All instruments and control and warning lights will then light up for approx. 3 seconds.
- The speedometer displays the number '88', the gear-shift status indicatator shows the number '8'.
- In the event of a functional defect, have an inspection performed by your local Komatsu dealer.

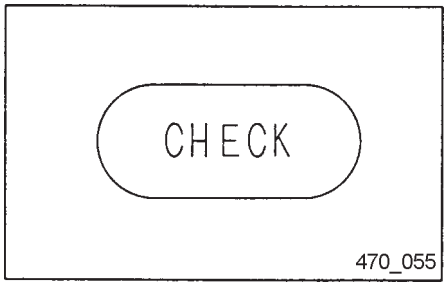
NOTE

When the either driving direction lever or the driving direction switch not being in its neutral position, the central warning light (CAUTION) will start to flash and the alarm buzzer will sound at intervals, if the ignition is turned to position '1'. In this case, return either the lever or the switch to the neutral position. The warning light will go out and the buzzer will stop.

WARNING INDICATORS



1. CENTRAL CONTROL LIGHT (CHECK)



If this control lamp starts to flash, it is immediately required to perform the relevant maintenance step.

If a functional defect has occurred, the central control light (CHECK) and the respective warning light will start to flash before the engine is started.

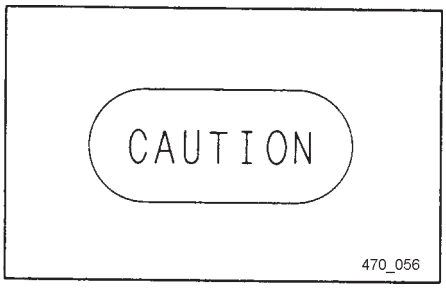
Check which warning light is flashing and perform the required troubleshooting measures.

Before the start-up, do not only rely on the control panels when performing the pre-start checks. Also carry out the prescribed maintenance steps in time.

If the coolant level is too low, the central control light (CHECK) goes out when the engine is started. The central warning light (CAUTION) will then start to flash and the alarm buzzer will sound at intervals.

If an error is detected in the battery charging system while the engine is running, the battery discharge indicator and the central control light (CHECK) will start to flash. In this case, check the charging current circuit.

2. CENTRAL WARNING LIGHT (CAUTION)

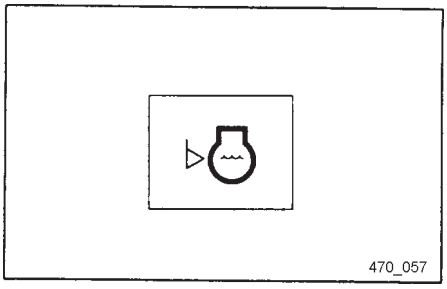


If this warning light starts to flash, switch off the engine immediately or let it run idle.

The alarm buzzer sounds at intervals if a fault has occurred (coolant temperature, converter oil temperature, coolant level, brake oil pressure, engine oil pressure) while the engine is running. The warning light for the faulty component and the central warning light (CAUTION) start to flash at the same time.

The fuel gauge indicator and the central warning light (CAUTION) start to flash, if the fuel gauge has entered the critical (red) range while engine is running.

3. WARNING LIGHT FOR ENGINE COOLANT LEVEL



Park the machine horizontally on level ground before performing this check.

Check prior to start:
The warning light and the central control light (CHECK) start to flash, if the coolant level in the cooling system is too low.

In this case, check the coolant level in the equalizing tank and top up with coolant.

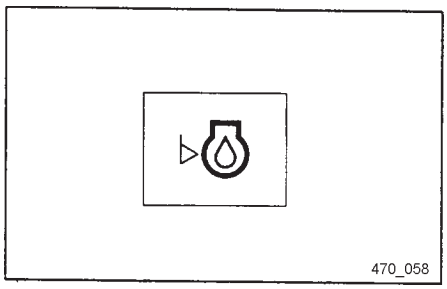
With the engine running:
The warning light and the central warning light (CAUTION) start to flash and the alarm buzzer sounds at intervals, if the coolant level in the cooling system is too low.

In this case,

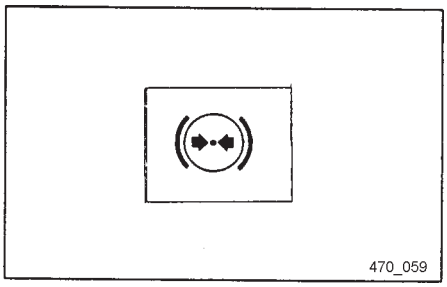
- switch off the engine,
- check the coolant level in the equalizing tank,
- top up with coolant.

4. WARNING LIGHT FOR ENGINE OIL LEVEL

(not installed)



5. WARNING LIGHT FOR BRAKE STORAGE- PRESSURE



NOTE!
Never drive the machine when the storage pressure is too low, since there is no sufficient braking effect!

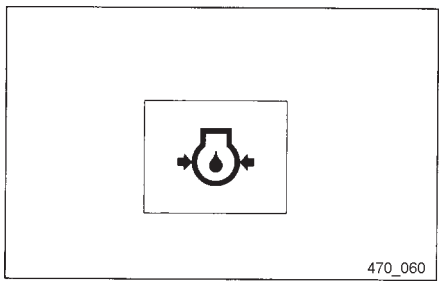
Check prior to start:
If engine is switched off, no warning is given.

With the engine running:
The warning light and the central warning light (CAUTION) start to flash, if the oil pressure in the pressure tank is too low. At the same time, the alarm buzzer sounds at intervals.

IMPORTANT!

An empty pressure tank must be filled within about 10 seconds after starting the engine and after the warning has ended. If not, switch off the engine immediately and let the oil pressure circuit for the brake be checked by a Komatsu-Hanomag service technician.

6. WARNING LIGHT FOR ENGINE OIL PRESSURE

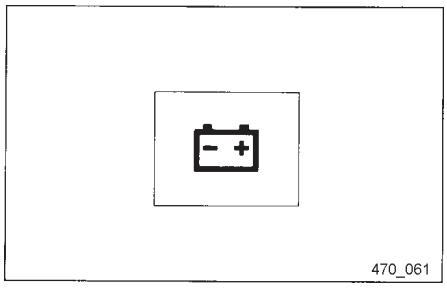


Check prior to start:
The light must light up.

With the engine running:
The lubrication pressure is built up after the engine is started. Then, the light will go out. If the oil pressure level sinks too low, the warning light and the central warning light (CAUTION) will start to flash. The buzzer sounds at intervals.

Switch off the engine immediately, if a warning is indicated. Then, check the engine oil level and top up with oil, if required. If the warning light still does not go out, have the machine checked by an authorized garage.

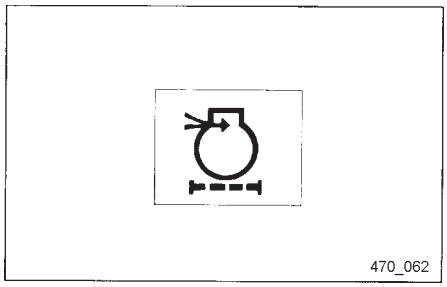
7. WARNING LIGHT FOR CHARGING CURRENT



Check prior to start:
The light must light up.

With the engine running:
When the engine is started, the alternating current generator starts to generate current. After the batteries are recharged, the light goes out. If a fault has occurred, the warning light and the central control light (CHECK) will start to flash. In this case, have the system checked.

8. WARNING LIGHT FOR AIR FILTER



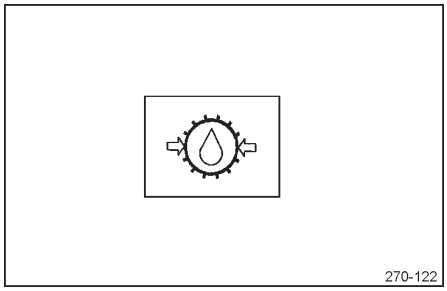
Check prior to start:
The light goes out.

With the engine running
The warning light and the central control light (CHECK) start to flash, if the air filter is dirty.

In this case, clean or replace the filter insert.

9. WARNING LIGHT FOR THE TRANSMISSION GEAR-SHIFT PRESSURE

NOTE:
You may no longer drive the machine, if the transmission gear-shift pressure is too low. Otherwise, consequential damages cannot be ruled out. Have any faults immediately repaired. At first, check the oil level in the transmission unit and top up with oil, if necessary.

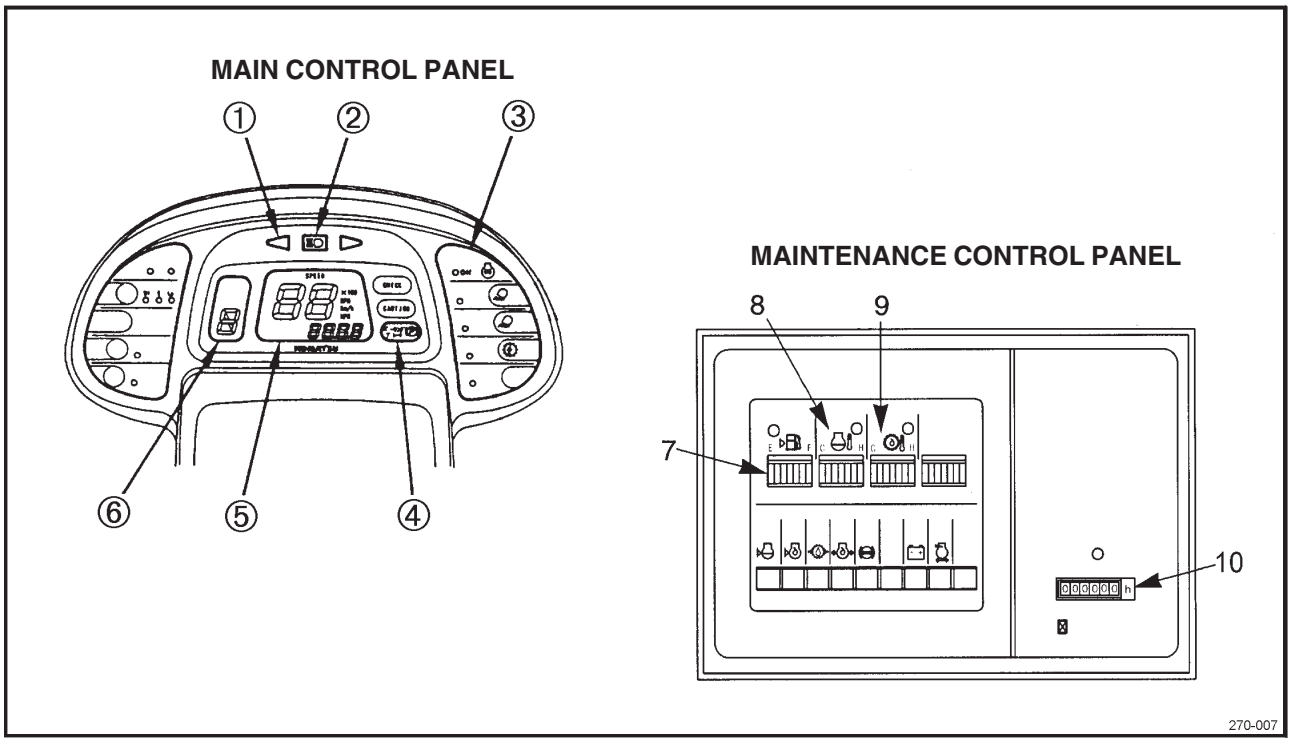


Check prior to start:
The light must light up.

With the engine running:
When the engine is started, pressure is built up and the light goes out. The warning light and the central warning light (CAUTION) start to flash, if the pressure drops under the permitted level. The buzzer sounds at intervals.
.

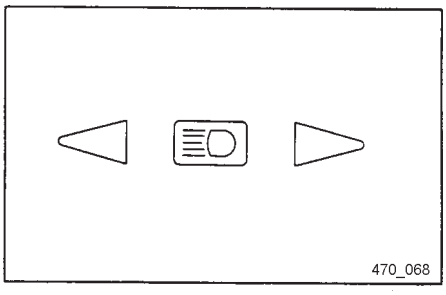
CONTROL AND MEASURING INSTRUMENTS

If the start switch is set to its operating position ('ON'), all control and measuring instruments will light up for a moment if they are fully functioning.



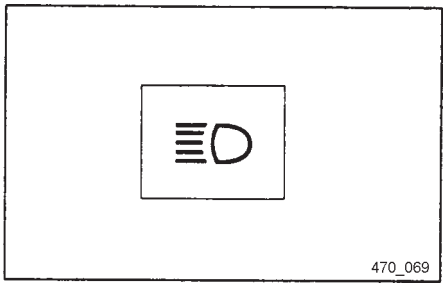
1. CONTROL LIGHT FOR DIRECTION INDICATOR

The control light starts to flash, if the direction indicator is switched on.



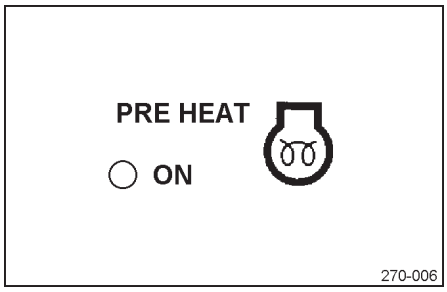
2. CONTROL LIGHT FOR HIGH-BEAM HEADLIGHTS

This control light light up, if the high-beam headlights are switched on.



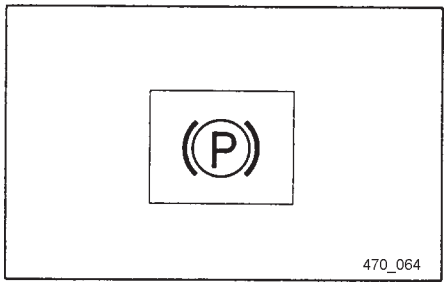
3. CONTROL LIGHT FOR PREHEATER

The control light lights up, if the start switch is set to its operating position ('1') and the preheating is automatically started. The light will go out, when the preheating has been completed. The switch-on time for the preheating system depends on the ambient temperature. The engine can be started after the control light has gone out.



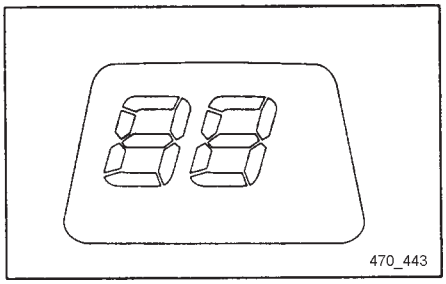
4. CONTROL LIGHT FOR PARKING BRAKE

This control light lights up, if the parking brake has been applied.



5. SPEEDOMETER

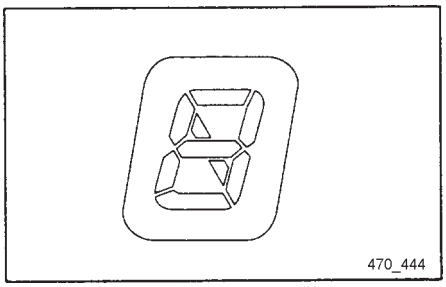
This instrument indicates the speed of the machine.



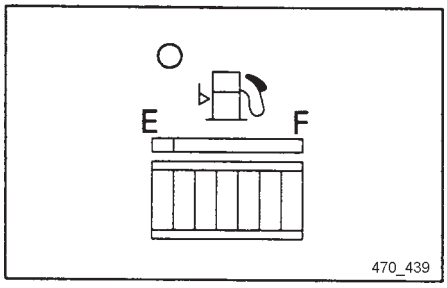
6. GEAR-SHIFT STATUS INDICATOR

This indicator shows the selected gear. If 'N' is displayed on the indicator, the driving direction lever has been set to its neutral ('N') position.

If the driving direction lever has been set to its 'F' or 'R' position, the indicator represents the gear which has been selected with the gear-shift lever as a number.



7. FUEL GAUGE

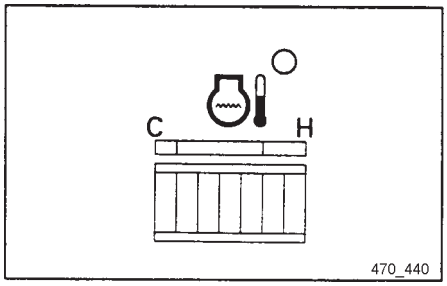


E: The tank is empty
F: The tank is full

During operation, the indicator of the fuel gauge should be in the green range . The control light of the fuel gauge and the central warning light (CAUTION) start to flash, if the indicator enters the critical (red) range.

Fill up with fuel if the indicator enters the red range.

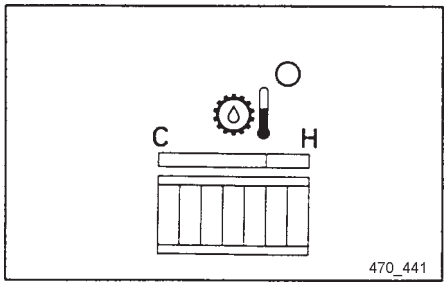
8. ENGINE COOLANT TEMPERATURE



This measuring instrument indicates the temperature of the coolant. During operation, the indicator lights up in the green range if the temperature is normal. If the red range lights up, stop the machine and run the engine at medium rpm without load until the indicator returns to the green range.

The instrument control lights and the central warning light (CAUTION) start to flash, if the indicator lights up in the 1st red section. An acoustic alarm will also be issued, if the indicator enters the 2nd red section.

9. TEMPERATURE FOR CONVERTER OIL



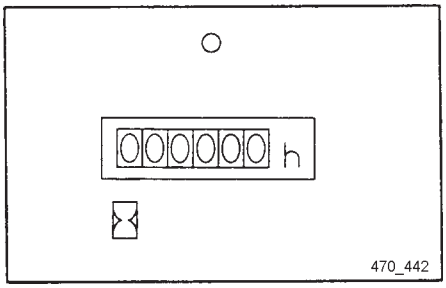
This measuring instrument indicates the temperature of the converter oil. During operation, the indicator will be in the green range, if the temperature is normal. The converter oil temperature is too high, if the indicator is in the red range.

The instrument's control light and the central warning light (CAUTION) start to flash, when the indicator enters the first red section. An acoustic alarm is also issued, if the indicator enters the second red section.

The torque converter's oil can extremely heat up, if the machine is driven in an inappropriately high gear. In this case, select the next lower gear so that the oil temperature can cool down.

If the temperature is still too high, stop the machine, put the driving direction lever in its neutral position and run the engine at medium speed until the gauge's indicator has returned to the green range.

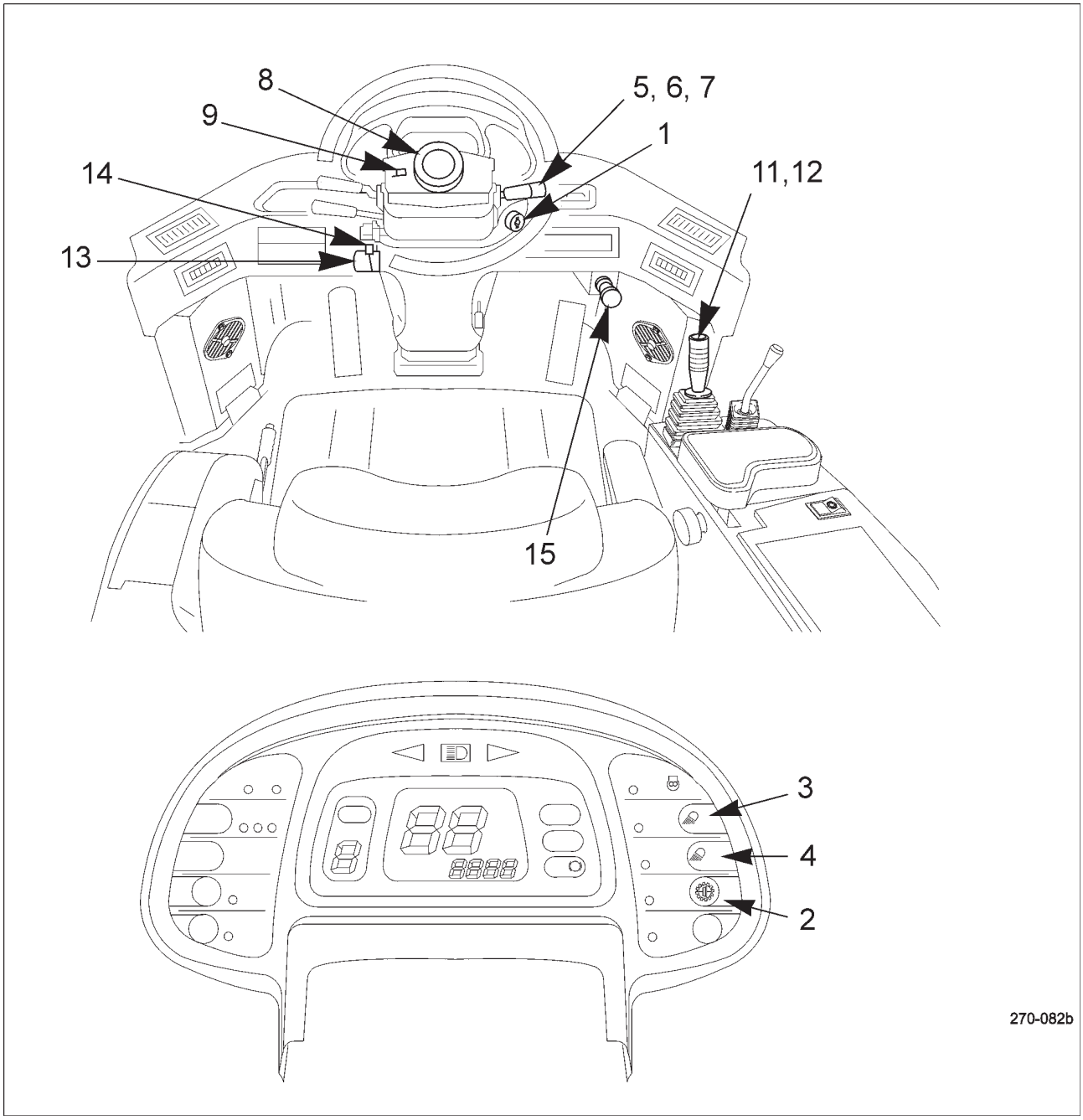
10. OPERATING HOURS METER



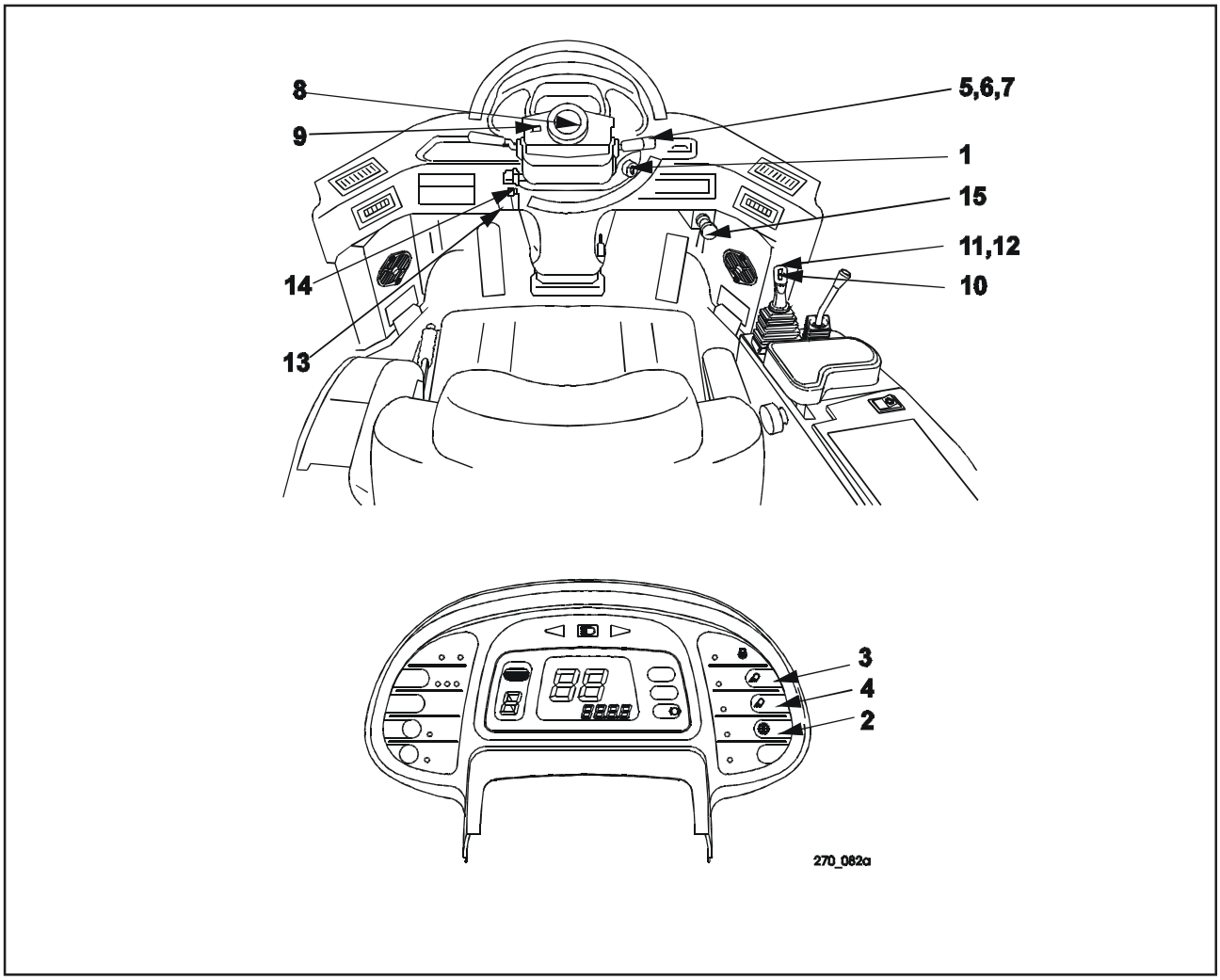
The operating hours meter indicates the total operating hours. It is only active when the engine is running and the alternating current generator is generating power - independent whether the machine is being driven or not.

When the engine is running, the meter's green light starts to flash indicating that it is counting the operating hours.

SWITCHES

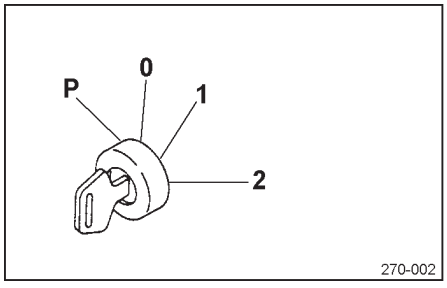


SWITCHES (WITH MULTIFUNCTIONAL LEVER, IF INSTALLED)



1. START SWITCH

This switch is used to start or switch off the engine.



Parking position (P)
Not used.

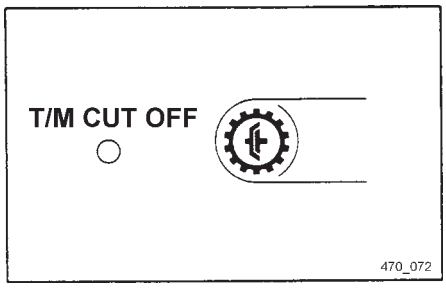
Stop position (0)
In this position, the ignition key can be removed. The engine and specific power supply circuits are switched off.

Operating position (1)
In this position, the engine is automatically preheated. Leave the key in this position when the engine is running. Previously deactivated power supply circuits are again switched on.

Start position (2)
Hold the ignition key in this position until the engine starts up, then release it immediately; it automatically returns to the operating position (1).

IMPORTANT
The engine can only be started if the driving-direction lever, or the driving-direction switch, is in its neutral position "N".

2. TRANSMISSION CUT-OFF SWITCH



WARNING

If the transmission cut-off is activated, the braking effect of the engine is not available. This may lead to accidents while driving on slopes or public roads!
Before driving on public roads or slopes, set the transmission cut-off switch to its "OFF" position.

The transmission cut-off (T/M CUT-OFF) can be switched on or off with this button.

Switch positions:

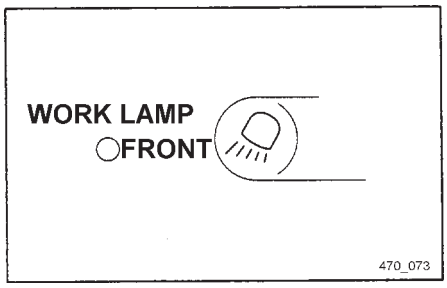
OFF: The control light of the switch is not lit.
The brake pedal can be used as a normal brake.

ON The switch control lamp is lit.
If the brake pedal is used for braking, the transmission is automatically set to its neutral position. When the brake is released, the machine starts to drive, if a gear has been selected.

NOTE

The transmission cut-off function is only effective in the first or second gear.
The transmission cut-off should be set to "ON" during normal operation.

3. SWITCH FOR FRONT WORKING LIGHTS

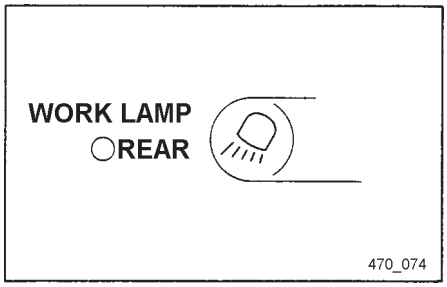


CAUTION

The front working lights may blind oncoming traffic!
Switch off the front working lights before driving on public roads.

It is required to switch on the main headlights before the front working lights can be switched on. Press the working lights switch once to switch on the front working lights; the relevant control light lights up. Press the switch again to switch off the front work lights.

4. SWITCH FOR REAR WORKING LIGHTS

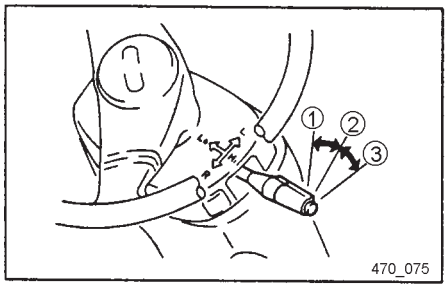


CAUTION

The rear working lights may blind following traffic!
Switch off the rear working lights before driving on public roads.

It is required to switch on the main headlights before the front working lights can be switched on. Press the working lights switch once to switch on the rear working lights; the relevant control light lights up. Press the switch again to switch off the rear work lights.

5. LIGHT SWITCH



This switch is used to switch on the main headlights, the sidelights, the taillights and the instrument illumination.

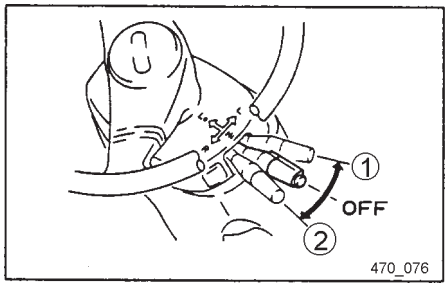
(1) OFF

(2) ≡D•◇≡ position: Sidelights, taillights and instrument illumination are switched on.

(3) ≡D• position: Main headlights and the switch-position illumination (2) are switched on.

IMPORTANT
The light switch can be operated independent from the lever positions for the direction indicator, low-beam and high-beam.

6. DIRECTION INDICATOR LEVER



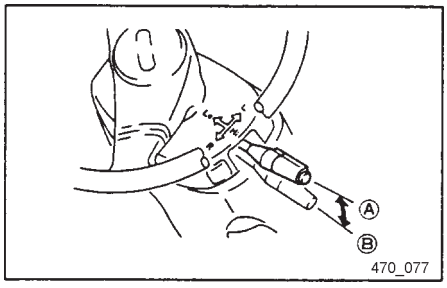
This lever is used to switch on the direction indicators.

(1) Left direction indicator: Push the lever forward.
(2) Right direction indicator: Pull lever to the back.

The direction indicator control light on the main and maintenance control panel lights up when this lever is activated.

The direction indicator is automatically reset after the driving manoeuvre (curve) is finished. The direction indicator lever returns to the OFF position. If not, return manually the lever to this position.

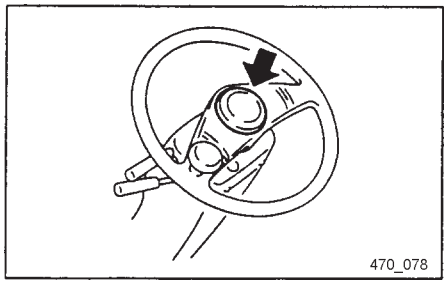
7. LOW-BEAM SWITCH



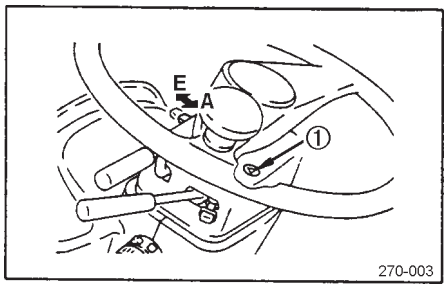
This switch is used to change from high-beam to low-beam.

(A) Low-beam
(B) High-beam

8. HORN BUTTON



9. HAZARD FLASHER SWITCH



NOTE

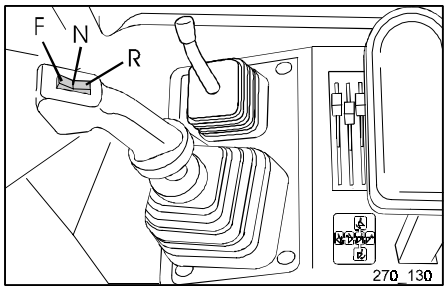
The hazard flasher may only be activated in an emergency situation.

E : Hazard flasher switched on
A : Hazard flasher switched off

If the hazard flasher is switched on, all indicator lights, the direction indicator control light, the switch lights and the warning light of the hazard flasher (1) start to flash.

10. DRIVING-DIRECTION SWITCH (ONLY WITH INSTALLED MULTIFUNCTIONAL CONTROL LEVER)

You can change the driving direction of the machine using the driving-direction switch.



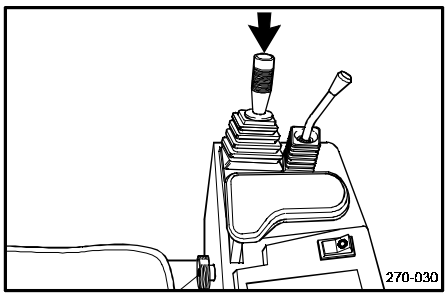
Position F : Forward drive
Position N : Neutral position
Position R : Reverse drive

NOTE:

The engine can only be started if the driving direction switch is in the neutral "N" position.

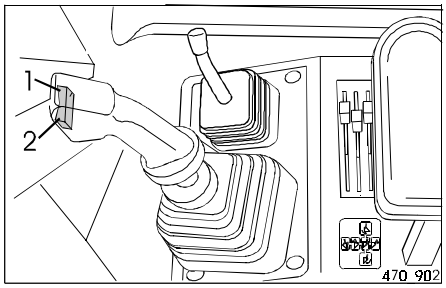
11. KICKDOWN SWITCH

If you are driving in 2nd or 4th gear, you can increase the thrust for excavation and loading operations by using the kickdown function. In 3rd gear kickdown switch can not be operated. The transmission changes down to the 1st gear, as soon as the kickdown function is activated.



Kickdown ON

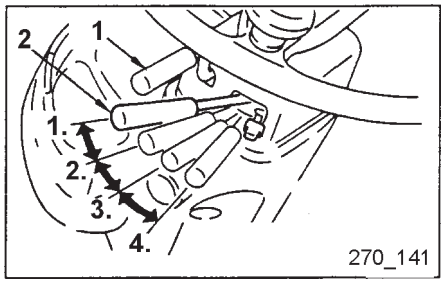
In 2nd gear, press the button on top of the control lever for the work hydraulic system (see arrow).
If your machine is fitted with a mullti-function control lever, you may activate the kickdown function by bringing the toggle switch at the front of the mullti-function control lever to its position '1'.



Kickdown OFF

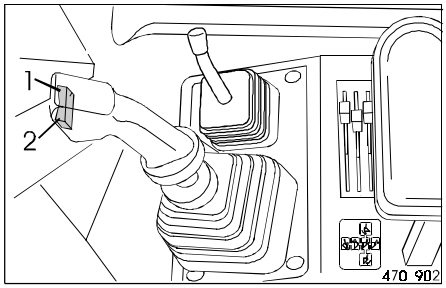
You have three possibilities for switching the kickdown function off:

1) Put the driving direction lever (1) or the driving direction switch first into its neutral position and then into the position for forward or reverse driving.
2) Use the driving direction lever (2) to change to any other gear.
3) Switch off the start switch (switching position 'OFF').



12. GEAR-SHIFT LOCK (2) (ONLY IF THE MULTI-FUNCTION LEVER IS INSTALLED)

Use the gear-shift lock if you are driving uphill or downhill, or if you are performing works which are to be carried out in a specific gear. As soon as you activate the gear-shift lock, the selected gear is retained, even if you increase engine speed to a level at which the automatic transmission usually would change into a higher gear.



Switching ON the gear-shift lock

1. Select the required gear.
2. Start the machine and increase speed until the selected gear is displayed on the gear shift indicator.
3. Press the toggle switch at the front of the multifunctional lever to position '2'. The gear-shift lock is now switched on and the control lamp for the gear-shift lock is lit.

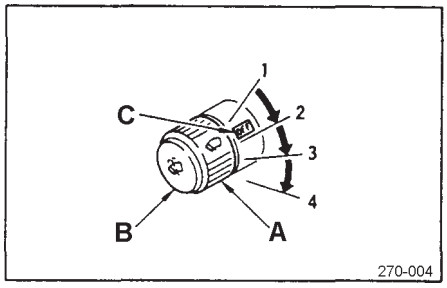
Switching OFF the gear-shift lock

You can switch off the gear-shift lock by restting the toggle switch at the front of the multifunctional lever to position '2'. The gear-shift lock is now switched off again and the control lamp for the gear-shift lock goes out.

13. FRONT WINDSCREEN WASHER/WIPER SWITCH

Turn switch (A) to turn on the windscreen wiper.

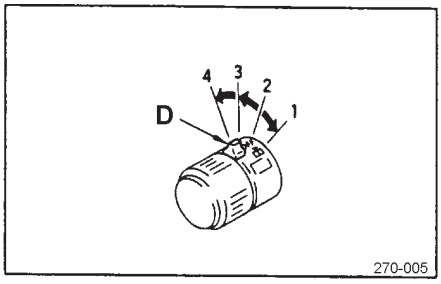
Keep button (B) pressed, if you want to start the front windscreen washer.



Switch position	Window display (C)	Operation
1	OFF	OFF
2	INT	Interval operation
3	1	Slow
4	2	Fast

14. REAR WINDSCREEN WASHER/WIPER SWITCH

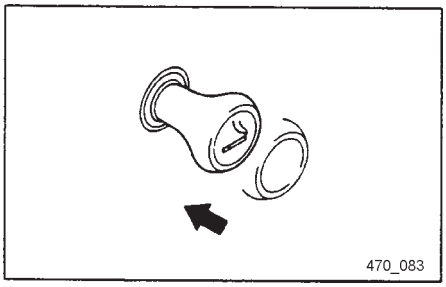
Turn lever (D) to activate the rear windscreen wiper.



Switch position	Window display	Operation
1		Washer on
2	OFF	OFF
3		Wiper on
4		Washer on Wiper on

15. CIGARETTE LIGHTER

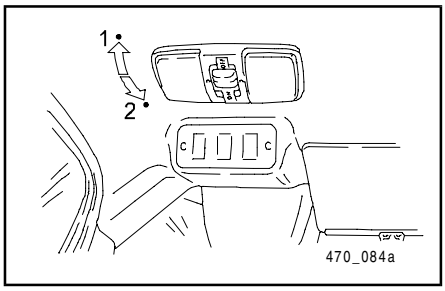
If you want to use the cigarette lighter, press it in. After a few seconds, it will return to its original position and can be pulled out to light up a cigarette.



NOTE

The cigarette lighter may only be used for connecting the working lamp. Do not connect any other electric device since it may interfere with the board electronics.

16. SWITCH FOR INTERIOR LIGHTING



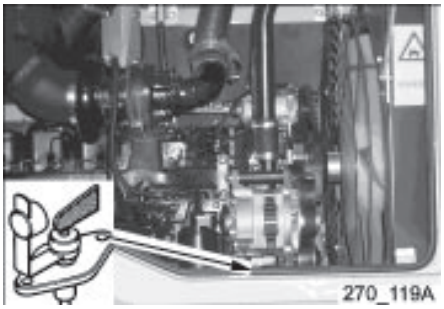
Switch position 1: Switched OFF
Switch position 2: Switched ON by door contact

Note

The interior lighting can also be switched on, if the start switch is in position '0'. For this reason, set the switch to position '1' (OFF) when you are leaving the cabin.

If you operate the machine with open doors, set the switch to position '1' (OFF).

17. BATTERY MAIN SWITCH



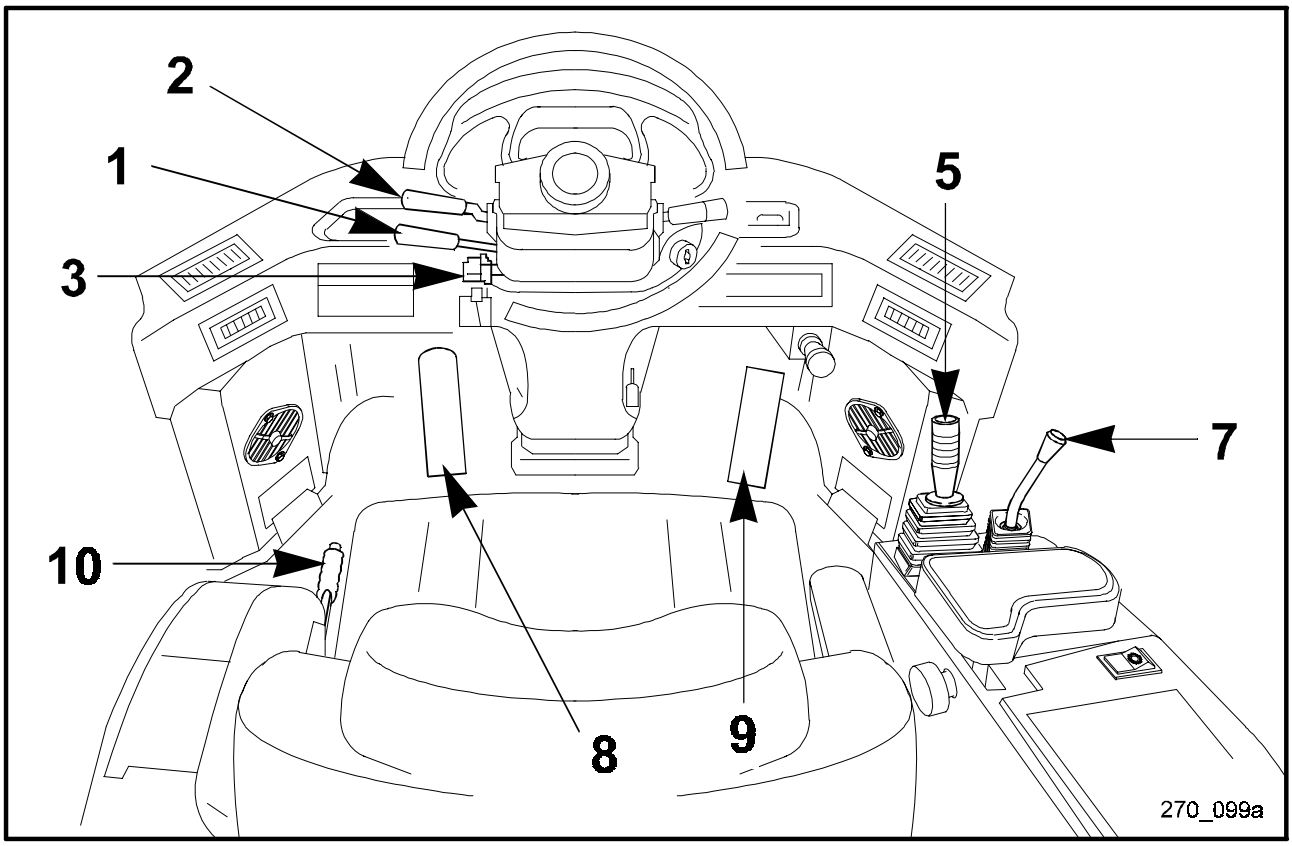
NOTE

Do not switch off the battery main switch with engine still running!

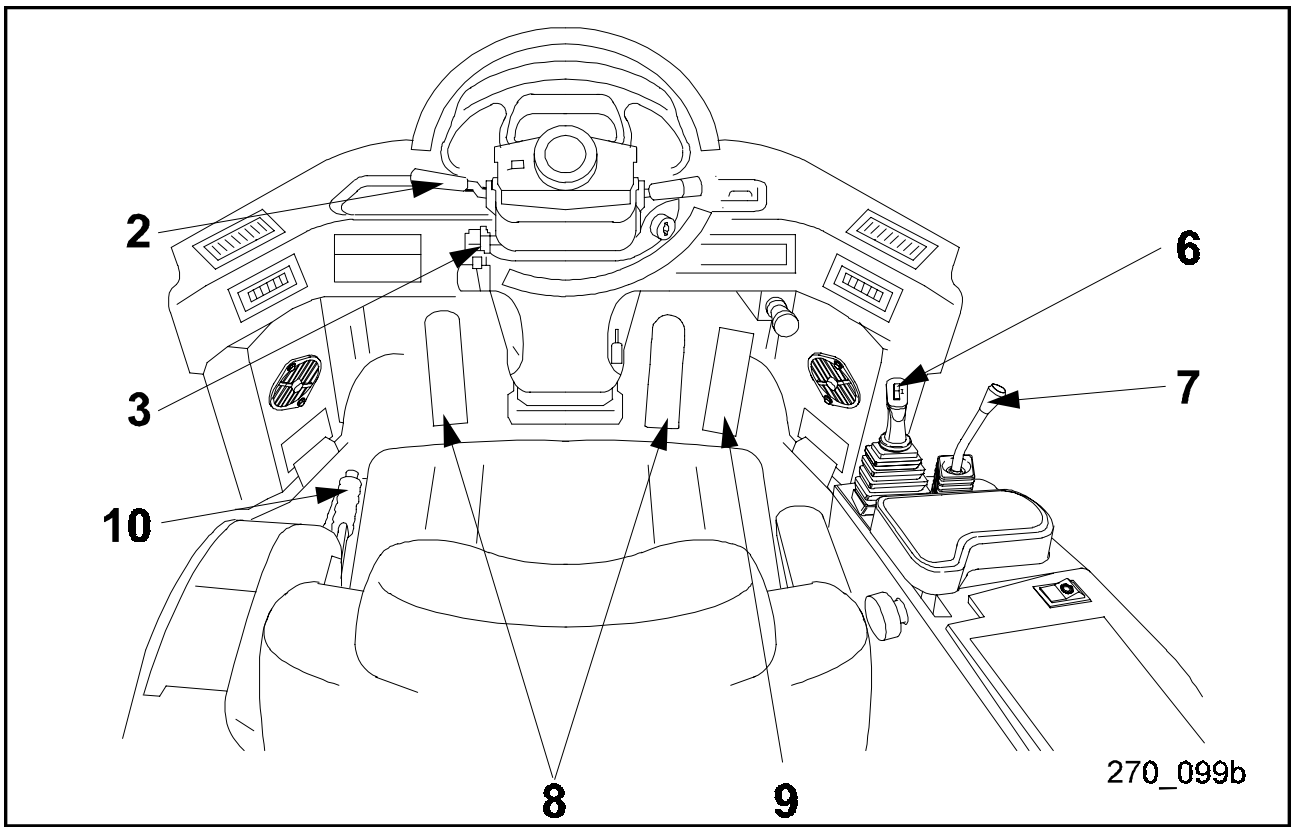
The power supply of the machine can be interrupted with the battery main switch. The switch is located behind the left engine cover.

If the machine is to be shut down for a longer period of time, switch off the battery main switch and remove the switch key.

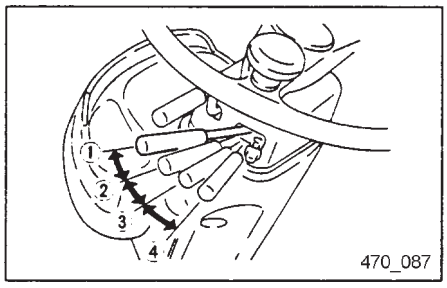
CONTROL LEVERS, PEDALS



CONTROL LEVERS, PEDALS (WITH MULTIFUNCTIONAL LEVER, IF INSTALLED)



1. CONTROL LEVER



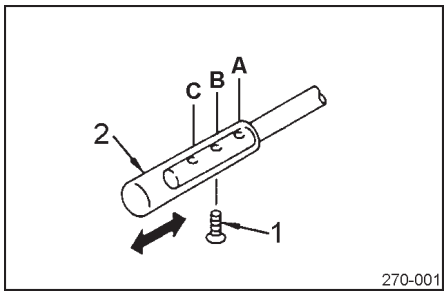
This lever is used to select the machine speed.

The machine is provided with an automatic gear-shift transmission with four forward gears and three reverse gears.
Set the lever to the appropriate position for the required speed range.

Position (1):	1st forward and reverse gear
Position (2):	2nd forward and reverse gear
Position (3):	3rd forward and reverse gear
Position (4):	4th forward and 3rd reverse gear

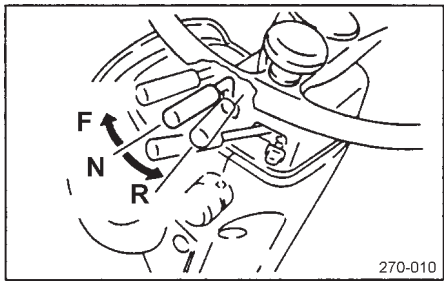
Working range:	1st and 2nd gear
Transport range:	3rd and 4th gear

The 3rd and 4th gears can be blocked using a gear-shift lever limit-stop.



ADJUSTING THE LENGTH OF THE GEAR-SHIFT LEVER
The gear-shift lever can be adjusted to three lengths (positions A, B and C). To adjust it, remove the screw (1), push the lever end section (2) to the required position and retighten the screw.

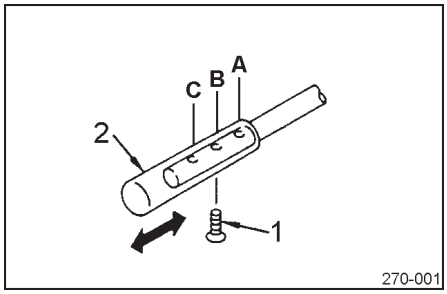
2. DRIVING DIRECTION LEVER



Use this lever to change the driving direction.
The engine can only be started, if the driving direction lever - or the driving direction switch - is in its the neutral position (N).

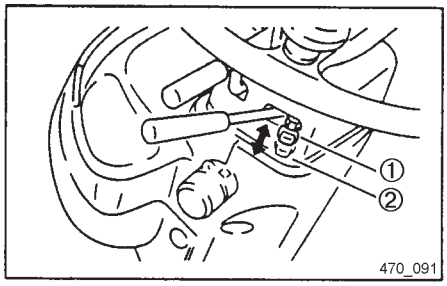
F	Forward
N	Neutral
R	Reverse

IMPORTANT
If your machine is equipped with a multifunctional lever, it is provided with a driving direction switch instead of a driving direction lever.



Adjusting the length of the driving direction lever
The lever can be adjusted to three lengths (positions A, B and C). To adjust it, remove the screw (1), push the lever end section (2) to the required position and retighten the screw.

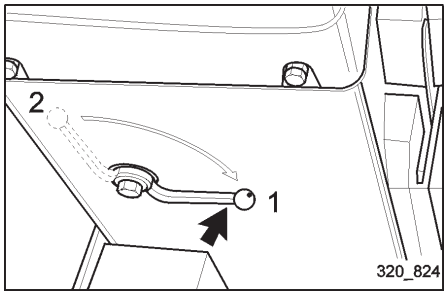
3. SWITCH LEVER LIMIT-STOP



This limit stop blocks the 3rd and 4th gear.

Position (1):	Limit stop activated
Position (2):	Limit stop switched off

4. LOCKING LEVER FOR THE WORK HYDRAULIC SYSTEM



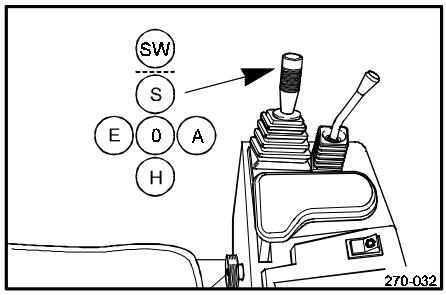
WARNING

Unintentional lowering of the bucket may lead to severe accidents!
Before you start maintenance operations: Turn the locking lever for the work hydraulic system into position '1'. The locking lever for the work hydraulic system will then be without function. In addition, lower the bucket onto the ground and switch off the engine, before leaving the driver's cab.

The work hydraulic system is secured against unintentional operation with this locking lever.

Lever position:	1	Locking lever secured
	2	Operating position

5. CONTROL LEVER FOR THE WORK HYDRAULIC SYSTEM



The work unit is controlled with this lever.

SW Swimming position  The lever is locked in this position. The switch position 'SW' is for planing (removing subsoil). The work unit lowers to this operating position due to its own weight and can be moved freely by external force.

S Lowering 

0 Stopping  The boom is held in position.

H Raising  If the control lever is pulled further in the raising direction ('H'), it is locked in that position until the boom has reached the pre-set position of the lift limit switch. The control lever is then automatically returned to the stop position '0'.

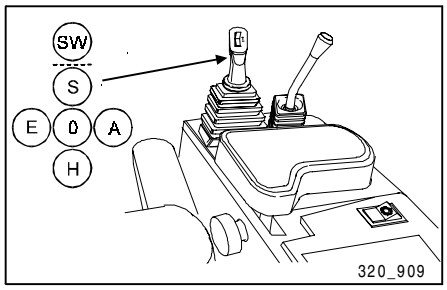
E Tipping in  If the control lever is pulled further in the tip-in direction ('E'), the lever is locked in that position until the bucket has reached the pre-set digging angle. The control lever is then automatically returned to the stop position '0'.

A Dumping 

Note
Never lift heavy loads with the work unit with the balance being only on one side!

6. MULTIFUNCTIONAL LEVER FOR THE WORK HYDRAULIC SYSTEM

The multifunctional lever is a special equipment and is used to control the work unit.



SW Swimming position 
The multifunctional lever is locked in this position. The switch position 'SW' is for planing (removing subsoil). The work unit lowers to this operating position due to its own weight and is moved freely by external force.

S Lowering 

0 Stopping 
Boom is held in position.

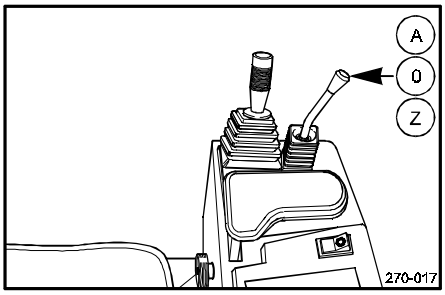
H Raising 
If the multifunctional lever is pulled further in the raising direction 'H', it is locked in that position until the boom has reached the pre-set position of the lift limit switch. The multifunctional lever is then returned automatically to the stop position '0'.

E Tipping in 
If the multifunctional lever is pulled further in the tip-in direction 'E', the lever is locked in that position until the bucket has reached the pre-set automatic digging angle. The multifunctional lever is then returned automatically to the stop position '0'.

A Dumping 

Note
Never lift heavy with the work unit while the load is balanced only on one side!

7. CONTROL LEVER FOR SPECIAL EQUIPMENT

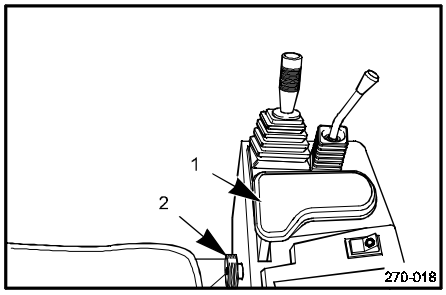


Control lever positions:

A Open*
0 Neutral position
Z Closed*

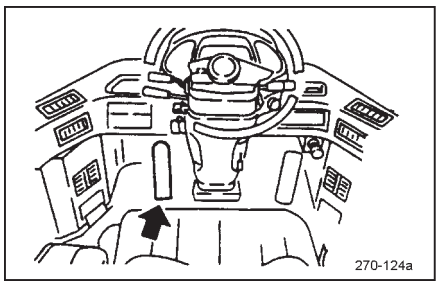
*) The designations "A" and "Z" or "Open" and "Closed" are not binding and depend on the type of unit and its connection.

The control lever must not be placed in either "A" or "Z" position if no special equipment is mounted. Otherwise, the work hydraulic system is operating against overpressure, thus heating up the oil unnecessarily.



ADJUSTING THE ARMREST
The height of the armrest (1) can be adjusted. Loosen the screw (2), raise or lower the armrest to the desired position, then retighten the screw.

8. BRAKE PEDAL



CAUTION

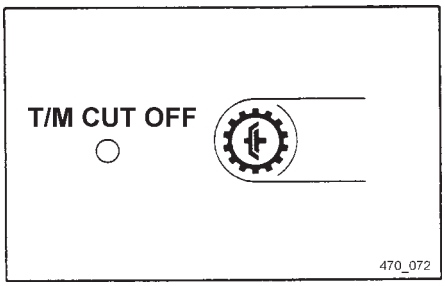
- **If driving downhill, use the engine only when necessary. Frequent use of the brake impairs its braking effect and thus lead to accidents!**
  Let the engine run, if you are driving downhill. Use the brake pedal for additional braking, if required.
- **Unintentional braking may lead to accidents!**
  Do not use the brake pedal as a foot rest

Brake pedal
The brake pedal works on all 4 wheels.

Braking with transmission cut-off switched on or off

WARNING

If the transmission cut-off is switched on, there is no braking effect of the engine available. This may lead to accidents when driving on slopes!
For this reason, switch off the transmission cut-off before driving on slopes (the switch control light is not lit).



The transmission cut-off is switched on or off by pressing the switch (T/M CUT-OFF).

Operating positions of the transmission cut-off:

OFF: The brake pedal can be used as normal brake.
The switch control light is not lit.

ON: This function can only be used in the 1st and 2nd gear.
The switch control light is lit.

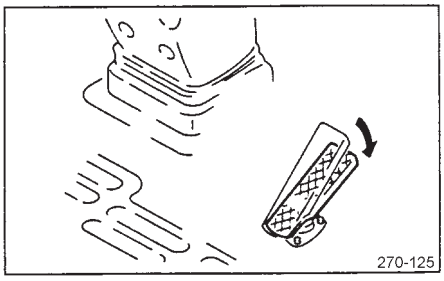
If the brake pedal is used for braking, the transmission is at the same time automatically set to its neutral position. During braking, the engine speed can be increased in order to provide full power for the work hydraulic system.
After the brake is released, the machine can be operated. Reduce the engine speed when releasing the brake to prevent excessive wear and tear of the drive components.

NOTE

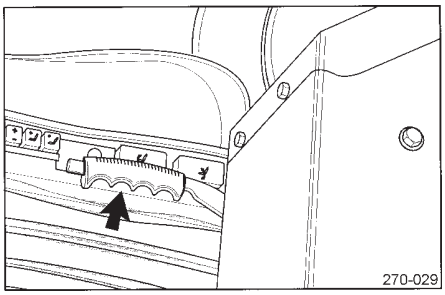
If you use the brake pedal for braking during normal operation, the transmission cut-off must be switched ON.

9. ACCELERATOR

This pedal is used for controlling speed and performance of the engine.



10. PARKING BRAKE



The parking brake is a mechanically activated drum brake at the transmission unit.
As soon as the parking brake lever is lifted from its normal position, the braking effect is exerted and the transmission is switched off automatically. The machine will drive again, if you loosen the parking brake and insert a gear.

IMPORTANT

You cannot travelling the machine, when the parking brake is pulled. Therefore, pull the parking brake before you start up the engine (in order to prevent the machine from rolling away) and loosen the parking brake immediately before you start to drive.
If the driving direction lever is set to switching position forward 'F' or reverse 'R', with the parking brake still being pulled, the warning light (CAUTION) will start to flash.

Pulling the brake

WARNING

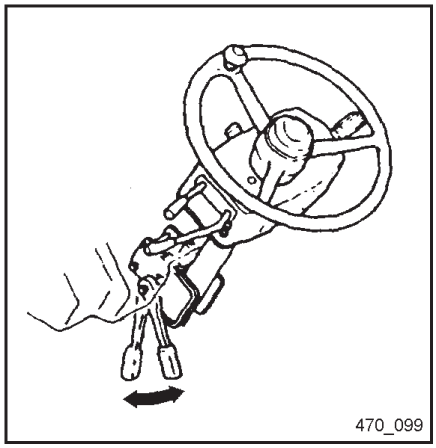
Danger of accidents! If you are pulling the parking brake during driving, the transmission is automatically set to its neutral position and the braking effect of the engine is cannot be applied!
While driving, never brake the machine with the parking brake, except for emergencies,. Pull the parking brake only after the machine has come to a standstill.

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

Releasing the brake

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

STEERING COLUMN ADJUSTMENT

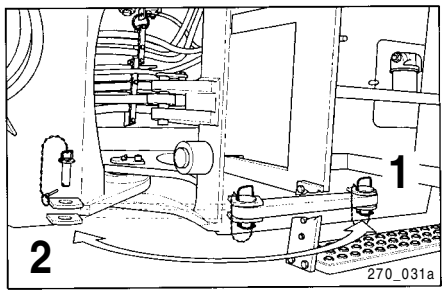


You can use this lever to adjust the steering column's angle of inclination. Proceed as described in chapter „Pre-Start Settings".

ARTICULATED STEERING CATCH

DANGER

Danger of pinching or squeezing! An unsecured articulated steering may jack-knife all of a sudden.
Always secure the articulated steering with the locking bar before you perform maintenance or repair work or if the machine is to be transported.



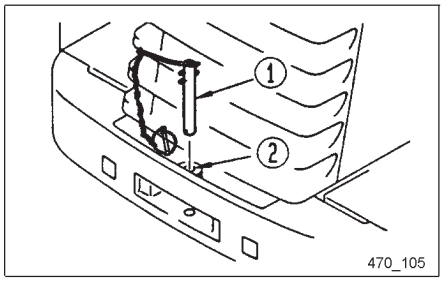
Before lifting the machine or performing maintenance operations and repairs, you must secure the articulated steering against jack-knifing.

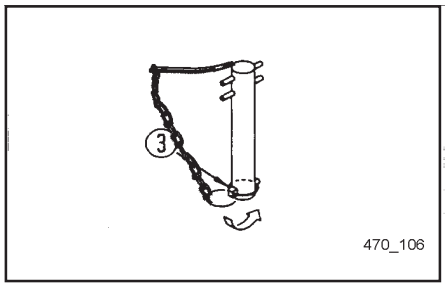
1. Position the machine for straightline driving.
2. Loosen the spring pin and remove the bolt.
3. Turn the locking bar from position '1' into position '2'.
   1 Articulated steering released
   2 Articulated steering locked
4. Re-insert the bolt (attached with chain) and secure it with the spring pin.

TRACTION DEVICE

1. Insert towing pin (1) into hole (2) in the counterweight.
2. Use linch pin (3) to fix the towing pin.

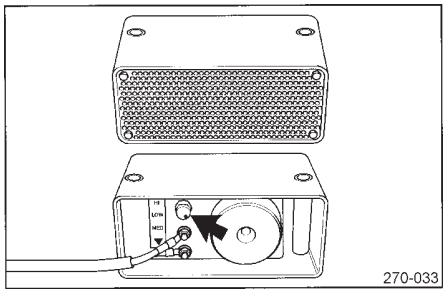
To remove the pin proceed in reverse order.





REVERSING ALARM HORN

The horn sounds when the driving direction lever has been set to the reverse driving position.



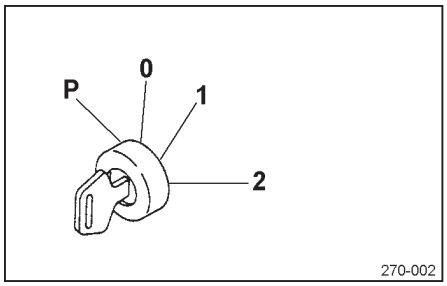
Changing the sound volume:
A switch with three possible settings is located on the rear section of the machine permitting to adjust the volume.

Switch positions:	HI	loud
	LOW	low
	MED	medium

FUSES

CAUTION

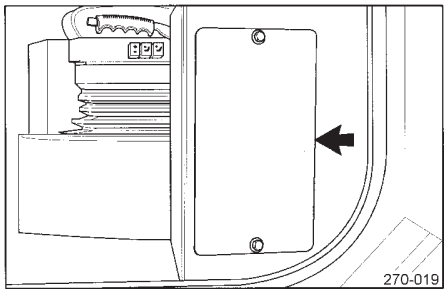
Parts of the electrical system can be damaged, if you replace fuses while the ignition is switched on.
Set the start switch to position '0' (OFF) before you replace fuses.
Fuses with the wrong amperage may cause cable burns or may blow again! Replace defective fuses always with fuses with the same amperage.

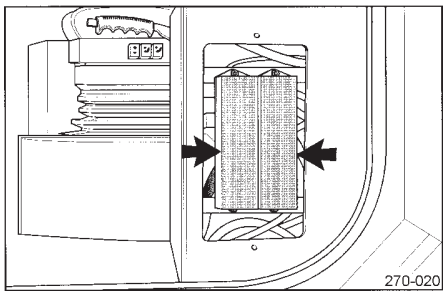


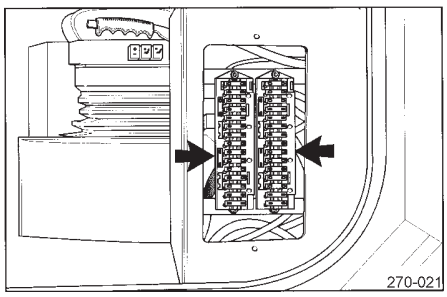
The fuses protect the electrical system. Exchange defective, corroded or loose fuses.
The fuses can be accessed, if the cover is unscrewed and the cover caps are removed from the fuse boxes.

FUSE ASSIGNMENT

1	Main fuse, main headlight, brake light	20A	Front working light	10A
2	Reverse driving light, reversing alarm	10A	Rear working light	10A
3	Direction indicator	10A	(Air-conditioning, condensator)	20A
4	Main headlight, right	10A	Fan for heating and air-conditioning	20A
5	Main headlight, left	10A	Windscreen wiper and washer, front and rear	20A
6	Parking light, right, instrument illumination	10A	Control unit, gear-shift	10A
7	Parking light, left	10A	Cigarette lighter, radio	10A
8	Parking brake	10A	(Warning beacon)	10A
9	Gear-shift, emergency drive switch	10A	Engine cut-off	10A
10	Main control panel, maintenance control panel	10A	(Central lubrication)	10A
11	Servo-control unit	10A	(Reserved 1)	10A
12	Start switch	10A	(Reserved 2)	10A
13	Hazard flasher system, interior lighting	20A	(Reserved 3)	10A
14	(Reserved 4)	10A	(ALS)	10A
15	(Central lubrication)	10A	Horn left/right	10A

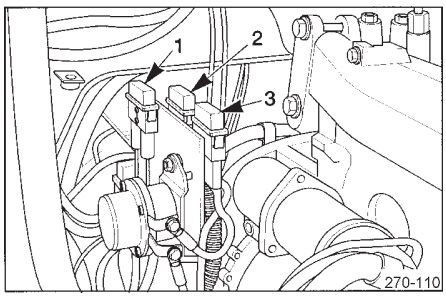






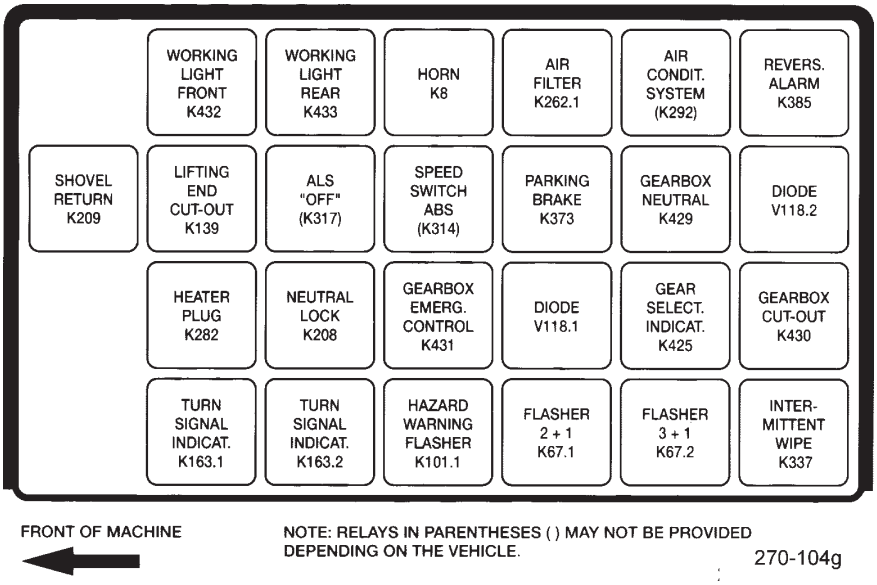
SLOW-BLOW FUSES

If the power supply breaks down, it is possible that one of the slow-blow fuses has blown. Check the electrical system and replace the fuse, if necessary.



1	30A:	Glow plug
2	30A:	Battery power supply (start switch, hazard flasher system)
3	100A:	Main power supply

RELAYS

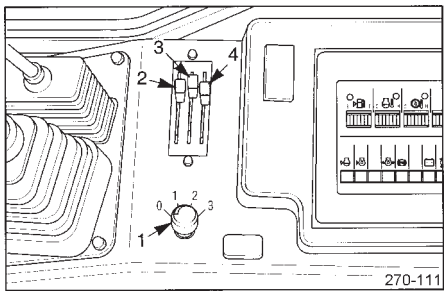


NOTE: RELAYS IN PARENTHESES ( ) MAY NOT BE PROVIDED DEPENDING ON THE VEHICLE.

270-104g

HEATING AND VENTILATION SYSTEM

Rotary switch for fan



The air flow can be set to three levels using this switch (1).

Settings:	0	Fan switched off
	1	Low air flow
	2	Medium air flow
	3	High air flow

Temperature selector lever
This control lever (2) is used for continuous temperature setting.

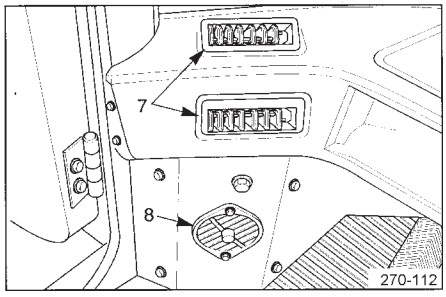
NOTE

The heating performance depends on the coolant temperature of the engine.
Full heating performance is only achieved when the engine has reached operating temperature.

Selector lever for fresh and circulating air
This lever (3) is used for selecting between fresh air, circulating air or both, fresh and circulating air. In the circulating air position, external fresh air is blocked so that only the air in the cab is circulated.

Selector lever for rear window
The air jets for the rear window can be continuously opened or closed with this lever (4).

Air jets
Air is distributed through the air jets (7 and 8); they can be individually opened or closed. The direction of the air flow can be adjusted using the vane discs.



The air jets (7) can be opened using the side levers. The air flow direction can be adjusted using the levers and the lateral knurled wheels.

The air jets (8) can be opened by turning the central knobs anti-clockwise. The flow direction can be adjusted by turning the vane discs.

NOTE

Leave the defroster jets for the windscreen always open.

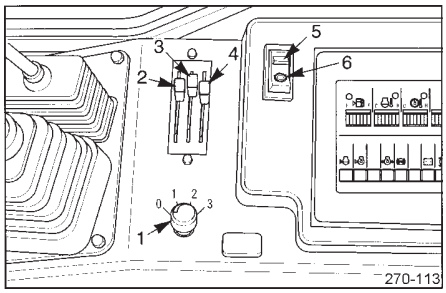
AIR-CONDITIONING

NOTE

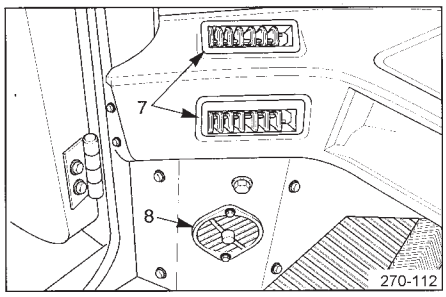
- **Only operate the air-conditioning with the engine running.**
- **Run the air-conditioning for at least 10 minutes every month irrespective of season. This prevents the compressor shaft seal from drying out.**

Cab windows, doors and ventilation openings must be closed when the air-conditioning is operated, otherwise there is an excessive influx of heat so that the cab can no longer be cooled effectively. If the machine was parked in the sun for a longer period of time, we recommend airing the cab completely when starting up the engine by switching on the air-conditioning while leaving the doors and windows open for some time. This process can be accelerated by increasing the engine speed.

Switching on the air-conditioning



1. Turn the rotary switch (1) of the fan to position '3'.
2. Set the temperature control lever (2) to 'cold'.
3. Set the selector lever (3) to position 'circulating air'.
4. Push the switch (6) lock (5) down, then hold it in place and press the switch. The air-conditioning is now switched on and the control light in the switch is lit. Maximum cooling is achieved with this setting; even more so if the engine is run at a high speed. Turn the fan down by one position as soon as the required temperature has been reached and regulate it further using the temperature control. For low cooling requirements, switch the fan to its lowest operating level.
5. The selector lever (4) is used for air distribution to the rear window via air jets (7 and 8). These air jets can be individually opened and closed. The flow direction can be adjusted by changing the position of the vane discs (see "Heating and Ventilation System").



OPERATION

RUNNING IN THE MACHINE

Before shipment, each machine was carefully checked and adjusted. A machine which is to be run in for the first time 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 valid for the running-in period, its performance may be prematurely impaired and its service life may be shortened. A new machine must be run in and serviced 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 also chapter "Maintenance“).

INSPECTIONS PRIOR TO STARTING

VISUAL INSPECTIONS (see also section "Maintenance Prior to Starting")

WARNING

Leaking oil or fuel or inflammable material which has collected on or near hot parts, such as the exhaust or turbo-charger may ignite!
Before the start, check oil and fuel lines for leaks and repair immediately any damages. Store inflammable material in a safe place.

Before starting the engine
Check the area around the engine for any loose nuts or bolts. Check for any leaking oil, fuel or coolant. Check the condition of the work unit and hydraulic system. Remove accumulated dirt and eliminate faults.

Before starting operation with the machine
Perform daily the following inspections:

1. **Work unit**
   Check work unit, cylinders, rods and hoses for ruptures, cracks, excessive wear and tear or play. Eliminate faults.

2. **Remove dirt and dust**
   Check the areas around the engine and radiator for accumulated dirt or dust. Check the battery area and the vicinity of hot parts, e.g. exhaust and turbo-charger, for accumulated inflammable material. Remove any dirt or dust.

3. **Engine and cooling system**
   Pay attention that no oil is leaking out of the engine and that there are no leaks in the fuel supply and cooling system. Repair any damages.

4. **Transmission, axles, hydraulic tank, hoses and connections**
   Check the above mentioned points for oil leaks. Eliminate faults.

5. **Brake lines**
   Check for oil leaks. Eliminate faults.

6. **Wheels**
   Check tyres for cracks, damages and wear and tear. Check the wheel rims and retaining rings for cracks and damages. Tighten loose wheel nuts. Eliminate faults. Replace any missing valve caps.

7. **Handrails**
   Check handrails for damages and whether the screws are loose. Repair any damage and retighten any loose screws.

8. **Measurement and control indicators**
   Check measurement and control indicators for faults and any loose screw connections. Replace defective parts. Remove dirt from the surfaces.

9. Air filter
Check the fixing screws. Retighten any loose screws.

10. Battery terminals
Retighten any loose battery terminals.

11. Seat belt

WARNING

Danger of injuries! Any seat belt which has been damaged or stretched as a result of an accident must be replaced.
Have the safety belt be replaced at a garage, if it is damaged or if the machine had an accident.

The belt strap must not be twisted, trapped or rub against sharp edges. The belt buckle catch must not be blocked by paper or similar as this would prevent the belt buckle from locking into place when inserted.

Keep the belt clean and check whether the belt holder is properly attached.

Replace the seat belt if either the belt or the belt holder has been damaged or deformed.

12. ROPS
Check for loose or damaged bolts. Bolts may only be retightened or replaced by a Komatsu dealer. Loose bolts must only be retightened with the correct torque. Damaged bolts may only be replaced with OEM parts.

13. Cabin windows
Clean the cabin windows before starting work.

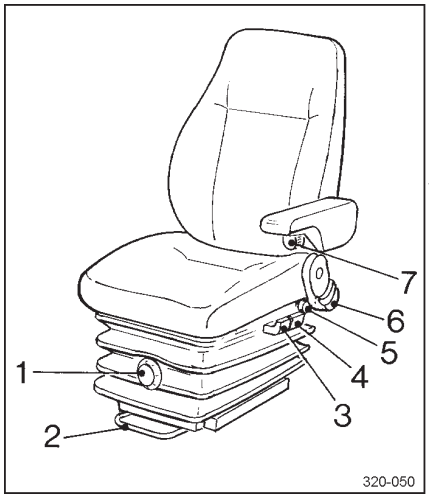
Perform the steps described in **"MAINTENANCE PRIOR TO STARTING"**.
(See maintenance plan in section 3)

ADJUSTMENTS PRIOR TO START-UP

ADJUSTING THE DRIVER'S SEAT (without pneumatic suspension)

Each time, a new driver wants to operate the machine, it is necessary to re-adjust the driver's seat. Before starting operation, you must check whether the seat is adjusted in such a way that the braking pedal can be completely pushed down, with your back touching the seat backrest. Proceed as follows to appropriately adjust the seat:

NOTE
Adjust the seat and backrest so that the backrest does not knock against the rear window or the wiper motor when swinging the seat into position.



1. Weight adjustment
The suspension system can be adjusted to suit the driver's individual weight by turning the handwheel (1).

2. Adjusting the horizontal position
The horizontal seat position can be adjusted by raising the lever (2) and pushing the seat forward or backwards. The seat locks into place when the lever is released.

3/4. Adjusting the height and angle of inclination
The height and the angle of inclination of the seat can be adjusted using levers (3) and (4).

The position of the seat front section can be adjusted up or down by raising lever (3) and applying or removing pressure to the front section of the seat cushion. The selected seat height/angle locks into position when the lever (3) is released.

The position of the seat rear section can be adjusted up or down by raising lever (4) and applying or removing pressure to the rear section of the seat cushion. The set seat height/angle locks into position when the lever (4) is released.

5. Seat belt attachment

6. Adjusting the backrest
The position of the backrest can be adjusted by raising lever (6) with light pressure applied to backrest. Then, move the backrest to the required position by increasing or decreasing pressure. The backrest automatically locks into position when the lever (6) is released.

NOTE
Lower seat carefully and check that the backrest does not knock against the rear window or the wiper motor when swinging the seat into position.

7. Armrest
The angle of inclination of the armrest can be continuously adjusted using the knurled knobs (7). Lift the relevant armrest when sitting down or leaving the driver's seat.

ADJUSTING THE DRIVER'S SEAT (with pneumatic suspension)

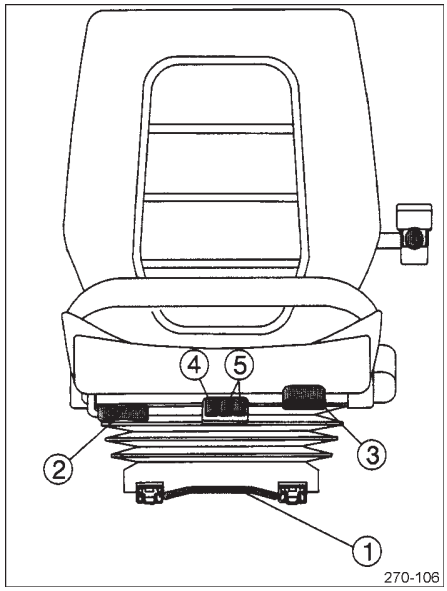
Each time, a new driver wants to operate the machine, it is necessary to re-adjust the driver's seat. Before starting operation, you must check whether the seat is adjusted in such a way that the braking pedal can be completely pushed down, with your back touching the seat backrest. Proceed as follows to appropriately adjust the seat:

NOTE

Adjust the seat and backrest so that the backrest does not knock against the rear window or the wiper motor when swinging the seat into position.

1. Adjusting the horizontal position

Raise the adjustment lever 1 and position seat as required. Release the lever to lock the seat in the desired position.



2. Adjusting the height and angle of inclination

Raise the lever (2) and apply or remove pressure to the front section of the seat cushion.
Push the lever (2) down and apply or remove pressure to the rear section of the seat cushion.

3. Adjusting the backrest

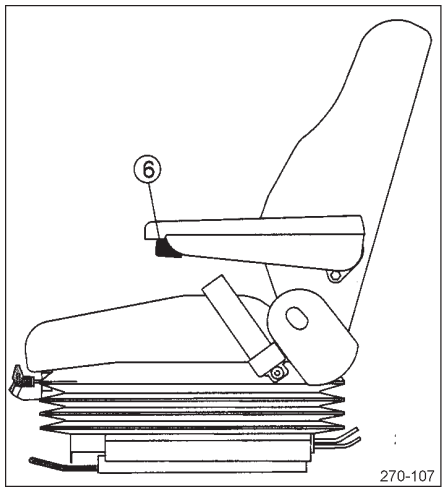
Raise the lever (3) and move the backrest to the required position by moving your body weight. Release the lever to lock the backrest in the desired position.

4. Weight adjustment

The suspension system is adjusted to the driver's weight by pushing button (4).

Heavier: Push button (4) up (+).
Lighter: Push button (4) down (-).

Ideal setting: central position of lift +/- 50 mm.



5. Adjusting the lumbar vertebra support

There is an upper and a lower air chamber in the backrest.

Button (5) left: air supply for lower chamber.
Button (5) right: air supply for upper chamber.

Button (5) up (+): air supply is increased.
Button (5) down (-): air supply is reduced.

NOTE

Lower seat carefully and check that the backrest does not knock against the rear window or the wiper motor when swinging the seat into position.

6. Armrest

The angle of the armrest can be continuously adjusted using the knurled knobs (6). Lift the relevant armrest when sitting down or leaving the driver's seat.

FASTENING THE SEAT BELT

WARNING

- **Danger of injuries! A damaged seat belt or which was overstretched in an accident or whose belt holder or attachment screws are improperly mounted, does no longer protect you when an accident occurs. Replace the seat belt if it is damaged or if the machine had an accident. Make sure that the belt holder and fastening screws are in perfect condition.**
- **If you have not fastened your seat belt, you may be severely injured when you have an accident!**
  Always fasten the seat belt before you start working and keep it fastened when operating the machine. Make sure when you fasten it that the belt is not twisted and that it is in contact with your lap.

Fastening and removing the seat belt
(Automatically rewinding lap belt)
Automatic belts permit full freedom of movement when they are pulled out slowly, but lock immediately in the event of sudden braking or acceleration and while driving on hills or in curves.

1. Sit down on the driver's seat and pull out the belt slowly. Then, push the buckle - without interruption - into the catch until it locks into place. Pull the belt to make sure that the buckle really has locked into place.
2. To release the belt, press the orange button. The belt rewinds automatically.

IMPORTANT
The belt can only be pulled out after it has completely rewound.

ADJUSTING THE REAR-VIEW MIRROR

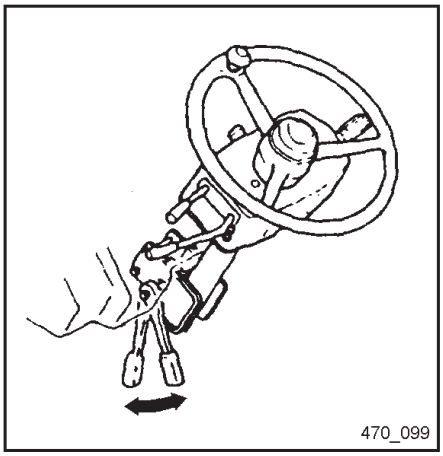
Sit down on the driver's seat and adjust the rear-view mirror to the required position.

ADJUSTING THE STEERING COLUMN

WARNING

If you adjust the steering column's angle of inclination while the machine is stil driving, you may cause severe accidents! Always stop the machine, before you change the steering column's angle of inclination.

The angle of inclination of the steering column can be adjusted using this lever. Pull the lever up and move the steering wheel to the required position. Then, press the lever down to lock the steering column in position.

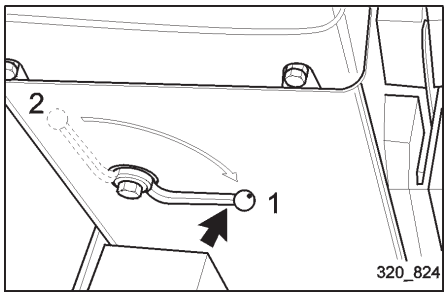


SWITCHING THE ENGINE ON AND OFF

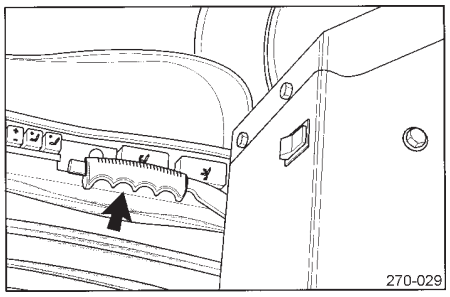
BEFORE STARTING THE ENGINE

WARNING

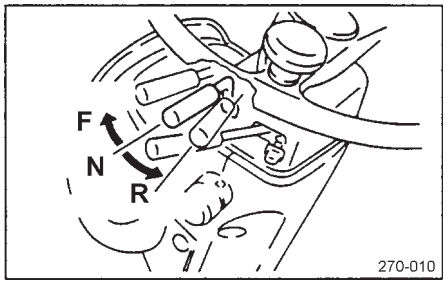
Unintentional lowering of the bucket can cause severe accidents!
For this reason, turn the locking lever for the work hydraulic system to position '1', before you start up the engine.

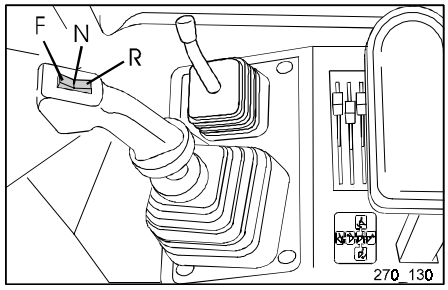


1. Check that parking brake lever is pulled. The pilot lamp for the parking brake is on.

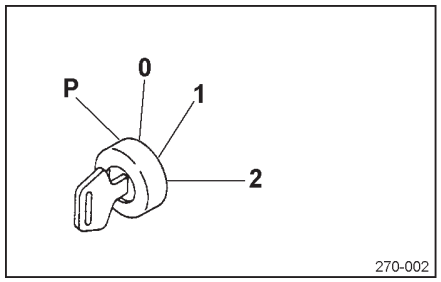


2. Check that either the directional lever or the directional switch is set to the 'N' position.
   If directional lever or the directional switch is not set to 'N' the engine will not start.





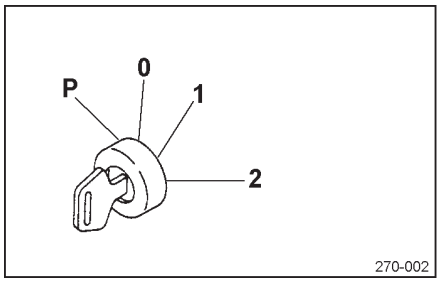
3. Insert the key in starter switch (5), turn the key to the ON position, and make sure that the pilot lamp lights up.



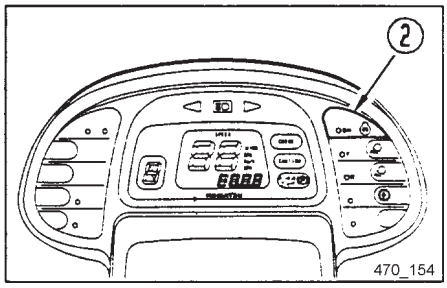
STARTING THE ENGINE

CAUTION

Unintentional starting up of the machine can cause severe accidents!
Make sure that there are no people or obstructions in the vicinity of the machine, before you start up the engine. In addition, sound horn immediately before you start up the engine.



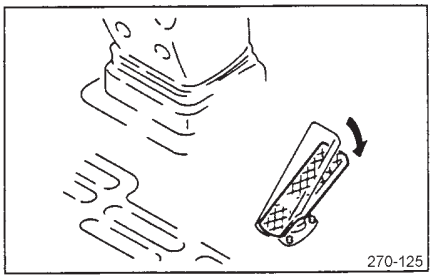
1. Turn ignition key to position '1'. The preheating process is automatically started and the preheating control light (2) lights up.



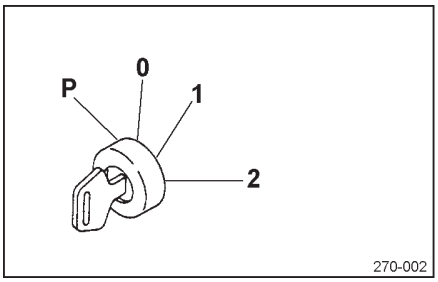
IMPORTANT

The switch-on time for the preheating system depends on the ambient temperature.

2. Press down lightly the accelerator pedal.



3. When the preheating control light goes out, turn the ignition key to starting position '2' to start up the engine.



NOTE

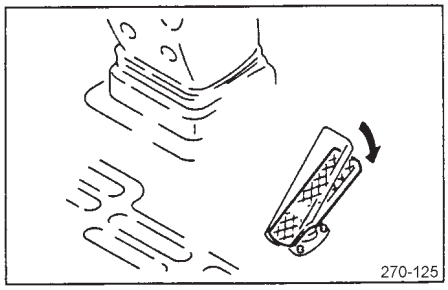
Do not apply the starter for longer than 20 seconds. If the engine does not start up within this period, you must wait for at least 2 minutes, before retrying to start up the engine.

4. Release the key as soon as the engine has started; the key automatically returns to position '1' .

See section **"WINTER OPERATION"** when starting in cold weather.

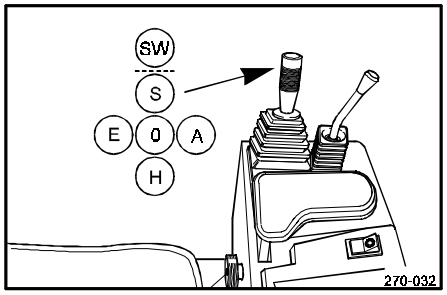
AFTER STARTING THE ENGINE

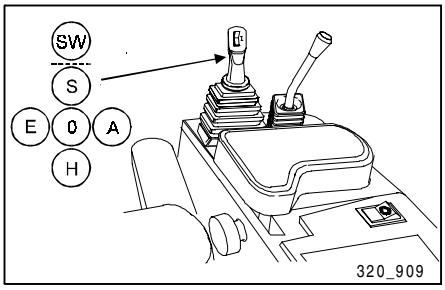
The engine must not be abruptly accelerated before the warm-up phase has been completed.
Do not run the engine for longer than 20 minutes at lowest or highest idling engine speed. If the engine has to run idle for a longer period of time, rev it up from time to time or let it run at medium speed.



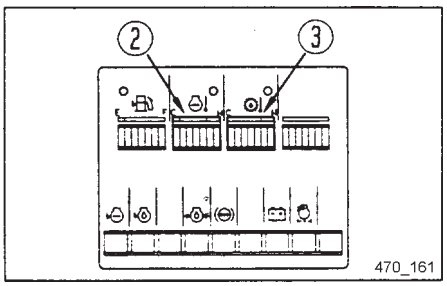
Do not start to work immediately after starting up the engine. First of all, perform the following preparations and checks.

1. Press the accelerator pedal lightly and run the engine without load for approx. 5 minutes at medium speed.
2. Proceed as follows to warm up the hydraulic oil at low temperatures: The engine must "smoothly" after the warm-up phase. Push either the control lever for the work hydraulic system or the multifunctional lever to position 'E' (tip-in position) and then back again at short intervals to warm up the hydraulic oil. This procedure helps to warm up hydraulic oil faster.
   The control lever or the multifunctional lever must not be held in the 'E' (tip-in) position for longer than 10 seconds.





3. Observe all measuring instruments and warning lights during the warm-up phase. Eliminate any faults immediately. Keep the engine running at light load until the indicators for the engine coolant temperature (2) and the converter oil (3) have entered the green range.
4. Pay attention that the exhaust gas colour is normal and that the exhaust does not produce any unusual noise or vibrations. Eliminate any faults.



SWITCHING OFF THE ENGINE

NOTE

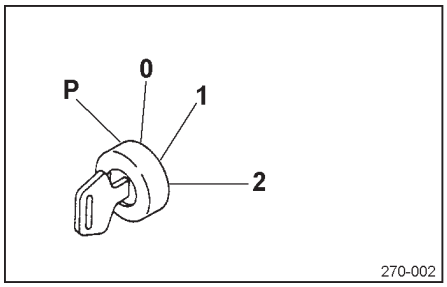
Switching the engine off abruptly after heavy loads without allowing it to cool down can severely affect the service life of the engine. For this reason, the engine should only be abruptly switched off in an emergency situation.

1. Check the engine and torque converter temperatures and engine oil pressure with the help of the measuring instruments and control lights.

2. If the engine is overheated, let it run at medium speed for 5 minutes before switching it off. This permits the engine and torque converter to cool down sufficiently.

3. Lower the work unit onto the ground. Then, turn the start switch to position '0' to switch off the engine.

4. Remove the key from the start switch.



AFTER MACHINE OPERATION

1. Walk around the machine and inspect visually the work unit, bodywork and chassis. Check for leaking oil or water. Eliminate any faults.

2. Fill up the fuel tank.

3. Remove any inflammable material from engine compartment, since it represents a fire hazard.

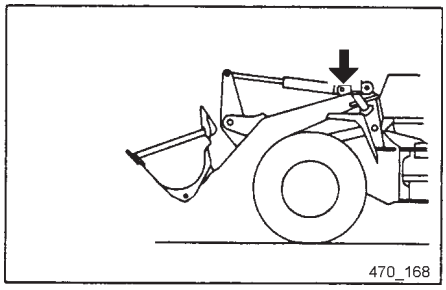
4. Remove dirt from the chassis.

DRIVING

START-UP

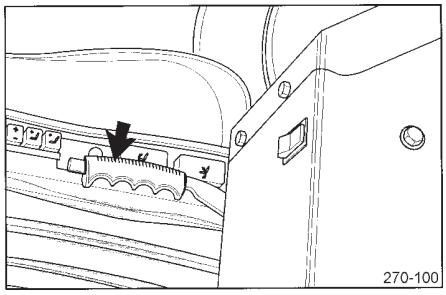
CAUTION

Careless starting up may lead to accidents!
Before starting to drive, make sure that there are no people in the vicinity of the machine. Sound horn immediately before you start to drive.
The doors are to be kept closed during a journey.



1. Start the engine.

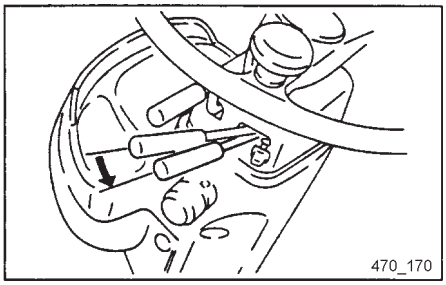
2. Unlock either the control lever for the work hydraulic system or the multifunctional lever and move the work unit into the drive position, as indicated in the illustration on the right-hand side. Observe the markings for the transport position (arrow).



3. Press down the brake pedal and keep it in that position.

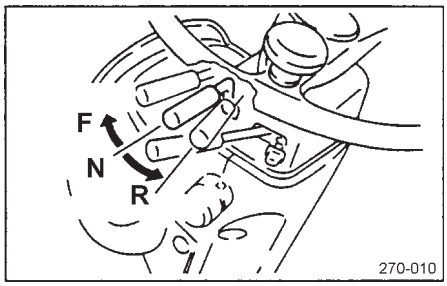
4. Push down the parking brake lever to release the parking brake.

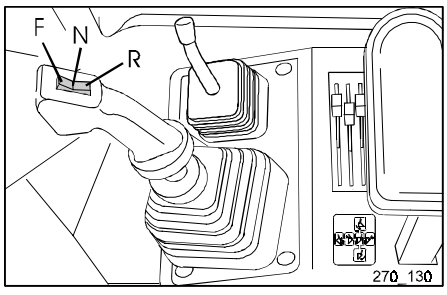
5. Select the desired gear using the gear-shift lever.



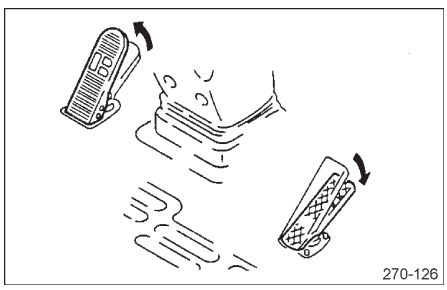
6. Select the required direction using either the directional lever or the directional switch.

   F Forward
   N Neutral
   R Reverse





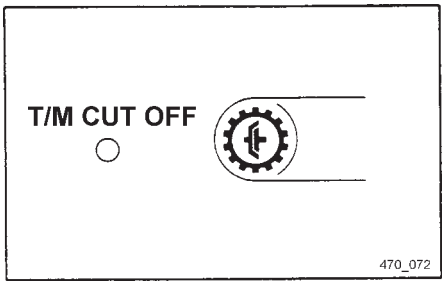
7. Release the brake pedal, while pressing down the accelerator pedal at the same time, to set the machine in motion.



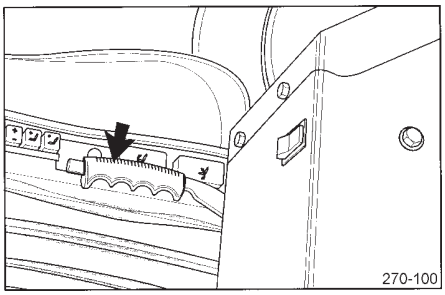
STARTING UP ON HILLS AND SLOPES

CAUTION

Careless starting up may lead to accidents!
Before starting to drive, make sure that there are no people in the vicinity of the machine. Sound horn immediately before you start to drive.
The doors are to be kept closed during a journey.



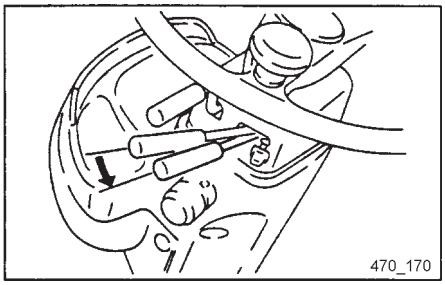
1. Switch off the transmission cut-off when starting on a slope. The control light goes out.



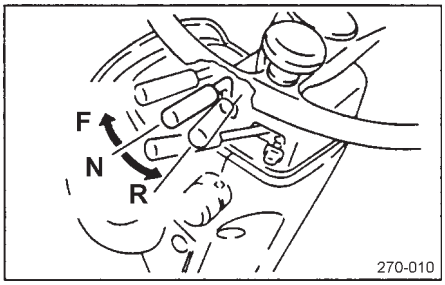
2. Start the engine.

3. Press down the brake pedal and keep it in that position.

4. Push down the parking brake lever to release the parking brake.

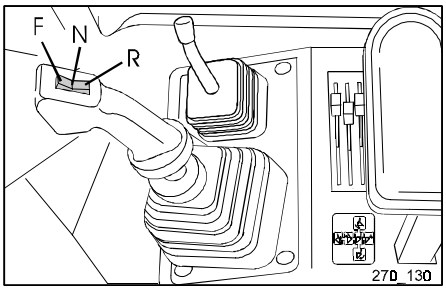


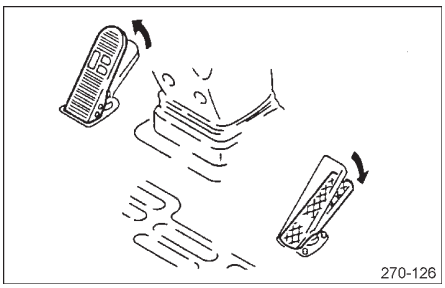
5. Select the desired gear using the gear-shift lever.



6. Select the desired direction using either the directional lever or the directional switch.

   F Forward
   N Neutral
   R Reverse





7. Press down the accelerator pedal, while releasing slowly the brake pedal at the same time.

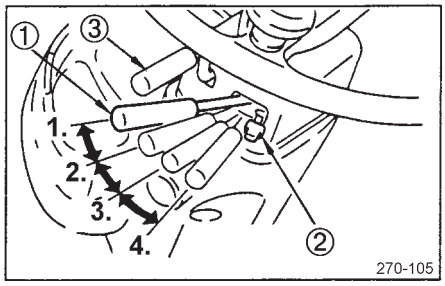
GEAR SHIFTING

CAUTION

Never select abruptly a lower gear when driving with high speed, since this may damage the engine and gear mechanism! Always reduce speed first, using the service brake, before you select a lower gear.

GEAR SELECTION

Select the required or appropriate gear using the gear lever (1). Dozing and loading operations are only to be performed in the 1st or 2nd gear. Activate the gear lever limit-stop (2) when you carry out these operations, since it will block the 3rd and 4th gear.



AUTOMATIC GEAR-SHIFT

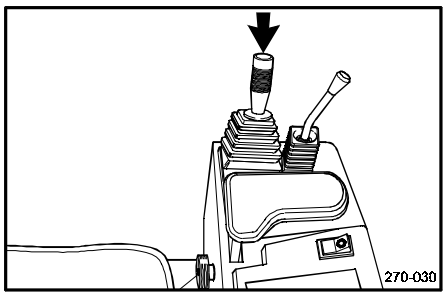
This machine has an automatic gear-shift for the 2nd, 3rd and 4th gear. This mechanism is only active if the 4th gear is selected with the gearshift lever (1). The 1st gear cannot be automatically activated.

Position of gear-shift lever (1)	Gear shifting in the gearbox
1st gear	1st gear locked
2nd gear	2nd gear locked
3rd gear	3rd gear locked
4th gear (automatic)	2nd ↔ 3rd ↔ 4th gear (forward) 2nd ↔ 3rd gear (reverse)

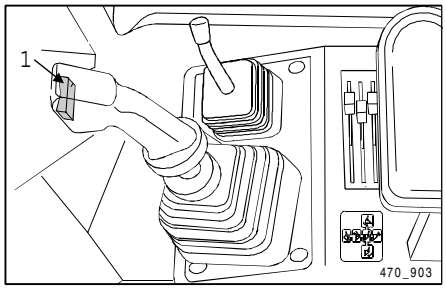
KICK-DOWN FUNCTION

The kick-down function is recommended for driving in the 2nd gear to perform dozing or loading operations.

The 1st gear can be selected at any time using the kick-down switch (arrow), which is integrated into the work hydraulic control lever, by pressing it briefly when the 2nd gear has been selected with the gear lever (1).

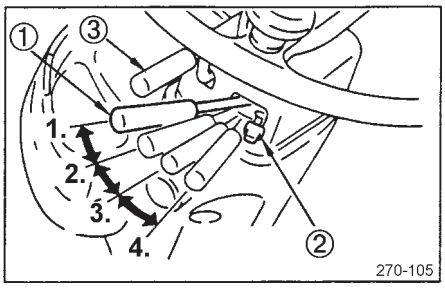


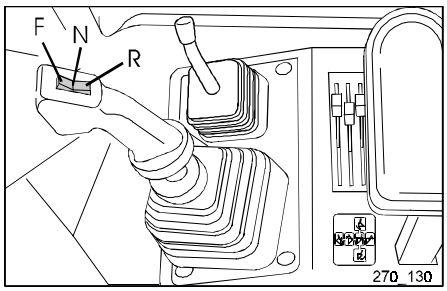
If your machine is fitted with a multifunctional lever, you can activate the kickdown function by pressing the toggle switch at the front of the multi-function lever to position '1'.



Switching off the kick-down function:

1. First, switch the driving direction switch (1) or driving direction switch to the neutral position.
2. Then, set the driving direction switch (1) or driving direction switch to the desired driving direction.
3. Use the gear-shift lever (2) to set the required gear.





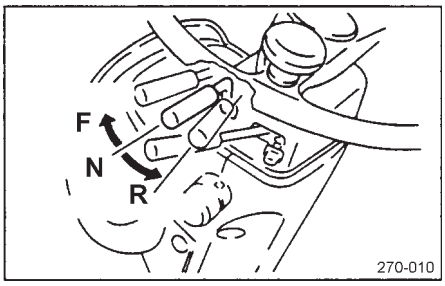
CHANGING THE DRIVING DIRECTION

WARNING

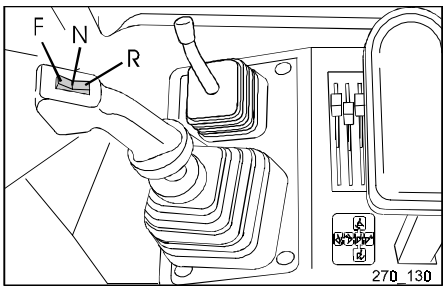
Careless changing of the driving direction may lead to severe accidents!
If you are changing the driving direction from forward to reverse driving or vice versa, make sure that there is nobody or no obstacle in your way.

CAUTION

Drive unit components can be damaged, if you are driving with high speed and change abruptly the driving direction from forward to reverse driving or vice versa!
Slow down the machine, using the brake, before you change the driving direction (max. permitted speed: 12 kph).



Either the driving direction lever (3) or the driving direction switch is used for changing the driving direction. The machine does not have to be brought to a standstill to do so.



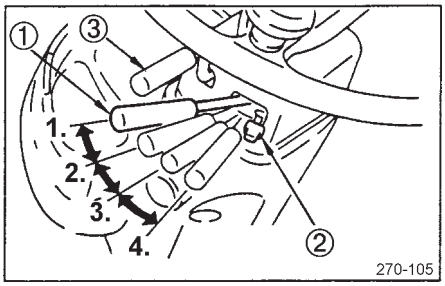
Gearchange positions:

	F	Forward
	N	Neutral
	R	Reverse

The driving direction can be directly changed in the 1st and 2nd gear.

1st gear forward ↔ 1st gear reverse.

2nd gear forward ↔ 2nd gear reverse.



If the machine is being driven at a speed exceeding the maximum speed of the 2nd gear (gear lever [1] position in 4th gear) when changing the driving direction, the transmission automatically shifts to the 2nd gear first. After a brief delay, the driving direction is changed, first in the 2nd gear and then to the preselected gear, e.g.:

4th gear forward → 3rd gear forward → 2nd gear forward →

short delay →

2nd gear reverse → 3rd gear reverse.

NOTE

Only change the driving direction in the 3rd gear after the speed of the machine has dropped below the maximum speed of the 2nd gear. Apply the machine brakes first, if required.

STEERING AND TURNING

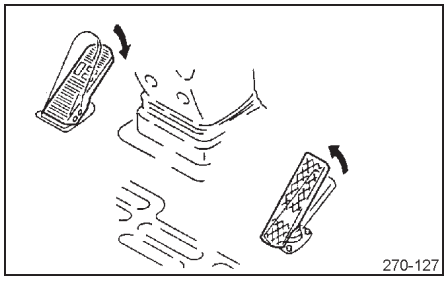
NOTE

- **The machine may fall over, if it is abruptly turned at high speeds.**
- **If the machine comes to a halt during driving, it can no longer be steered. The emergency steering system does only work, if the machine is towed away (see section "Emergency Steering").**

STOPPING

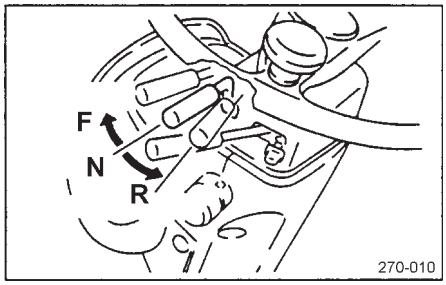
WARNING

Danger of accidents! If you pull the parking brake while driving, the transmission is automatically set to its neutral position and the braking effect of the engine can no longer be used!
During driving, never brake the machine using the parking brake, except for emergencies. Pull the parking brake only after the machine has come to a standstill.

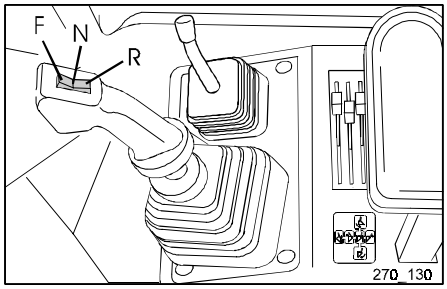


Avoid any abrupt stopping. Proceed as follows to stop the machine:

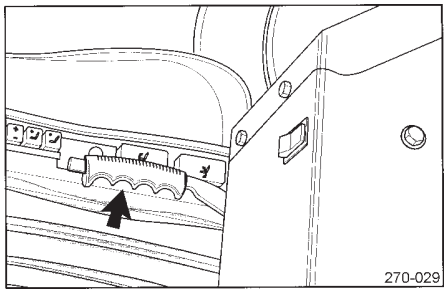
1. To stop the machine: take the foot from the accelerator pedal and press the brake pedal.



2. Set either the driving direction lever or the driving direction switch to the neutral position (N).



3. Pull the parking brake lever up to apply the parking brake.
4. Lower the bucket to ground level.

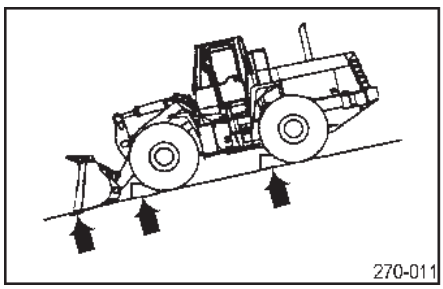


WARNING

Unintentional moving of the bucket may cause accidents! Turn the locking lever for the work hydraulic system to position '2', before quitting the driver's cab. The control level for the work hydraulic system will then be blocked.

5. Secure the work hydraulic system against unintentional operation.

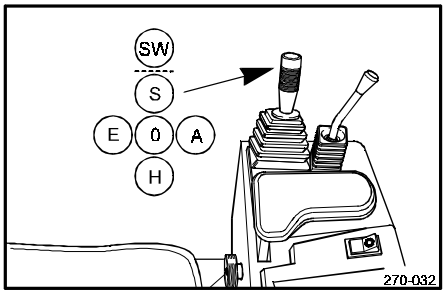
Parking the Machine On Slopes
If possible, park the machine on level ground. If it has to be parked on a slope, position it in such a way that the front section (bucket) is pointing downhill. Lower the bucket onto the ground and place wheel chocks in front of the wheels.



CONTROL LEVERS FOR THE WORK HYDRAULIC SYSTEM

Control lever for the work unit

Control lever positions:



SW Swimming position  The lever is locked in this position. The switch position 'SW' is for dozing (removing subsoil). The work unit lowers to this operating position through own weight and is moved freely by external force.

S Lowering 

0 Stopping  Boom is held in position.

H Raising  If the control lever is pulled further in raising direction 'H', the lever is locked in this position until the boom has reached the pre-set position of the lift limit switch. The control lever is then returned automatically to the stop position '0'.

E Tipping in  If the control lever is pulled further in the tip-in direction 'E', the lever is locked in this position until the bucket has reached the pre-set automatic digging angle. The control lever is then returned automatically to the stop position '0'.

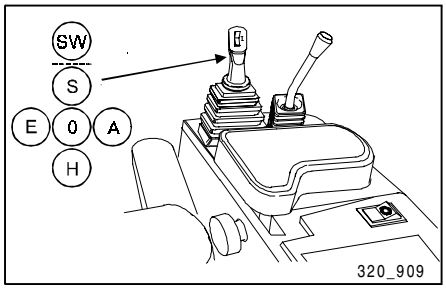
A Dumping 

NOTE

Never lift heavy loads with the work unit with the balance being only on one side!

MULTIFUNCTIONAL LEVER FOR THE WORK HYDRAULIC SYSTEM

Positions of the multifunctional lever:



SW Swimming position 

The multifunctional lever is locked in this position. The switch position 'SW' is for dozing (removing subsoil). The work unit lowers to this operating position through own weight and is moved freely by external force.

S Lowering 

0 Stopping 

Boom is held in position.

H Raising 

If the multifunctional lever is pulled further in raise direction 'H', the lever is locked in this position until the boom has reached the pre-set position of the lift limit switch. The multi-functional control lever is then returned automatically to the stop position '0'.

E Tipping in 

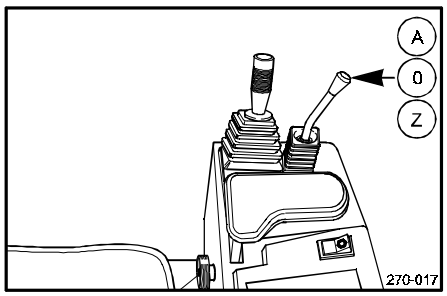
If the multifunctional lever is pulled further in the tip-in direction 'E', the lever is locked in this position until the bucket has reached the pre-set automatic digging angle. The multifunctional lever is then returned automatically to the stop position '0'.

A Dumping 

NOTE

Never lift heavy loads with the work unit with the balance being only on one side!

Control Lever for Special Equipment

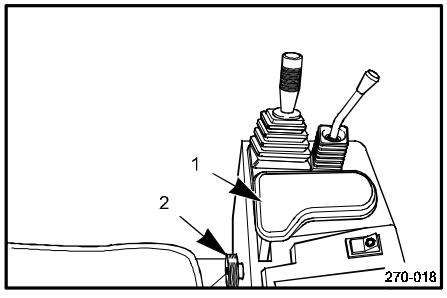


Control lever positions:

A Open *
0 Neutral
Z Closed *

*) The designations "A" and "Z" or "Open" and "Closed" are not binding and depend on the type of unit and its connection.

The control lever must not be placed in either "A" or "Z" position if no special equipment is connected. Otherwise, the work hydraulic system would work against overpressure and heat up the oil unnecessarily.



Adjusting the Armrest

The height of the armrest (1) can be adjusted. To adjust the armrest, loosen the screw (2), raise or lower it to the desired position and retighten it.

WORKING WITH THE MACHINE

Other operation possibilities, in addition to the operations described below, can be performed using other special equipment.

EXCAVATING

CAUTION

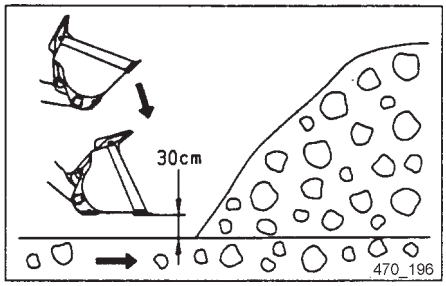
If you want to perform excavation operations with the machine being in bent position, you may damage the articulated steering and the cardan shaft!
Always drive into the material which you want to remove in straight direction.

Removing piled up soil
Removing heaps of loose soil or debris of exploded rock 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.
- If you are working on heaps, drive the machine in the 1st or 2nd gear; if you are loading debris of exploded rock, drive the machine in the 1st gear.

Proceed as follows, if you are removing loose soil or performing dozing operations:

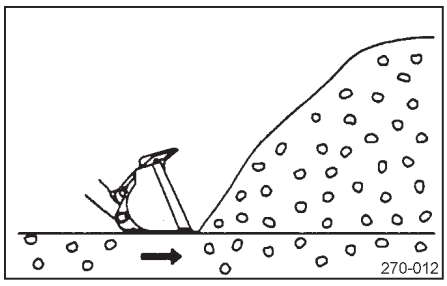
1. While driving forward, lower the bucket until it reaches a height of approx. 30 cm above the ground. Then, lower it slowly.



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.

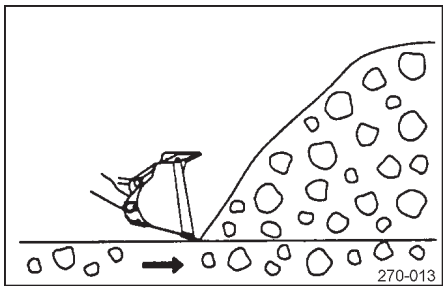
2. Shift to a lower gear immediately in front of the material to be removed. Press down the accelerator pedal and drive the bucket into the material.



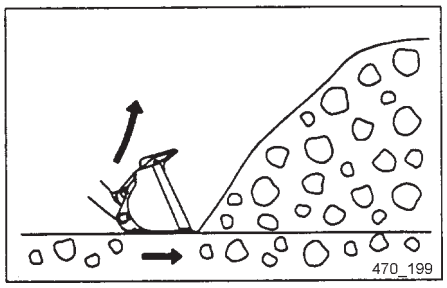
3. If the material to be removed is lying on a heap, it is required that you align horizontally the cutting edge of the bucket while driving into the material. When you are loading rock debris, it is necessary to dump the bucket slightly down.

- 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 balance of the machine will be impaired.



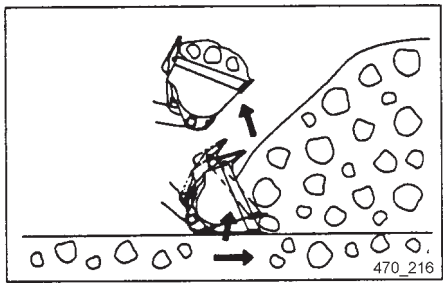
4. To prevent the bucket from digging in too deep into the material to be removed, you must lift the boom while driving into the material. Lifting the boom ensures a sufficient thrust force.



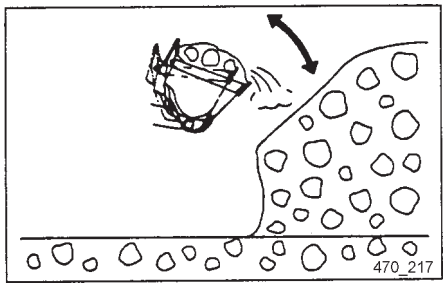
5. Tip the bucket in.

NOTE

If the edge of the bucket is moved up and down during driving/ digging into the material to be removed, it can result in the front wheels being lifted from the ground, thus causing the wheels to skid.



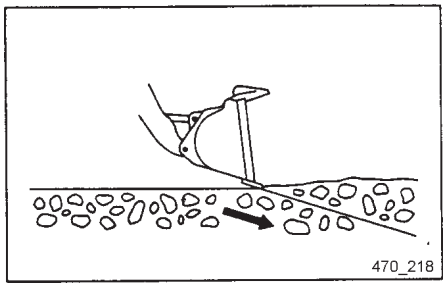
6. If there is too much material inside the bucket, you must briefly tip it in, dump it and lower it in order to reduce the load and to prevent that you lose the load during the transport.



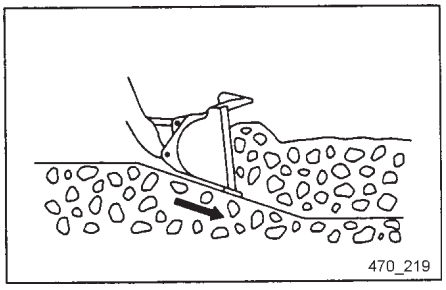
Excavating on Level Ground

When excavating and loading on level ground, make sure that the bucket is not overloaded on one side, since the balance of the machine may be impaired.
Perform this type of operation in the 1st gear.

1. Bend the bucket edge slightly down.

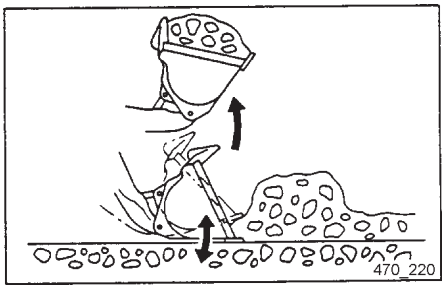


2. While driving forward, move slightly the control lever of the boom in order to remove only a thin layer of the surface of the soil to be removed.



3. Move the control lever of the boom slightly up and down to reduce the resistance during driving forward.

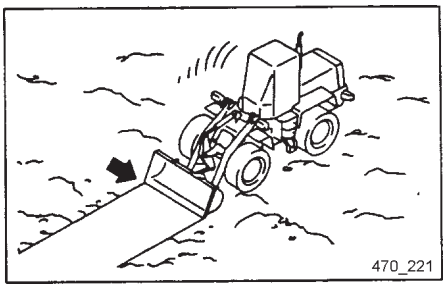
   While excavating, ensure that the digging force is not applied only on one side of the bucket.



LEVELLING

NOTE

Drive the machine in reverse for normal levelling operations. Do not tip the bucket by more than 20° if levelling work has to be performed during driving in forward direction.



1. Fill the bucket with soil. Drive the machine in reverse and distribute the soil gradually from the bucket.

2. Drive backwards over the distributed soil, using the bucket teeth to level the ground.

3. Fill a little more soil into the bucket, set the boom to its swimming position and level the ground in reverse drive. Make sure that nobody is in your way while driving backwards.

DOZING

CAUTION

The bucket teeth and the bucket will be damaged, if you are digging with the bucket being in the dumping position.
If you are performing digging operations, adjust the bucket in such a way that its bottom side is in parallel to the ground.

Perform dozing operations in the 1st or 2nd gear.

LOADING AND TRANSPORTING

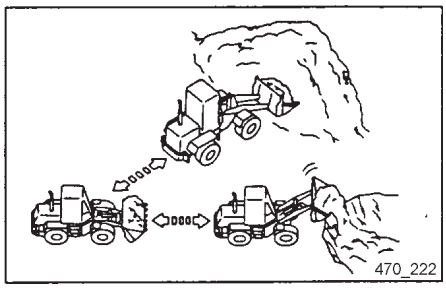
CAUTION

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 and transport procedure for wheel loaders is based on the following work cycle:

Dozing → Transporting → Unloading.

Always keep the travel route in perfect condition.



LOADING
Always select the type of operation 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.

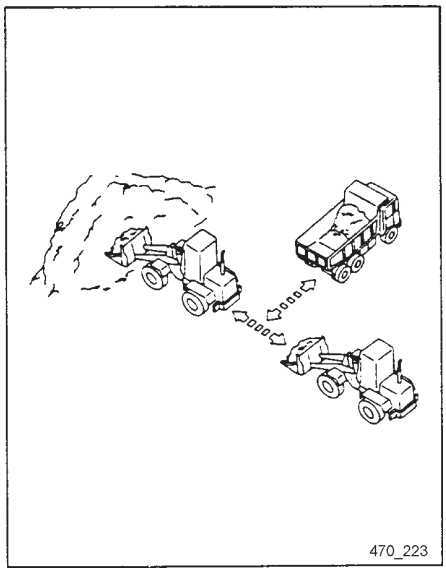
Removing heaps of loose soil or debris of exploded rock may cause premature wear and tear of the tyres due to cracks and small fissures. As a result, the service life of the tyres is reduced. Proceed as follows to avoid unnecessary wear and tear of the tyres:

- Try to work on level ground and remove any rocks and large stones which are sticking out.
- If you are working on heaps, drive the machine in the 1st or 2nd gear. If you are loading rock debris, drive the machine in the first gear.

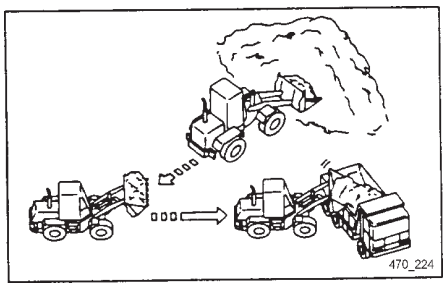
NOTE

Avoid excessive shaking of the bucket

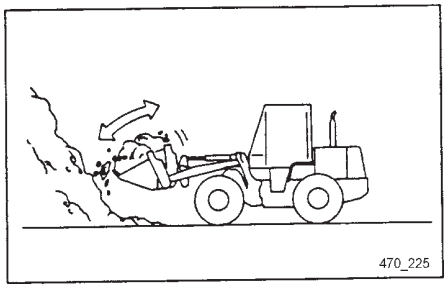
LOADING IN DIAGONAL DIRECTION
Align the machine in rectangular position to the heap. Drive the machine backwards in straight line after you have filled the bucket. Then, let the dump truck drive between heap and machine. Drive up to the dump truck and unload the material.
This operation requires not 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.
Shake the bucket after the filling and before raising it to maximum height in order to stabilise the load and to prevent parts of the load falling out to rear.

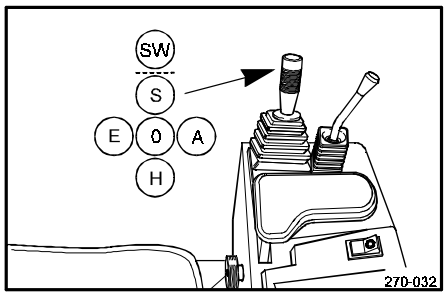


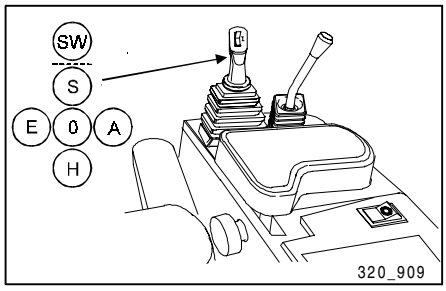
Safety measures when piling up material
Do not position the bucket in its maximum tip-in or dumping position while piling up material. Instead, use the required mining angle. The rear counterweight must not touch the ground.



ADJUSTING THE WORK UNIT

LIFT LIMIT SWITCH





The lift limit switch provides the possibility of an automatic setting of the required lifting height of the boom.

1. Stop the machine on level ground.
2. Raise the boom to the required lifting height, set either the control lever for work hydraulic system or the multifunctional lever to stop position '0'.

WARNING

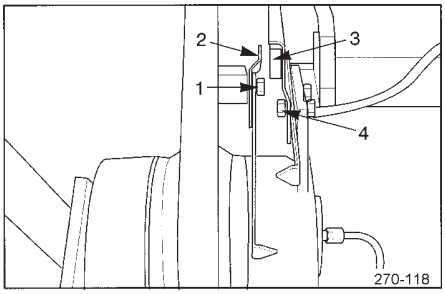
Unintentional lowering of the bucket may lead to severe accidents!
Turn the locking lever for the work hydraulic system to position '2', before leaving the driver's cab. The control lever for the work hydraulic system will then be locked.

3. Secure the work hydraulic system against unintentional activation.
4. Switch off the engine and pull the parking brake.

WARNING

If the pressure inside the work hydraulic system suddenly drops, the bucket may be abruptly lowered, leading to severe accidents!
Never go below the raised bucket, if it is not supported.

5. Place wheel chocks in front and behind the wheels.
6. Lock the articulated steering with the articulated steering catch.
7. Loosen both screws (1).
8. Adjust the indicator (2) in such a way, that the rear edge is in the centre of the contact area of the switch (3).
9. Retighten both screws.
10. Loosen both screws (4), permitting to set a gap of 3 to 5 mm between the indicator (2) and the contact area of the switch (3).
11. Retighten the screws (4).
12. After the adjustment is finished, the engine can be started.

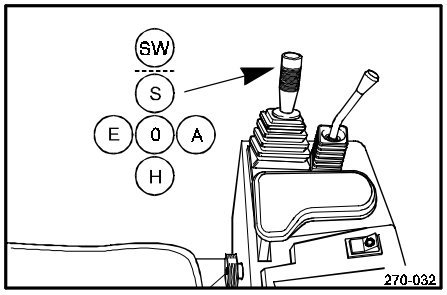


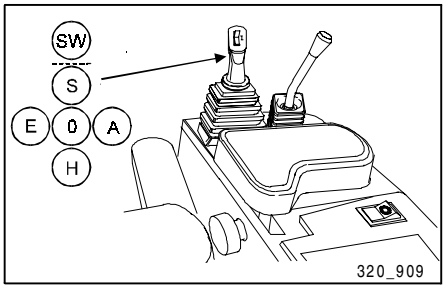
WARNING

Unintentional lowering of the bucket may lead to severe accidents! Make sure that there is nobody standing below the bucket, before lowering the bucket and sound the horn immediately before you start to lower the bucket.

13. Lower the boom.
14. Set either the control lever for the work hydraulic system or the multifunctional lever to raising position 'H', lock it in place, then release it. Check whether either the control lever or the multi-functional lever returns automatically to the stop position '0' when the boom has reached the required height. Correct adjustments, if necessary.

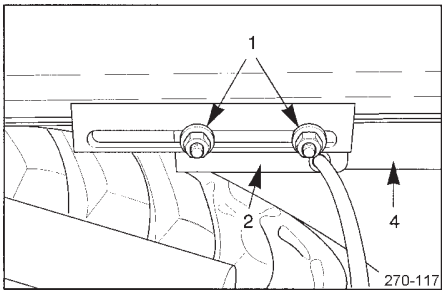
BUCKET RETURN MECHANISM





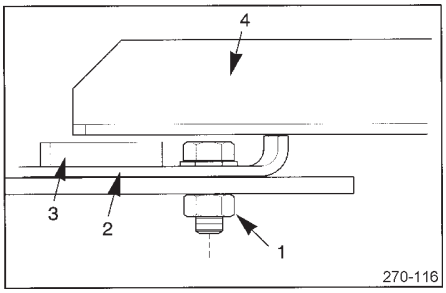
The bucket return mechanism permits to set automatically the required digging angle of the bucket.

1. Stop the machine on level ground.
2. Lower the bucket to the ground.
3. Position at required digging angle.
4. Push either the control lever for work hydraulic system or the multi-functional lever to stop position '0'.
5. Switch off the engine pull the parking brake.
6. Place wheel chocks in front and behind the wheels.
7. Secure the articulated steering with the articulated steering catch.
8. Loosen both nuts (1) and adjust the holder (2) of the switch (3) in such a way, that the rear tip of the bracket is in the centre of the contact area of the switch (3).
9. Retighten both nuts.
10. The gap between the contact area of the switch (3) and the bracket (4) must be 3 to 5 mm.
11. After the adjustment is finished, the engine can be restarted.



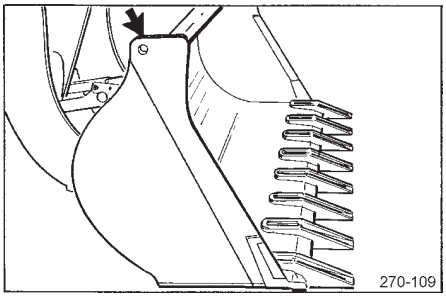
WARNING

Unintentional moving and opening of the bucket may lead to severe accidents!
Make sure that there is nobody standing next to the bucket, before lifting and opening the bucket. Sound the horn immediately before you start to lift the bucket.



12. Raise the boom.
13. Open the bucket.
14. Set either the control lever for the work hydraulic system or the multifunctional lever to tip-in position 'E', lock it in place, then release it. Check whether either the control lever or the multifunctional lever returns automatically to the stop position '0' when the bucket has reached the required angle. Correct the adjustments, if necessary.

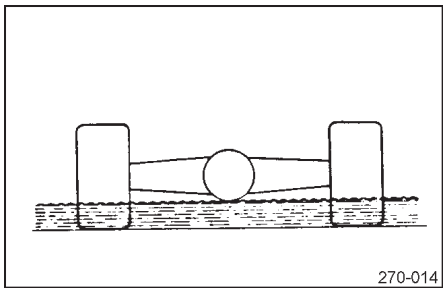
BUCKET LEVEL INDICATOR



The level indicators on both sides of the bucket run in parallel to the bucket cutting edge.

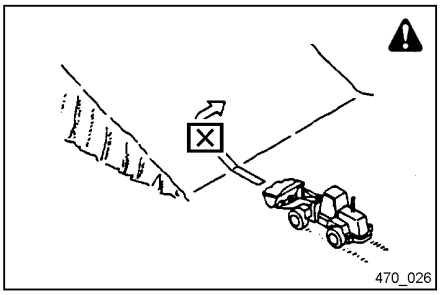
The position of the bucket cutting edge can be seen from the driver's seat with the help of the level indicator.

PRECAUTIONS FOR SPECIAL OPERATIONS

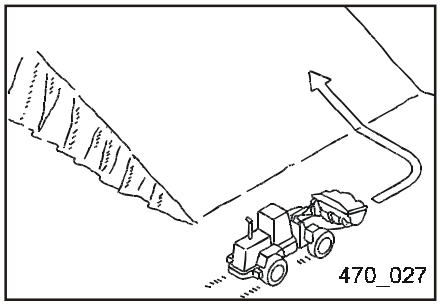


Working in water
While operating in water or on swampy ground, the water must not reach the underside of the axle housing. Wash the machine after the work has been finished and check the lubricating points.

If the wheel brake breaks down
If the machine does not come to a standstill after pressing the brake pedal, use the parking brake instead.



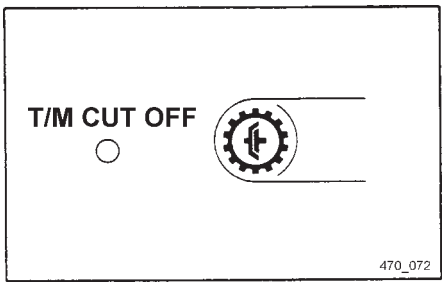
Turning on slopes, dams or hills
Keep sufficient distance to ridges and steep slopes. There is danger of the machine tipping over or sliding down on steep slopes, embankments, or hill flanks. The limiting values are defined in chapter "Limiting Values for Slopes“.
Do not turn on a slope or drive across 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 on slopes

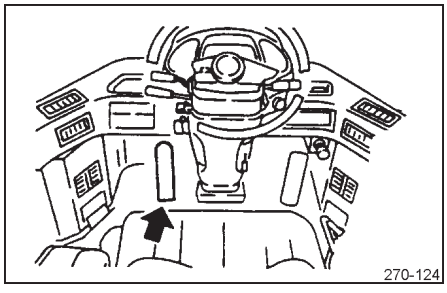
WARNING

If the transmission cut-off is switched on, there is no braking effect of the engine available. This may lead to accidents when driving on slopes!
For this reason, switch off the transmission cut-off before driving on slopes (the switch control light is not lit).



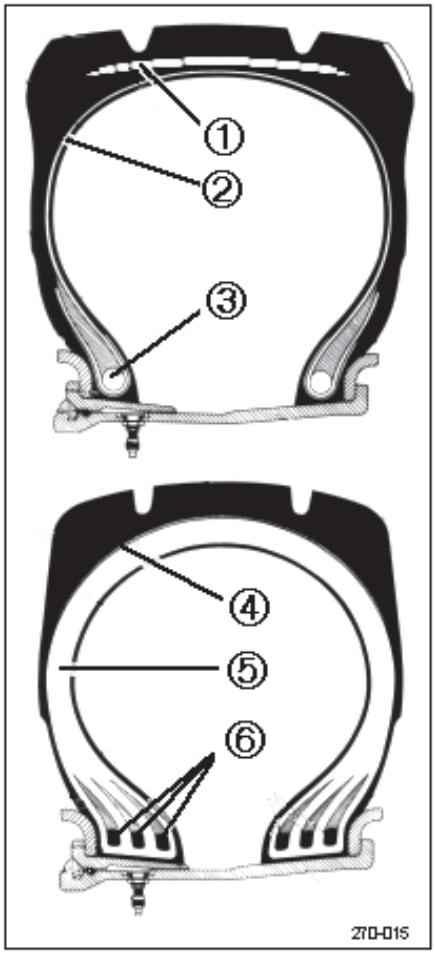
If you use the service brake too often while driving downhill, it may overheat and be damaged. You can avoid this by driving downhill in the lower speed range and by using the braking effect of the engine. (In the lower speed range the driving range switch will be switched off and the control light will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

If the engine breaks down
If the engine stops on a slope, press down fully the brake pedal. Lower the work unit onto the ground and apply the parking brake. Set either the driving direction lever or the driving direction switch to the neutral position and restart the engine. The engine can only be started if the driving direction lever or the driving direction switch is in the respective neutral position.



TYRES

HOW TO HANDLE TYRES



1 Steel belt cord
2 Radial carcass
3 Bead core
4 Intermediate layer
5 Diagonal carcass
6 Bead cores

Tyres must be changed for safety reasons, if they have any of the following defects.

- The bead core is torn or twisted.
- Excessive wear and the carcass - with the exception of the intermediate layer - is exposed over more than 1/4 of the circumference.
- Damage to the carcass exceeds 1/3 of the tyre width.
- The individual layers of the tyre peel from each other.
- Radial tears in the carcass.
- Deformation or damage making the tyres unsuitable for use.

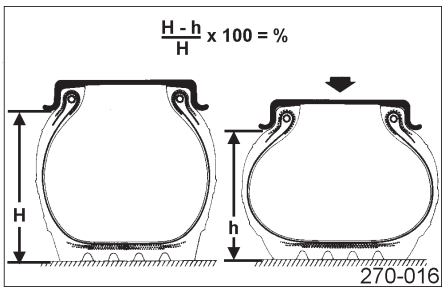
TYRE AIR PRESSURE

NOTE

Before starting operation, check the tyre air pressure with the tyres being cold.

If the tyre pressure is too low, the tyres will be overstrained; excessive pressure can lead to cracks in the tyres which may result in the tyre bursting under peak loads. Set the tyre pressure according to the table to avoid any damage.

VISUAL INSPECTION



As a guideline for visual inspection, the compression ratio of the front tyres (no load/under load) should be as follows:

When transporting normal loads (boom in horizontal position): approx. 15 - 25 %

For excavation works (rear wheels lifted from ground): approx. 25 - 35 %

Check for cracks, peeling and unusual wear when checking the tyre pressure. Remove any nails, pieces of metal or other foreign particles.

Remove any rocks or large stones from the working area. Creating a free surface assists in prolonging the service life of the tyres and, thus, increases the efficiency of the machine.

DRIVING LONGER DISTANCES

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.
- Check the tyre pressure with the tyres being cold before driving.
- Lower the bucket to its transport position and move it completely to its rear limit stop position.
- Always drive with empty bucket or 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.

TYRES AND TYRE PRESSURES

WARNING

- **If a tyre bursts while inflating or if a multipart wheel rim breaks apart, the hurling tyre or wheel rim parts can cause injuries or property damages!**
  For inflating, use a tyre with inner tube with clamping installation which is at least so long that you can stand next to the running surface of the tyre during inflating.
  If you are inflating tyres, stand next to the running surface.
  Secure a removed wheel before inflating it with ropes, chains or a protective cage.
- **Inappropriately performed works on the tyres and wheel rims may lead to severe injuries or property damages, due to the high tyre pressure!**
  Have tyres and wheels repaired by skilled experts.

The service life and the performance of the tyres depend significantly on the correct tyre pressure. Only the right tyre pressure save the tyres from defects.

If the tyre pressure rises due to warming up, the tyres may not be deflated. For this reason, check and adjust the tyre pressures before beginning to drive, that is with the tyres being cold.

TYRES				RECOMMENDED AIR PRESSURE							
				For road use				For work conditions			
Make	Size	Model	EM-Code	Front axle		Rear axle		Front axle		Rear axle	
				bar	psi	bar	psi	bar	psi	bar	psi
BRIDGE-STONE	20.5R25	VKT	L 3	2.0	29	1.5	22	3.0	44	2.0	29
BRIDGE-STONE	20.5R25	VMT	L 3	2.0	29	1.5	22	3.0	44	2.0	29
DUNLOP	555/70R24	SP T9	L 2	1.75	26	2.0	29	3.75	55	1.5	22
DUNLOP	20.5-25	E91	L 2	1.5	22	1.5	22	2.5	37	1.5	22
DUNLOP	20.5R25	SP T9	L 2	1.5	22	1.75	26	3.0	44	1.5	22
DUNLOP	20.5R25	SP T8S	L 2	1.5	22	1.75	26	3.0	44	1.5	22
DUNLOP	20.5-25	PG6S	L 3	1.5	22	1.5	22	3.0	44	1.5	22
DUNLOP	20.5R25	SP T7LD	L 3	1.5	22	1.75	26	3.0	44	1.5	22
MICHELIN	555/70R25	XHF	L 3	2.0	29	1.5	22	3.5	51	2.5	36
MICHELIN	20.5R25	XHA	L 3	2,0	29	1.5	22	3.0	44	2.0	29
MICHELIN	20.5R25	XLD D2A	L 5	2.0	29	1.5	22	3.0	44	2.0	29
MICHELIN	20.5R25	XTLA	L 2	2.0	29	1.5	22	3.0	44	2.0	29
GOODYEAR	20.5R25	RL-2+	L 2	2.0	29	2.0	29	3.0	44	2.0	29
GOODYEAR	20.5R25	GR2B	L 2	2.0	29	2.0	29	3	44	2.0	29
U:\DTP\BA270gb\TYRES.TBL 01/97											

If the tyre compression is too large, increase the tyre pressure accordingly **(see section "TYRES", "VISUAL INSPECTION")**.

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.

- The frost resistance of the **cooling system** must be adequate for temperatures which can be expected in your climate. Top up with anti-freeze if required. If necessary, exchange complete content of cooling system for anti-freeze coolant. Check function of the remote thermometer, coolant regulator and the radiator valves.

- Use 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 alternator 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 start switch 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 hydraulic 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 chassis. 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“).

LONG-TERM SHUTDOWN

PRIOR TO SHUTDOWN

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 tarpaulin 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 tarpaulin.
- 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.
- Add sufficient anti-freeze to the coolant if temperatures are expected to drop below 0°C.
- Check whether the coolant is set to a temperature of -37° C. Refill antifreeze, if necessary.

DURING SHUTDOWN

WARNING

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

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

AFTER THE SHUTDOWN

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

After a longer shutdown 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

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

ELECTRICAL SYSTEM		
Fault	**Fault cause**	**Remedy**
Battery charging control lamp does not light up when the engine is switched off and the ignition switch is set to the operating position.	Faulty electrical connection Faulty bulb	Check/repair terminals, connecting points and cables. *) Replace bulb.
Battery charging control lamp shines when engine is running at high speed.	Faulty electrical connection	Check/repair terminals, connecting points and cables. *)
Battery charging control lamp flickering when engine is running.	Alternator belt tension too low	Adjust belt tension.
Battery charging control lamp does not go out when engine is running.	Faulty electrical connection Faulty alternator Alternator belt tension too low	Check/repair terminals, connecting points and cables. *) Replace alternator or regulator. *) Adjust belt tension.
Alternator making strange noises.	Faulty alternator	Replace alternator.
Starter does not turn over.	Faulty electrical connection Battery charge too low	Check/repair terminals, connecting points and cables. *) Recharge battery.
Starter pinion engages/ disengages repeatedly.	Battery charge too low Faulty starter	Recharge battery. Change starter. *)
Starter only turns engine over slowly.	Battery charge too low Faulty starter	Recharge battery. Change starter. *)
Starter disengages before the engine has ignited.	Battery charge too low Faulty starter	Recharge battery. Repair/change starter. *)

*) Have this work carried out by the responsible dealer.

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

ENGINE		
Fault	**Fault cause**	**Remedy**
Warning lamp for oil pressure lights up with engine running.	Oil level too low	Top up with oil.
	Oil filter cartridge dirty	Change cartridge.
	Oil pipe connection faulty	Check, repair. *)
	Pressure sensor faulty	Replace sensor. *)
Steam emitting from pressure valve of radiator cap.	Coolant level too low	Top up with coolant.
	Loss of coolant	Seal cooling system.
Temperature gauge in red zone and respective control lamp flashing.	Fan belt loose	Retighten belt.
	Scale formation or dirt in cooling system	Clean inside of cooling system.
	Radiator dirty outside	Clean outside of radiator.
	Thermostat faulty	Replace thermostat. *)
	Faulty or loose radiator cap when operating at high altitudes	Replace/tighten radiator cap.
	Faulty coolant level sensor	Replace sensor. *)
Temperature display in white zone.	Thermostat faulty	Replace thermostat. *)
	Faulty temperature display	Replace temperature display. *)
Engine does not start.	Not enough fuel	Fill up with fuel.
	Air in the fuel system	Bleed fuel system.
	Faulty injection pump or nozzles	Replace injection pump or injection nozzles. *)
	Starting speed too slow	See "ELECTRICAL SYSTEM".
	Compression too low because of incorrect valve clearance	Adjust valve clearance. *)
Exhaust gases are white or blue.	Oil level too high	Adjust to prescribed oil level.
	Incorrect fuel	Use prescribed fuel.

*) Have this work carried out by the responsible dealer.

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

ENGINE (continued)		
Fault	**Fault cause**	**Remedy**
Exhaust gases black at times.	Air filter insert dirty	Clean/replace insert.
	Injection nozzle faulty	Replace injection nozzles. *)
	Compression too low because of incorrect valve clearance	Adjust valve clearance.*)
	Turbocharger faulty	Clean/replace turbocharger. *)
Combustion makes sound like breathing at times.	Injection nozzle defect	Replace injection nozzles. *)
Unusual combustion noises.	Incorrect fuel	Use recommended fuel.
	Overheating	See "Fault: Temperature gauge in red zone and respective control lamp flashing."
Unusual mechanical noises.	Silencer faulty	Replace silencer.*)
	Valve clearance too large	Adjust valve clearance.*)

*) Have this work carried out by the responsible dealer.

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

TRANSMISSION		
Fault	**Fault cause**	**Remedy**
Machine does not drive.	Parking brake on	Release parking brake.
	Drive direction lever not engaged correctly	Engage drive direction lever correctly.
	Oil level too low	Top up with oil according to specifications.
Machine only runs slowly and not at full power.	Oil level too low	Top up with oil according to specifications.
Overheating.	Oil level too low or too high	Top up with oil according to specifications.
	Machine being driven in a gear which is too high	Run machine in a lower gear.
	Engine overheating	See "ENGINE; fault: Temperature gauge in red zone and respective control lamp flashing."
Noises.	Oil level too low	Top up with oil according to specifications.

AXLES		
Noises.	Oil level too low	Top up with oil according to specifications.
	Incorrect oil for machine with multi-disc self-locking differential	Top up with specified oil.

*) Have this work carried out by the responsible dealer.

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

BRAKES		
Fault	**Fault cause**	**Remedy**
Brakes not working.	Brake discs have reached limit of wear	Replace brake discs. *)
	Air in the system	Bleed system.
	Hydraulic system faulty	Repair. *)

PARKING BRAKE		
Faulty brake action.	Too much play on brake lever	Adjust brake. *)
	Brake lining worn	Replace brake linings. *)

STEERING		
Steering reaction sluggish.	Faulty hydraulic system	Repair. *)
Steering wobbles.	Play on steering cylinder bolts too large	Repair. *)
	Hydraulic system faulty	Repair. *)

*) Have this work carried out by the responsible dealer.

If faults or causes of faults are not listed below, have them rectified by the responsible dealer.

HYDRAULIC SYSTEM		
Fault	**Fault cause**	**Remedy**
Insufficient lifting force.	Oil level too low	Top up with oil according to specifications.
Lift action too slow.	Filter insert dirty	Replace insert.
Air bubbles in oil.	Poor oil quality	Top up with prescribed oil.
	Oil level too low	Top up with oil according to specifications.
Cylinders jerking.	Oil level too low	Top up with oil according to specifications.

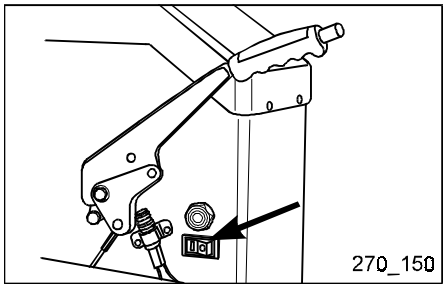
*) Have this work carried out by the responsible dealer.

EMERGENCY DRIVING MODE

The machine is provided with a fully automatic transmission. Gear-shifting and driving the machine is no longer possible, if there is a fault in the control unit. In this case, an emergency driving mechanism can be activated.

CAUTION

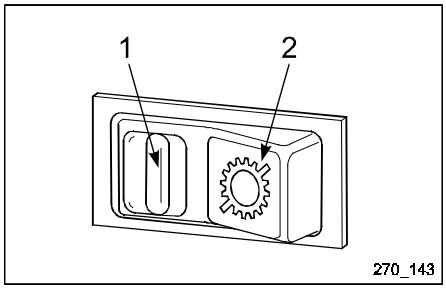
Driving longer distances in the emergency driving mode damages the machine!
The emergency driving mode is intended only for removing the machine out of a dangerous zone or for driving to the next repair workshop.



Switching on the emergency driving mode in the event of a fault in the control unit for the automatic gear-shift:

1. Apply the parking brake and set the driving direction lever to its neutral position.

2. Push the lock (1) of the emergency switch (2) to the side, hold it in this position and press the switch. The emergency driving mode is now activated and the control light in the switch lights up.



3. Press the brake pedal, start the engine and release the parking brake.

WARNING

Careless starting up of the machine may lead to accidents! Before you start to drive, make sure that there are no persons in the vicinity of the machine. Sound the horn immediately before you start to drive.

4. Set the driving direction lever to forwards or reverse, release brake pedal slowly and move off slowly.

IMPORTANT

The machine will only drive in the 2nd gear, independent of the position of the gear lever.

STARTING ENGINE WITH JUMPER LEADS

NOTE

- **The current-supplying and the discharged batteries must have the same nominal voltage.**
- **The capacities of the current-supplying batteries must not be significantly less than the capacities of the discharged batteries.**
- **The cross-section of the jumper leads and the cable terminals must be selected according to the size of the batteries.**

WARNING

The battery contains strongly aggressive battery acid which may spill and burn your eyes!
Carry goggles and rubber gloves if you work on the battery. Immediately wash off battery acid from eyes or skin using plenty of water and go to see a doctor.

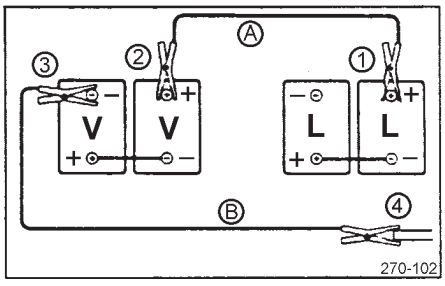
CONNECTING THE JUMPER LEADS

CAUTION

A short circuit can damage parts of the electrical installation. It may occur in the following situations:
- **If you join the positive and the negative pole of the battery while they are conducting (e.g. with a tool).**
- **If the operationable and the defective machine have contact with each other and if current is supplied immediately after connecting the positive terminals.**
- **If a terminal slips off and comes in contact with the machine!**

Attach the terminals firmly and make sure durig connecting and disconnecting the jumper leads that
- **both cable ends neither touch each other nor the machine;**
- **both machines do not touch each other.**

1. Turn the start switches of both machines to '0' (OFF).
2. Connect one terminal of the jumper lead (A) to the positive pole (+) of the empty battery (L).
3. Connect the other terminal of the jumper lead (A) to the positive pole (+) of the charged battery (V).
4. Connect a terminal of the jumper lead (B) to the negative pole (-) of the charged battery (V).



WARNING

Danger of explosions! If you connect the last terminal to the engine block of the defective machine, sparks are generated which can ignite the gas which has formed inside the battery! For this reason, connect the last terminal with the widest possible distance to the battery.

5. Connect the last terminal of the jumper lead (B) to the engine block of the machine with the discharged battery.

STARTING THE ENGINE

Start the engine of the machine with the discharged batteries. If the engine (of the machine with the empty batteries) does not immediately start, wait at least for two minutes before retrying.

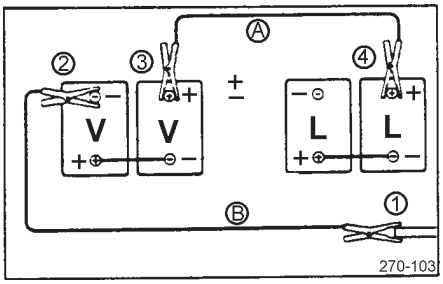
DISCONNECTING THE JUMPER LEADS

CAUTION

If the cable ends either touch each other or the machine during disconnecting the jumper lead from the started machine ,a short circuit is produced which can damage parts of the electrical installation!
For this reason, hold the cable ends away from each other and the machine during disconnecting.

After the engine has started, disconnect the jumper leads by reversing the order described in the connection section.

1. Disconnect one terminal of the jumper lead (B) from the engine block.
2. Disconnect the other terminal of the jumper lead (B) from the negative pole (-) of the charged battery (V).
3. Disconnect a terminal of the jumper lead (A) from the positive pole (+) of the charged battery (V).
4. Disconnect the other terminal of the jumper lead (A) from the positive pole of the empty battery.



TOWING THE MACHINE

WARNING

If the actively towing machine's weight is too light, accidents may occur during towing!
Always use a machine for towing which has at least the same weight as the machine which has broken down.

Only tow the machine to a place where it can be serviced or repaired. For this purpose, use a machine for towing which has at least the same weight as the machine which has broken down. Always use a tow-rod for towing.

CAUTION

Tow-rods which have been attached to the wrong locations, can damage the machine!
Use only the prescribed attachment points for attaching the tow-rod.

The tow-rod has to be attached to the front machine at the designated hooks. The tow-rod can be attached to the machine which has broken down at the ptraction opening.

Contact your local Komatsu dealer to obtain detailed information on towing.
Observe the following instructions if the machine has to be towed with the engine switched off:

- Set either the driving direction lever or the driving direction switch to the neutral position.
- A towing speed of 10 kph and a towing distance of 10 km must not be exceeded if damage to the power-shift transmission, due to insufficient lubrication, is to be avoided when towing with the engine switched off.
- Steering is only active during drive because the emergency steering pump is driven by the axles via the cardan shafts of the power-shift transmission.
- The pressure reserve for the service brake is used up completely after only a few braking actions. After this, only the parking brake can be used for braking.

The articulated steering must be locked in place when the machine is transported on a low-bed truck, by rail or towed by a mobile crane.

The cardan shaft of the running axle has to be removed when the front axle is to be raised. The parking brake does not work if the cardan shafts have been removed.

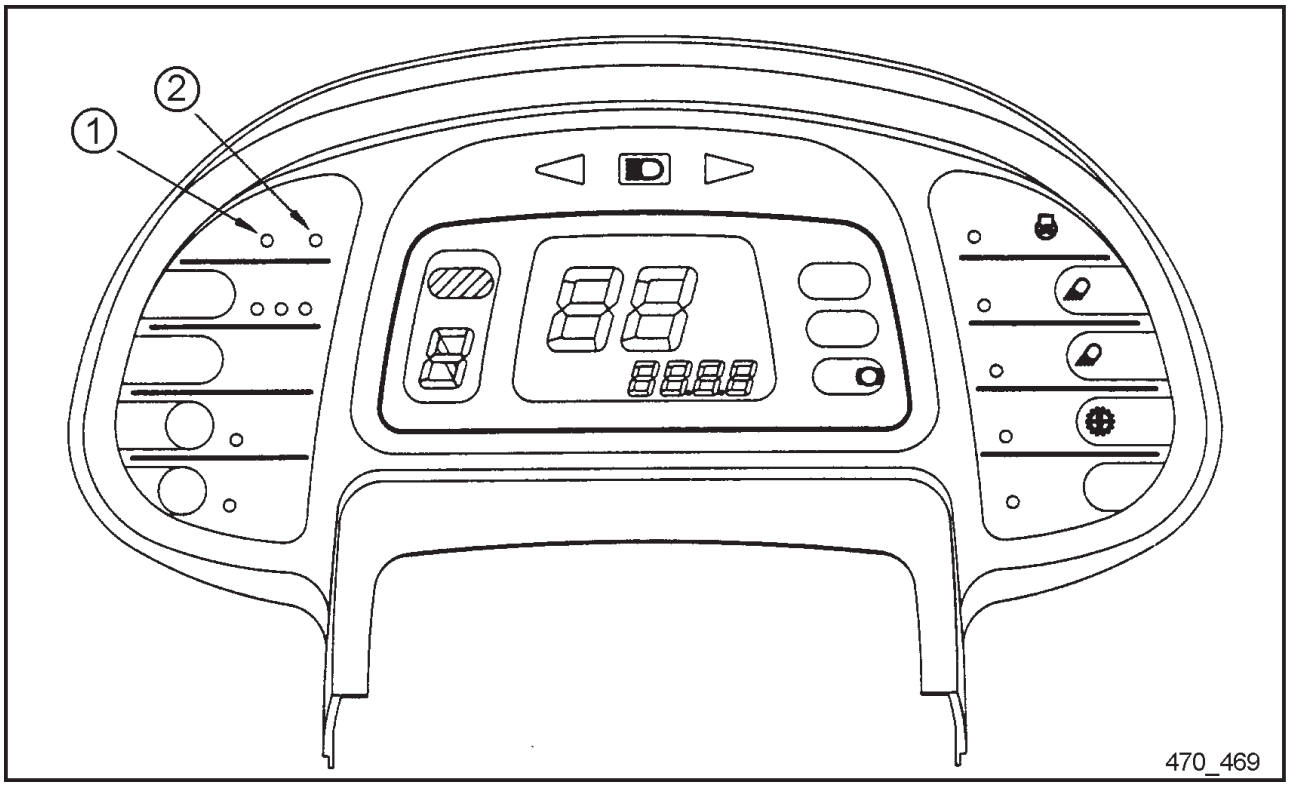
WARNING

If the machine to be towed has defective brakes, it may collide during the towing!
Use two machines to tow a machine with defective brakes. Connect the three machines with tow-rods.

If you need to tow a machine with defective brakes or if the machine is being towed downhill, use a larger machine for towing to ensure that there is sufficient tensile force and braking performance. Connect a second machine to the rear of the machine to be towed. This helps to prevent the machine getting out of control.

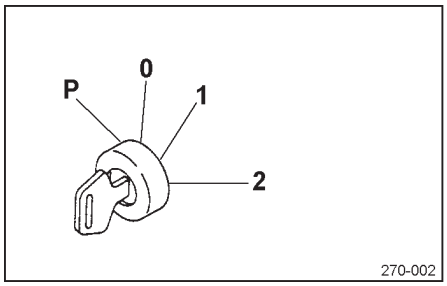
Conditions for towing can vary, so that it is impossible to predict basic requirements in advance. Towing on level and horizontal roads requires only little tensile force; towing on slopes or uneven ground requires a high tensile force.

EMERGENCY STEERING



CONTROL LIGHTS FOR EMERGENCY STEERING

These control lights indicate the hydraulic circuit of the steering and emergency steering system.

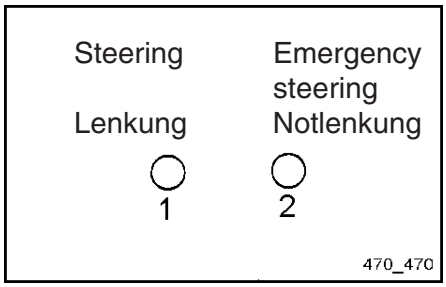


Always check the function of both lights before starting to drive. Proceed as follows:

1. Turn the start switch to operating position '1' (ON).
   The red control light (1) for steering starts to flash.
   The green control light (2) for emergency steering is not lit.

2. Start up the engine.
   The red control light (1) for steering goes out.
   The green control light (2) for emergency steering remains unlit.

3. Drive with the engine running.
   The red control light (1) for steering remains unlit.
   The green control light (2) for emergency steering lights up.

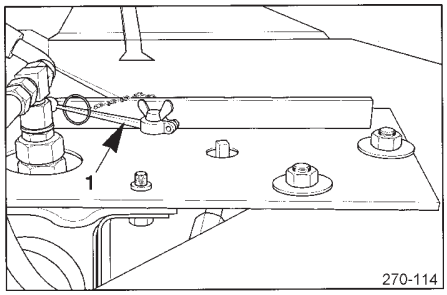


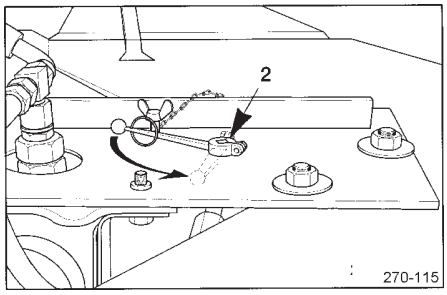
If the red control light (1) flashes and the green control light (2) lights up during driving, a fault has occurred in the steering's hydraulic circuit and the emergency steering system is triggered. Stop the machine immediately and have the steering system checked by an authorised workshop.

Note
If the emergency steering system is activated, steering is only possible during driving. The reaction of the steering is slowed down and depends on the speed of the machine (max. 10 kph).

EMERGENCY LOWERING SYSTEM

If the engine is switched off, it is possible to lower the work unit with the emergency lowering system.





Lowering for chassis numbers up to WA270H20259

WARNING

Danger of accidents! While lowering the work unit, it is not possible to see the hazardous area below the work unit. For this reason, ask somebody to secure the hazardous area below the work unit.

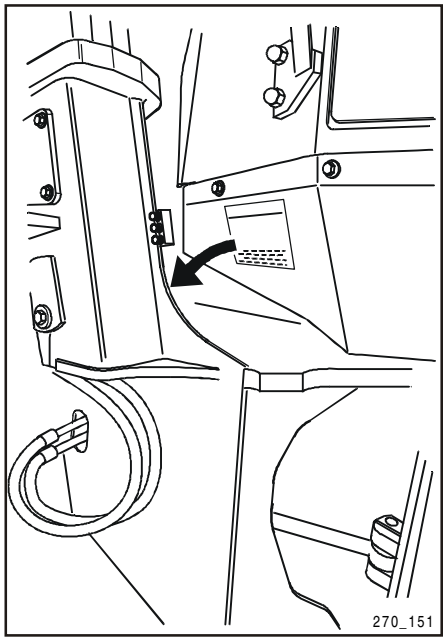
1. Unscrew the lever (1) from retainer and place on the shut-off valve (2).
2. Lowering takes place by turning the shut-off valve in the lift cylinder circuit for the boom slowly in the direction of the arrow.
3. Upon completion, close shut-off valve and return lever to retainer and screw tight for safety reasons.

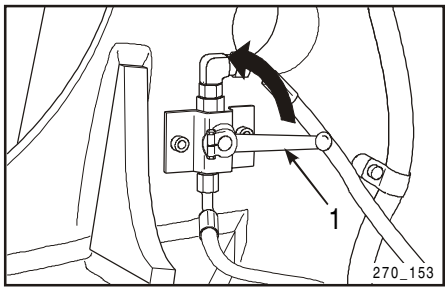
Lowering possible from chassis numbers from WA270H20260 onwards

WARNING

Danger of accidents! While lowering the work unit, it is not possible to see the hazardous area below the work unit. For this reason, ask somebody to secure the hazardous area below the work unit.

1. On the left-hand side, grip into the section between the articulated steering and the front part of machine (see arrow).
2. Lower the wor unit by slowly shifting upwards the shut-off valve (1) in the lifting cylinder line of the boom.
3. Then, reset the shut-off valve into the horizontal position.





MALFUNKTION OF BRAKE

CHECKING SERVICE BRAKE

Drive the machine at a speed of 20 km/h (12.4 MPH) on a dry flat concrete road surface, and check whether the stopping distance is less than 5 m (16.4 ft).

NOTE

All repairs on the brake system must be performed by an authorised Komatsu garage.

CHECKING PARKING BRAKE

TEST CONDITIONS

- Tyre air pressure: according to specifications
- Road surface: dry, firm surface with an angle of inclination of 25%
- Engine: operating conditions

TEST PROCEDURE

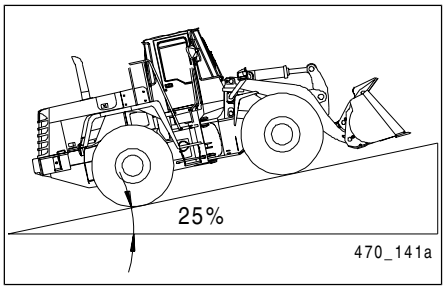
WARNING

Danger of accidents! If you apply the parking brake during driving, the transmission is automatically set to its neutral position so that there will be no braking effect of the engine available!
While driving, never brake the machine using the parking brake - with the exception of emergencies. Apply the parking brake only after the machine has come to a standstill.

1. Start up the engine, align the machine for straight driving and drive it, with empty bucket, up a 25% slope.

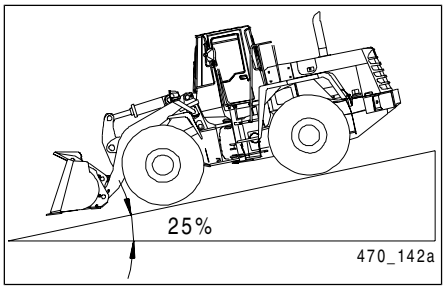
2. Stop the machine using the service brake, place the driving direction lever in the neutral position and switch off the engine.

3. Apply the parking brake firmly, release the brake pedal slowly and check whether the machine stays in position.



NOTE

All repairs on the brake system must be performed by an authorised Komatsu garage.



MAINTENANCE

MAINTENANCE BASICS

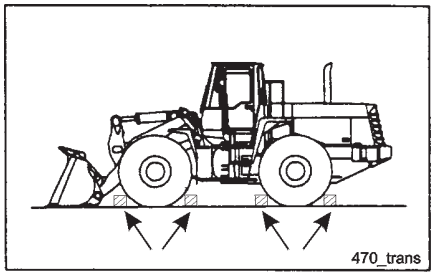
CAUTION

Maintenance operations are only to be performed by trained specialists. Also refer to chapter "Safety Measures During Maintenance".

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 firm and level ground.
2. Bring the machine into the defined maintenance and repair position.
3. Lower the work unit onto the ground and position it as indicated in the adjacent illustration.
4. Switch all control levers into neutral or stop position ‘0’.
5. Turn the locking lever for the work hydraulic system into position ‘1’.
6. Remove the ignition key and store it in a safe place.
7. Pull the parking brake.
8. Attach warning signs to the start switch.
9. Place wheel chocks infront and behind the tyres.
10. Secure the articulated steering with the articulated steering catch.
11. Remove any dirt, if necessary.



OPERATING HOURS METER

Check operating hours meter reading every day so that you know when maintenance work is due.

SPARE PARTS

Only use Komatsu original spare parts.

FLUID FOR THE WASHER SYSTEM

Use clean washer fluid as prescribed for use in cars.

KEEP THE MACHINE CLEAN:

Always keep the machine clean. Keep grease nipples, ventilation openings and oil level indicators particularly clean. Avoid any contamination of the operating agents etc. with foreign particles. This helps to avoid most faults.

CAUTION WHEN HANDLING HOT FLUIDS:

Draining hot oil, hot coolant and the removal of filters for these immediately after the engine has been switched off is dangerous. For this reason, wait until the engine has cooled down to 60°C. But: Do not drain oil in a cold state.

CHECK DRAINED OIL AND FILTER FOR FOREIGN BODIES:

After changing oil or filter, check oil and filter for metal particles and foreign bodies. If larger quantities of metal particles or foreign bodies are found, contact your local Komatsu dealer.

TOPPING UP FUEL OR OIL; FUEL SIEVE

Always top up fuel or oil in a sufficiently ventilated place. If the machine is provided with a fuel sieve in the tank opening, do not remove this fuel sieve before you start refuelling. Relock the tank opening after refuelling.

You may slip on spilled fuel or oil or spilled fluid may ignite. For this reason, remove immediately any spilled fluid.

Never use fuel for rinsing or cleaning parts. Make sure that oil or fuel does not contaminate the ground or water. Dispose of these fluids appropriately.

CHECKING OIL LEVEL AND OIL-CHANGE:

Checking oil level and oil-changes should only be carried out at dust-free locations to avoid any foreign bodies getting into the oil.

WARNING SIGN

Attach a warning sign to the start switch when performing maintenance operations so that no one can accidently start the engine. The warning sign is supplied with the tools.

WELDING INSTRUCTIONS

- Turn the engine start switch to the OFF position.
- Do not apply a constant voltage of more than 200 V.
- Connect the ground cable in a distance of max. 1 m from the area in which the welding is to be performed.
- There must be no seals or bearings between the welding area and the chassis point.
- Between the welding area and the battery should be a min. distance of 1m.
- Never weld lines or pipes containing fuel or oil.

FIRE PREVENTION

Do not use any inflammable detergents to clean parts. Do not allow any naked flames in the vicinity of detergents. Do not smoke whilst working.

GASKETS / SEALS

Clean contact surfaces after removing gaskets/seals. Replace gaskets/seals and O-rings with new ones. Do not forget the gaskets/seals and O-rings when reassembling.

OBJECTS IN POCKETS

Do not carry any loose objects in clothing pockets which could fall out when bending over and drop into the machine.

CHECKING THE TYRES

When working on rocky sites, check the tyres for damage, wear, tear and cracks. Retighten loose bolts and nuts.

PROTECTIVE MEASURES WHEN WASHING THE MACHINE

- Never spray steam or water at high pressure onto the radiator.
- Make sure that no water comes into contact with the electric al components.

WARNING

If the bucket is accidentally lowered during cleaning the machine, severe accidents may occur!
For this reason, support the bucket below the boom or lower the bucket to the ground while cleaning.

If cleaning work has to be carried out in the area below the boom and no support is available, park and secure the machine as follows:

1. Park the machine on even ground.
2. Apply the parking brake.
3. Place wheel chocks in front of wheels to prevent machine from rolling.
4. Dump the opened bucket completely and lower it with the blade or teeth touching the ground.

MUDDY OR WET ENVIRONMENT

- Wash the machine immediately after work to protect the machine against corrosion.
- Perform maintenance measures and lubrication in shorter intervals when working on sites where conditions are often unfavourable.
- The work unit's bolts have to be greased daily when working frequently in water.

DUSTY ENVIRONMENTS

If working in dusty environments, observe the following instructions:

- Observe the air filter's warning light to check in time whether the air filter is dirty. Clean the air filter element more often than specified.
- Clean the external surface of the radiator block in shorter intervals to ensure a troublefree air flow.
- Replace the fuel filter insert in shorter intervals.
- Clean electrical components, in particular the start switch (ignition) and the generator.

ENGINE / HYDRAULIC OIL

- The oil in the engine and the hydraulic system is subject to extreme conditions (high temperatures, high pressure). The quality decreases, therefore, as operation increases.
  Always use oil types complying with the operation and temperature specifications in the operation and maintenance manual. Always observe prescribed oil change intervals.
- Special attention must be paid when storing, handling and, in particular, topping up oil and grease to prevent these from becoming soiled. The majority of functional faults are caused by unclean oil.
- Never mix different types or brands of oil.
- Always top up the prescribed oil quantities.
  Functional disturbances can be caused by too much or too little oil.
- If the oil in the work hydraulic system is not clear (milky), oil or air is probably penetrating the circuit. In this case, contact you local Komatsu dealer.
- If changing oil, change corresponding oil filter as well.
- We recommend to have an engine oil and hydraulic oil analysis to be performed by your local Komatsu dealer on a regular basis to check the condition of the machine.

GREASE

- Grease is used to prevent wear and tear as well as noise emissions.
- Grease nipples which are not mentioned in the service section are for overhaul purposes; for this reason, they do not need to be greased.
- If a part becomes sluggish after long use, lubricate with grease.
- Wipe off any old grease which is pressed out when lubricating. Any sand or dirt in the grease causes considerable wear and tear.

FUEL

- The fuel injection pump is a precision instrument. Fuel containing water or dirt causes damage to the fuel injection pump.
- Take maximum care when storing fuel or refuelling to avoid any soiling.
- Always use the fuel prescribed in the operation and maintenance manual.
- Paraffin can precipitate from fuel at temperatures below -15 °C and block filters and lines. Always use suitable fuel if working in this temperature range.
- Always top up fuel at the end of each working day to prevent air humidity precipitating and water forming in the fuel tank.
- If you want to drain dirt and water from the fuel tank, wait at least ten minutes after filling so that the swirling foreign bodies can settle again.
- The fuel system must be bled, if it has been run empty during driving or if the filter has been replaced. Refer also to chapter "Maintenance Every 500 Operating Hours".
- Engine oil change periods will have to be reduced by half if fuel is being used with a sulphur content of 0.5 to 1.0 % and reduced to one quarter if fuel with a sulphur content of more than 1.0 % is being used.

BIOLOGICALLY DEGRADABLE HYDRAULIC OILS AND GREASE

- Biologically degradable hydraulic oils and grease - on a diester oil basis - can be used in Komatsu machines. Please contact our works dealers for the products approved by us and most suitable for your requirements.

STORAGE OF OIL AND FUEL

- Store oil and fuel indoors to prevent it being contaminated by water, dirt or other foreign bodies.
- If storing for longer periods, lay the drum on its side so that the filler opening is located at the side. This prevents moisture from forming inside the drum.
- Drums being stored in the open must be covered with watertight foil or other appropriate measures taken to protect them.
- Always use the principle "first in, first out" to prevent any loss in quality if storing for longer periods of time, i.e. always use the oldest oil or fuel first.

COOLANT

- Always mix coolant according to specifications of machine-related section of the maintenance manual.
- River water contains large quantities of calcium and other foreign bodies. If using this type of water, scale collects in the engine and the radiator and restricts heat exchange which can result in overheating.
- Do not use water which is not suitable as drinking water.
- When using anti-freeze, always observe the instructions in the operating and maintenance manual.
- Our machines are supplied with original antifreeze from Komatsu. This antifreeze prevents corrosion in the cooling system, among other things, lubricates moving parts, raises the boiling point of the coolant and must therefore also be used at hot working sites.
- Anti-freeze is inflammable and particular attention must therefore be paid that it does not come into contact with naked flames.
- If the anti-freeze level is too low, it can cause overheating and corrosion to the cooling system because of the air in the coolant.
- If the engine overheats and it is necessary to top up with coolant, wait until the engine has cooled down before topping up.

FILTERS

Filters are extremely important safety components. They prevent foreign bodies from entering individual circuits and sections of equipment and causing damage there.

- Change all filters regularly. Further details in this respect can be found in the operating and maintenance manual. The filters will have to be changed more frequently if working under extreme conditions depending on the type of oil and fuel being used, e.g. with a high sulphur content.
- Never attempt to clean filter cartridges in order to re-use them. Always replace these filters with new ones. If changing oil filters, check whether there are any metal particles inside the old filter. If this is the case, contact your local Komatsu dealer.
- Do not open the package with the replacement filters until immediately before installing.
- Always use original filters from Komatsu.

WEARING PARTS

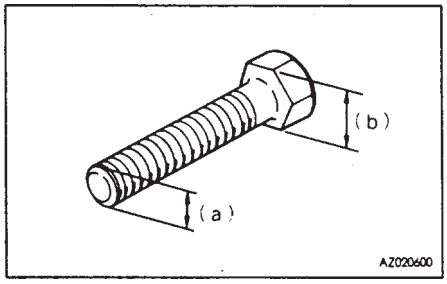
- Wearing parts such as filter cartridge, air filter element, exhauster, must be changed when carrying out regular maintenance work or when the respective wear or dirt level limit has been reached.
- This work must be performed regularly and correctly at the prescribed intervals to ensure economical use of the machine.
- Only use original Komatsu spare parts.
- Always quote the part number, as listed in the spare parts catalogue, when ordering spare parts.

SPECIFICATIONS OF THE ELECTRICAL SYSTEM

- Never remove or alter electrical components which is installed in the machine.
- Never install any other electrical components other than those approved by Komatsu Hanomag.
- Pay attention that no water enters the electrical system when washing the machine or working in the rain.
- Wet wiring or damaged insulation can result in insulation faults in the electrical system and, consequently, functional faults in the machine.
- When working close to the coast, clean the machinery carefully to prevent any corrosion.
- A foreign source of power must never be connected to the fuses, the start switch or the battery relay.
- **Maintenance of the electrical system consists of:**
  1. Checking the tension of the belt for the three-phase generator.
  2. Checking the belt of the three-phase generator for damage and wear.
  3. Checking the acid level in the battery.

STARTING TORQUES FOR STANDARD NUTS AND BOLTS

Unless stated otherwise, metric bolts of strength class 8.8 and nuts of strength class 8 are to be tightened to torque settings as quoted in the table below.
The starting torque depends on the diameter of the thread (a) and wrench size (b) for the nuts and bolts.
If nuts or bolts are being changed, always use original parts of the same quality and dimension as the part being replaced.



Thread diameter of the bolt (mm) (a)	Wrench size (mm) (b)	Strength class 8.8	
		Nm	kpm
M 6	10	10	1
M 8	13	24	2.4
M 10	17 (15)	48	4.8
M 12	19	83	8.3
M 14	22	130	13
M 16	24	200	20
M 18	27	280	28
M 20	30	390	39
M 22	32	520	52
M 24	36	670	67
M 27	41	980	98
M 30	46	1330	133
M 33	50	1790	179
M 36	55	2310	231
M 39	60	2970	297

NOTE

Parts which are provided with plastic attachment elements must not be tightened too tight as this could damage the plastic components.

REGULAR REPLACEMENT OF SAFETY-RELATED PARTS

The user must service the machine regularly to ensure troublefree operation of the machine.

CAUTION

Worn safety-related parts may cause accidents!
Replace all parts which are relevant for the security of the machine and for fire prevention on a regular basis.

The following parts must be replaced regularly - even if they appear to be fully functioning:

- The seatbelt must be replaced every three years at the latest.
- Hoses should not be used longer than six years under normal loads.
- Hoses must be replaced as soon as any damage becomes apparent:
  Damage includes:
  - Damage to the outer layer as far as the intermediate layer
  - Brittleness of the outer layer
  - Deformation in pressurized or non-pressurized state which does not conform with the original form of the installed hose
  - Leaks
  - Damage to the hose fittings or the connection between fitting and hose
  - Warehouse damage (warehouse storage for hoses should not exceed 2 years)
- Always exchange the respective O-rings, seals and similar parts as well when replacing hoses.

WEARING PARTS

NOTE

Wearing parts must be replaced when performing maintenance work on a regular basis or if they are excessively worn or soiled.

Parts indicated in brackets are to be exchanged at the same time.

Position	Part no.	Part designation	Qty	Replacement interval
Engine oil filter	6735-51-5140	Cartridge	1	Service every 250 operating hours
Fuel filter	6732-71-6110 6732-71-6120	Cartridge Cartridge	1 1	First service after 250 operating hours Service every 500 operating hours
Transmission oil filter	42Y-15-H0S92	Cartridge	1	First service after 100 operating hours Service every 1000 operating hours
Service brake	42Y-43-H0P01 (42X-00-H0190)	Insert (O-ring)	1 (1)	First service after 100 operating hours Service every 1000 operating hours
Hydraulic oil filter	42Y-60-H5080 (07000-05220)	Insert (O-ring)	1 (1)	First service after 250 operating hours Service every 2000 operating hours
Engine valve cover	6732-11-8181 6735-11-8810	Gasket Seal	6	Service every 1000 operating hours
Air filter	42X-01-H0P01 42X-01-H0P02	Filter insert Safety filter	1 1	As required

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TOOLS

No.	Designation	Part No.	Comments
1	Spanner set	09000-30006	Spanner sizes: 8/10mm 12/14mm 13/17mm 19/22mm 24/27mm 30/32mm
2	Screwdriver	421-98-H1120	
3	Screwdriver	421-98-H1110	
4	Spanner	09014-10200	
5	Pliers	09036-00150	
6	Grease gun	424-98-H1010	
7	Hose	424-98-H1020	Hose for grease gun
8	Grease cartridge	07950-90403	(Lithium grease: 400g)
9	Hammer	421-98-H1140	
10	Bag	421-98-H1130	
11	Base	09989-13301	
			I:\dtp\ba270GB\TOOLS.TBL

LUBRICANTS AND OPERATING AGENTS

WA270-3	LUBRICANTS AND OPERATING EQUIPMENT BI abbreviations *), specifications and filling quantities					
	Lubricants and operating equipment	**BI abbreviation**	**Quality class**	**Temperature range**	**Viscosity class**	**Filling quantity in litres (approx.)**
Engine	EO engine oil	EO 1540 A EO 1030 A NRS	CCMC D4 or, if not available, API CE or API CF - 4 [2])	-10° to 50°C -25° to 20°C -40° to 20°C	SAE 15W-40 [1]) SAE 10W-30 SAE 05W-30	16
Transmission	EO engine oil	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	17
Axles with multi-disc locking differential	GO gearbox oil	GO 90 LS	API GL5+LS	-	SAE 90 [1]) SAE 85W-90 SAE 80W-90	2x25.5
Hydraulic system, steering, brakes	HYD hydraulic oil	HYD 0530	HVLP, HVLP D	-35° to 50°C	ISO VG 46 [1])	120
	or EO engine oil	EO 10	CCMC D4 or, if not available, API CD	-35° to 40°C	SAE 10W	
	or BIO-E-HYD hydraulic oil	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° to 50°C	ISO VG 46	
Cooling system	SP-C long-term coolant with anti-frost and rust protection	SP-C	Anti-frost and rust protection			56
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		185
Grease nipples, central lubrication	Multi-purpose grease on a lithium basis	MPG-A	KP2N-20	-	NLGI 2	
Air-conditioning	Coolant Refrigerating machine oil	NRS NRS	R134a (CFC-free) PAG (Polyalcohol glycol oil)			900-1000 g 150 cm [3]

The specified filling quantities are guideline values; test equipment values are binding. The choice of viscosity depends on the respective long-term outside temperature. The temperature limits are intended as guideline levels which can be exceeded for a short period

[1]) Works filling

[2]) If no API CE or API CF - 4 specification engine oil is available, API CC or API CD specification engine oil can be used instead. The oil change intervals, however, must be halved.

[3]) Oil change intervals for the engine must be halved if fuel with a sulphur content of 0.5 to 1 % is being used and reduced to a quarter if the sulphur content exceeds 1.0 %.

*) BI abbreviations are "Regular Lubricants for Constructional Machinery and Vehicles of the Central Association of the German Building Industry e.V." (BI). The Regular Lubricants for Constructional Machinery and Vehicles brochures are available from bookshops or Bauverlag GmbH Wiesbaden and Berlin under the ISBN no. 3-7625-3102-1.

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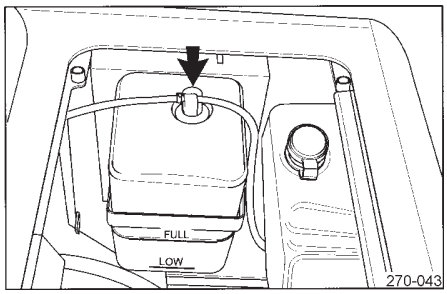
MAINTENANCE SCHEDULE

MAINTENANCE PRIOR TO STARTING UP

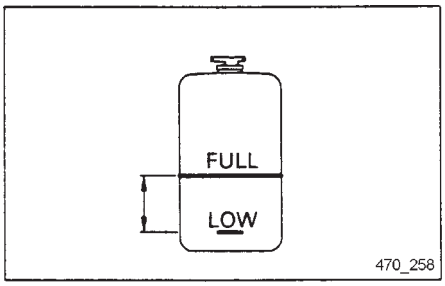
COOLING SYSTEM, CHECKING THE COOLANT LEVEL, TOPPING UP COOLANT

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.**

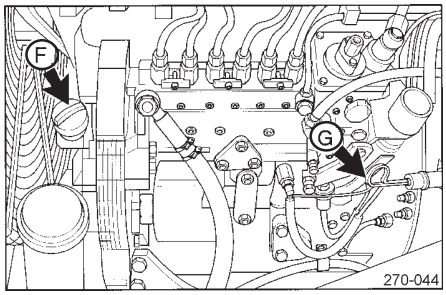


1. Open the top cover on the front of the engine hood.
2. Check that the coolant level in the expansion tank is between the FULL and LOW markings.
   If the coolant level does not reach up to the LOW marking, top up coolant.
3. Therefore remove the cover cap of the expansion tank.
4. Top up coolant until the level reaches up to the FULL marking.
5. After topping up, firmly close the cover cap.



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.

CHECKING ENGINE OIL LEVEL, TOP UP

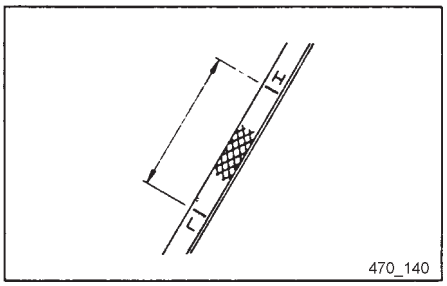


NOTE

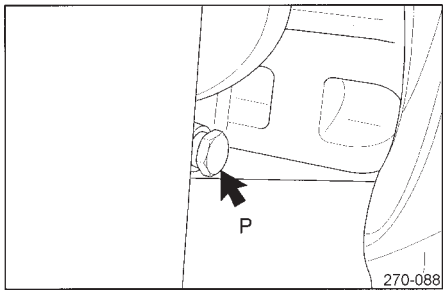
Check the engine oil level after waiting at least 5 minutes after switching off the engine. The machine must be parked on level ground.

1. Open the right engine hood.
2. Pull out the dipstick (G) and wipe off oil with a clean cloth.
3. Insert the dipstick fully and pull it out after a short interval.
4. The oil level must be between the markings (H and L) on the dipstick. If the oil level is below the marking (L), top up with engine oil by pouring through the oil filler inlet (F).

   Information on recommended oils, see section **"LUBRICANTS AND OPERATING AGENTS".**

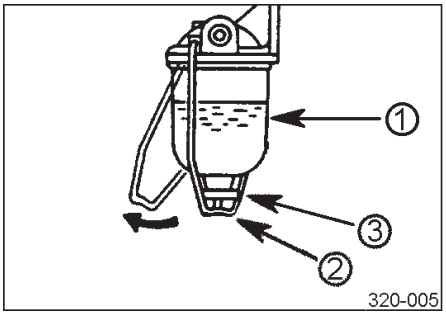


5. If the oil level is above the marking H, the excess oil will have to be drained off at the drain plug (P, rear frame, behind the right wheel) and the oil level checked again.
6. If the oil level is correct, replace and tighten oil filler cap and close engine hood.



WATER SEPARATOR, DRAIN WATER AND DIRT DEPOSITS

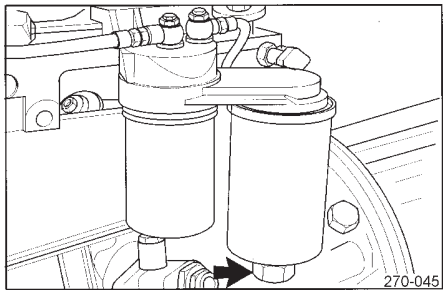
Open the right engine hood. If there is any water or dirt deposit in the water separator, remove the inspection glass (1), empty and clean it.



1. Loosen the knurled nut (3).
2. Swing the retaining clip (2) to the side and remove inspection glass.
3. Empty the inspection glass and clean it.
4. Remount it in reverse order.

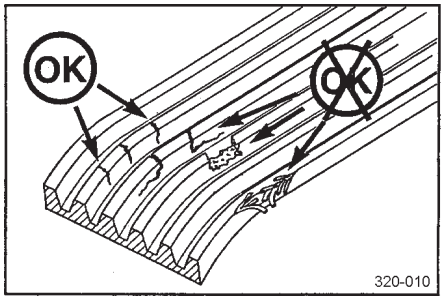
If you find water or dirt deposits in the water separator, you will also have to check the fuel tank and the fuel filter for water and dirt deposits and, if necessary, drain these.

FUEL FILTER, DRAIN WATER



If dirt or water has been detected in the water separator, place a clean container beneath the fuel filter. Open the drain valve on the base of the fuel filter and drain off the water. Close the drain valve again as soon as clean fuel emerges.

CHECKING DRIVE BELTS



Check whether the belt has any signs of cracks. Cracks across the width of the belt are permitted. Longitudinal cracks along the length of the belt meeting cross-cracks, missing pieces or damaged fabric layers are not permitted.

CHECKING THE FAN AND ITS ATTACHMENT

CAUTION

The fan can be damaged, if you turn the engine at the fan! Only turn the engine with the engine swivel installation.

Check whether the fan is firmly attached. If necessary, retighten the bolts. Damaged fans must be replaced.

CHECKING ELECTRICAL CONNECTIONS

CAUTION

Accumulated inflammable material (leaves, twigs, grass, etc.) in the electrical system represents a fire danger.
For this reason, always check this area for inflammable material and remove it, if necessary.

NOTE

If a fuse blows regularly or if there are signs of a short-circuit in the electrical system, find the cause of the trouble and repair it.

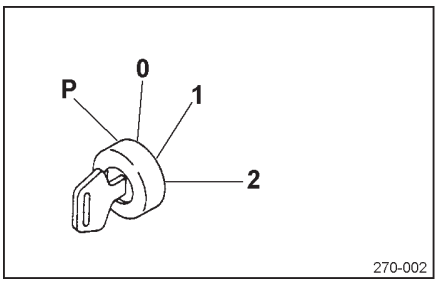
Check the fuses for damage, paying attention to signs of interruptions or short-circuits in the electrical system. Retighten any loose connection terminals.

Check the following carefully.
- Battery
- Starter
- Three-phase generator

IMPORTANT

Contact the responsible if you need assistance in finding a fault and troubleshooting.

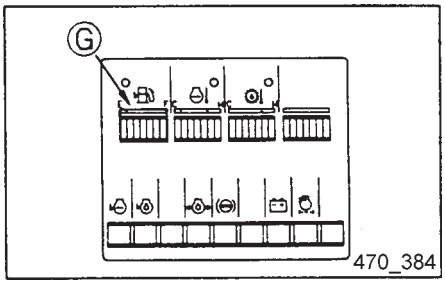
CHECKING FUEL LEVEL, TOP UP



WARNING

Danger of fire! Spilled fuel may ignite!
Remove thoroughly any fuel which has spilled during filling up.

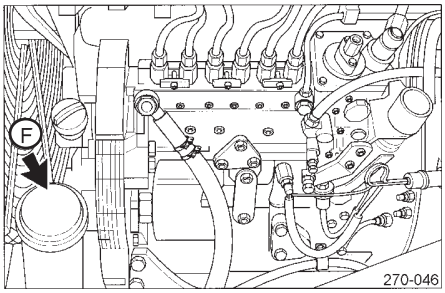
1. Turn the start switch to its operating position (2) and check the fuel level on the fuel gauge (G).



2. Reset the switch to switch position (1).

3. Fill up the fuel tank with fuel through the filler inlet after you have finished working.

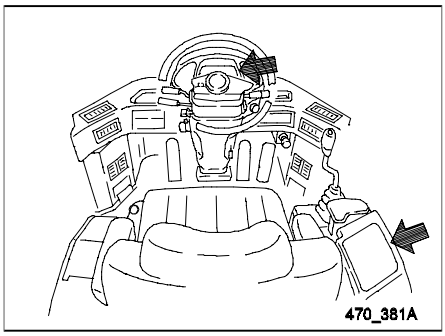
   For information on recommended oils, see section **"LUBRICANTS AND OPERATING AGENTS".**



3. Make sure that you reclose the tank tightly after filling up.

CHECKING CONTROL PANELS

1. Turn the start switch to its operating position (2).



2. Ensure that all control lights, measuring instruments and warning lights light up for approx. 3 seconds and that the alarm buzzer sounds for approx. 1 second.

NOTE

If a control lamp does not light up, arrange an inspection with the responsible dealer.

Before starting up, do not only rely on the control panel. Perform the prescribed pre-start checks and always carry out the operations specified in the section on regular maintenance.

OTHER PRE-START MAINTENANCE MEASURES

- Checking lighting for function, dirt and damage
- Checking exhaust, exhaust fumes colour and noise
- Checking measuring instruments
- Checking steering wheel play and function
- Checking lighting for function, dirt and damage
- Checking rear-view mirror for alignment, dirt and damage

MAINTENANCE DURING THE RUNNING-IN PERIOD

The following maintenance operations are to be performed in the running-in period of the machine, in addition to the regular maintenance steps:

AFTER THE FIRST 100 OPERATING HOURS

TRANSMISSION, CHANGE OIL AND FILTERS

OPERATING BRAKE, CHANGE OIL FILTER

AFTER THE FIRST 250 OPERATING HOURS

FUEL TANK, DRAIN WATER

FUEL FILTER, CHANGE CARTRIDGES

HYDRAULIC SYSTEM, CHANGE OIL FILTER INSERTS

AFTER THE FIRST 500 OPERATING HOURS

AXLES, OIL CHANGE

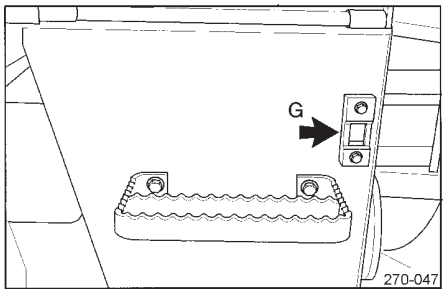
Refer to the following sections for further details on the respective maintenance operation:
"Maintenance as required"
"Maintenance every 500 operating hours"
"Maintenance every 1000 operating hours"

MAINTENANCE EVERY 100 OPERATING HOURS

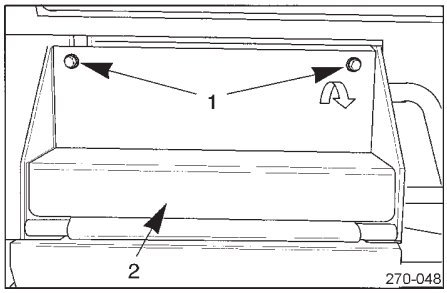
HYDRAULIC SYSTEM, CHECKING OIL LEVEL, TOPPING UP OIL

NOTE

The hydraulic tank is under pressure. Oil can spurt out when the oil filler cap (F) is removed.
Switch the engine off and allow the oil to cool down sufficiently. Then, unscrew the screw plug (3) slowly so that the pressure can escape gradually. Remove the cap (3) and top up with oil.

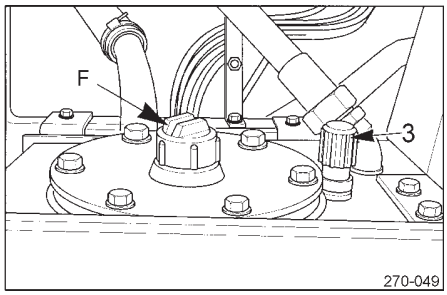


1. Lower the bucket horizontally onto the ground and switch off the engine. Wait for five minutes, then check the oil level in the inspection glass (G) of the hydraulic tank. The oil level must be visible in the centre of the inspection glass.



2. If the oil level is too low, loosen the screws (1) and open the cover (2) above the hydraulic tank to the front.

3. Unscrew the screw plug (3) slowly so that pressure can escape gradually. Then unscrew the cap (F) of the oil filler inlet.



4. Pour in hydraulic oil through the oil filler inlet.

   Information on recommended oils, see section **"LUBRICANTS AND OPERATING AGENTS".**

5. Retighten firmly the screw plug (3).

NOTE

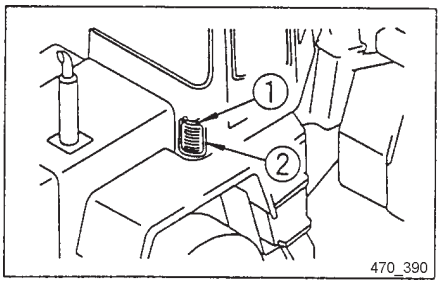
Do not top up with too much oil as this could damage the hydraulic system and cause oil to spray out of the ventilation filter.

CLEANING THE FRESH-AIR FILTER INSERTS

CAUTION

- **Whirled up dust particles may hurt the eyes! Always wear protective goggles if you are cleaning the filter inserts with compressed air.**
- **Dangerous dust particles may irritate the lung! Always wear a protective mask if you are cleaning the filter inserts with compressed air.**

Switch off the air-conditioning system before cleaning the filter inserts.

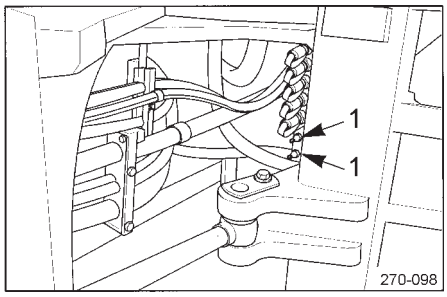


1. Loosen the screws (1) and remove the cover (2).
2. Mark the outside of the filter.
3. Loosen the wing nut, remove the support rail and remove the three filter inserts.
4. Blow out the interior of the filter inserts using compressed air (pressure max. 7 bar). Then, blow-clean the external surfaces. Finally clean the interior of the filter inserts again.
5. Re-insert the filters with the markings pointing to the outside.
6. Replace the cover.

LUBRICATION

DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.



1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance", before performing maintenance measures.
2. Clean the grease nipples which are indicated by arrows.
3. Apply sufficient grease using a grease gun.
   Rear axle bolts (2 points)
4. Remove old grease which is pressed out of the bearing.

NOTE

The lubrication is to be performed in shorter intervals, when you are working frequently in humid conditions or in a salty environment.

MAINTENANCE EVERY 250 OPERATING HOURS

This maintenance cycle automatically includes all maintenance operations to be performed every 100 operating hours.

ENGINE, CHANGE OIL AND OIL FILTER CARTRIDGE

WARNING

- **Longer or repeated skin contact with used engine oil can lead to skin irritations and other physical damages! Wear protective gloves when changing oil. Wash skin carefully if it has come into contact with engine oil.**
- **Hot engine oil may cause burns! Wear protective gloves and hold the collecting container in such a way under the discharge opening that you do not have contact with the oil.**

The following items are required:
- Sufficiently large oil collecting container/vessel
- Engine oil with the specified quality, see section **"LUBRICANTS AND OPERATING AGENTS"**
- Filter wrench

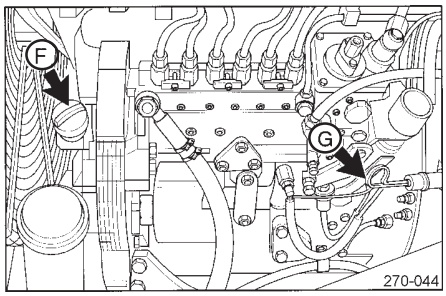
NOTE

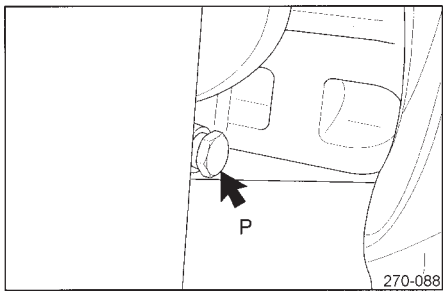
Only perform the oil change with the engine being warm.

DANGER

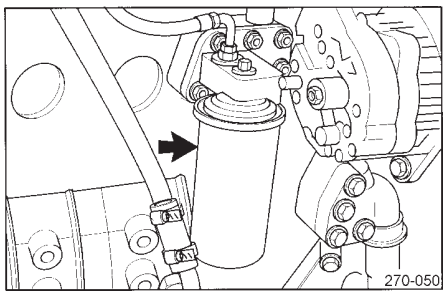
Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance", before performing maintenance measures.
2. Open the lateral engine hoods.
3. Open the oil filler inlet (F) on the right-hand side of the machine.
4. Place the oil collecting container below the drain plug (P) (on the rear frame on the right-hand side, behind the wheel).
5. Open the drain plug (P) and drain oil.
6. Inspect the drained oil: if it contains too many metal particles or foreign bodies, contact your local Komatsu dealer.
7. Retighten the drain plug.



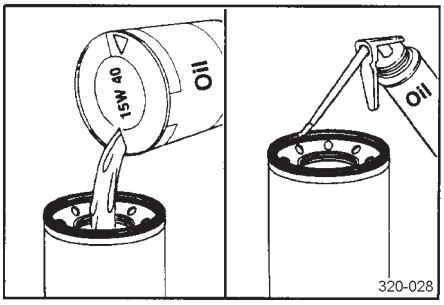


8. Using a filter wrench, unscrew the filter cartridge anti-clockwise on the left-hand side of the machine.



9. Clean the filter support. Fill up the new filter cartridge with engine oil. Oil the seal and thread of the cartridge slightly with engine oil (or apply a thin coat of grease). Re-insert the filter cartridge and tighten it.

10. The sealing surface of the cartridge must rest lightly against the filter support first when installing. Then, tighten the filter cartridge, as specified in the instructions of the filter manufacturer.

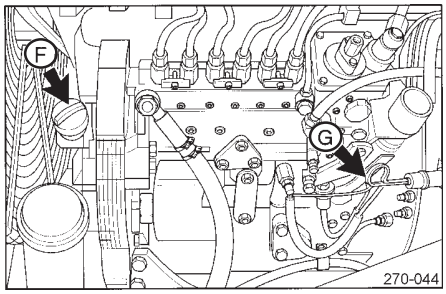


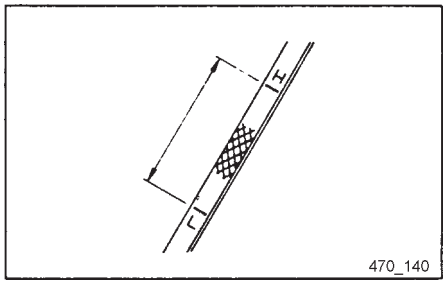
11. After replacing the filter cartridge, pour fresh engine oil into the filler inlet (F) until the oil level has reached the marking (H) on the dipstick.

    Information on recommended oils, see section **"LUBRICANTS AND OPERATING AGENTS".**

12. Let the engine run idle for a short period, then switch it off and check the oil level.

    Further details, see section **"MAINTENANCE PRIOR TO STARTING UP"**





CHECKING THE AIR ASPIRATION SYSTEM

Check the air aspiration lines for damaged hoses, loose hose clamps and holes, which could result in damage to the engine. If necessary, tighten or replace components to ensure that the air aspiration system has no leaks.

AIR-CONDITIONING, CHECK TENSION OF THE COMPRESSOR V-BELT

The performance of the air-conditioning system and the service life of the V-belt depend on the correct tension.

DANGER

You can be severely injured, if you touch the running V-belt or the rotating fan!
Never reach into or in the vicinity of the V-belt or fan when the engine is running.

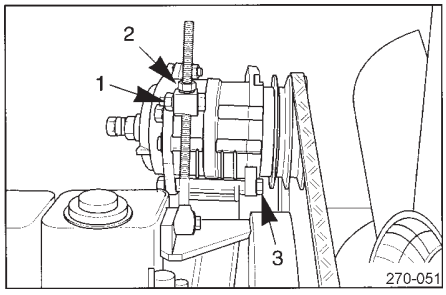
INSPECTION

The air-conditioning compressor is located on top of the engine behind the right-hand side flap.

To check the tension, press in the back of the V-belt with moderate thumb pressure in the centre between the belt pulleys. It should be possible to depress the V-belt by about 10 mm.

Check the belt pulleys and the compressor V-belt for damage, wear and tear. The belt must not run in the base of the V-belt groove.

The belt must be replaced if excessively worn or cracked.



ADJUSTMENT

Loosen the retaining nuts (1 and 3) by approx. 1 turn and adjust the compressor using the adjusting nut (2). Retighten the retaining nuts.

CHANGE

To change, remove the protective grid and the fan. If the V-belt is being exchanged, push the tension unit back far enough so that the new belt can be mounted without overstretching.
Check and re-adjust the tension of the new V-belt after it has been running for approx. 10 to 20 minutes.

NOTE

V-belts must be kept free of grease, oil and fuel.

BATTERIES, CHECKING THE ACID LEVEL

WARNING

- **Danger of injury! The battery contains strongly aggressive battery acid which may spill and burn your eyes! Carry goggles and rubber gloves if you work on the battery. Immediately wash off battery acid from 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.**

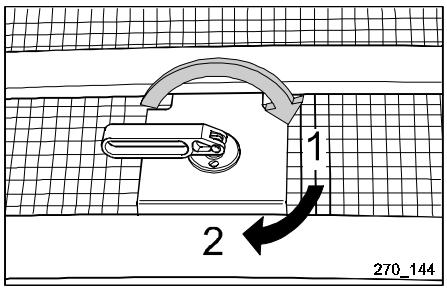
CAUTION

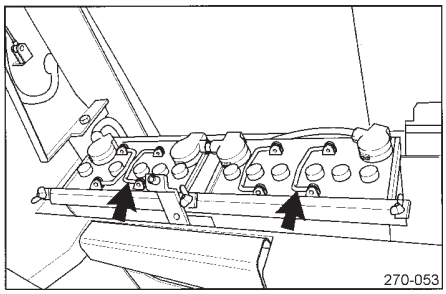
- **Possibility of short circuiting! If you join the positive and the negative pole of the battery while they are conducting (e.g. with a tool), a short circuit can result and the battery may explode!**

  Neither place tools nor any conducting connections, such as cables, on the battery. Always pull off the battery main switch (1) or disconnect the cable from the negative pole before checking the electric system.
- **Overvoltages resulting from disconnecting the battery while the engine is still running, may damage parts of the electric system.**

  Switch off the engine before disconnecting the battery.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Push the locking lever of the radiator protection to the right-hand side into position '1'. Then, turn it downwards into positon '2' and open up the radiator protection.
3. Check the battery and pole terminals for proper fit.
4. Clean the pole terminals and lubricate them with pole grease.
5. Clean the environment of the screw plugs.
6. 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, fill up with diluted sulphuric acid.





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.

7. 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

8. Lock the cells with the cleaned plugs.

BATTERY RECHARGING

Recharging an installed battery.

- Before recharging, remove the negative (-) battery terminal. Otherwise, the three-phase generator will be damaged due to high voltage peaks.

- Remove all stoppers from the battery before recharging to ensure that there is sufficient venting and ventilation. Keep naked flames and sparks away from the battery to prevent any danger of gas explosion.

- Interrupt the recharging procedure, if the temperature of the battery acid exceeds 45 °C.

- Switch off the recharging unit as soon as the battery is recharged. Overcharging the battery can result in the following conditions:
  1) Battery overheating
  2) Reduction in quantity of battery acid
  3) Damage to the electrode plates.

- Do not mix up the cables (positive [+] and [-]).

- Remove the cables from the poles if performing maintenance work on the battery, except for checking the acid level or measuring the specific density.

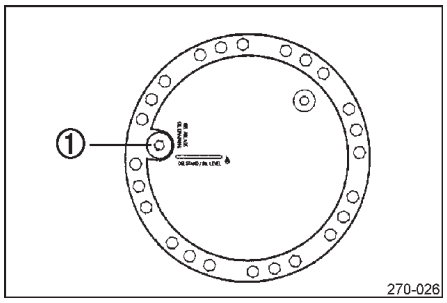
AXLES, CHECK OIL LEVELS

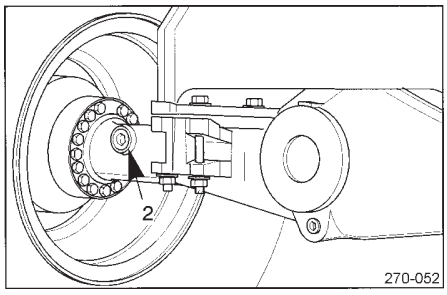
The machine must be parked on solid, even ground for this work.
Inspection of an axle must be carried out on all three inspection bore holes in one complete maintenance cycle.

DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Lower the work unit to the ground.
3. Before opening, clean thoroughly all lubricating points.
4. Planetary transmission:
   a. Move the machine until the oil level markings on both planetary transmissions are horizontal.
      The axles must be in horizontal position without any lateral inclination when carrying out this inspection.
   b. Secure the machine.
   c. Unscrew the filler plugs (1) of the inspection bore holes. The oil level must reach the lower rim of the inspection hole. If necessary, top up with fresh oil through the inspection hole.
   d. Replace the filler plugs with undamaged sealing rings and retighten it.
5. Differential transmission:
   The axles must be in horizontal position without any lateral inclination when carrying out this inspection.
   a. Unscrew the filler plugs (2) of inspection bore holes. The oil level must reach the lower rim of the inspection hole. If necessary, top up with fresh oil through the inspection hole.
   b. Replace the filler plugs with undamaged sealing rings and screw tight.
6. Repeat the entire maintenance cycle at the second axle.





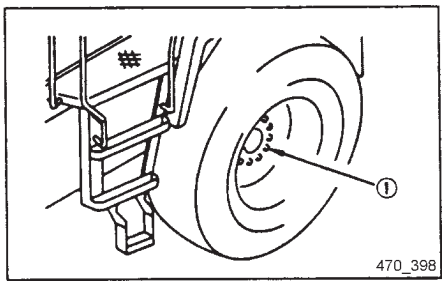
Information on recommended oil, see section **"LUBRICANTS AND OPERATING AGENTS".**

WHEEL NUTS, CHECK, RETIGHTEN

WARNING

Loose wheel nuts (1) can result in severe accidents!
Control and retighten the wheel nuts regularly.

Retighten any loose wheel nuts. **Torque: 560 Nm**



NOTE

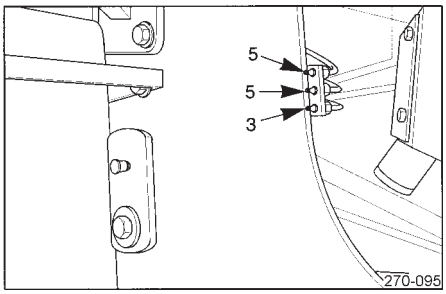
If a wheel nut breaks, all wheel nuts of the relevant wheel must be replaced.

LUBRICATION

DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

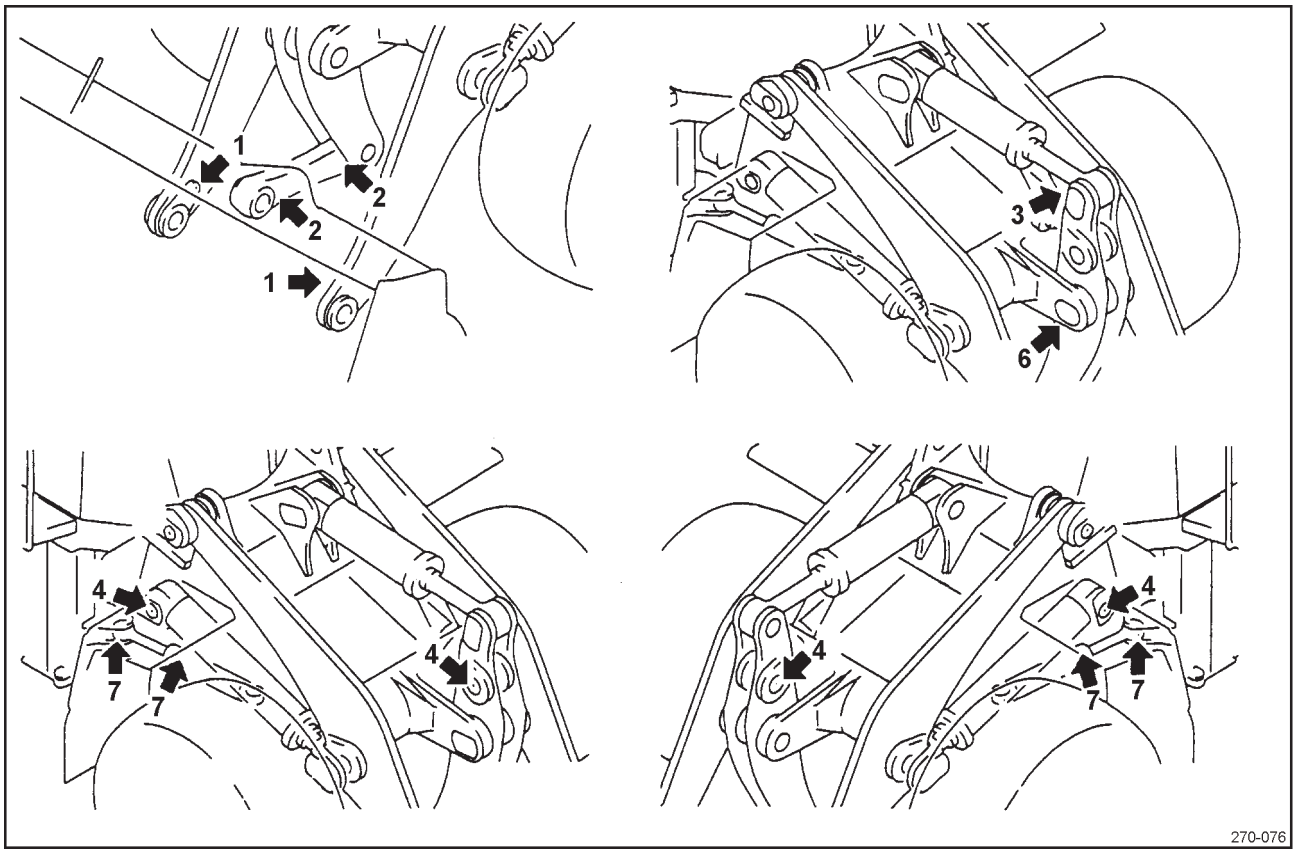
1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Clean the grease nipples indicated by arrows.
3. Apply sufficient grease using a grease gun.
4. Remove the old grease which is pressed out of the bearing.



1.	Bucket bolts	(2 points)
2.	Tilt rod bolts	(2 points)
3.	Tilt cylinder bolts	(2 points)
4.	Lift cylinder bolts	(4 points)
5.	Boom bolts	(2 points)
6.	Tilt lever bolts	(1 point)
7.	Steering cylinder bolts	(4 points)

NOTE

Reduce the lubrication intervals if you are constantly working in humid conditions or in a salty environment.



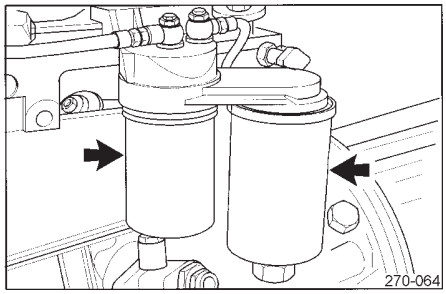
MAINTENANCE EVERY 500 OPERATING HOURS

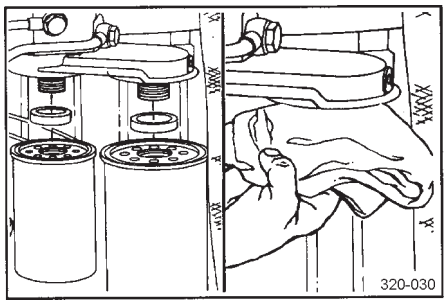
This maintenance cycle automatically includes all maintenance operations to be performed every 100 and 250 operating hours.

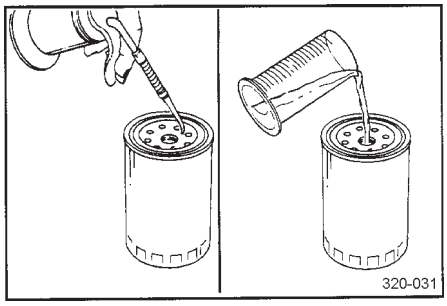
FUEL FILTER, CHANGE FILTER CARTRIDGES

DANGER

Fuel may ignite on hot surfaces!
Wait until the engine has sufficiently cooled down, before replacing the filter cartridges.







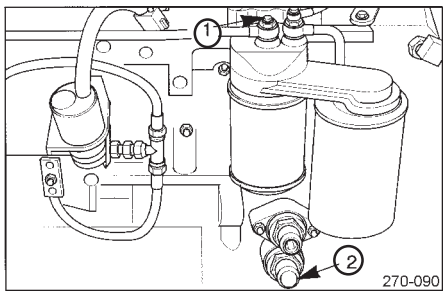
A filter wrench and a container for catching fuel are required for this work.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance", before performing maintenance measures.
2. Open the right engine cover.
3. Clean the area around the fuel filter.
4. Unscrew the filter cartridges using the filter wrench.
5. Clean the filter head.
6. Change the O-rings.
7. Fill up new filter cartridges with clean fuel.
8. Apply a thin engine oil film on the sealing surfaces of the filter cartridges and the O-rings.
9. Re-insert the filter cartridges and manually retighten them until the seals have contact. Now tighten the filter cartridges by approx. 1/2 a turn. (Observe the filter manufacturer's instructions).
10. Bleed the fuel system (see following page).
11. Start up the engine and check for leaks.

DANGER

The fuel inside the injection system is under pressure. Fuel which is splashing out can penetrate the skin and lead to blood poisoning.
Wear protective goggles and rubber gloves, when working on the injection pump. If you are hit by a high-pressure stream of fuel, immediately go to see a doctor and describe what has happened.

BLEEDING THE FUEL SYSTEM

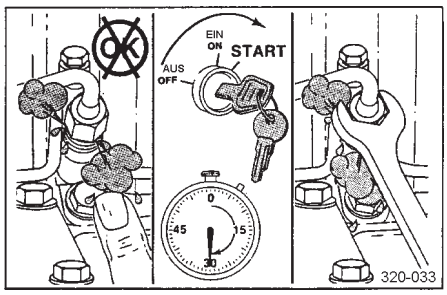


Have a container ready to collect fuel.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance", before performing maintenance measures.
2. Loosen the bleed screw (1).
3. Activate the pump (2) until fuel emerges from the bleed screw which is bubblefree.
4. Retighten the bleed screw.
5. Activate pump several times to bleed the injection pump.
6. Loosen the injection lines, one after the other, at the noozle holders.
7. Turn the engine using the starter until all air has emerged from the injection lines. Do not activate the starter for longer than 20 seconds without interruption.
8. Reconnect and retighten all connections

WARNING

If the engine is running, be careful not to get injured by the moving parts of the engine compartment.
Do not perform actions in the engine compartment while the engine is running.



9. Start the engine and carefully bleed the lines again, one after the other, with the engine running until the engine runs smoothly.

IMPORTANT

If the fuel system has run empty during driving, or if repairs or maintenance tasks have been performed on it, it is required to bleed the system.

MAINTENANCE EVERY 1000 OPERATING HOURS

This maintenance cycle automatically includes all maintenance operations to be performed every 100, 250 and 500 operating hours.

TRANSMISSION, CHANGE OIL AND FILTERS

WARNING

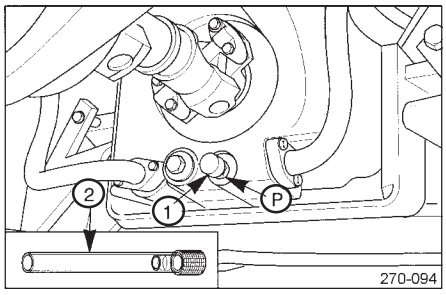
- **Frequent skin contact with used transmission oil may cause skin damages and other injuries!**
  Carry rubber gloves for exchanging the filter. Wash any transmission oil carefully from your skin.
- **Danger of being burnt by hot transmission oil!**
  Wear rubber gloves and hold the oil trough under the discharge hole in such a way that you cannot come into contact with the extruding oil.

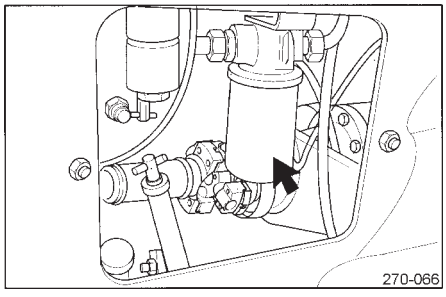
Have a collecting container of sufficient volume ready to collect oil.

DANGER

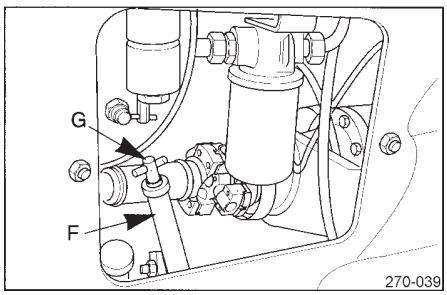
Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Place the collecting container below the drain valve (P).
3. Remove the cap (1) of the drain valve (P) and connect the drain pipe, thus opening the drain valve. Drain the oil into the collecting container.
4. Unscrew the drain pipe and close drain valve with the cap.
5. Place a collecting tray below the transmission oil filter.
6. Unscrew the old filter cartridge. Fill up the new filter cartridge with fresh oil and apply a thin oil film on the seal.
7. Screw in the filter cartridge manually until the sealing has contact. Then tighten the filter cartridge (observe the filter manufacturer's instructions).





8. Pour the prescribed quantity of oil in the oil filler inlet (F). Information on the recommended oil, see section **"LUBRICANTS AND OPERATING AGENTS".**
9. After filling up oil, check the oil level:

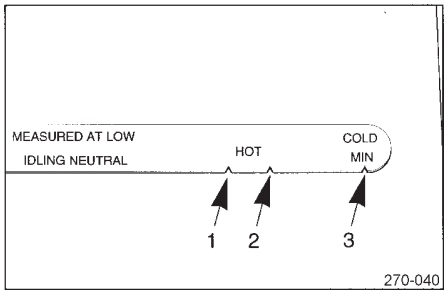


NOTE
The oil level in the transmission can rise considerably when the engine is not running. For this reason, only check the transmission oil level with the engine idling. The gear-shift must be in its neutral position.

1) Turn the handle of the dipstick (G) anti-clockwise until it is loose. Then pull out the dipstick and wipe off the oil with a clean cloth.

2) Push the dipstick into the filler nozzle (F) fully and pull out again.

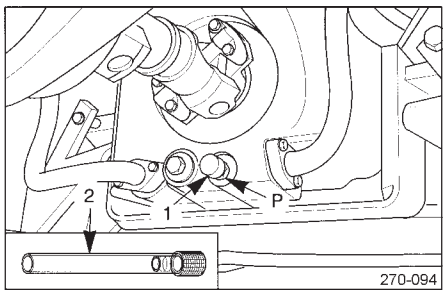
3) Read off the oil level:
Range between markings 1 and 2:
operational range - oil temperature between 40°C and 80°C
Range between markings 2 and 3:
operational range - oil temperature between ambient temperature and 40°C
below marking 3:
minimum when the oil is cold



4) If the oil level is below the appropriate marking, top up with fresh oil in the oil filler nozzle (F).

5) If the oil level is above the appropriate marking, the excess oil will have to be drained off from the drain plug (P) and the oil level checked again.

6) When the oil level is correct, insert the dipstick again and tighten the cover by turning the handle on the cover clockwise.



7) Check the transmission and filter for leaks.

ENGINE, ADJUSTING THE VALVE CLEARANCE

NOTE

The valve clearance may only be adjusted by a competent garage. Refer to the workshop and training manual for the required actions and settings.

SERVICE BRAKE, CHANGE OIL FILTER

Run the engine for approx. 3 minutes at high speed in order to fill the service brake pressure accumulator. Then switch the engine off.

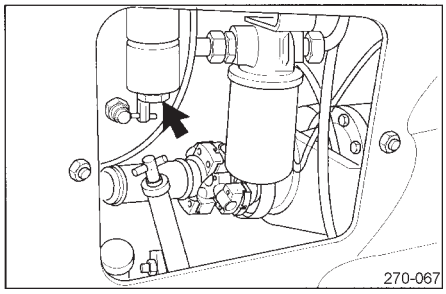
WARNING

Frequent skin contact with used transmission oil may cause skin damages and other injuries!
Carry rubber gloves for exchanging the filter. Wash any transmission oil carefully from your skin.

DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Unscrew the filter housing behind the left-hand side cover of the rear frame and remove the filter insert.
3. Clean the filter housing and check the O-ring of the sealing; exchange the O-ring if it is damaged, hardened or significantly deformed.
4. Insert the new filter insert. Then, re-insert and retighten the screw filter housing.
5. Let the engine run and check the filter housing for leaks.



DRIVE BELTS, CHECK TENSION PULLEY AND FAN BEARING

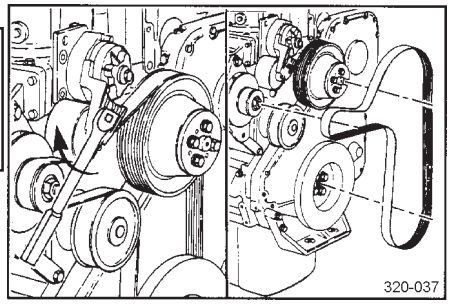
DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".

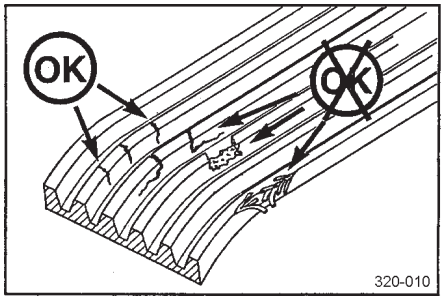
WARNING

When the engine is running, you may get hurt by the moving components of the engine compartment.
For this reason, do not perform actions in the engine compartment while the engine is running.



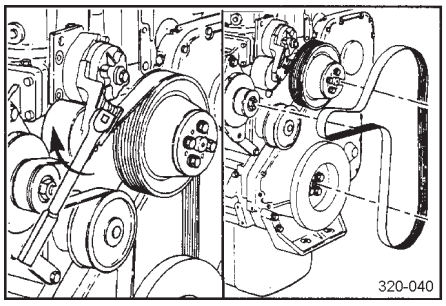
2. Remove the fan protector from the radiator, the fan and the compressor drive belt. Raise the belt tensioner using a 3/8" bar and remove the drive belt.

NOTE
Never push the belt tensioner down to avoid that the tension spring is breaking.



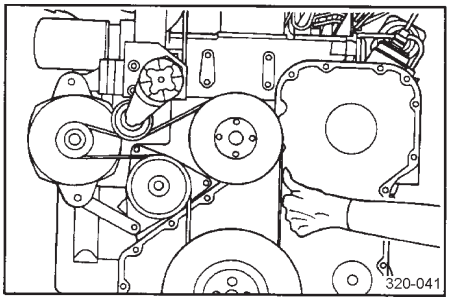
3. Check whether the belt has any signs of cracks. Cracks across the width of the belt are permitted. Longitudinal cracks along the length of the belt meeting cross-cracks, missing pieces or damaged fabric layers are not permitted. In this case, the belt will have to be exchanged.

4. Check tension pulley bearing and the fan bearing. The tension pulley and the fan must rotate freely and easily.



5. Raise the belt tension pulley with a 3/8" wrench. Connect the drive belt by placing on the ribbed belt pulley first and then sliding the belt over the water pump belt pulley.

   After raising the belt tension pulley, check the cover screw of the tension pulley arm. **Torque: 43 Nm.**

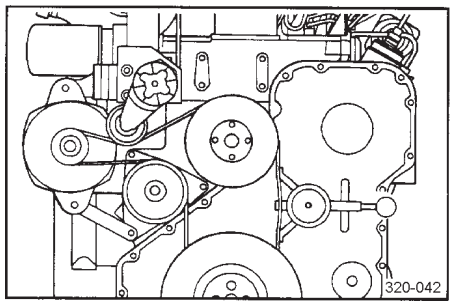


6. Check the tension of the drive belt. The tension is checked by pressing in the back of the belt . This test is to be performed at the centre of the longest, straight stretch of the belt.

   It should be possible to depress the belt by **10 to 12 mm**.

7. It is recommended, to use a Cummins belt tension tester (ST-1293).

Measured value: 267 to 578 N



TURBOCHARGER, CHECKING THE ATTACHMENT AND PLAY

Have the attachment components and the play of the turbine and compressor wheel checked by your local dealer.

CHECKING THE GAS PRESSURE

DANGER

Danger of injuries! The pressure tanks are filled with nitrogen gas, which is put under pressure.
Never open or damage the pressure tanks .

Have the gas pressure of the pressure tank checked by your local dealer when maintaining or replacing important, safety-related components at the prescribed intervals.

NOTE

In countries with a hot climate, the responsible Komatsu dealer must check the gas-pressure of the pressure reservoir already every 650 hours.

AXLES, OIL CHANGE

The oil change procedure for the front and the rear axle is identical.

WARNING

- **Frequent skin contact with used oil may cause skin damages and other injuries!**
  Carry rubber gloves for exchanging the filter. Wash any oil carefully from your skin.
- **Danger of being burnt by hot transmission oil!**
  Wear 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.

NOTE

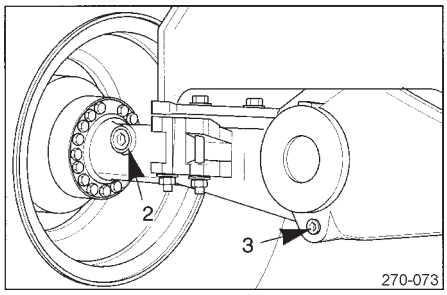
Drain oil immediately after a longer driving period so that any particles of dirt are still circulating and will be flushed out with the oil.

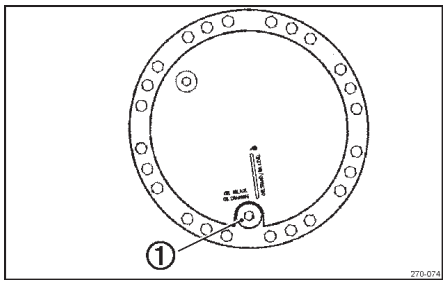
Have a collecting container of sufficient capacity ready when carrying out this work.

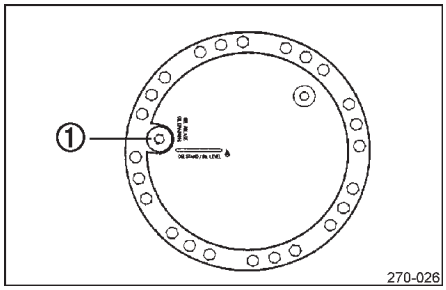
DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Move the machine until the control bore holes (1) of both planetary transmissions of an axle are at their lowest point.
3. Place the collecting container below the oil discharge opening.
4. Remove the screw plugs of the control holes (1 and 2) and the drain plug (3). Drain oil into collecting container.
5. Clean the drain plug (3) and re-insert it with a new O-ring.
6. Now move the machine until the oil level markings on both planetary transmissions are horizontal.
7. Pour oil slowly into all control holes (1 and 2) until the oil reaches the lower rim of the control holes.
8. Wait a few minutes then recheck and top up, if necessary, until the oil level remains constant at the lower rim of the control holes.
9. Replace the control screws with new O-rings.
10. Repeat the process on the other axle.
11. Check for leaks after driving for approx. 5 minutes.







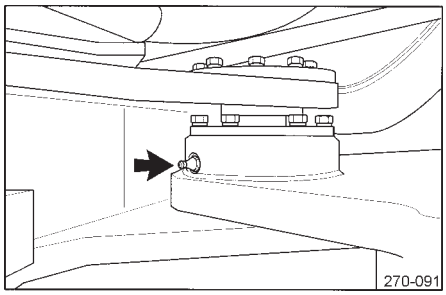
LUBRICATION

Perform the lubrication thoroughly and in time.

DANGER

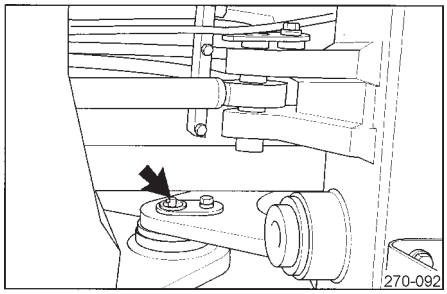
Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

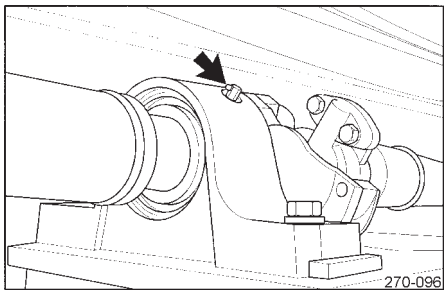
1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance", before performing maintenance measures.
2. Clean the grease nipples which are indicated by arrows.
3. Apply sufficient grease using a grease gun.
   Articulated steering (2 points)
   Universal joints on cardan shafts (5 points)
   Intermediate bearing of the front cardan shaft (1 point)
4. Remove old grease which is pressed out of the bearing.



NOTE

The lubrication is to be performed in shorter intervals, when you are working frequently in humid conditions or in a salty environment.

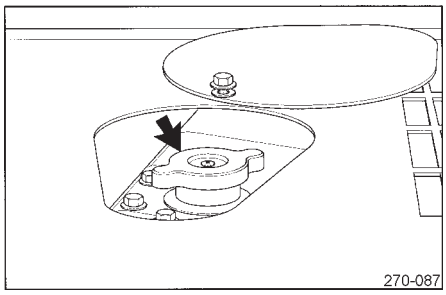




COOLING SYSTEM, EXCHANGING COOLANT AND CLEANING THE SYSTEM

WARNING

Danger of being burnt! The coolant is under pressure if the engine is hot. Hot coolant may squirt out during opening.
Do not open the radiator until the engine has cooled down somewhat. 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

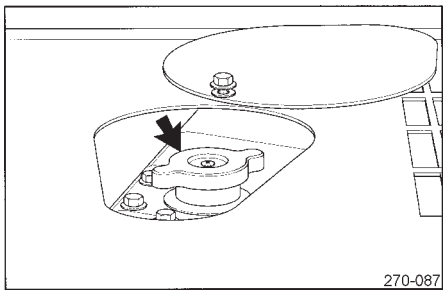
The coolant must be exchanged after max. two years.

NOTE

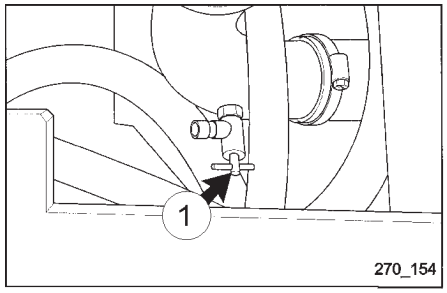
Antifreeze in the coolant is required in all climates since it does not only lower the freezing point, it also raises the boiling point, lubricates moving parts and sealing lips and prevents corrosion as well. While preparing the coolant, make sure to adhere to the prescribed mixing proportions to ensure 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. Use a suitable aid (e.g. ladder) to climb up the back of the machine and undo the cover screws on the engine hood.
3. 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.
4. Stretch a tube onto the drain opening (1) of the discharge cock and insert the other tube end into the collecting container.
5. Open the discharge cock and let the coolant run off.
6. Close the discharge cock.

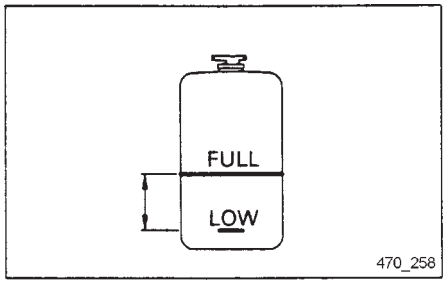


Cleaning the Cooling System

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.

7. Fill up the cooling system slowly with cleaning fluid
   (Adhere to the specifications of the cleaning agent manufacturer).
8. With the radiator cap opened, let the engine run for 5 minutes with a coolant temperature of approx. 80°C.
9. 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.
10. Let the engine run for five minutes with a coolant temperature of approx. 80° C.
11. 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.
12. Close the drain valve.



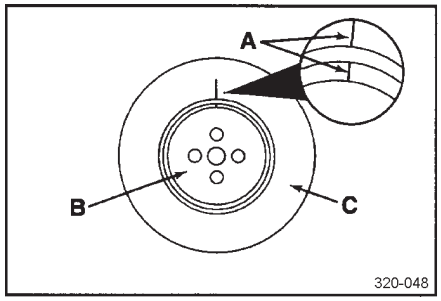
Filling Up Coolant

13. Empty and clean the expansion tank.
14. Prepare the coolant as prescribed.
15. Fill up the coolant slowly into the cooling system up to the overflow shoot of the radiator.
16. 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.
17. Switch off the engine, wait approx. three minutes and then refill coolant up to overflow shoot of the radiator. Re-lock the radiator.
18. Fill up coolant into the expansion tank, until the coolant level is between the FULL and LOW markings.

MAINTENANCE EVERY 2000 OPERATING HOURS

This maintenance cycle includes all maintenance operations to be performed every 100, 250, 500 and 1000 operating hours.

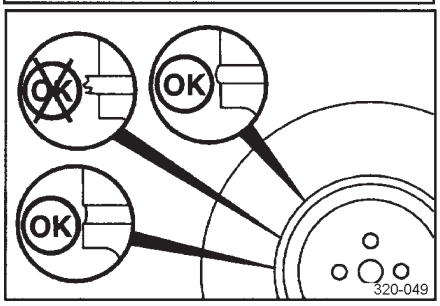
CHECK SHOCK ABSORBER



1. Check the control marks A on the absorber hub (B) and the flywheel (C). If these markings are more than 1.6 mm apart, the vibration absorber must be exchanged.

2. Check the rubber section. The shock absorber must be replaced if parts are missing or if the rubber is more than 3.2 mm below the metal surface.

3. The shock absorber must also be exchanged if the flywheel (C) can be moved on the absorber hub (B).



CHECKING THE COOLING SYSTEM

NOTE

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

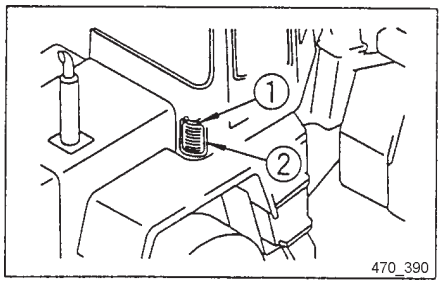
CHECKING AND CLEANING THE TURBOCHARGER

Accumulation of oil carbon or oil sludge on the blower wheel reduces the performance of the turbocharger and can lead to damage. Therefore, have it cleaned by your local dealer.

CHECK THREE-PHASE GENERATOR AND STARTER

Consult the responsible dealer for inspection or repair, if the carbon brushes are worn or grease is emerging from the bearing seals. Have inspections carried out every 1000 operating hours, if the engine is being started frequently.

AIR-CONDITIONING, CHANGING THE FILTER INSERTS



Switch off the air-conditioning before changing the filter inserts.

1. Loosen the screw (1) and remove the cover (2).
2. Loosen the wing nut, remove the bracket and filter inserts.
3. Insert new filter inserts and the bracket, re-insert the cover.

HYDRAULIC SYSTEM, OIL CHANGE, CHANGING THE FILTER INSERT

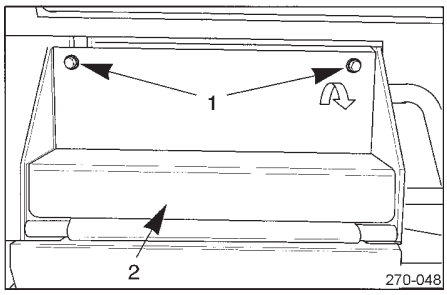
DANGER

- **Frequent skin contact with used hydraulic oil may cause skin damages and other injuries! Wear rubber gloves for changing the oil. Wash any hydraulic oil carefully from your skin.**
- **The hydraulic tank is put under pressure! Danger of being burnt by hot transmission oil! Wear 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. Loosen the screw plug (3) by a few turns to let the pressure escape, before opening the cap (F).**

Have a collecting container of sufficient capacity ready when carrying out this work.

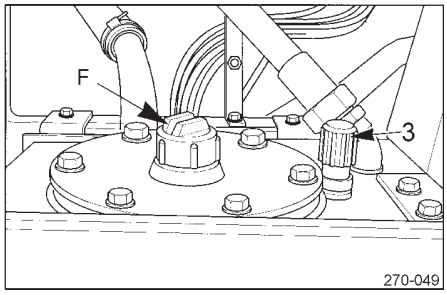
1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".

2. Remove screws (1) and open the cover (2) to he front via the hydraulic tank.



3. Unscrew the venting filter (3) slowly so that the pressure can escape.

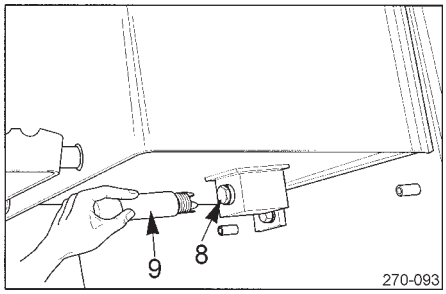
4. Then unscrew the cap (F) of the oil filler inlet.



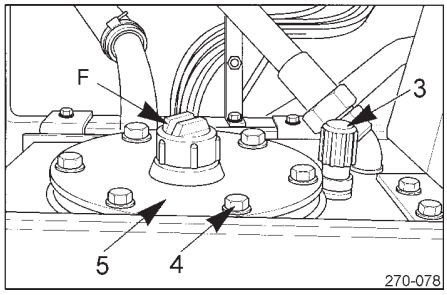
5. Place the collecting container below the drain valve.

6. Remove the drain plug (8) of the drain valve. Screw the drain pipe (9) (included with tools) into the threaded hole of the drain plug (8). This opens the drain valve. A hose can be connected to the drain pipe in order to be able to collect the oil better.

7. After the oil has drained, unscrew the drain pipe and re-seal the drain valve with the drain plug and an undamaged washer.



8. Remove the screws (4) from the filter cap (5) and remove the cap.



9. Remove the filter insert (6).

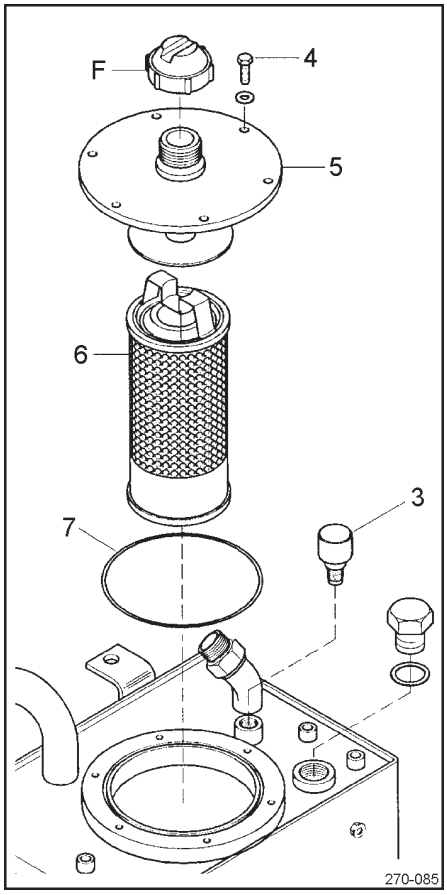
10. Clean the interior of the filter. Before cleaning, check whether there are any foreign particles inside the filter.

11. Insert a new filter insert. Retighten the cap.
If the O-ring (7) of the cap is no longer in perfect condition, replace it by a new one.

12. Tighten the cap screws evenly.

13. Top up with oil at the oil filler inlet until the prescribed oil level has been reached. Retighten the filler cap.

    Details of recommended oil, see section **"LUBRICANTS AND OPERATING AGENTS".**



14. Clean the venting filter in fuel and re-screw it.

15. Check the oil level. See section **"MAINTENANCE EVERY 100 OPERATING HOURS"** for further details.

CAUTION

The piston rings will be damaged by the air in the cylinders if
- **the engine is run idle at a too high speed during the extraction or retraction of the cylinders,**
- **the cylinders are extracted up to the limit stop!**

Therefore, let the engine only run at low speed.

16. Run the engine idle at low speed and extract and retract the steering, bucket and boom cylinders about 5 times each. Pay attention that the cylinders are not extracted fully in order to prevent excessive pressure being caused in the hydraulic system (stop about 100 mm from the end of the stroke).
17. Now extend the steering, bucket and boom cylinders completely for 3 to 4 times each. Switch off the engine.

18. Check the oil level in the inspection glass and top up oil to required level. Wait for five minutes and recheck the oil level . The oil level must now be visible in the centre of the inspection glass.

19. Run the engine at high speed and repeat the process described under step 17.

20. Recheck the oil level.

21. Check for leaks.

MAINTENANCE EVERY 4000 OPERATING HOURS

This maintenance cycle includes all maintenance operations to be performed every 100, 250, 500, 1000 and 2000 operating hours.

CHECK WATER PUMP

Open the left engine hood. Check the water pump for belt pulley play, emerging grease and leaks. The outlet hole in the base of the pump housing must not be blocked. If something is not in order, have the pump repaired by the responsible dealer or have the water pump exchanged.

MAINTENANCE AS REQUIRED

AIR FILTER: INSTALLATION AND REMOVAL OF FILTER ELEMENTS CLEANING FILTER INSERTS AND CHANGING SAFETY FILTER

AIR FILTER DESIGN

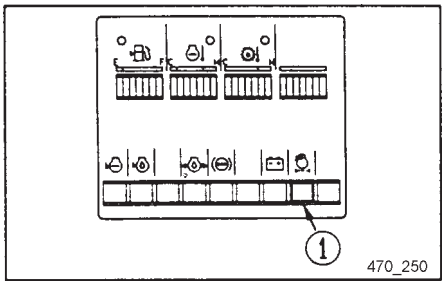
The air filter consists of the air filter housing with cover and dust extractor valve, the filter insert and the safety filter.

WHEN IS MAINTENANCE NECESSARY?

If the control light (1) for the air filter on the maintenance control panel starts to flash, the air filter insert is dirty. The air filter insert must be cleaned or replaced.

The condition of the filter insert should be checked from time to time, independent from the display on the control light. A damaged or deformed filter insert must be exchanged immediately.

If the safety filter is dirty, the filter insert is damaged. In this case, filter insert and safety filter have to be immediately replaced.

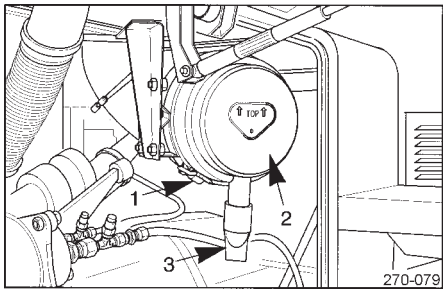


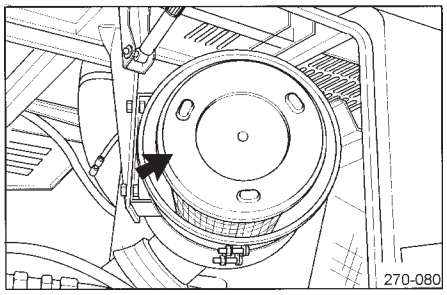
REMOVING THE FILTER INSERT

WARNING

If the engine is running, you may hurt yourself severely on the moving components of the engine compartment!
Do not perform actions in the engine compartment while the engine is running.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Open the right engine hood.
3. Loosen the clamps (1) and remove the cover (2).
4. Check the cover gasket.
5. Check the dust extractor valve (3). It must not be blocked, jammed or damaged. If it is defective, replace it.
6. Pull out the filter insert.
7. Clean the interior of the filter housing thoroughly with a rag.





CLEANING OR EXCHANGING THE FILTER INSERT

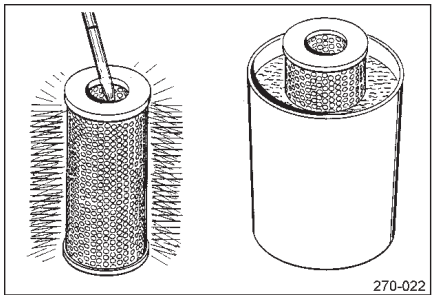
The air filter insert can be cleaned with compressed air or water with mild detergent, depending on the type of dirt.
The filter insert must be exchanged
if the control light lights up again only short time after cleaning,
if it was already cleaned six times or
after 2000 operating hours.

CLEANING WITH COMPRESSED AIR

DANGER

- **Whirled up dust particles may hurt the eyes!**
  Wear goggles if you clean the filter cartridges with compressed air.
- **Dangerous dust particles may irritate the lungs!**
  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.

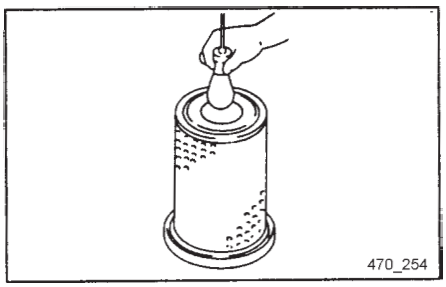


CLEANING WITH WATER OR DETERGENT

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 INSERT

Usually, it is required to check each air filter insert before it is re-installed. For this purpose, insert a into the insert 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 inserts for damaged seal.



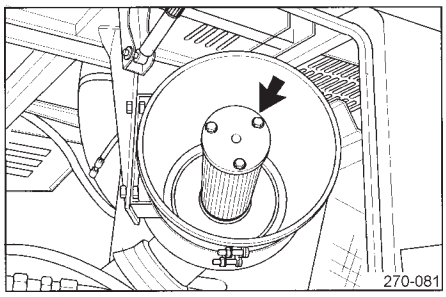
NOTE

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

CHANGING THE SAFETY FILTER

NOTE

Always insert a new safety filter. You must not clean the safety filter and re-use it. It must be replaced if the filter insert is exchanged for the third time.



1. Open the air filter and pull out the air filter insert (1) and the safety filter (2).
2. In order to prevent that dust enters the interior of the engine, it is required to block the air aspiration opening of the engine with a clean cloth or similar.
3. Clean the interior of the air filter housing and remove the cloth from air aspiration opening.
4. Check the new safety filter for damages using a lamp. Then, re-insert it firmly.

ASSEMBLING THE AIR FILTER INSERT

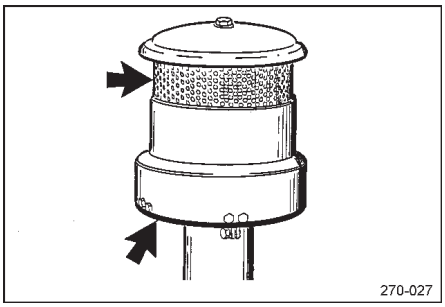
1. Check the safety filter for a proper fit.
2. Insert the filter insert into filter housing in such a way that the seal of the insert locks firmly on the collar of the housing rear panel.
3. Assemble the air filter cap.

NOTE

If the control light lights up again after a short time, you must replace both, the air filter insert and the safety filter.

DUST PRE-EXTRACTOR "TURBO II": CHECK, CLEAN

(This pre-extractor is an optional special equipment)



The intake screen and the dust extractor gap (at the bottom section of the pre-extractor) must always be kept clean.

The pre-extractor should be unscrewed and its condition checked from time to time depending on use. If necessary, blow out the pre-extractor from the inside.

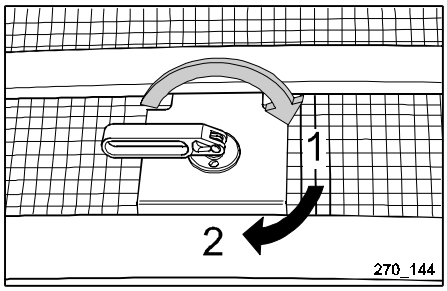
CLEANING THE RADIATOR

If the radiator is dirty, it has to be cleaned. Otherwise, the engine may overheat.

1. Push the locking lever of the radiator protection to the right-hand side into position '1'. Then, turn it downwards into positon '2' and open up the radiator protection.

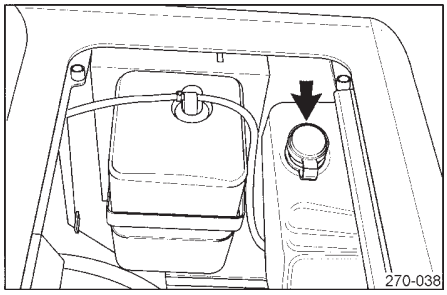
2. Clean the radiator with compressed air or water. A high-pressure or steam cleaner can be used if a sufficient distance is maintained so that the radiator fins are not bent.

3. Inspect the rubber hoses at the same time. If the hoses show signs of cracks or have hardened, they must be replaced by new ones. Tighten loose hose clamps.



WINDSCREEN WASHER, CHECKING FLUID LEVEL, TOPPING UP

1. Open the cover flap of the engine hood.
2. Check the fluid level in the washer tank. If it is too low, top up with a standard commercial fluid for windscreen washer systems.
3. Pay attention that no dirt or dust gets into the fluid in order to prevent the nozzles from getting blocked.



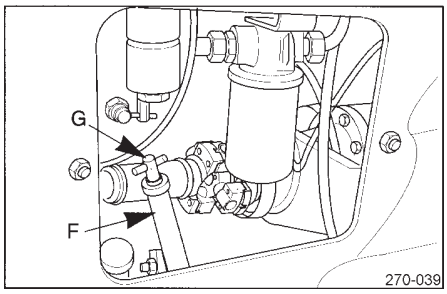
TRANSMISSION, CHECKING OIL LEVEL, TOPPING UP OIL

NOTE

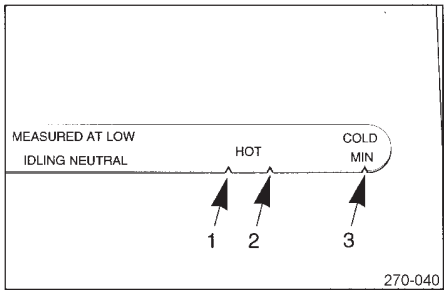
The oil level in the transmission can rise considerably when the engine is not running. For this reason, only check the transmission oil level with the engine idling. The gear-shift must be in the neutral position.

DANGER

Severe accidents may happen, if you perform maintenance operations on machines which are not properly parked and secured!
Park the machine on firm and level ground and secure it, before starting maintenance operations.

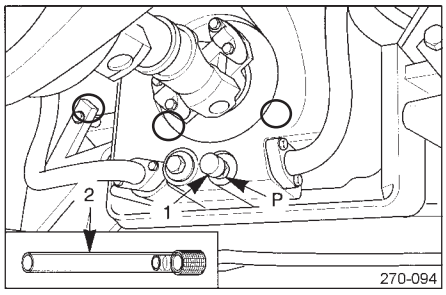


1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2. Remove the left side cover on the rear frame.
3. Turn the handle of the dipstick (G) anti-clockwise until it is loose. Then pull out the dipstick and wipe off the oil with a clean cloth.
4. Push the dipstick completely into the filler nozzle (F) and pull it out again.
5. Read off the oil level:
   Range between markings 1 and 2:
   Operational range - oil temperature between 40°C and 80°C
   Range between markings 2 and 3:
   Cold range - oil temperature between ambient temperature and 40°C
   Below marking 3:
   Minimum for cold oil



6. If the oil level is below the appropriate marking, top up with fresh oil in the oil filler nozzle (F).

   Details of recommended oil, see section
   "LUBRICANTS AND OPERATING AGENTS".



7. If the oil level is above the appropriate marking, the excess oil must be drained from the drain plug (P) and the oil level checked again.
8. When the oil level is correct, re-insert the dipstick and tighten the cover by turning the handle on the cover clockwise.
9. Replace the left side cover.

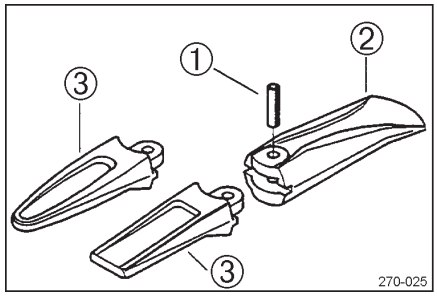
REPLACING BUCKET TEETH

Worn bucket teeth have to be replaced as follows:

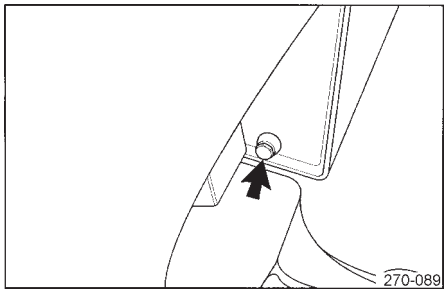
DANGER

Any movement of the bucket during replacing the bucket teeth can lead to severe accidents.
For this reason, park the machine on firm and level ground and secure the machine, before you start maintenance tasks.

1. Park and secure the machine as described in chapter "Preparing the Machine for Maintenance".
2.. Raise the bucket slightly and tip it in in such a way, that the underside is horizontal.
3. Place chocks under the bucket to prevent it from dropping down.
4. Knock out the securing pin (1) and remove the tooth (2).
5. Clean the mounting surface of the tooth holder (3).
6. Insert the new tooth in the tooth holder and secure it with a new securing pin.



FUEL TANK, DRAINING WATER AND DIRT DEPOSITS



This work has to be carried out if dirt or water is found in the pre-separating glass. Place a clean collecting container below the drain and open the drain plug on the left front side of the tank a few turns and drain off the water and dirt deposit. Retighten the drain plug firmly, when clean fuel starts to emerge from the drain hole.

NOTE

Pay attention that seal is tight.
The point of time at which the tank is to be maintained depends widely on the purity of the fuel.

TYRES, CHECKING AIR PRESSURE

Measure the air pressure while the tyres are still cold, i.e. prior to starting work. Do not deflate the tyres, if the pressure has risen on warm tyres.

NOTE

The appropriate air pressure for tyres depends on the type of work to be performed.
See also section:
"Handling Tyres".

AIR-CONDITIONING, CLEANING CONDENSER

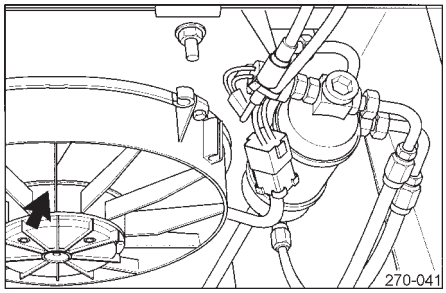
NOTE

Do not wash the condenser off with a steam cleaner or hot water. This could cause the condenser to become too hot and damage the air-conditioning.

1. Open the cover flap on the upper engine hood.

CAUTION

High water or air pressure can damage the radiator segments! During cleaning, ensure that the gap between the condenser and the end of the water or compressed-air hose is wide enough to avoid any deformation of the segments.



2. If the air-conditioning condenser is dirty, clean it with warm water or compressed air.

CHECKING AIR-CONDITIONING

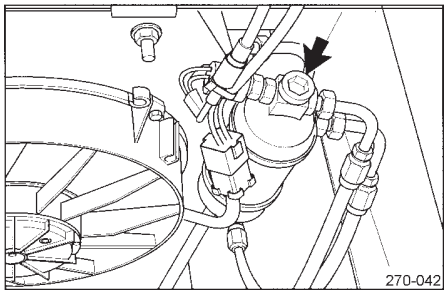
Check the air-conditioning twice a year, in spring and in autumn.

WARNING

Fluid spraying in the eyes or on the hands can lead to blindness or symptoms of frostbite.
Wear safety goggles and protective gloves when working on the air-conditioning. Never loosen parts of the coolant circuit.

CHECKING THE COOLANT LEVEL

Set the air-conditioning to "cold" and let the engine run for 5 minutes at 1000 rpm. Open the cover flap on the upper engine hood. Observe the indicator glass on the filter dryer. If clear fluid (1) is visible in the glass, the system is in order. If a clear stream of bubbles (2) or foam (3) can be seen in the glass, there is not enough coolant in the system. In this case, the system must be checked by a specialist for air-conditioning and the coolant is to be topped up.

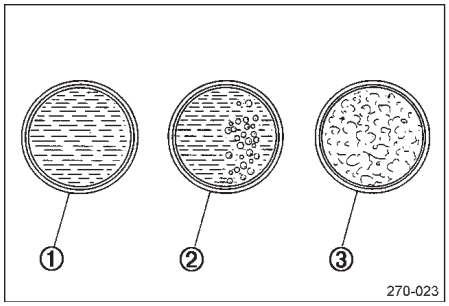


IMPORTANT

Small bubbles can form temporarily in the coolant in a troublefree system when the system is started up or if the engine speed is changed.

A slow loss of coolant is also normal even if there are no leaks in the system because of coolant diffusing through the walls of the hoses. This small loss must be replaced annually.

Contact the respobsible dealer if operations on the air-conditioning system are required.



NOTE

The correct quantity of coolant must be strictly observed: if there is not enough coolant, the system will not operate adequately; if there is too much coolant in the system, it switches off too soon and also operates inadequately. The system can be damaged if filling level deviates largely from specification.

TECHNICAL DETAILS

Technical details

SPECIFICATIONS			
Engine	Model		Komatsu S6D102E-1
	Engine output (ISO 9249)		103,5 kW (141 PS) / 2,200 min-1
	Torque, max. (DIN 70020)		566 Nm / 1,600 min-1)
	Starter		24 V
	Three-phase generator		24 V
	Battery		2 x 12 V 105 Ah
Driving speed	Forward gears	1.	7.2 km/h
		2.	12.7 km/h
		3.	27.2 km/h
		4.	41.8 km/h
	Reverse gears	1.	7.2 km/h
		2.	12.7 km/h
		3.	27.2 km/h
Tractive force, max.			108 kN
Turning radius 40°	Over bucket		5,717 mm
	Over tires		5,240 mm
Bucket, standard			2.0 m³
Carrying capacity, standard			3,600 kg
I:DTP\BA270GB\270ALU\270_alupm\TECHN.TBL02.2001			

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/EEC:
1 plate for sound pressure level L_{pA} = 76 dB/A
1 plate for sound power level L_{WA} = 106 dB/A

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

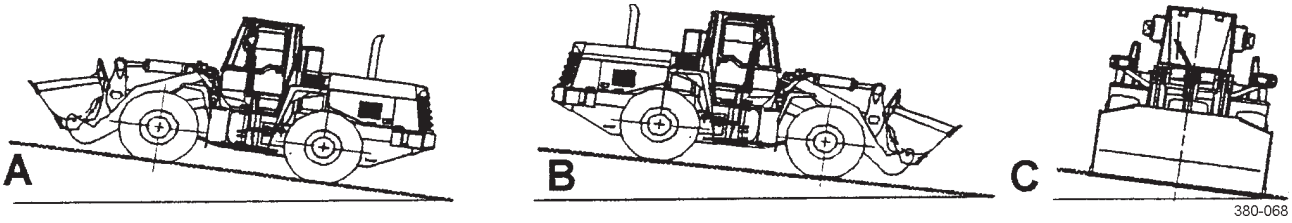
VIBRATION LEVEL

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 35° uphill, downhill or sideways. If you angle the machine at more than 35° during operation, the motor, transmission, hydraulic system or axles, will not be supplied with sufficient oil and can be damaged.

A	uphill	35°
B	downhill	35°
C	sideways	35°



NOTES

SPECIAL EQUIPMENT, AUXILIARY EQUIPMENT

ALS - ELECTRONIC

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 spring effect of the hydraulic accumulator installed to the circuit at the lift cylinder base end to absorb the vibration of the chassis when the machine is travelling. This enables the machine to travel smoothly at high speed.
- The ALS-Electronics consists of the ALS-Electronics switch, hydraulic accumulator and solenoid valves. When the travel damper switch is turned ON, the solenoid valves open, the circuit at the lift cylinder base end is connected with the hydraulic 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.

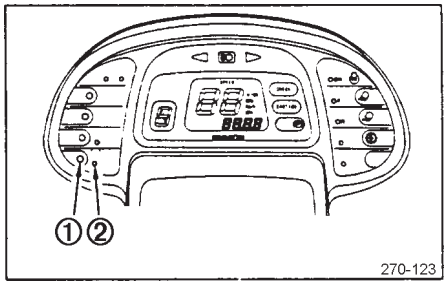
When inspecting and servicing the machine, also lower the work equipment to the ground then turn the ALS-Electronics switch OFF before beginning to service.

NOTE
The ALS system is activated when the transmission is shifted in 2nd to 4th gear and the machine is traveling at a speed higher than 5 km/h.

OPERATING THE ALS-ELECTRONICS

Switching ON the ALS-Electronics: Press the ALS-Electronics switch; the control lamp is lit.

Switching OFF the ALS-Electronics: Re-press the ALS-Electronics switch; the control lamp goes out.



Note

- **If, when the boom is raised, the boom-lift limit feature is activated, the ALS system is automatically switched off.**
- **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.**

PRECAUTIONS WHEN HANDLING THE ACCUMULATOR

WARNING

The accumulator is charged with high-pressure nitrogen gas, which is extremely dangerous, so read the following precautions and be careful to handle the accumulator properly.

- If any problem or failure occurs with the accumulator, contact immediately your Komatsu dealer.
- The gas must be charged only by a serviceman from your Komatsu dealer or by a person licensed to handle high pressure gas.
- Do not strike or bring any flame or heat close to the accumulator when it is charged with gas.
- Do not make any hole or weld any boss to the accumulator.
- Always release the gas before disposing of the accumulator or disassembling it for maintenance.
- Use the air bleed valve to release the gas.
- Contact your Komatsu dealer every 1,000 hours or once a year to have the gas pressure checked.
- In countries with a hot climate, the responsible Komatsu dealer must check the gas-pressure of the pressure reservoir already every 650 hours.