VEAM500100

Operation & Maintenance Manual

WA500-3H

WHEEL LOADER

SERIAL NUMBERS WA500H20051 AND UP

DANGER

Incorrect operation and maintenance of this machine may be hazardous and cause injuries. The operator and maintenance personnel must read this manual before commencing operation or maintenance. Keep this manual within reach at all times and ensure that operating personnel read it at regular intervals.

NOTE

Komatsu has had the operating and maintenance instructions translated into all the languages of the European Union. Should you require a copy in another language please inquire at your local dealer's.

KOMATSU

1. Introduction

1.1. Foreword

This manual takes into account legal directives and regulations necessary to ensure the safe and effective use of the machine.

Keep this manual within reach at all times and ensure that operating personnel read it at regular intervals. Call Komatsu or your local Komatsu dealer and request a replacement if this manual is lost or is no longer legible because of soiling. Pass the manual on to the new owner if selling the machine.

Our constant efforts to improve the design of our machines can result in changes to construction which may differ slightly from the details in this manual. Please contact Komatsu or your local Komatsu dealer if you require the latest available information on your machine or if you have questions regarding the contents of this manual.

Auxiliary equipment and accessories named in this manual may not be available in your region. If this is so, please contact Komatsu or your local Komatsu dealer with enquiries about the equipment you require.

⚠ DANGER

- **Incorrect operation and maintenance of this machine can be dangerous and lead to injury.**
- **The operator and maintenance personnel must read this manual before commencing operation or maintenance.**
- **The procedures and preventative measures named in this manual apply only for the intended use of the machine. If you use the machine for any other purpose than its intended function, you are responsible for ensuring that no danger is caused to you or others. Under no circumstances may you carry out work or functions which are explicitly forbidden in this manual.**
- **Safety regulations can be found under section "1.2. Safety information" on page 1-4 and in the chapter "2. Safety" on page 2-1".**

EU Directives

Machines delivered by Komatsu comply with the machinery directive 89/392/EWG as well as its supplements and the European standards EN474-1 and EN474-3. If the machine is being used in another country, it is possible that certain safety regulations and specifications may not be fulfilled for use in that country. For example, priority vehicle warning lamps may be used in some countries, but are forbidden in others.

Please contact our dealer before using the machine if you have any questions regarding the fulfilment of standards and regulations in a specific country.

Notes on subsequent installation of electrical and electronic equipment and components

Electrical and electronic equipment and/or components which have been installed subsequently, emit electromagnetic radiation which can influence the function of the electronic components and sections of the machine. This can have an influence on the safety of the machine and endanger persons. For this reason, please ensure that the following safety instructions are observed.

If you are installing electrical or electronic equipment and/or components in the machine and connect them to the vehicle electrical system, you must check at own responsibility that the installations do not cause any disturbance to the vehicle's electronic system or other components. Above all, you must ensure that any subsequently installed electrical and electronic components comply with the EMV Directive 89/336/EEC in its current edition and bear the CE mark.

The following requirements also have to be met for subsequent installation of mobile communication systems (e.g. radio, telephone):

- Only equipment approved by national legislation (e.g. BZT approval for Germany) may be used
- The unit must be fixed in position
- Portable or mobile units may only be used inside the vehicles if they are connected to a fixed outside antenna
- The transmitter unit must be spatially separated from the vehicle's electronic system
- Make sure when installing the antenna that this is installed correctly with good earth connection between antenna and vehicle mass

Also observe machine manufacturer's installation instructions for wiring, installation and maximum permitted power consumption.

1.2. Safety information

Most accidents are cause by failure to observe fundamental safety regulations during the operation and maintenance of the machines. Please read the safety and warning instructions in this manual and on the machine before operating or servicing the machine and observe them at all times in order to avoid any accidents.

The following words are used in this manual and on stickers on the machine to signify safety instructions and enable them to be recognized as such at a glance:

⚠ DANGER

This word is used for safety messages and safety label where there is a probability of serious injury if the danger is not avoided. The safety instruction or sticker contains precautions which must be observed in order to avoid the danger. Failure to do so can also result in damage to the machine.

⚠ WARNING

This word is used for safety messages and safety label where there is a potentially dangerous situation which could lead to serious injury if the danger is not avoided. The safety instruction or sticker contains precautions which must be observed in order to avoid the danger. Failure to do so can also result in damage to the machine.

⚠ CAUTION

This word is used for safety messages and safety label in the event of danger which could result in minor or partly serious injuries if the danger is not avoided. It may also relate to dangers which may only result in damage to the machine.

NOTE

This word is used for precautions which have to be taken in order to avoid situations which could result in shortening the service lift of the machine.

The safety instructions are listed in the chapter "2. Safety" on page 2-1 and following.

We cannot foresee all circumstances which could result in potential danger during maintenance and operation. The safety instructions in this manual and on the machine, therefore, do not necessarily contain all possible safety precautions. If you are using a procedure or measure not explicitly permitted and recommended in this manual, you must ensure that you and anyone else can use any such procedure without any danger or damage to the machine whatsoever. Please contact your local Komatsu dealer if you have any doubts about the safety of any procedures.

1.3. Introduction

1.3.1. Intended use

This loader is a machine with independent transmission, moving on wheels. Driving in forward direction, the loader can load or dig material using its attachments intended for loading operations (i.e. bucket).

The standard operation cycle of a loader includes filling up and loading of the bucket, transporting the material and emptying the bucket.

Refer to chapter "3.3.10. Wheel loader operations" on page 3-65 for more details.

1.3.2. Features

- Operator's cab with improved seals for reduced noise level, cab with reduced vibrations, problem-free assembly.
- Console and steering post with neat foot area and no protrusions, giving the same comfortable feeling as when driving in a car.
- Easy gear shifting with automatic transmission equipped with kick-down
- Fully hydraulic, effective brake control with no need to drain water or any need to worry about freezing or rust
- Maintenance-free,wet-type disc parking brake (acts also as emergency brake)
- Considerable reduction in maintenance operations with use of auto-greasing system
- Large capacity pump and 2-stage hydraulic system for reduced cycle time and increased productivity
- Installed air conditioning with key-field control and CFC-free refrigerant R134a

1.3.3. Breaking-in the machine

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the service meter.)

During breaking in:

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering und sudden stops except in cases of emergency.

The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual Komatsu cannot bear any responsibility for safety. All consideration of safety in such operations is the responsibility of the user.

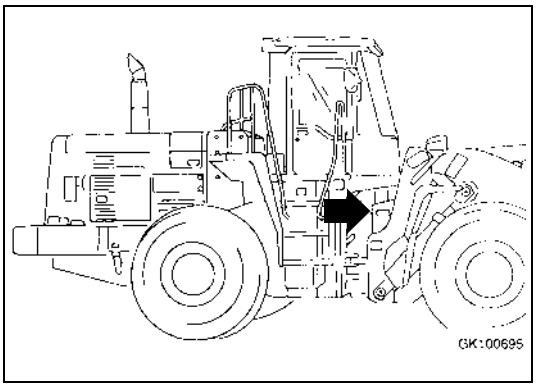
Operations that are prohibited in this manual must never be carried out under any circumstances.

1.4. Location of plates, table to enter serial no. and distributor

1.4.1. Machine identification plate

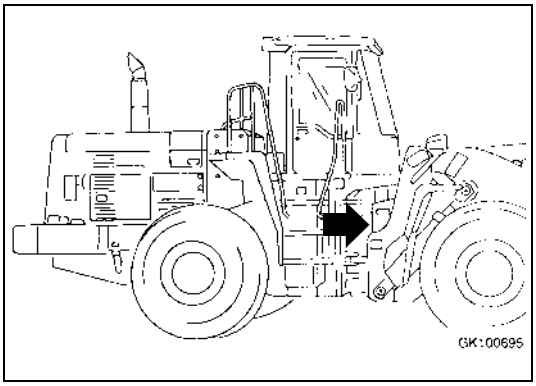
Position of the identification plate

On the centre right of the front frame.



Position of stamp

It is stamped into position at the right-hand side of the front frame below the name plate and at the rear frame.

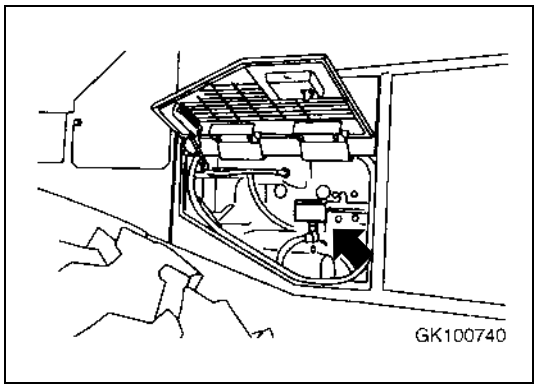


Machine identification plate

1.4.2. Engine identification plate

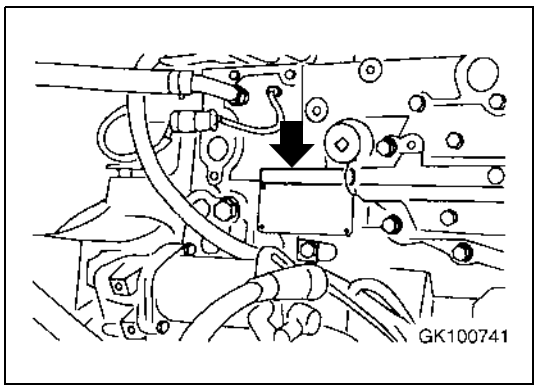
Position of identification plate

On the upper left-hand side of the cylinder block, when seen from the fan.



Position of stamp

This is stamped on the left side of the cylinder block as seen from the fan.



1.4.3. Table to enter serial no. and distributor

Machine serial No.:	
Engine serial No.:	
Name of Dealer:	
Address:	Phone:
Service Personnel for your machine:	

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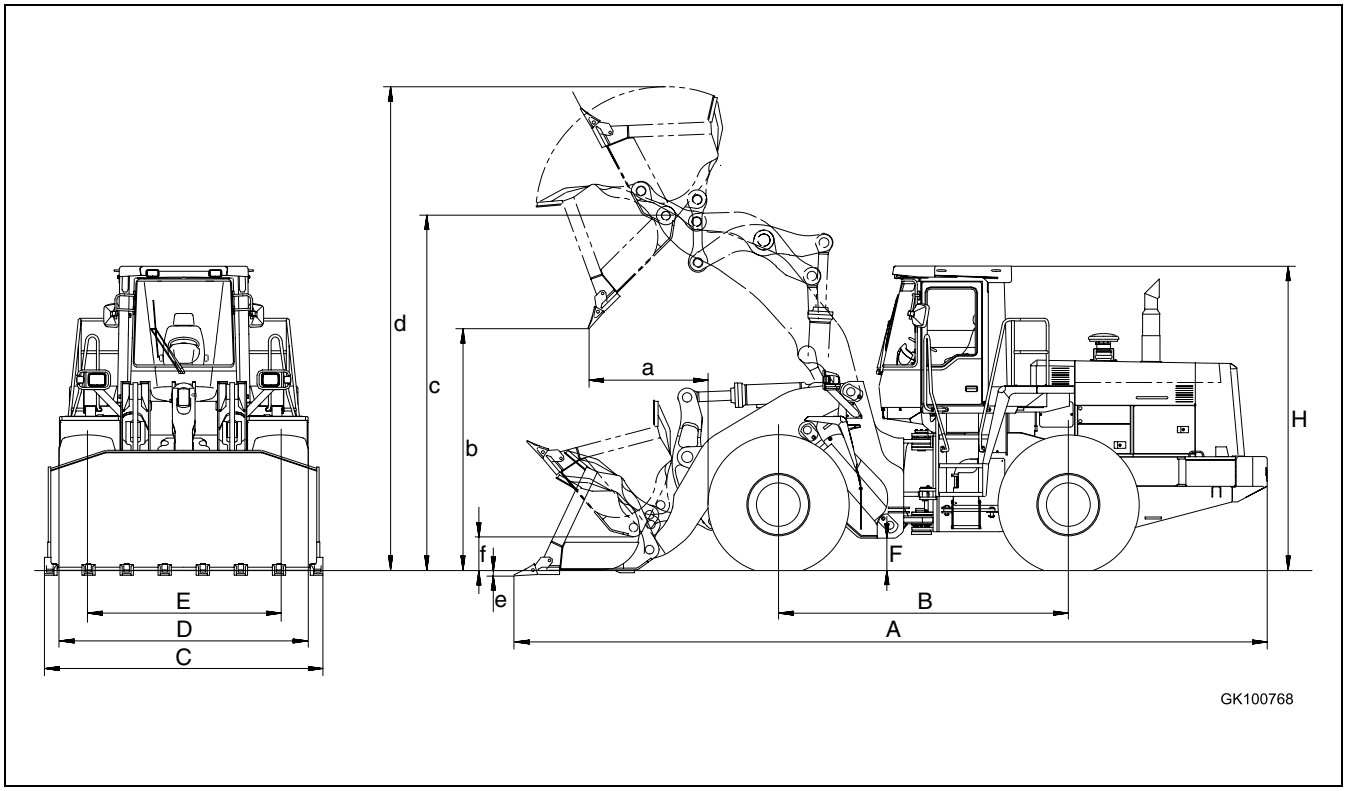
1.6. Dimensions, weights and operating data

1.6.1. WA500-3H: Dimensions, weights and operating data

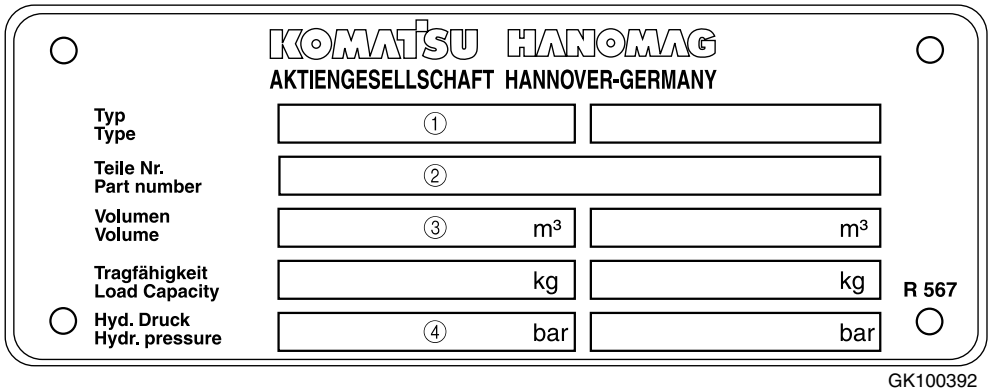


		Measurements, operating data		
	Bucket capacity to ISO 7546	**m³**	5.0	
	Material density	t/m³	1.6	
	Bucket weight without teeth	kg	2,800	
	Static tipping load, straight	kg	23,068	
	Static tipping load, 40° angle	kg	20,351	
	Breakout force, hydraulic	kN	240	
	Lifting capacity, hydraulic, on ground	kN	241	
	Operating weight *)	kg	30,220	
a	Reach at 45° discharge	mm	1,323	
b	Dumping height at 45° discharge	mm	3,195	
c	Lift height, hinge pin	mm	4,496	
d	Height to upper edge of bucket	mm	6,160	
e	Digging depth	mm	124	
f	Bucket hight when travelling	mm	270	
A	Overall length, bucket on ground	mm	9,330	
B	Wheel base	mm	3,600	
C	Bucket width	mm	3,400	
D	Width over tyres	mm	3,190	These values refer to machines with 29,5 R25 XHA tyres.
E	Gauge	mm	2,400	
F	Ground clearance	mm	443	*) Machine without additional counterweight
H	Overall height	mm	3,860	

1.7. CE-conforming equipment

1.7.1. CE-conforming equipment - part 1

CE-conforming equipment						
	1	2	3	–	4	–
	Type	Part No.	Volume m^3	Load Capacity kg	Hydraulic pressure bar	Weight kg
Bucket	WA500-3H	425-70-H2110	4.50	-	-	2,845
		425-70-H2120	4.50	-	-	3,290
		425-70-H2130	4.50	-	-	3,100
		425-70-H2140	5.00	-	-	2,950
		425-70-H2150	5.00	-	-	3,400
		425-70-H2160	5.00	-	-	3,200
		425-70-H2170	5.50	-	-	3,050
		425-70-H2180	5.50	-	-	3,500
		425-70-H2190	5.50	-	-	3,300
		425-70-H2200	4.50	-	-	3,200
		425-70-H2210	4.50	-	-	3,650
		425-70-H2220	4.50	-	-	3,460
		425-70-H2230	4.50	-	-	3,300
		425-70-H2240	4.50	-	-	3,800
		425-70-H2250	4.50			3,560



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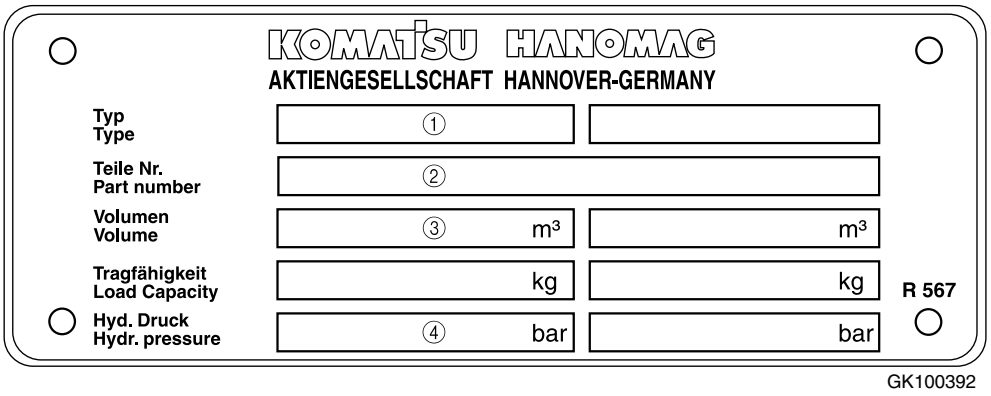
1.7.2. CE-conforming equipment - part 2

CE-conforming equipment						
	1	2	3	–	4	–
	Type	Part No.	Volume m^3	Load Capacity kg	Hydraulic pressure bar	Weight kg
Bucket	WA500-3H	425-70-H2260	5.00	-	-	3,400
		425-70-H2270	5.00	-	-	3,850
		425-70-H2280	5.00	-	-	3,700
		425-70-H2290	5.00	-	-	3,500
		425-70-H2300	5.00	-	-	4,000
		425-70-H2310	5.00	-	-	3,860



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1.7.3. Manufacturer-supplied CE-conforming equipment, according to document 419-93-H1160

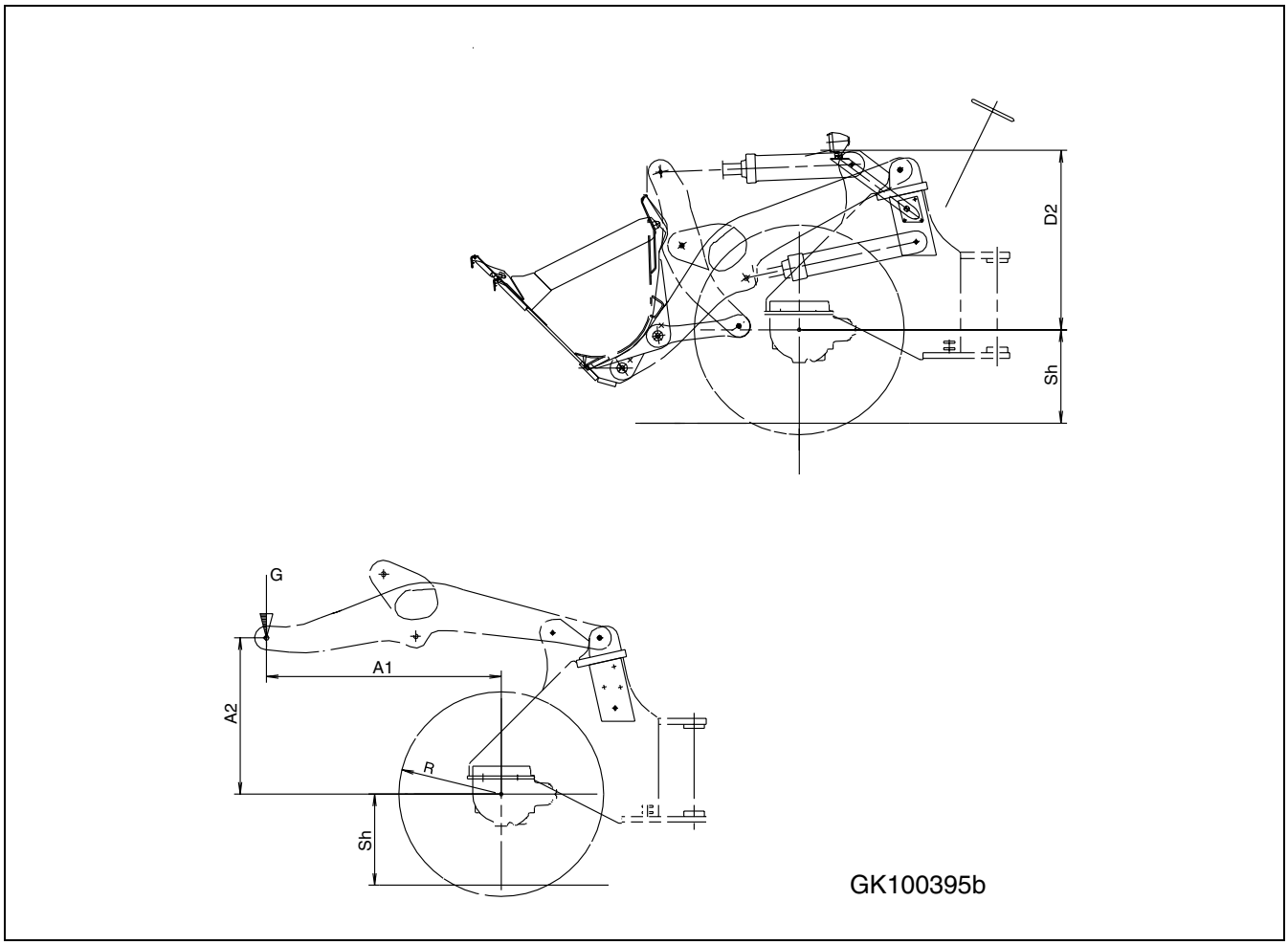
The responsibility for observing valid regulations in the case of wheel loaders with "interchangeable equipment" (e.g. bucket or fork-lift) which was not supplied from works lies with the customer which was subsequently fitted to the machine.

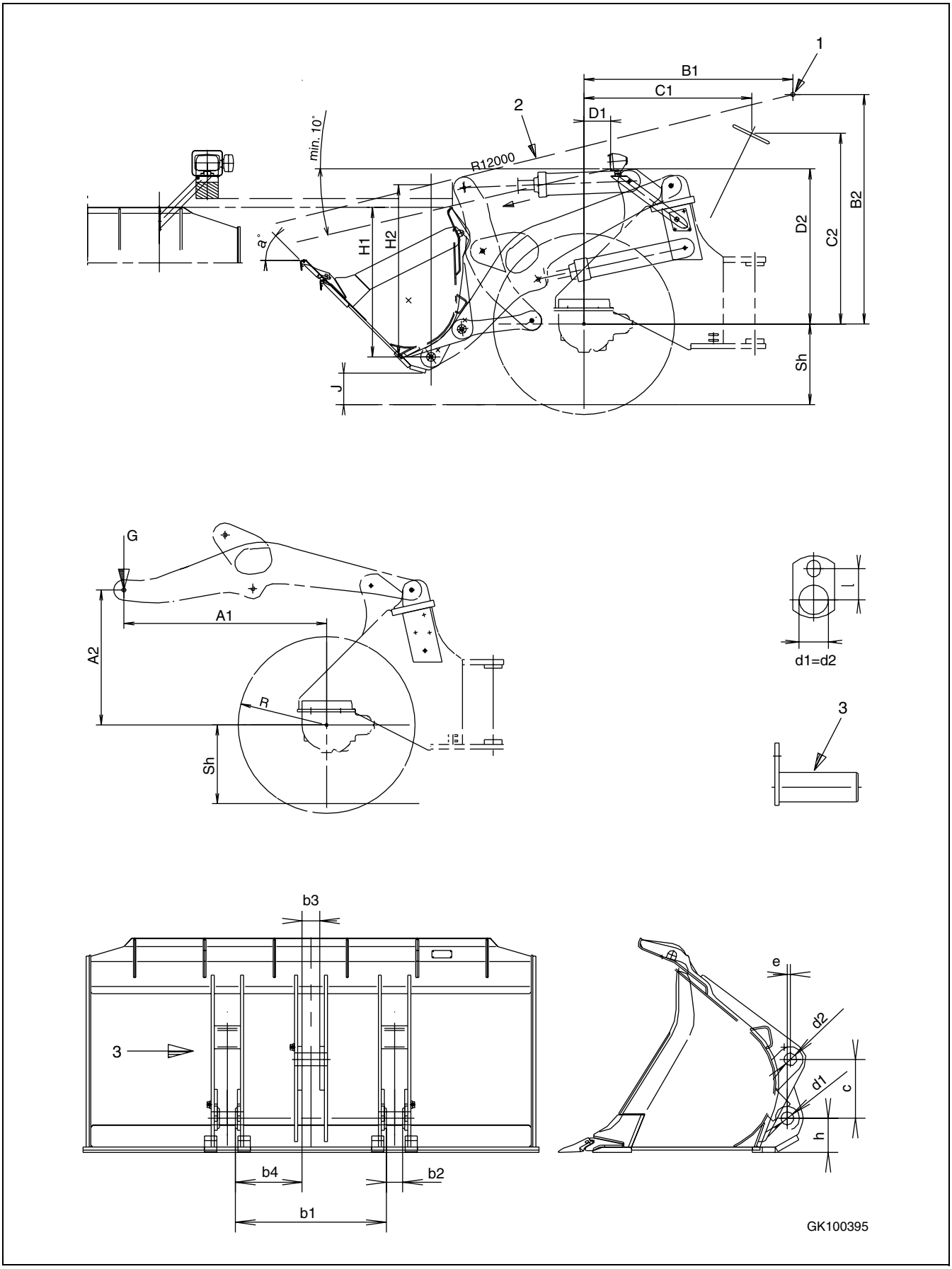
The directives for CE conformity are deemed to have been fulfilled when the manufacturer of the equipment confirms fulfilment of the form 419-93-H1160.

The certification must be sent to the customer and the wheel loader manufacturer. The CE conformity declaration for a specific wheel loader is only legally valid once this has taken place.

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

The figure **G** (in kg) represents the maximum load (equipment and operating load) which may act upon this point.




1
2
B1
C1
D1
R12000
min. 10°
a°
H1
H2
D2
C2
B2
J
Sh
G
A1
A2
R
d1=d2
l
3
b3
b4
b2
b1
e
d2
d1
c
h
GK100395

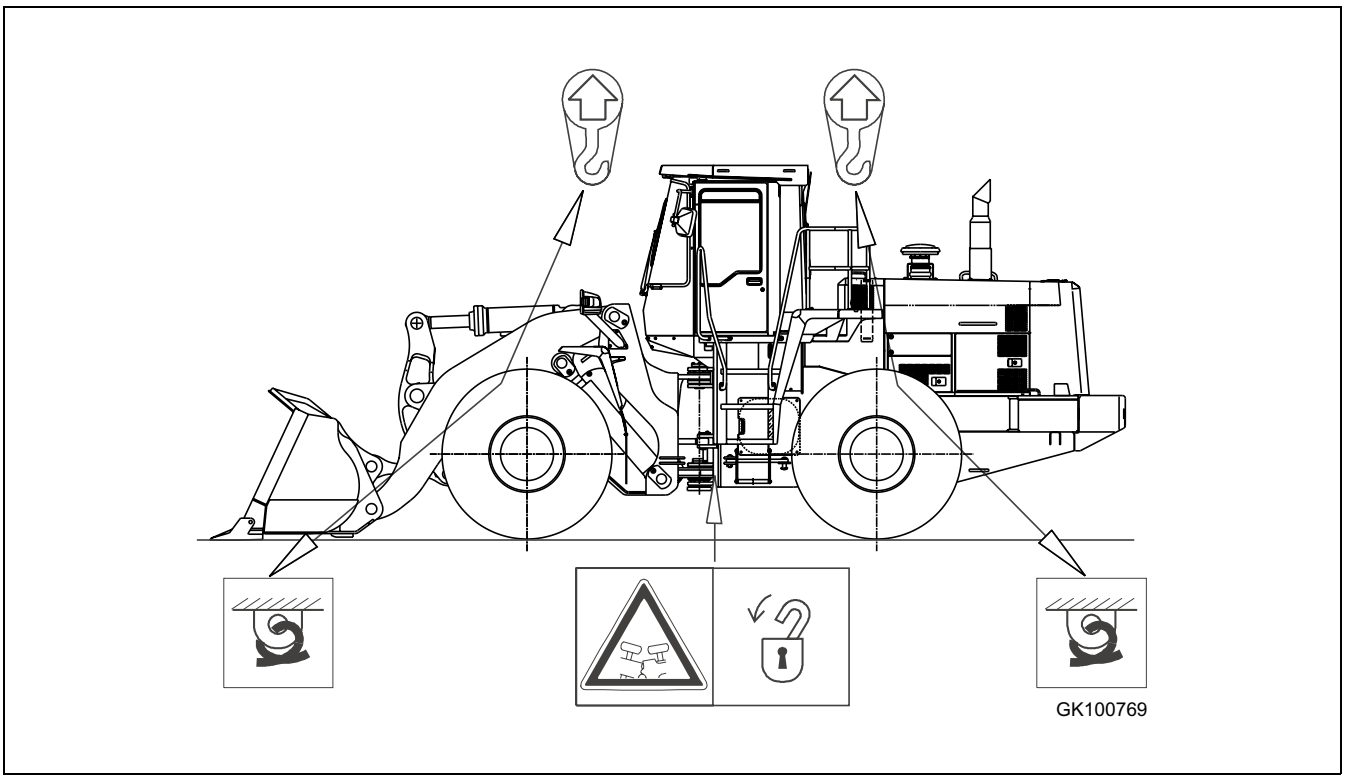
Manufacturer-supplied CE-conforming equipment, according to document 419-93-H1160

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: centre steering wheel - centre front axle, horizontal
C2 Distance: center steering wheel - centre front axle, horizontal
D1 Distance: headlight - centre front axle, horizontal
D2 Distance: headlight - centre front axle, vertical
G Weight of equipment and working load
H1 Distance: bucket pivoting point - bucket upper edge, vertical (carrying position)
H2 Distance: bucket pivoting point - vision line, vertical (carrying position)
J Distance: road level - bucket bottom edge (carrying position)
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

WA500-3H	419-93-H1160
A1	2,290
A2	1,416
Sh	876 / 813*
B1	2,244
B2	2,410
C1	1,742
C2	2,007
D1	550
D2	1,443
G	10,900
H1	1,795
H2	1,670
J	270
b1	1,020 ± 1.5
b2	180 ± 1.5
b3	145 ± 1.5
b4	437.5 ± 1.5
c	437 ± 1.5
d1	110 + 0.1
d2	110 + 0.1
e	0
h	320
l	120
1	Driver´s eye
2	Vision line
3	Bolt
Tyres	MICHELIN 29.5R25 XHA / 26.5R25 XHA*
Bucket	5 m³ - 425-70-H2260 3750C31

1.8. Loading and securing

Observe all safety instructions carefully in order to prevent accidents with severe injury.

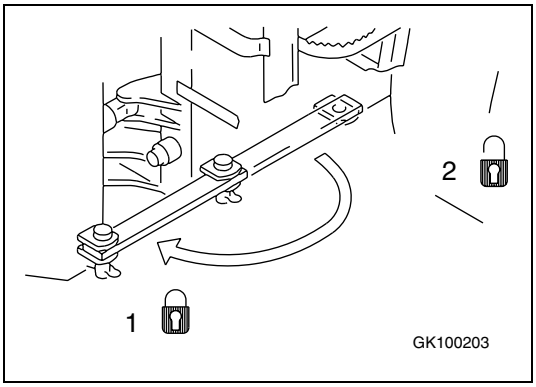


⚠ DANGER

- **Always secure articulated joint if maintenance or repair work is to be carried out or if the machine is going to be lifted or transported.**
- **An articulated joint may jack-knife unexpectedly if not secured. Danger of injury if joint jack-knifes.**

Position machine as if driving in forward direction and secure articulated joint against jack-knifing, using the articulated-joint lock. Always secure securing bar in either position using bolt and spring pin

Position 1	Articulated steering locked
Position 2	Articulated steering unlocked



NOTE

Due to safety reasons and to avoid consequential damages, it is prohibited to attach other points (such as axles, cardan shafts, articulated joint, bucket teeth) than those specified for lifting and securing. It is also prohibited to attach ropes etc. to the driver's cabin.

2. Safety

⚠ DANGER

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

2.1. General safety measures

2.1.1. Safety instructions

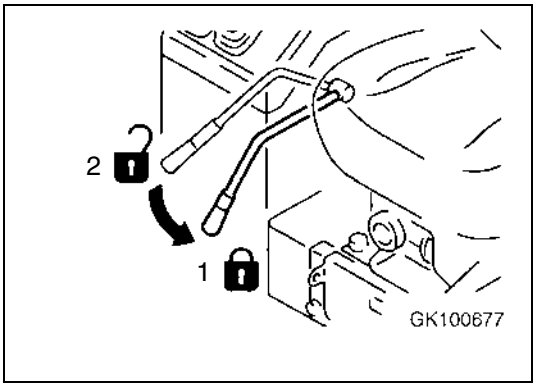
- Do not operate or service the machine unless you have been trained and are authorised to do so.
- Always adhere to all instructions, measures, and safety instructions when operating or servicing the machine.
- When working together with other persons, agree beforehand on all hand signals that you want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

2.1.2. 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 and the safety belt.

  Safety lever for working hydraulics:

  Position 1 Control lever for working hydraulics locked
  Position 2 Control lever for working hydraulics released

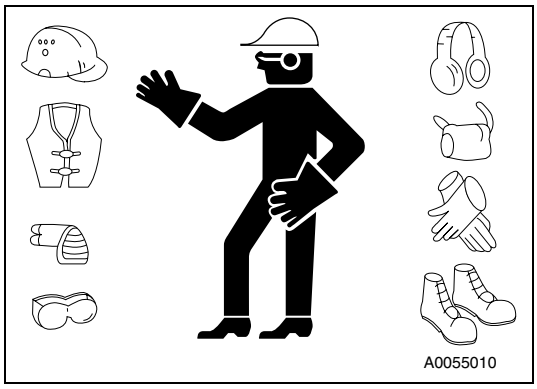


- **Do not** remove any of the safety devices. Safety devices must be kept in perfect condition.

2.1.3. Emergency exit

The door on the direction of travel's right-hand side of the cab can be used as an emergency exit in hazardous situations.

2.1.4. Clothing and personal protection

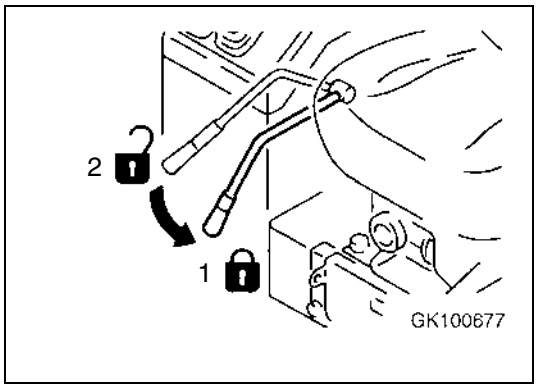


- Do not wear loose-fitting clothing, jewellery, or open long hair. There is danger that you get caught by control elements or moving parts, leading to serious injuries.
- Immediately replace clothing stained with highly inflammable substances.
- When operating and servicing the machine, wear the appropriate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

2.1.5. 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.

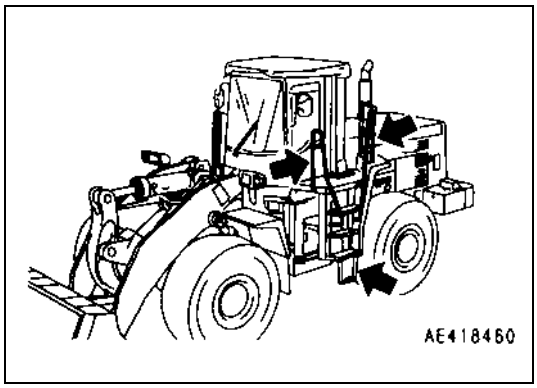
2.1.6. Before you leave the driver's seat

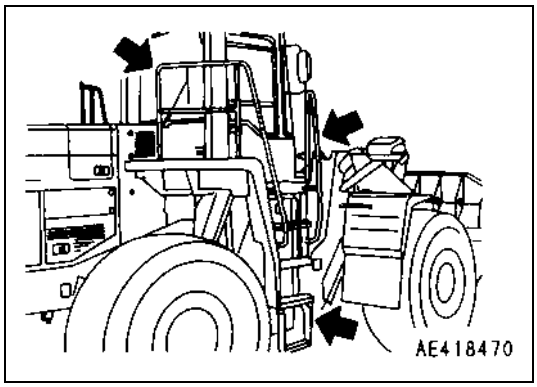


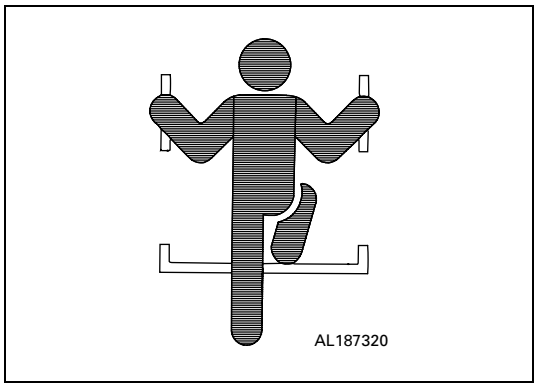
1. Lower the work unit onto the ground.
2. Use the safety lever to secure the work hydraulic system against unintentional operation (lever position '1'). If the lever for the hydraulic system is not secured and accidentally touched, uncontrolled movements of the work unit may lead to accidents with injuries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

2.1.7. 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.

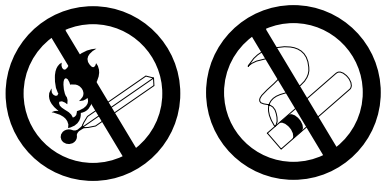






2.1.8. Fire prevention and fire fighting

- 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.
- If a fire extinguisher is provided it must be fully operational and within arm's reach.
- Do not operate the machine in the vicinity of naked light.



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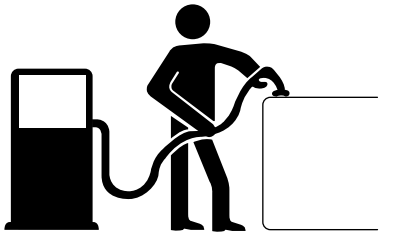

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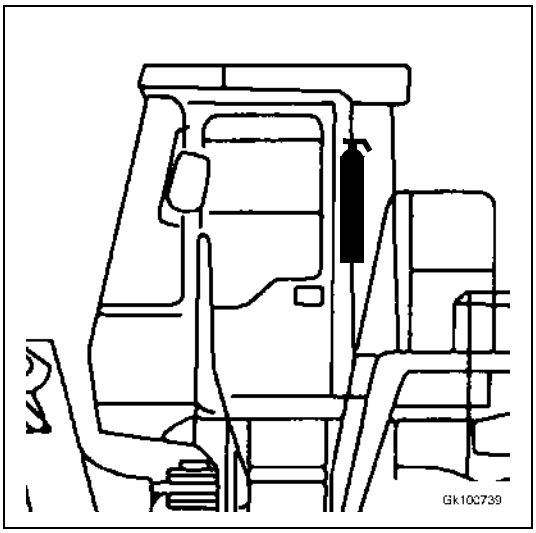
Fire extinguisher and first-aid kit

- A fire extinguisher must always be provided as a safety precaution wherever certain types of work could pose a fire risk.
- The fire extinguisher can be mounted in the driver's cab to the cab pillar.
- Familiarise yourself with the use of the fire extinguisher.
- Inform yourself on measures to be taken in the event of a fire
- A first-aid box can be stored 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.

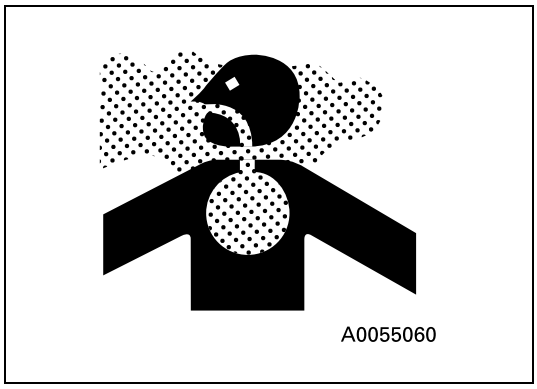


2.1.9. Protection against asbestos dust

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.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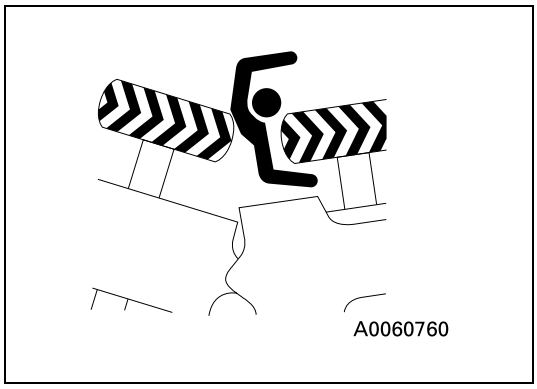
2.1.10. Protection against injuries

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.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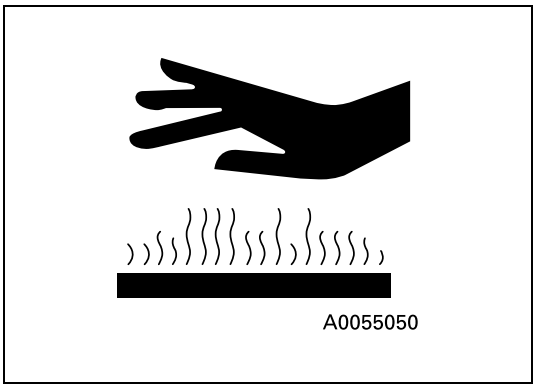
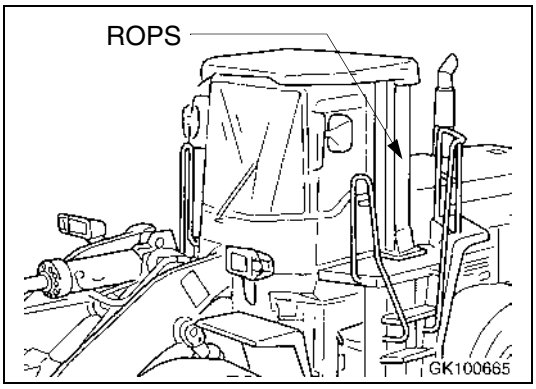
2.1.11. Working at high temperatures



- 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.

2.1.12. Roll-over protection system (ROPS)



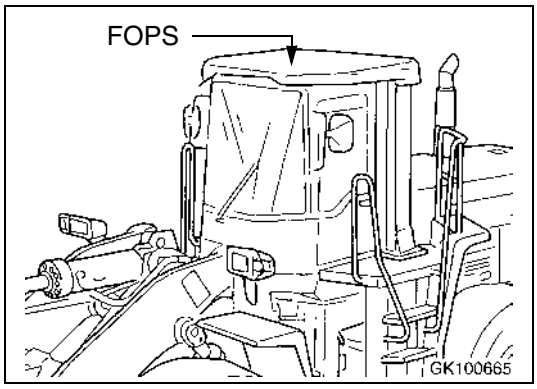
- The roll-over protection system (ROPS) protects the operator and absorbs load and impact energy, if the machine should roll over.
- The ROPS is a fixed component of the cab. The machine must not be operated without this roll-over protection system.
- The ROPS meets the regulations of all member states 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.

2.1.13. Attachment for protection against falling objects (FOPS)

NOTE

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.

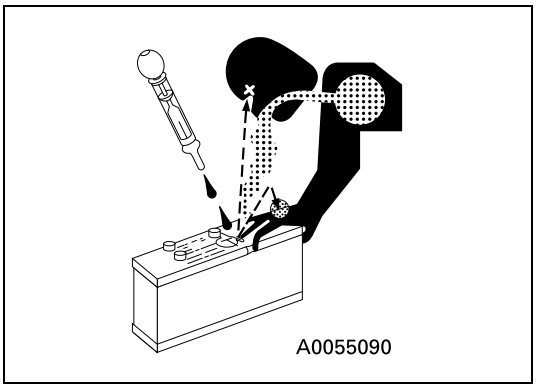


2.1.14. Attachments

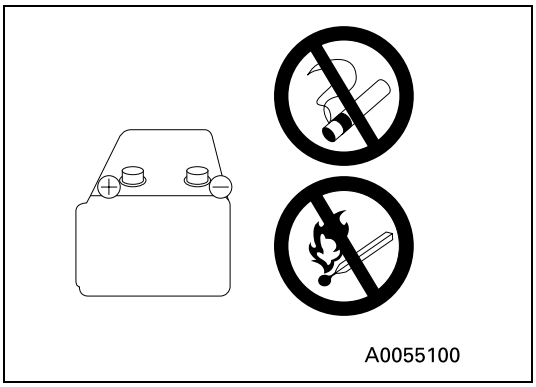
- Prior to assembly and operation of an additional attachment, read the attachment's manual and strictly adhere to the instructions on assembly and operation.
- Do not use attachments that have not been approved of by Komatsu or the responsible Komatsu dealer. If you use attachments which have not been approved of, safety, correct operation, and service life of the machine may be impaired.
- Komatsu are not liable for injuries, accidents, and damage resulting from the use of attachments that have not been approved.

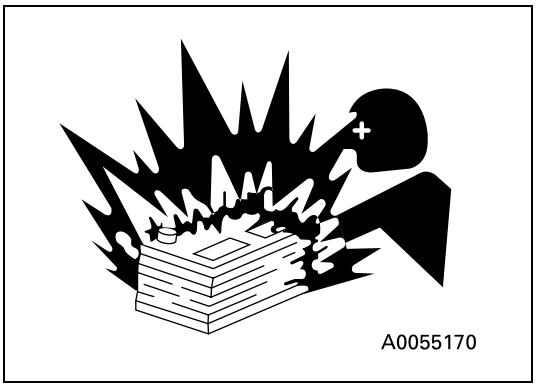
2.1.15. Battery

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.

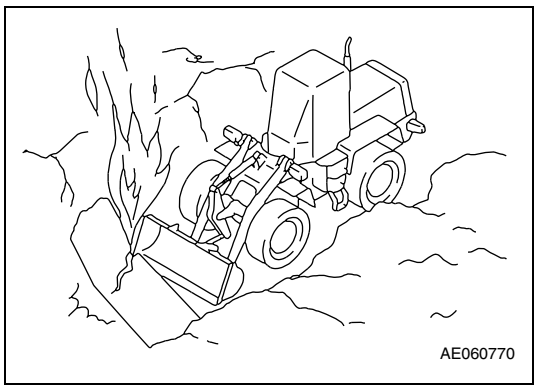




2.2. Safety precautions during operation

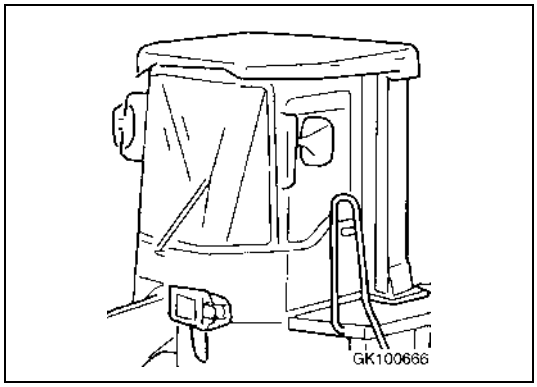
2.2.1. Before you start the engine

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!

A0055060

Gas, dust, and inflammable vapours

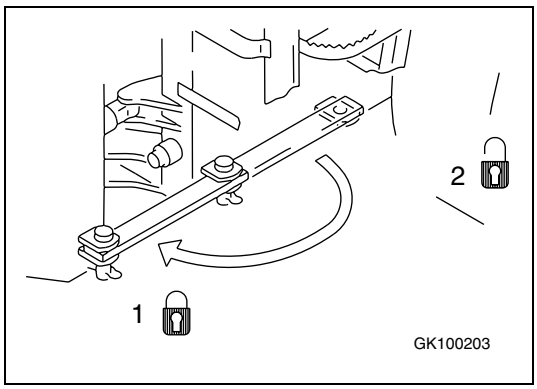
Do not operate combustion engines in an environment that may contain inflammable gases or vapours. These gases, dusts, or vapours may ignite or be sucked in by the suction system, thus causing a rise in engine speed or an exceeding of the engine's maximum rpm. This may lead to a fire, an explosion, and major damage to property. It may also happen that the engine cannot be switched off anymore. Also refer to section "In-door operation" on page 2-12.

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.

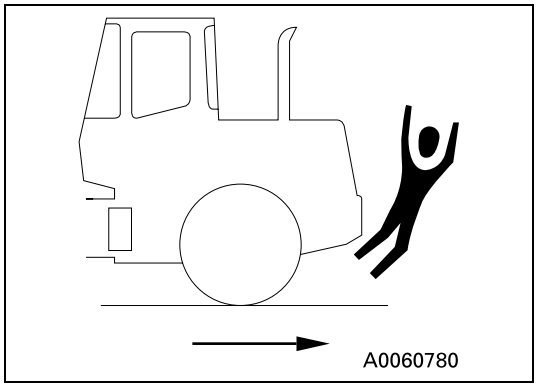
2.2.2. Machine operation

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. (see section "2.3.2. Before carrying out maintenance" on page 2-21).
- 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 '2') 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

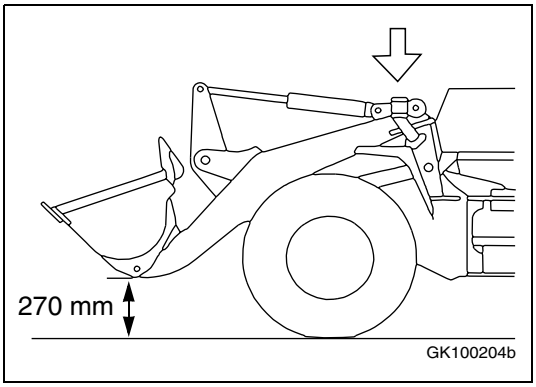


These rules must be observed for all machines, i.e. also for those machines equipped with a reversing warning system:

- 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.

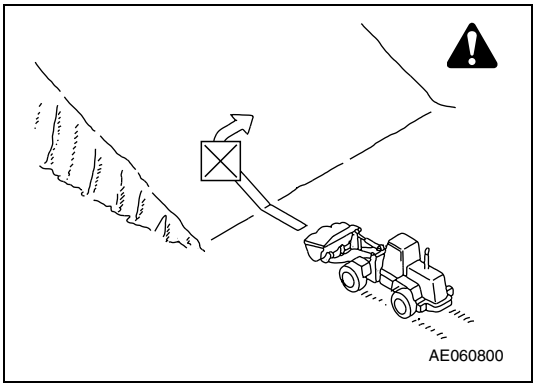
Driving

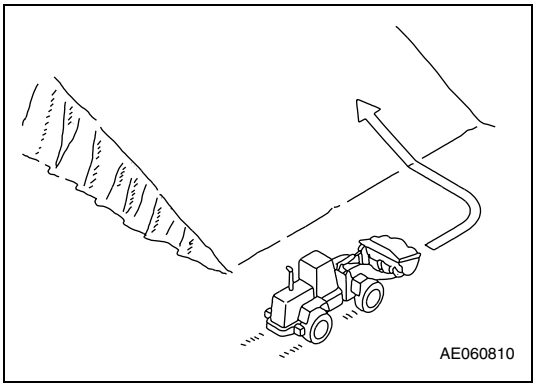
- When driving, set the bucket to the transport position.
- When driving on uneven ground, drive slowly and avoid sudden steering movements.
- The emergency steering system only functions if the machine is being pulled or the engine is running.



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 "6.4. Limit values for slopes" on page 6-3.
- 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. 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

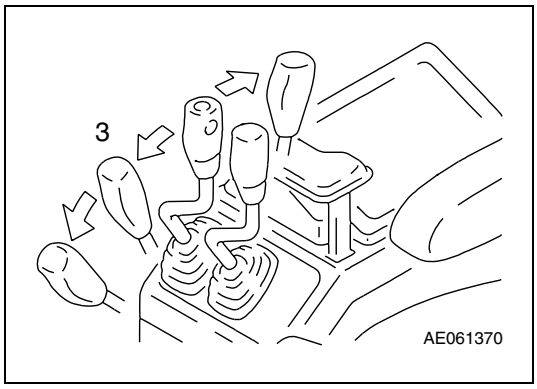




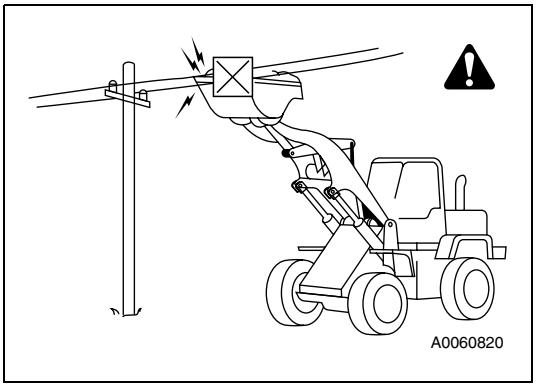
Emergency lowering system

With the engine switched off you can lower the working attachment using the emergency lowering system.

- Press the boom control lever slowly to position ‘3’ (lower).



Working close to power lines



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

- 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

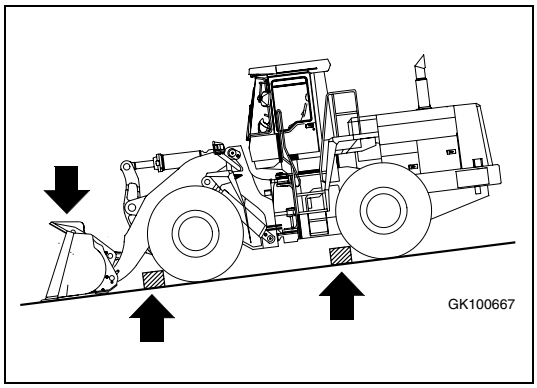
- Use the brake pedal only for braking, do not use the brake pedal as a foot rest.
- Do not step repeatedly onto the brake pedal, unless it is absolutely necessary.
- When driving downhill, use the engine as a brake and use the brake pedal, if necessary.

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

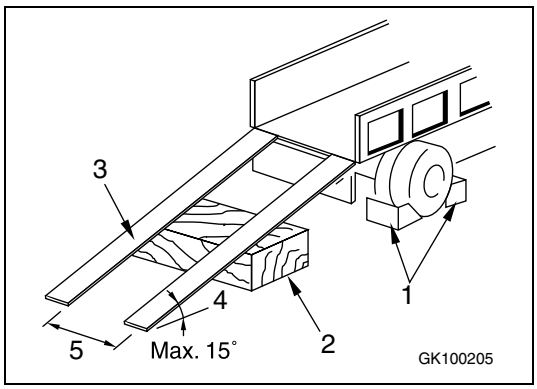
- If possible, park the machine on an even surface. If you have to park the machine on a slope, you must park the machine with the work unit pointing down the slope. Lower the work unit until it firmly touches the ground (1), or let the cutting edge of the bucket sink deeply into the soil. Block the wheels with wheel chocks (2) to ensure that the machine cannot roll away.
- 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.



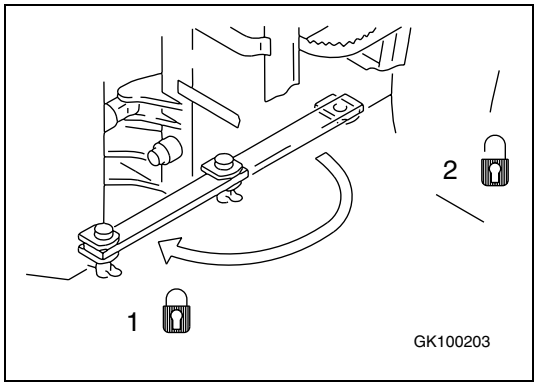
2.2.3. Transport

Loading and unloading the machine

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



- Load and unload the machine only on solid and level ground. Keep a safety distance to the edge of the road.
- Block the wheels of the transport vehicle (1) and place support blocks (2) under both ramps before driving the machine onto the transport vehicle.
- Only use ramps (3) with appropriate carrying capacities and widths. The ramps must be long enough to ensure that the maximum loading gradient (4) of 15% is not exceeded.
- Ensure that the ramps are positioned and fastened safely and that both sides have the same height. Set the distance between the ramps to the distance between the wheel tracks (5).
- Ensure that the surfaces of the ramps are clean and free of grease, oil, ice, and loose material. Remove any dirt adhering to the wheels.
- When loading and unloading the machine, keep the engine speed low and drive slowly.
- Do not carry out steering movements on the ramps. If required, drive off the ramps again, correct alignment of the machine, and drive up again.
- After loading, i.e. when the machine is on the transport vehicle, apply the parking brake.
- Block the wheels of the machine with wheel chocks.
- Set the steering wheel of the machine to straight driving.
- Secure the articulated steering with the locking bar.



Position 1	Articulated steering locked
Position 2	Articulated steering unlocked

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.

2.3. Precautions for maintenance

2.3.1. Personnel

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

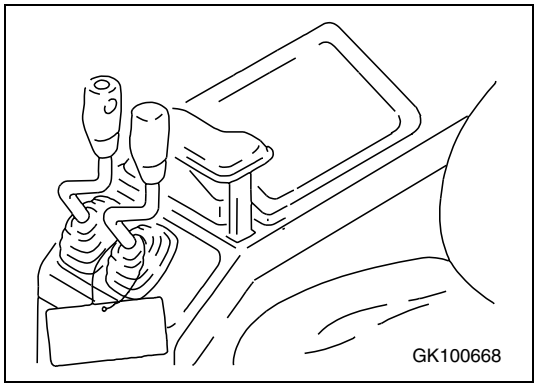
2.3.2. Before carrying out maintenance

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.

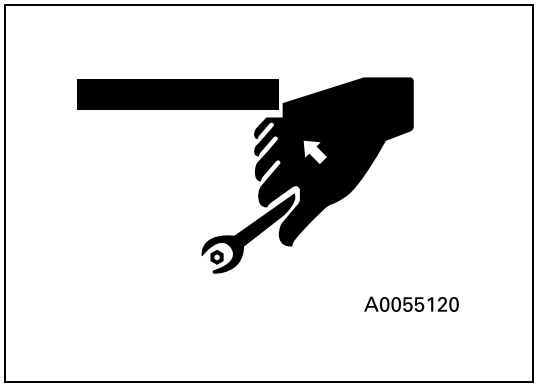
Always attach the **warning sign** to the control lever for the work hydraulic system to warn other persons that work is being performed on the machine. If required, put up additional warning signs around the machine.

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:

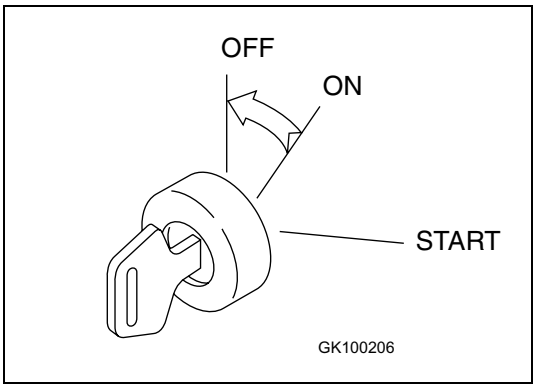
- Fuel system:
  - fuel hose,
  - overflow hose,
  - tank cap
- Hydraulic system:
  - pump outlet hose,
  - ront and rear pump branch hoses

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 and safeguard the machine.



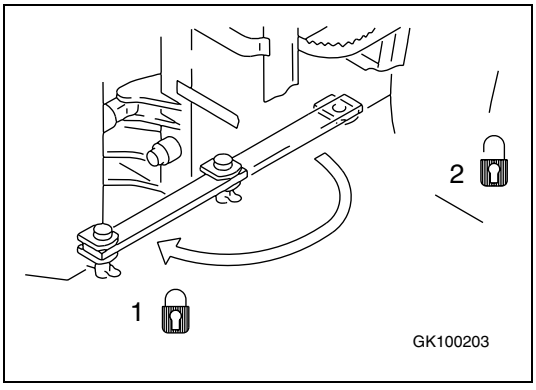
If the engine has to be running during maintenance, e.g. for pressure checks of the hydraulic system, proceed with particular care. Carry out such measures with two persons with whom you have arranged clear hand signs beforehand.

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 '1').



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.

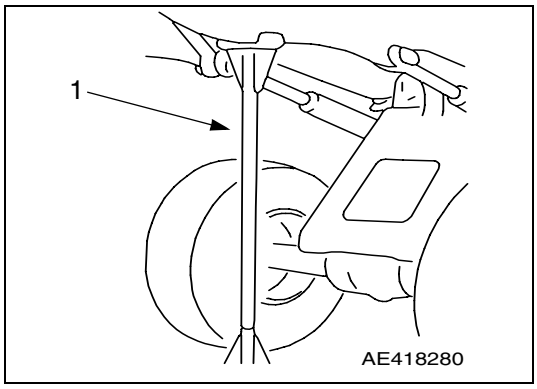
The working attachment must be propped up against falling down whenever any work is carried out underneath the working attachment when raised. For this purpose use a support (1) which is to be placed below the boom.

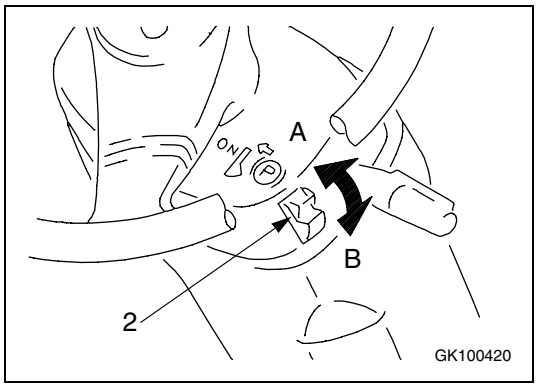
The following procedural description must be adhered to where supports are used.

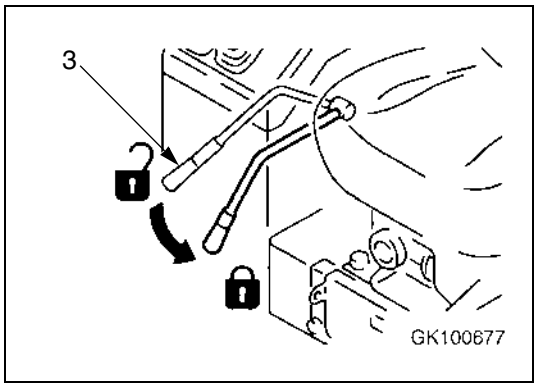
1. Park the machine on level, solid ground.
2. Engage the parking brake by pressing the toggle switch (2) on the steering column.

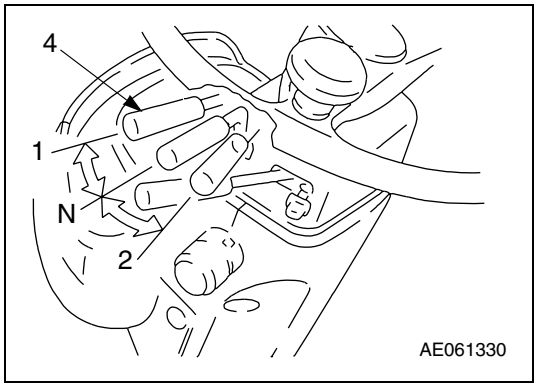
Pos. A	ON	The parking brake is applied. The warning light for the parking brake goes on.
Pos. B	OFF	The parking brake is released.

3. Place wheel chocks in front of the wheels to prevent the machine from inadvertently rolling away.
4. Raise the boom sufficiently far to enable the support (1) to be placed underneath it.
5. Switch the engine off.
6. With the engine switched off lower the boom slowly until it rests securely on the support.
7. Use the safety lever to secure the control lever for the working hydraulics (3).
8. Move the driving direction lever (4) to the neutral position (N).









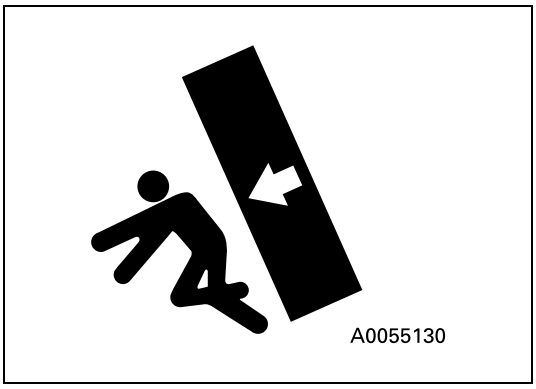
2.3.3. During maintenance

Attachments

Attachments removed from the machine must be put down in a safe location in such a way that they cannot tip over.

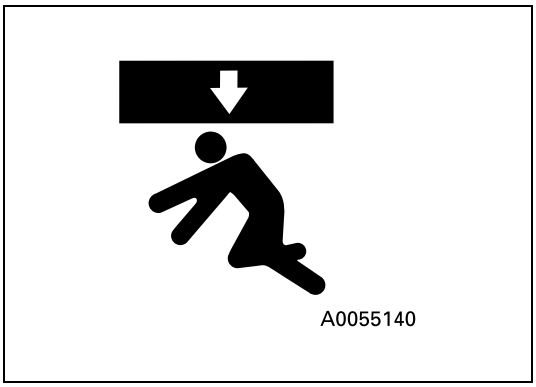
⚠ CAUTION

Risk of injury!



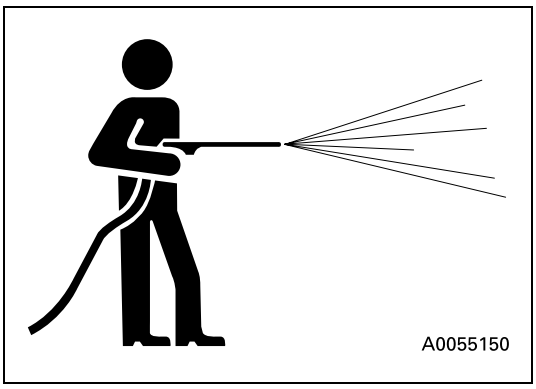
Working under the machine

- 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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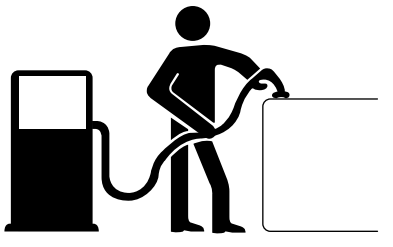
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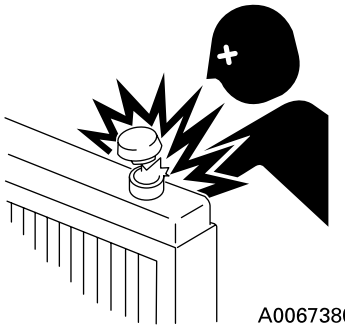
Coolant

- Caution, antifreeze is highly inflammable.
- To check the coolant level, first switch off the engine and wait for the cooling system to cool down. Then, check the coolant level in the expansion tank.
- Slowly unscrew the cap to let the pressure escape.
- If required, top up water in the expansion tank.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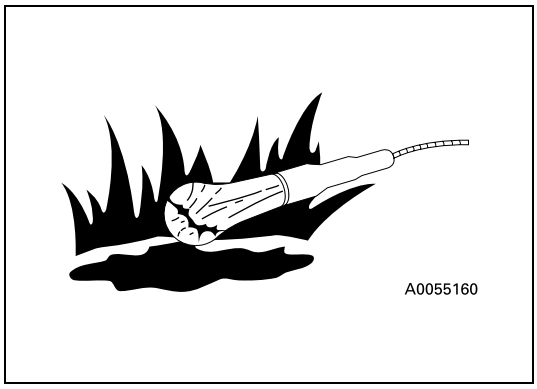
Use of lighting

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



High-pressure hoses

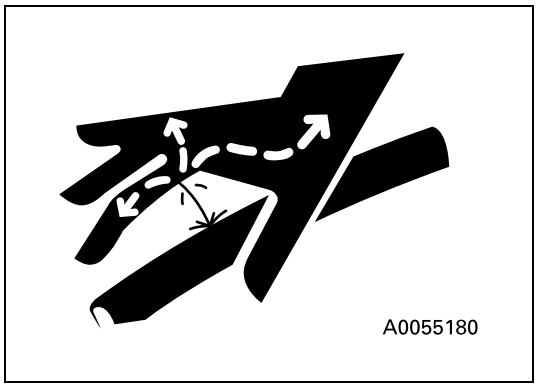
Neither bend high-pressure hoses nor hit them with hard objects. Do not use piping or hoses with fissures, cracks, or bends, since they may burst during operation.

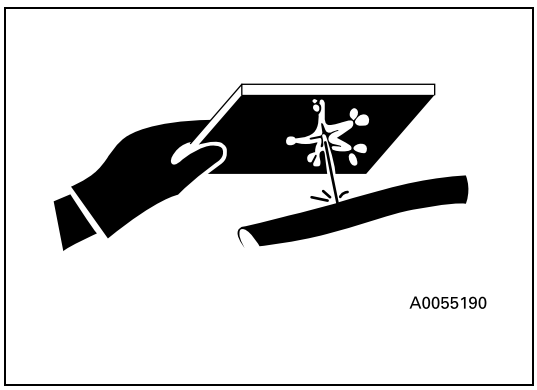
Immediately replace any loose or damaged fuel or oil hoses. Leaking fuel or oil involves danger of fire and slipping.

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.





Handling of pressure accumulators

⚠ WARNING

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

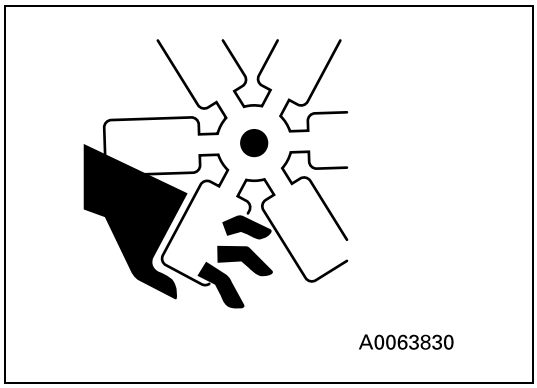
- Immediately inform your Komatsu dealer, if you detect malfunctions or defects of pressure accumulators.
- Filling pressure accumulators with gas or topping up gas in pressure accumulators is strictly limited to persons authorised to handle highly pressurised gas.
- Do not hit against the pressure accumulator.
- 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 1,000 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.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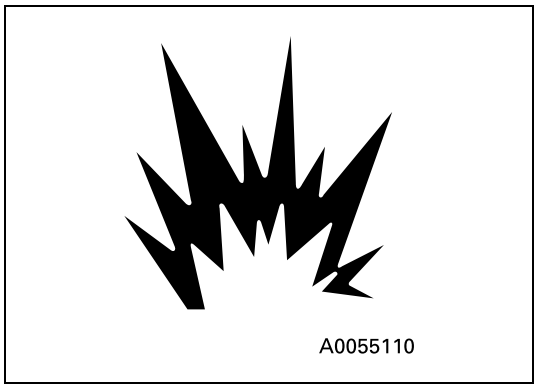
Waste material

- 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.

2.3.4. Tyres

Handling of tyres

(also refer to chapter "3.3.17. Tyre handling" on page 3-78)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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.

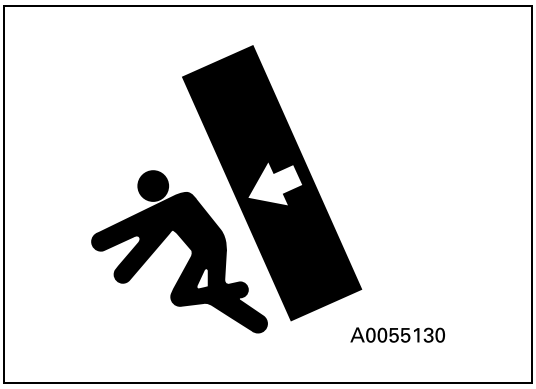
To ensure safety and reduce wear and tear, always adhere to the following instructions:

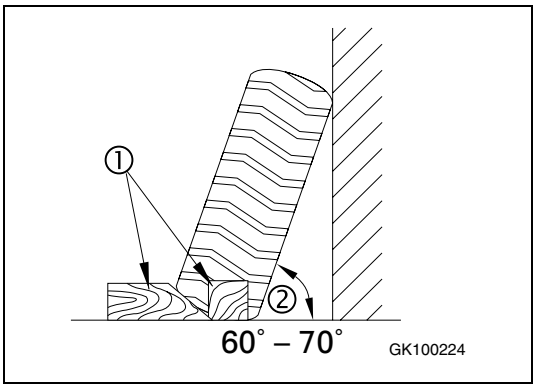
- Inflate tyres up to the defined pressure. If the tyre pressure is too low, the tyres may heat up and burst. If the tyre pressure is too high, there is also danger that the tyre may burst.
- If a tyre heats up considerably, inflammable gases are produced. A burning tyre may burst very easily, thus spreading 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.
- 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.

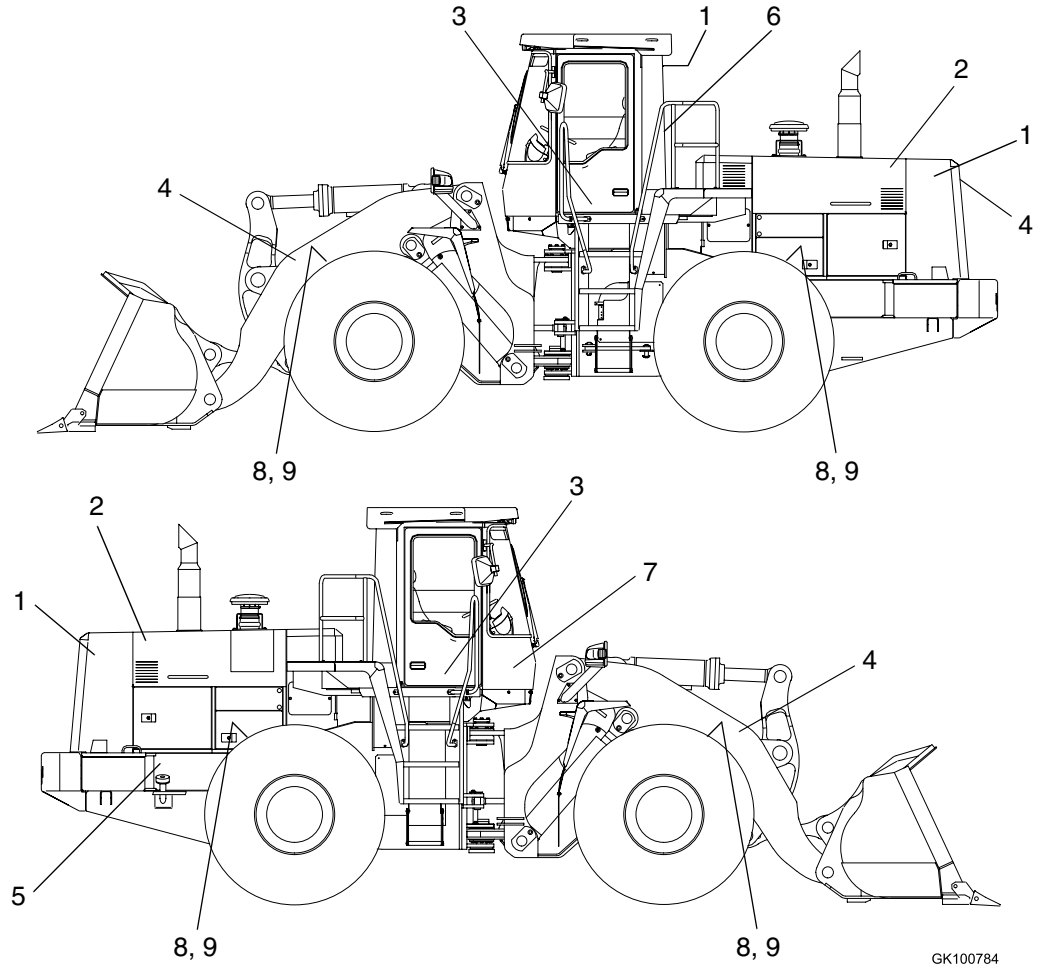


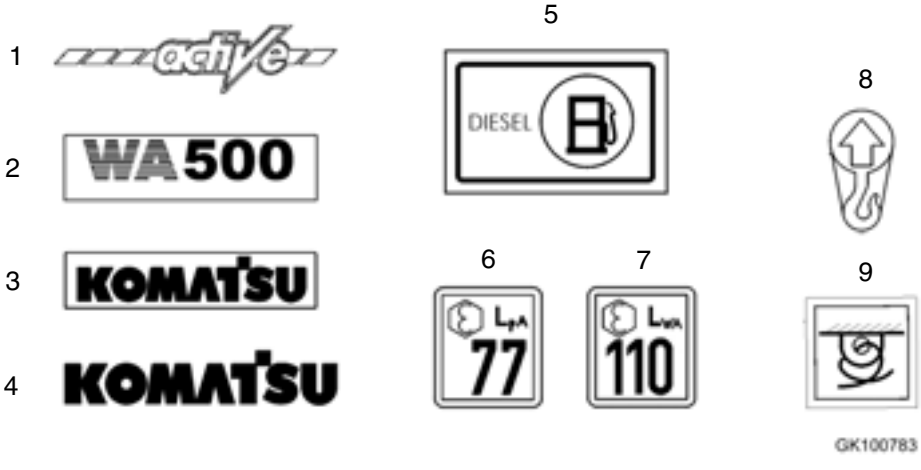


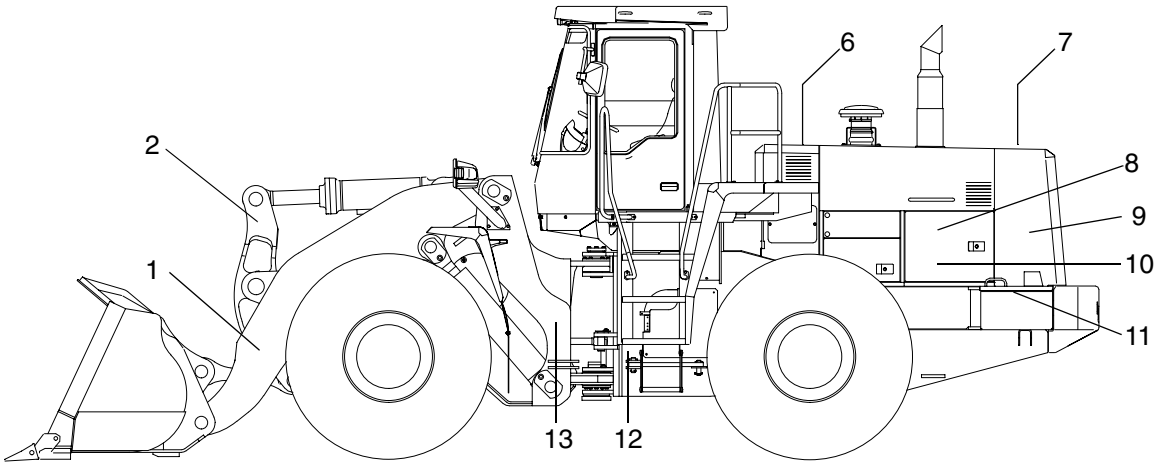
2.4. Safety labels

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

Position of safety labels



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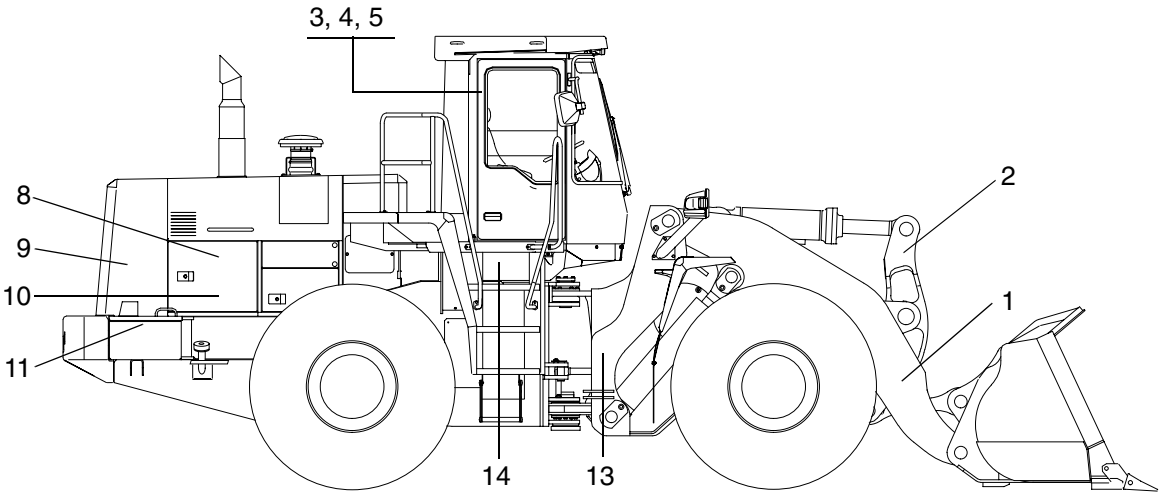
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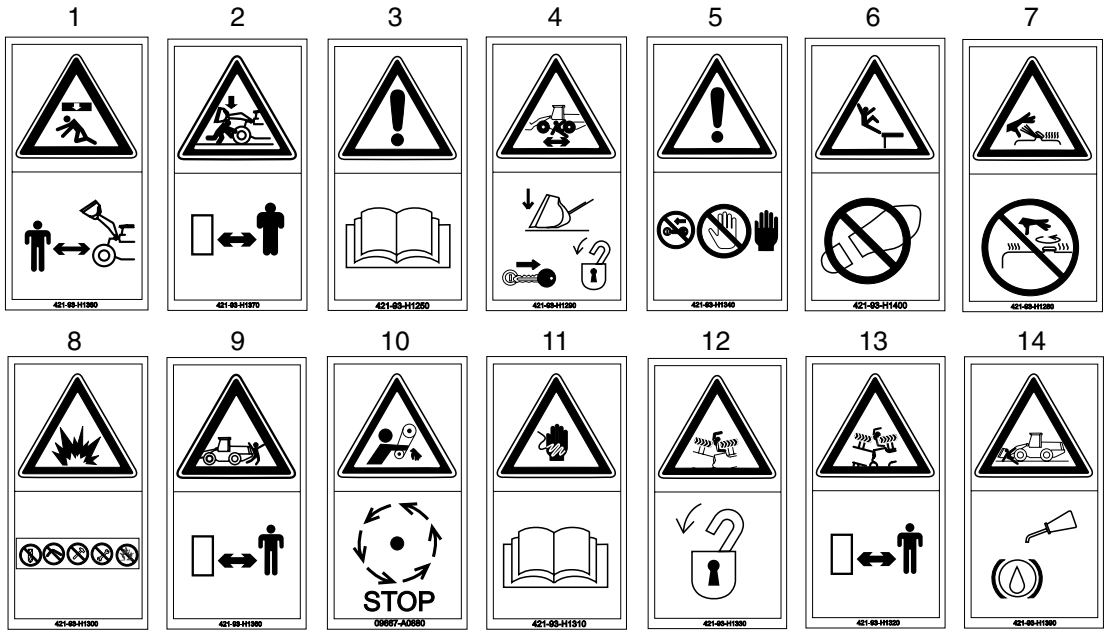
1
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STOP
GK100782

1 Maintain safe distance to operating unit
P/N: 421-93-H1380

2 Do not loiter underneath the operating unit
P/N: 421-93-H1370

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

4 Safety measures when leaving the machine
P/N: 421-93-H1290

5 Safety measures before starting work
P/N: 421-93-H1340

6 Do not stand on mudguard
P/N: 421-93-H1400

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

8 Danger of explosion from accumulators
P/N: 421-93-H1300

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

10 Do not open when the engine is running
P/N: 09667-A0880

11 Take care when using the starter cables
P/N: 421-93-H1310

12 Secure articulated joint when transporting or loading/unloading
P/N: 421-93-H1330

13 Maintain safe distance to articulated section of the machine
P/N: 421-93-H1320

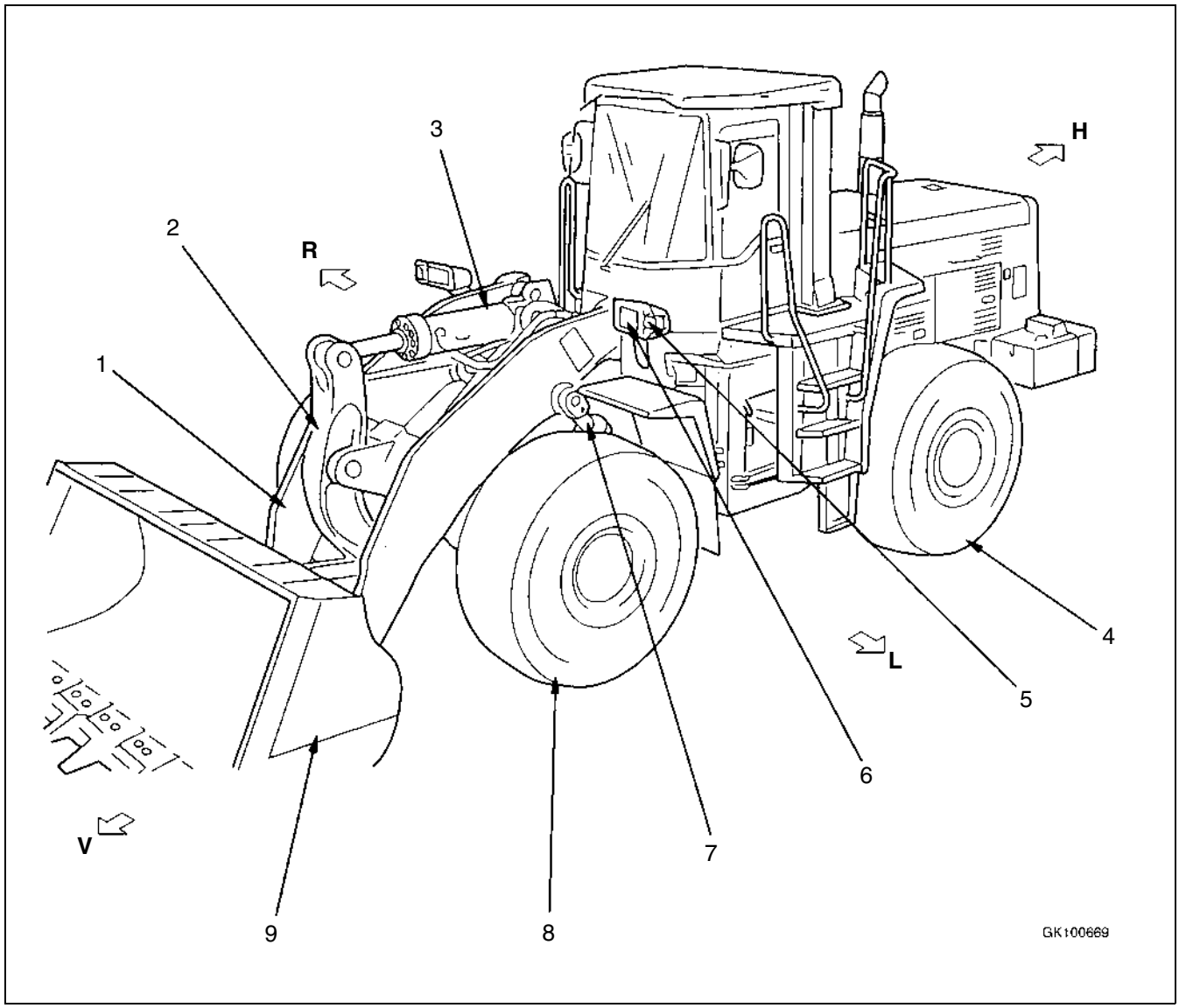
14 Only use Komatsu oil
P/N: 421-93-H1390

3. Operation

3.1. General view

3.1.1. General view of the machine

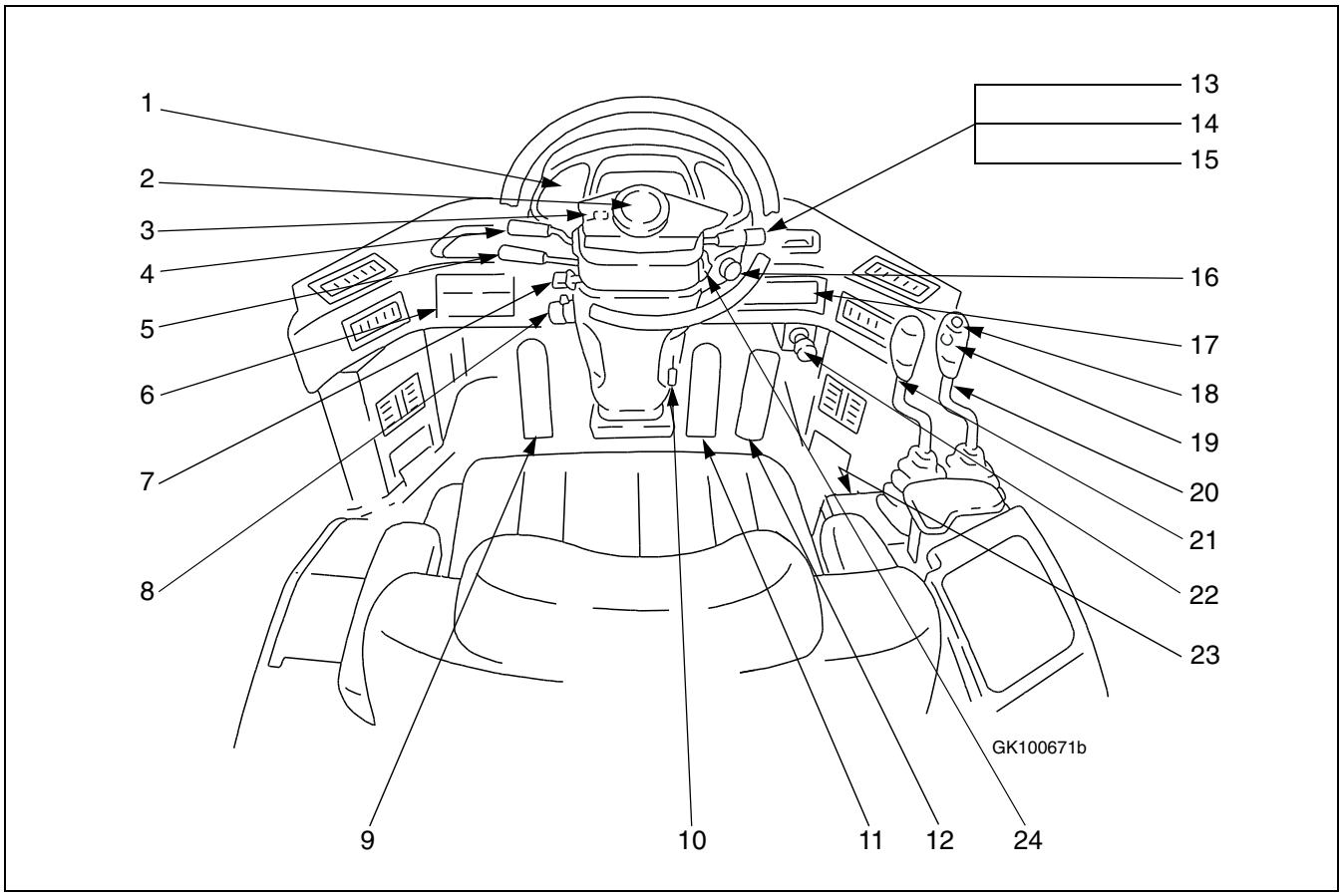
The directions indicated in this section refer to the directions shown by the arrows in the diagram below.



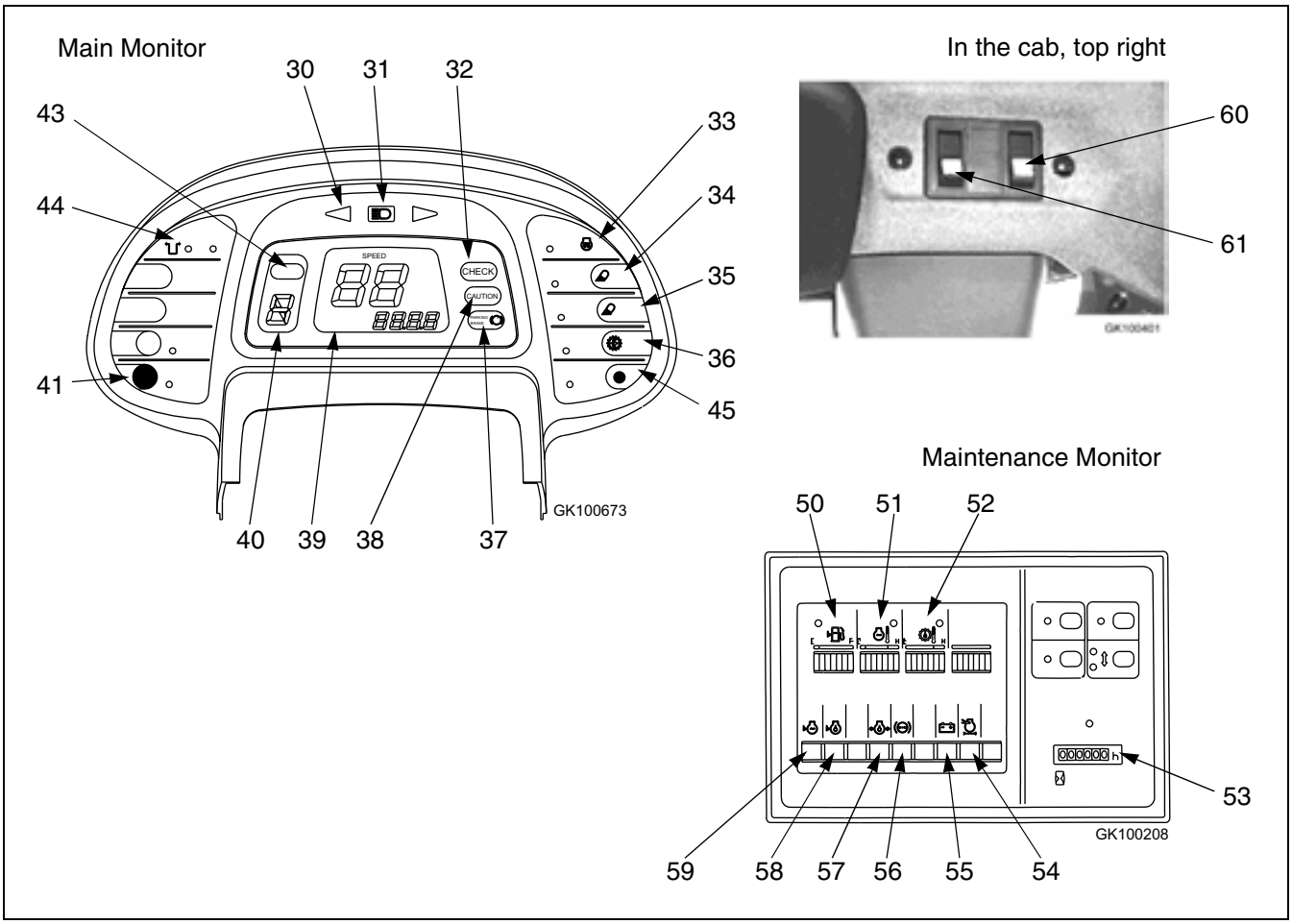
1	Boom	6	Headlamp	V	front
2	Tipping lever	7	Lift cylinder	H	rear
3	Bucket cylinder	8	Front wheel	R	right
4	Rear wheel	9	Bucket	L	left
5	Indicator lamp				

3.1.2. Control elements and measuring instruments

General view



1	Main monitor	9	Brake pedal	17	Car radio (Option)
2	Horn switch	10	Steering column tilt lever	18	Kickdown switch
3	Hazard lamp switch	11	Brake pedal	19	Gear-change lock
4	Directional lever	12	Accelerator pedal	20	Boom control lever
5	Speed control lever	13	Lamp switch	21	Bucket control lever
6	Air conditioner panel	14	Turn signal lever	22	Cigarette lighter
7	Speed control lever stopper	15	Dimmer switch	23	Safety lock
8	Wiper switch	16	Starting switch	24	Parking brake switch



Main monitor

30 Turn signal pilot lamp
31 High beam pilot lamp
32 Centralised checking lamp
33 Engine pre-heating pilot lamp
34 Pilot lamp for front working lamp
35 Pilot lamp for rear working lamp
36 Transmission cut-off selector pilot lamp
37 Parking brake pilot lamp
38 Central warning lamp
39 Speedometer
40 Transmission shift indicator
41 ECSS-Electronic
43 Pilot lamp for gear-change lock
44 Emergency steering operating monitor
45 Autoshift transmission pilot switch

Maintenance monitor

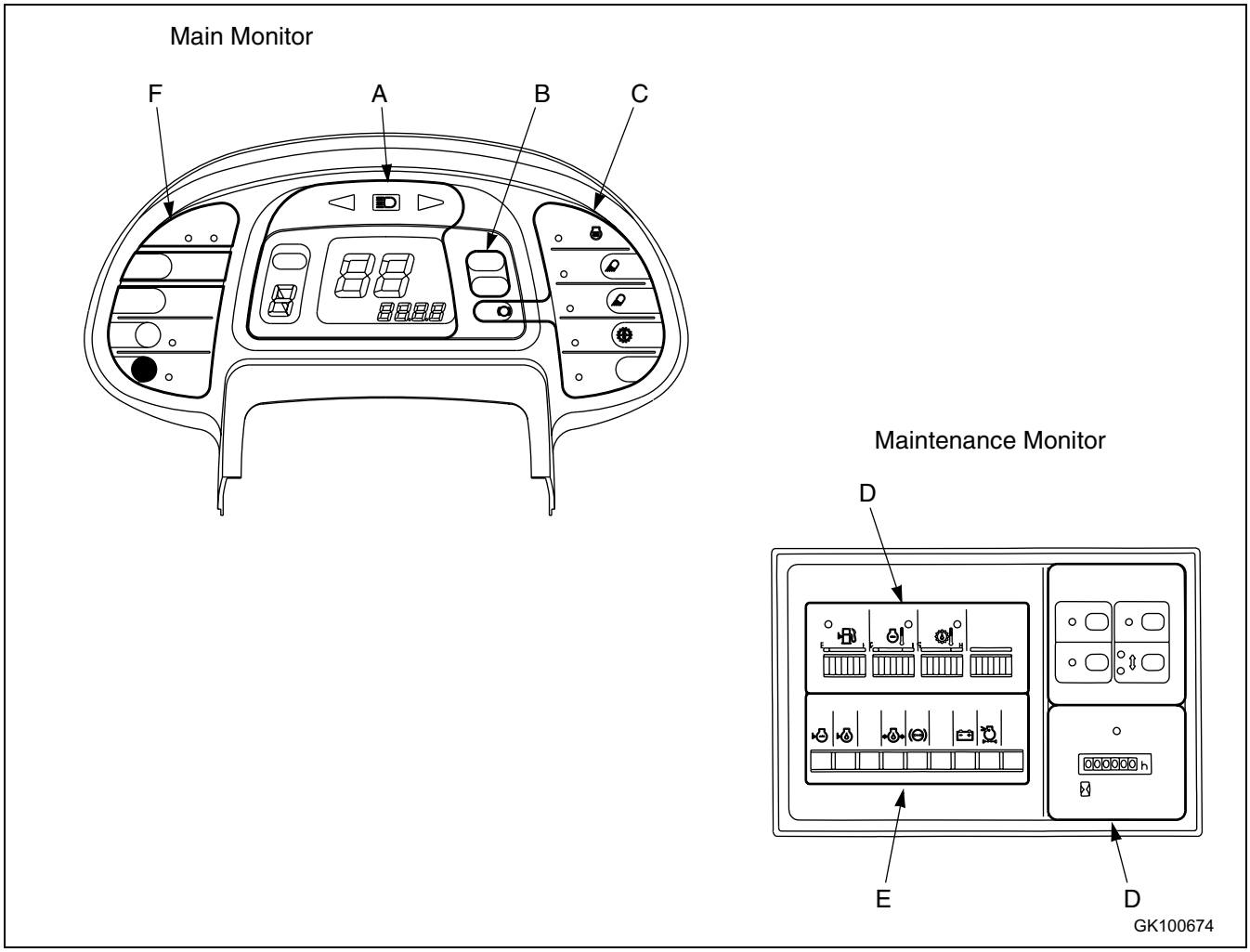
50 Fuel gauge
51 Engine cooling water temperature gauge
52 Torque converter oil temperature gauge
53 Service meter
54 Air cleaner clogging warning pilot lamp
55 Charge monitor
56 Brake oil pressure warning pilot lamp
57 Engine oil pressure warning lamp
58 Engine oil level warning pilot lamp
59 Coolant level warning light

Control lamps – in the cab, top right

60 Control lamp for central lubrication
61 Control lamp for rotating beacon

3.2. Description of the individual elements

3.2.1. Control monitor



The monitoring system consists of the main monitor and the maintenance monitor. Depending on the function type, the control system can be divided in:

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

In the following sections you will find an explanation of all devices required for efficient machine operation. To carry out all operations correctly and safely, it is important to fully understand the operating principles of the equipment and the meaning of the indicators/displays.

Control and measurement indicators (A, C and D)

These parts comprise the meters (speedometer, fuel gauge, engine water temperature gauge, torque converter oil temperature gauge, service meter, transmission shift indicator) and the pilot lamps (turn signal indicator, head lamp, high beam, preheating, front working lamp, rear working lamp, transmission cut-off, parking brake).

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 section "5. Maintenance" on page 5-1 and following and chapter "5.8.3. Checks before starting" on page 5-40.

Alarm indicators (B, E)

These parts comprise the central check lamp (CHECK), the central warning lamp (CAUTION), and warning pilot lamps (engine water level, engine oil level, brake oil pressure, engine oil pressure, battery charge, and air cleaner clogging).

Checking the control system

After switching off the engine, wait at least 30 before starting to check the control system.

Before starting the engine, set the starting switch to operating position 'ON'. Control if

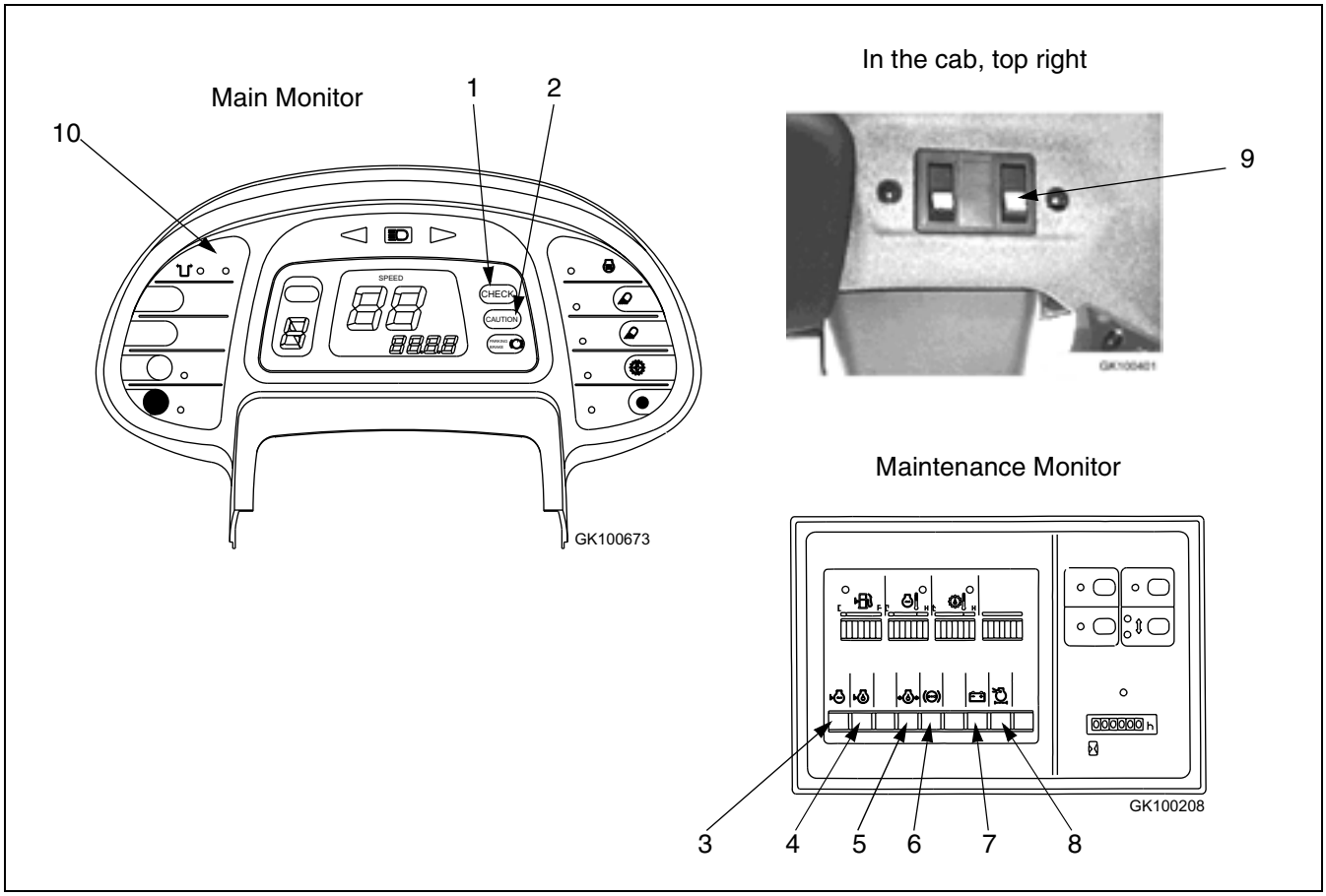
- all instruments and control/warning indicators light up for approx. 3 seconds,
- the alarm buzzer produces an audible signal (approx. 1 second),
- the speedometer displays the number '88',
- the transmission shift indicator displays the number '8',
- finally two beeps indicate that all control checks are terminated.

If you detect a malfunction, arrange an inspection with the relevant dealer.

NOTE

If the start switch is turned to operating position 'ON' with either the direction lever not being in the neutral position, the central warning lamp (CAUTION) and the alarm buzzer will issue a signal. In this case, reset the lever or the switch to the neutral position. The warning lamp goes out and the audible signal is ended.

Warning indicators



1. Central Check Lamp (CHECK)

WARNING

If this monitor lamp flashes, carry out inspection and maintenance of the appropriate machine part as soon as possible.

GK100376

- If any abnormality is found before starting the engine (engine oil level, engine water level), the affected monitor lamp and the central CHECK lamp will flash.

  Check which monitor lamp is flashing and remove the cause of the malfunction before starting.

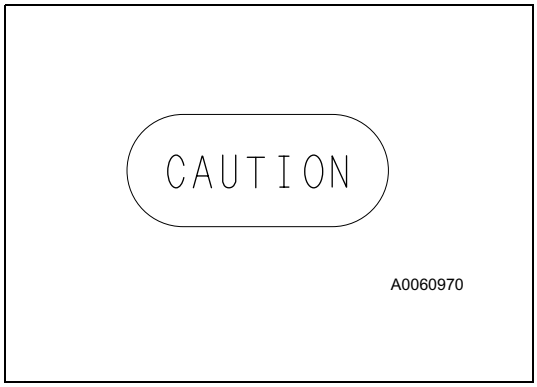
  When carrying out the pre-start checks, do not rely on the monitor alone. Always carry out the specified maintenance items, as well. If a low engine oil level is found during the pre-start checks, the operator must know that the level changes after starting the machine and that the central CHECK lamp and monitor lamp will stop flashing despite the low level.
  In case of a low engine water level, the central CHECK lamp will go out when the engine is started; instead, however, the central CAUTION lamp will flash and the alarm buzzer will sound intermittently.

- If an abnormality in the battery charging system is detected while the engine is running, the battery charge pilot lamp and the central CHECK lamp will flash simultaneously. In this case, check the charging circuit.

2. Central warning lamp (CAUTION)

⚠ WARNING

If these monitor lamps flash, stop the engine immediately or let it run at low idling and proceed as follows.

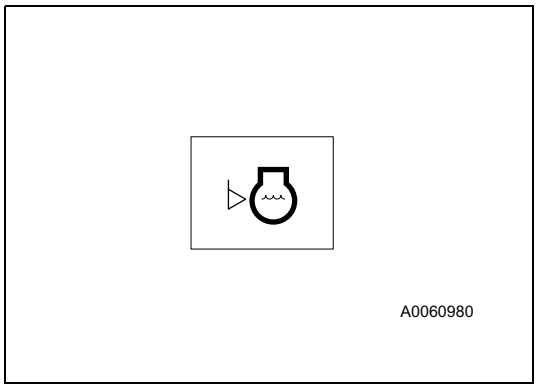


- If there is an abnormality in any CAUTION item while the engine is running (engine water temperature, torque converter oil temperature, engine water level, brake oil pressure, engine oil pressure), the alarm buzzer will sound intermittently and the monitor lamp for the affected element and the central CAUTION lamp will flash simultaneously.
- If the fuel gauge enters the red range while the engine is running, the fuel gauge and the central CAUTION lamp will flash. In this case, check the fuel level and fill-up fuel.

3. Coolant level warning light

NOTE

Position the machine on level ground, before starting the check.



During pre-start checks:
This warns the operator that the coolant level in the radiator has dropped when carrying out the pre-start checks (main switch ON, engine stopped).
If the coolant level in the radiator is low, the warning lamp and the central CHECK lamp will flash.
In this case, check the coolant level in the radiator sub-tank and add water.

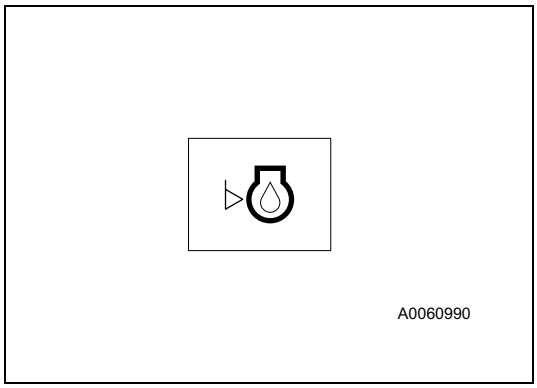
In operation (engine running):
Normally, this warning lamp should be off.
If the coolant level in the radiator is too low, the warning lamp and the central CAUTION lamp will flash, and the alarm buzzer will sound intermittently.
In this case, stop the engine, check the coolant level in the radiator sub-tank and add water.
Stop the machine on level ground before carrying out this check.

4. Engine oil level warning lamp

This warns the operator that the oil level in the engine oil pan has dropped.

During pre-start checks:
If the oil level in the engine oil pan is low, the warning lamp and the central CHECK lamp will flash.
In this case, check the oil level in the engine oil pan and add oil.

In operation:
Even if the engine oil level warning lamp is flashing during the pre-start check, it will go out after starting the engine.



5. Brake oil pressure warning lamp

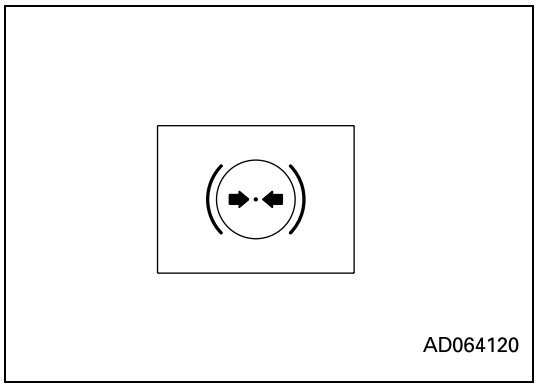
This warns the operator that the brake oil pressure has dropped.

During pre-start checks:
When the engine is stopped, the brake oil pressure circuit is not actuated, so that the warning lamp and the central CHECK lamp are also off.

In operation:
If the brake oil pressure drops, the warning lamp and the central CAUTION lamp will flash, and the alarm buzzer will sound intermittently. In this case, stop the engine immediately and check the brake oil pressure circuit.

NOTE

The warning lamp may flash and go out approx. 10 seconds after the engine is started. This is because pressure is being stored in the brake accumulator. It does not indicate any malfunction.

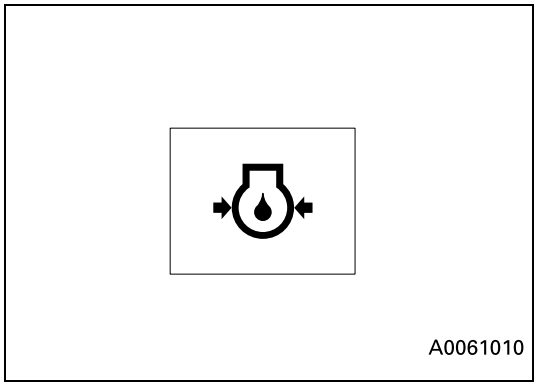


6. Engine oil pressure warning lamp

This warns the operator that the lubricating oil pressure of the engine has dropped.
If it flashes, stop the engine and check.

Pre-start check:
Lamp is lit.

Engine started or running:
When the engine is started, the lubrication pressure is formed and the lamp goes out. If the engine lubrication pressure drops during operation, the warning lamp and the central CAUTION lamp will flash, and the buzzer will sound intermittently.

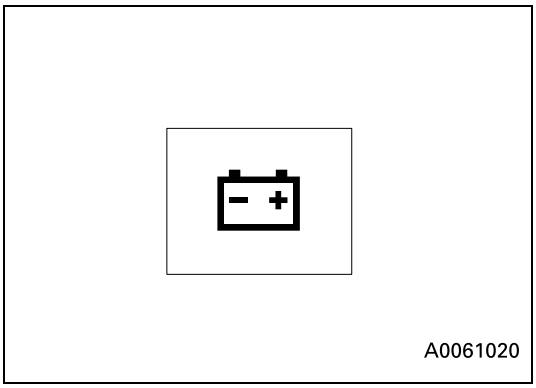


7. Battery charge warning lamp

This warns the operator that there is an abnormality in the charging system with the engine running.

Pre-start check:
Lamp is lit.

Engine started or running:
When the engine ist started, the alternator generates electricity and the lamp goes out. If any abnormality occurs in the charging system, the warning lamp and the central CHECK lamp will flash. In this case, check the charging circuit.

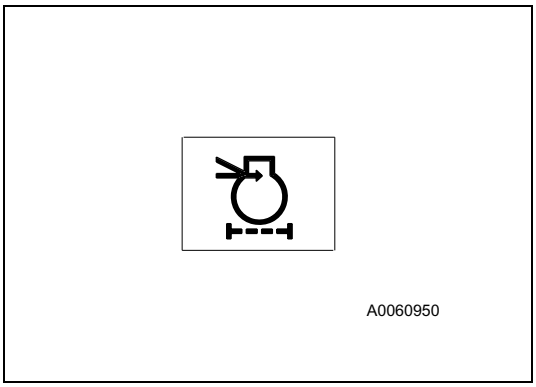


8. Air cleaner clogging warning lamp

When the engine is running, this warns the operator that the air cleaner element is clogged.

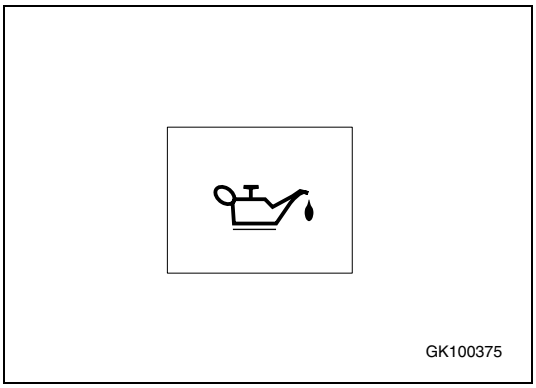
Pre-start check:
Lamp is OFF.

In operation:
If the air cleaner becomes clogged, the warning lamp and the central CHECK lamp will flash.
In this case, clean or replace the element.



9. Warning lamp for central lubrication system

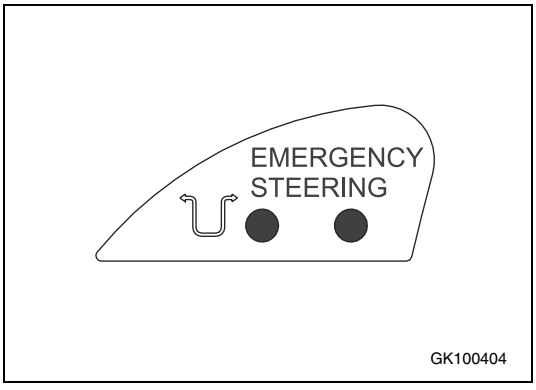
The yellow control lamp in the button (in the cab, top right) lights up if there is a fault in the central lubrication system.



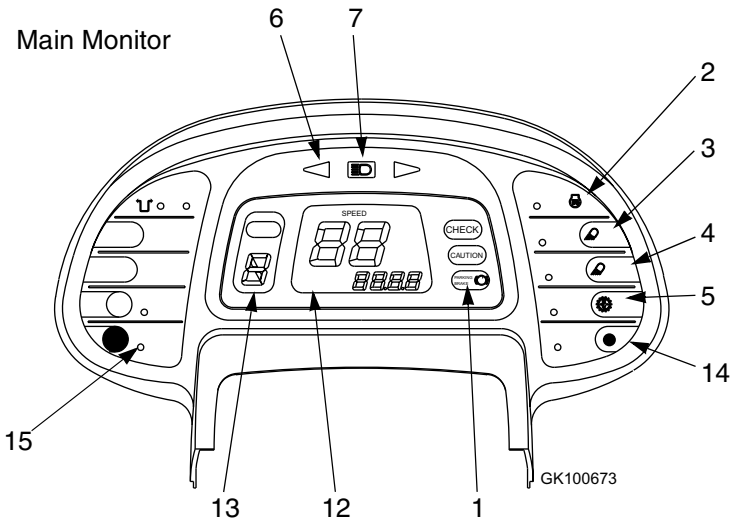
10. Emergency steering control lamp

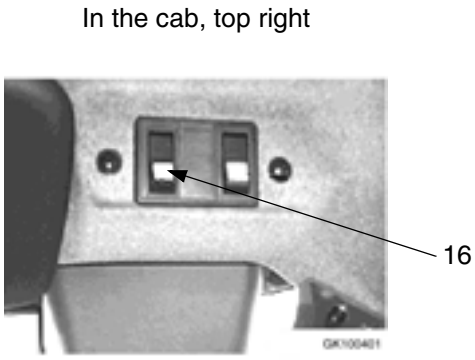
The green control lamp lights up when the machine is running if the main pump is operating normally.

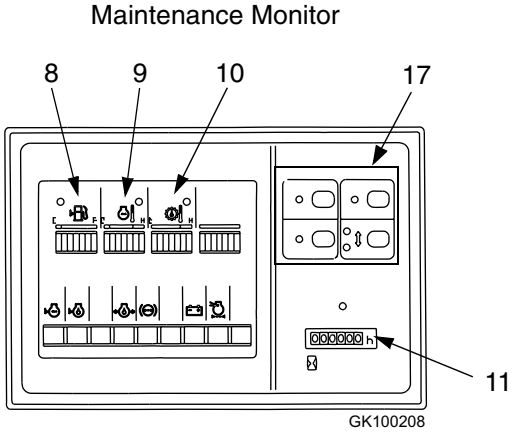
If a fault occurs in the pump circuit while the machine is running, the red lamp lights up to show that the emergency steering system has been switched on. Turn off the engine if the red control lamp lights up.



Measuring instruments and control elements





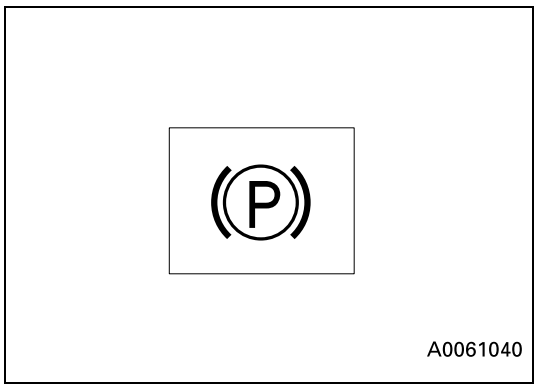


Control indicators

When the starting switch is ON, the control indicators light up if the display items are functioning correctly.

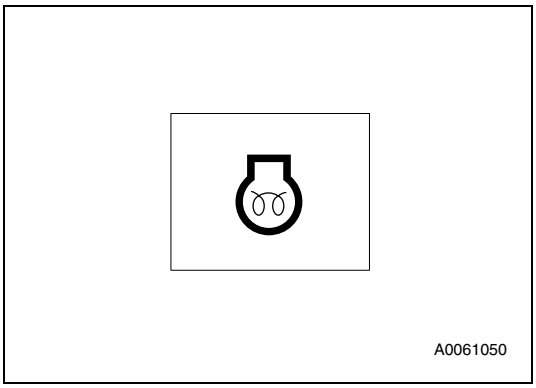
1. Parking brake control lamp

This control lamp will illuminate when the parking brake is applied (non-latching switch on steering column).



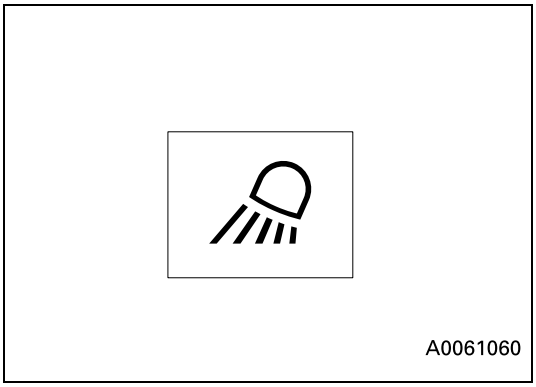
2. Engine pre-heating control lamp

This lamp is on when the pre-heater is in operation. This lamp lights up when the starting switch is turned to the 'ON' position, and goes out when pre-heating is finished. The time the pre-heater is operational varies according to the water temperature when the engine is started.



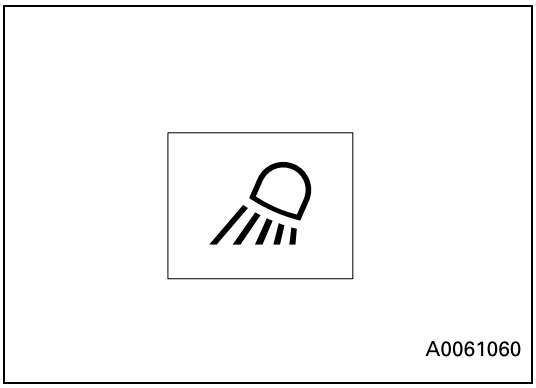
3. Control lamp for front working lights

This lamp lights up when the front working lights are switched on.



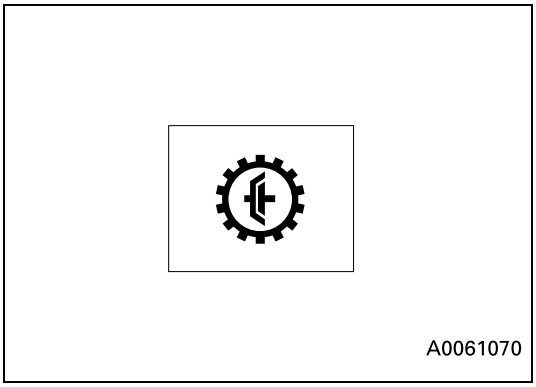
4. Control lamp for rear working lights

This lamp lights up when the rear working lights are switched on.



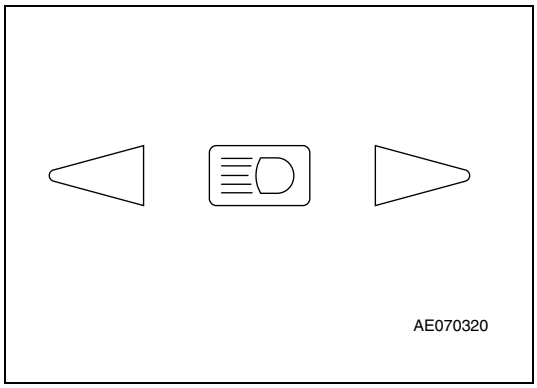
5. Transmission cut-off control lamp

This lamp lights up when the transmission cut-off switch is turned ON.
If the control lamp is ON and the left brake pedal is depressed, the transmission will be reset to neutral.



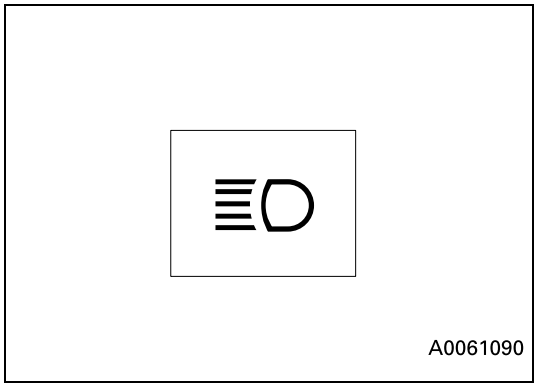
6. Turn signal control lamp

When the turn signal lamp flashes, the pilot lamp will also flash.



7. High beam control lamp

This lamp lights up when the head lights are set to high beam.



Measuring instruments / meters

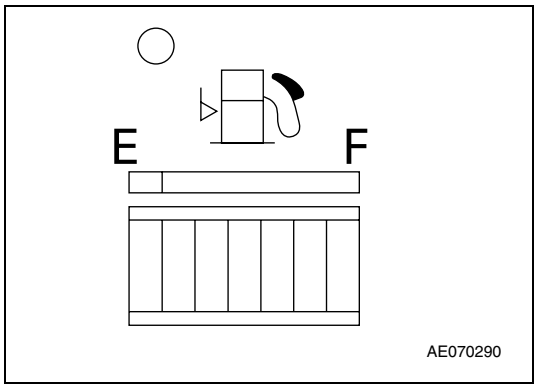
8. Fuel gauge

This gauge indicates the amount of fuel tank.

E: Tank is EMPTY
F: Tank is FULL

The indicator should be illuminated in the green range during operation. If, during operation, it enters the red range, the fuel gauge lamp and central CAUTION lamp will flash.

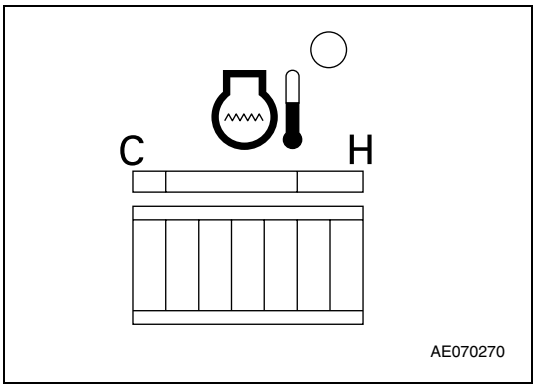
If only the red range is illuminated during operation, it means that there are less than 50 liters (13.2 US gal, 11UK gal) of fuel left, so check and add fuel.



9. Engine coolant temperature gauge

This gauge indicates the temperature of the coolant. If the temperature is normal during operation, the green range will light. If the red range lights during operation, stop the machine and run the engine without load at medium speed until the green range lights.

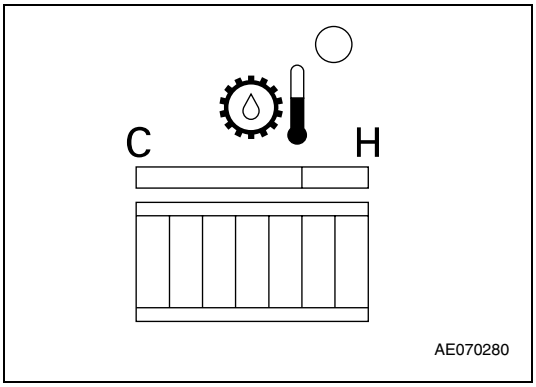
If the indicator lights up to the 1st red level, the engine coolant temperature gauge lamp and the central CAUTION lamp will flash; when the indicator lights up to the 2nd red level, the alarm buzzer will also sound intermittently.



10. Torque converter oil temperature gauge

This gauge indicates the temperature of the torque converter oil. If the temperature is normal during operation, stop the machine and run the engine with no load at medium speed until the green range lights.

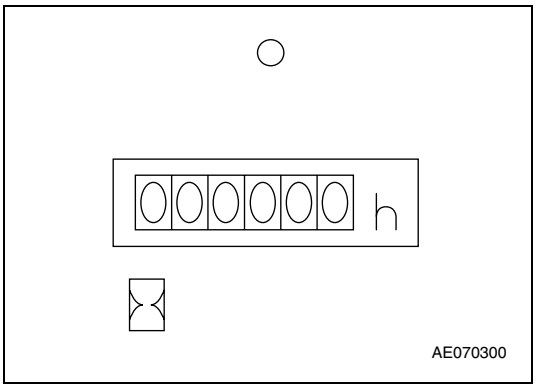
If the indicator lights up to the 1st red level, the torque converter oil temperature gauge lamp and central CAUTION lamp will flash; when the indicator lights up to the 2nd red level, the alarm buzzer will also sound intermittently.



11. Hourmeter

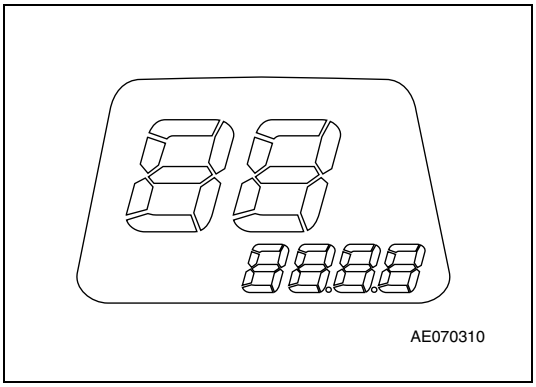
This meter shows the total operation hours of the machine. The hourmeter advances while the engine is running - even if the machine is not travelling.

While the engine is running, the green pilot lamp on the hourmeter flashes to show that the hourmeter is functioning.



12. Speedometer

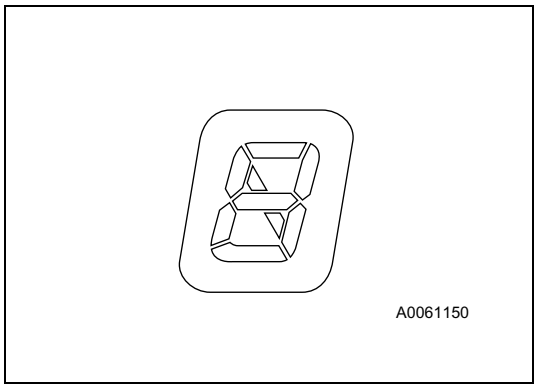
This indicates the travelling speed of the machine.



13. Gear shift indicator

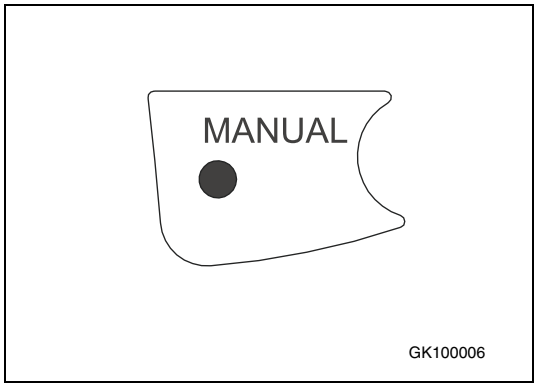
This indicator indicates the present speed range of the transmission. When the directional lever is in the N position, N is displayed on the indicator.

If the directional lever is set to the FORWARDS or REVERSE position, each gear selected by the gear shift lever will be displayed as a number.



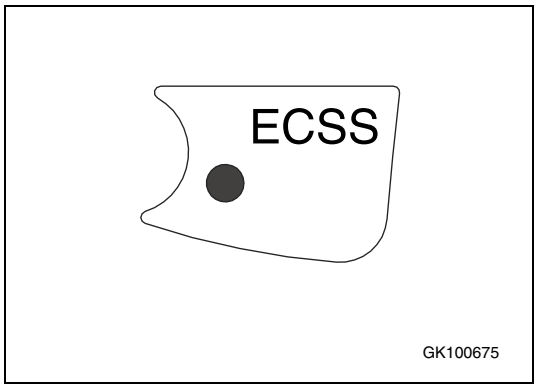
14. Autoshift transmission pilot lamp (yellow)

This lamp lights up when the transmission autoshift manual switch is turned ON (manual).



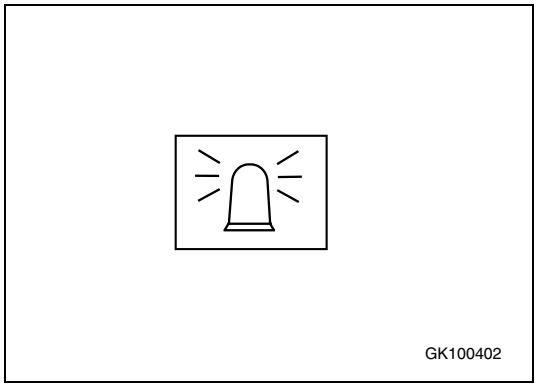
15. ECSS-electronics pilot lamp (option)

This lamp lights up when the ECSS-electronics switch is turned ON.



16. Turning light switch with control lamp (option)

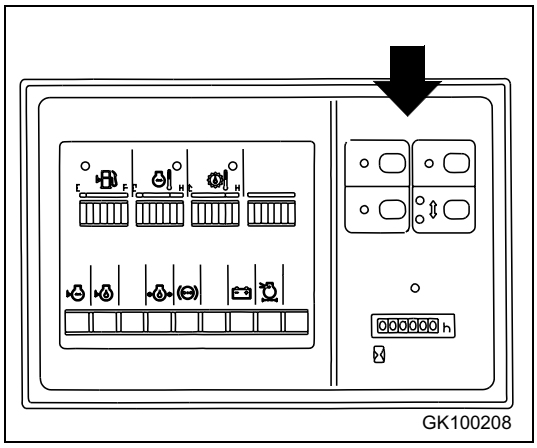
This turning light switch is only installed in machines which are provided with a turning light. If you switch on the turning light, the green control lamp in the switch lights up.



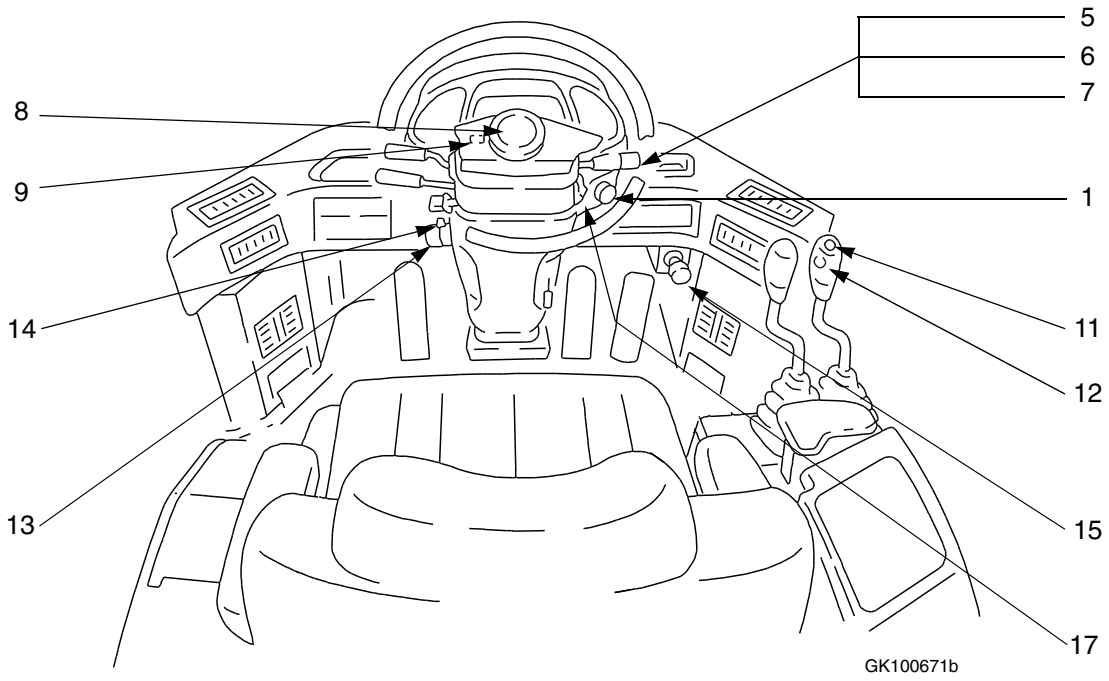
17. Control lamps for auto positioning (option) function

The control lamps are used when setting the auto-positioning function.

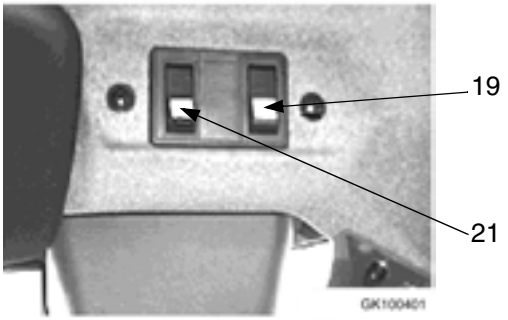
Information on operating the auto-positioning function, see section "7.2. Auto positioning" on page 7-5.

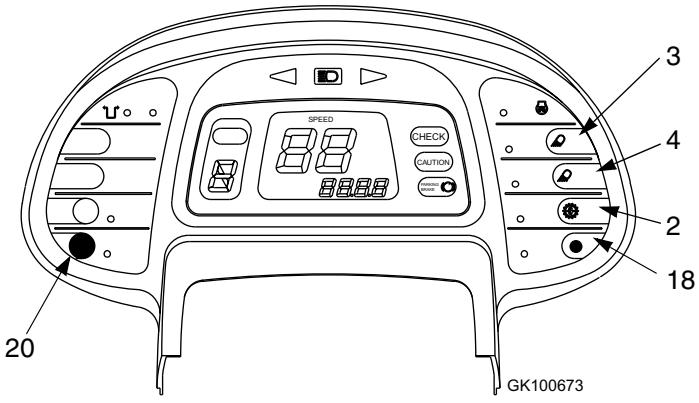


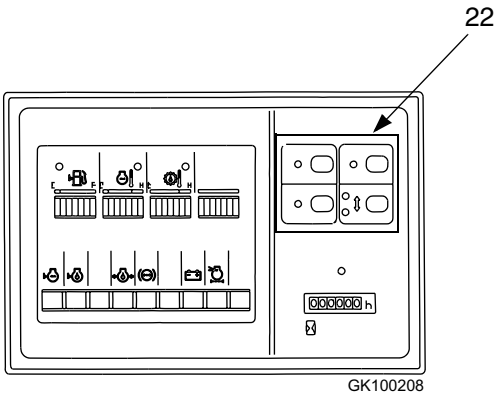
3.2.2. Switches



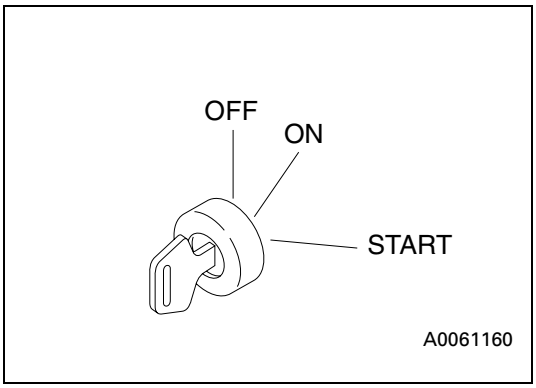
In the cab, top right







1. Start switch



This switch is used to start or stop the engine.

OFF
In this position, the key can be inserted and pulled off, the electric circuit is turned off and the engine is switched off.

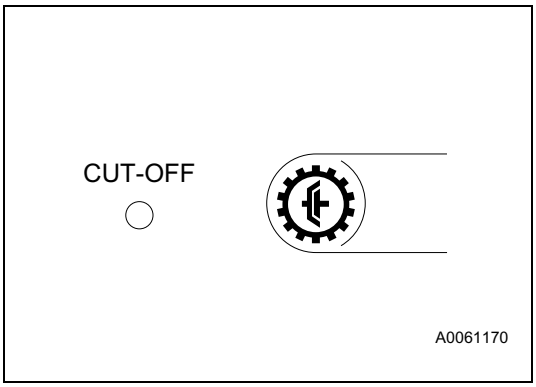
ON
In this position, electric current flows in the charging, lamp and auxiliary circuits. Keep the start switch key set to ON while the engine is running.

START
This is the engine start position. Keep the key at this position during cranking. Release the key immediately after starting the engine; it will automatically return to the ON position.

NOTE

The engine can only be started when the directional lever is set to the 'N' position.

2. Transmission CUT-OFF switch



WARNING

If the machine has to be started on a slope, always turn the transmission cut-off switch to OFF and depress the left brake pedal. Then depress the accelerator pedal while releasing the left brake pedal to start-up the machine slowly.

Pressing the push button switches the cut-off ON and OFF, alternately.
After pressing the switch, the control lamp will light up; if it is pressed again, the pilot lamp will go out and the transmission cut-off is turned OFF.
Normally, this switch is set to ON.

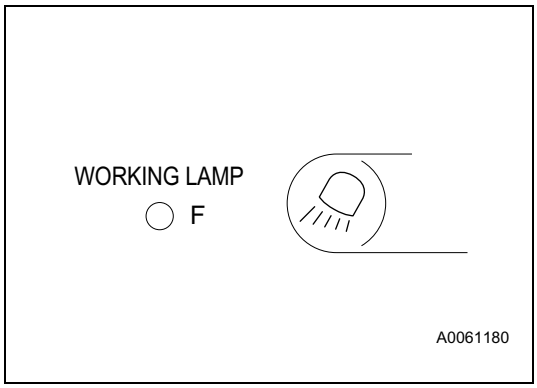
OFF Acts as normal brake (like right brake pedal).

ON Acts as normal brake, but also switches transmission to NEUTRAL.

3. Front working lights switch

Before turning on the front working lights, set the lamp switch for the side clearance light or for the head light to ON. Otherwise, the working lights will not light up.

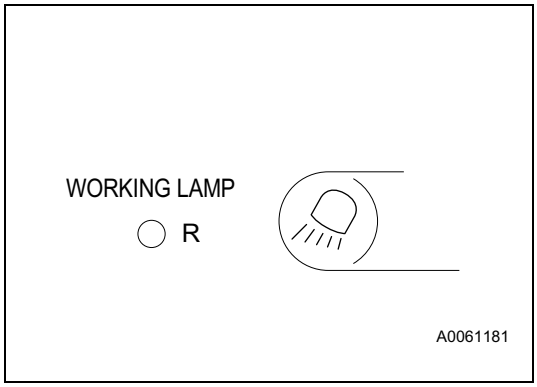
After pressing the switch, the control lamp will light up; if it is pressed again, the control lamp will go out and the working lamp is turned OFF.



4. Rear working lights switch

Before turning on the rear working light, set the lamp switch for the side clearance light or for the head lights to ON. Otherwise the working lights will not light up.

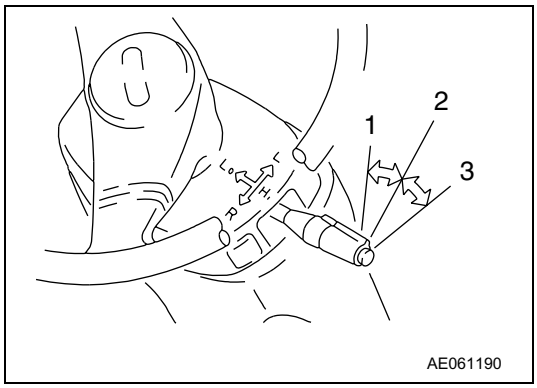
After pressing the switch, the control lamp will light up; if it is re-pressed, the control lamp will go out and the working lamp is turned OFF.



5. Lights switch

This is used to light up the head lamps, side clearance lamps, tail lamps, and instrument panel lighting.

1	OFF		off
2	position		side clearance lamp, tail lamps and instrument panel lighting are turned on,
3	position		head lamps light up in addition to lamps at position.



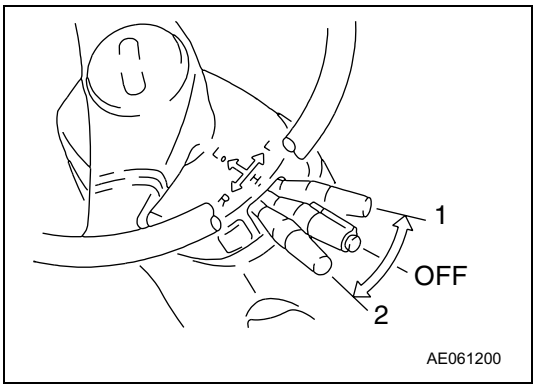
NOTE

The lamp switch can be operated regardless of the lever position.

6. Turn signal lever

This lever operates the turn signal lamps.

1	LEFT TURN	Push lever FORWARD
2	RIGHT TURN	Pull lever BACK



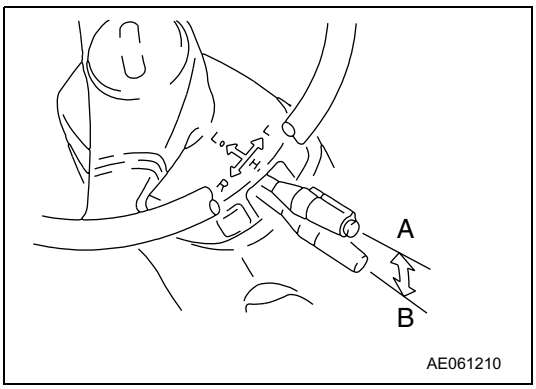
NOTE

- **When the lever is operated, the turn signal control lamp will also light up.**
- **When the steering wheel is turned to the neutral position, the turn signal lever will automatically return to OFF. If not, return the lever manually to OFF.**

7. Dimmer switch

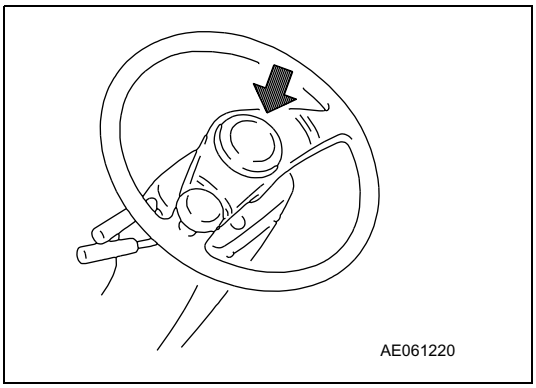
This switches the head lamp between high beam and low beam.

A Low beam
B High beam

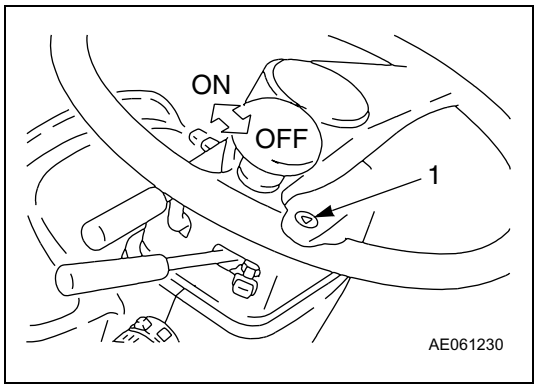


8. Horn button

When the button in the center of the steering wheel is pressed, the horn will sound.



9. Hazard warning switch



WARNING

Only use the hazard warning lights in the event of an emergency. Driving with hazard warning lights on only irritates other road users.

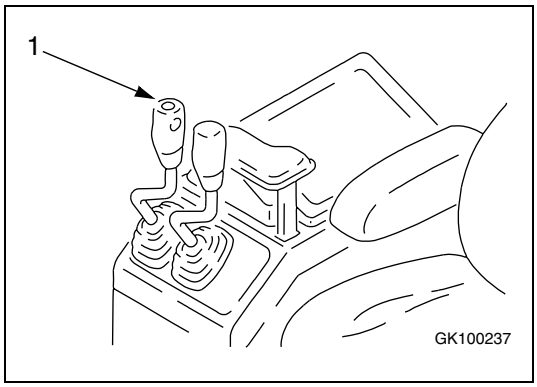
This switch is used in the event of an emergency, e.g. if the machine breaks down.

ON: All signal lamps flash

NOTE

The indicator lamps, the indicator control lamp and the hazard warning light control lamp (1) all flash when this switch is turned on.

11. Kickdown function (1)



If you are driving in second gear, you can increase thrust for excavation and loading work by using the kickdown function. The transmission changes down to 1st gear as soon as the kickdown function is switched on.

Kickdown ON
When in second gear press the key (1) at the top of the boom control lever.

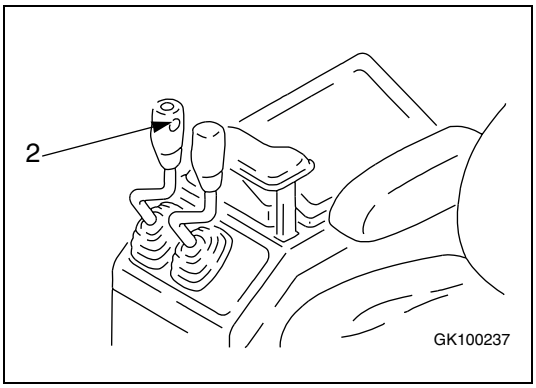
Kickdown OFF
You have three possibilities for switching the kickdown function off:

a) Put the directional lever into neutral first and then into the forward or reverse drive position.

b) Put the gear lever into any other gear (excluding 2nd gear).

c) Switch the starter switch off (switch position ”OFF”).

12. Gear-change lock (2)



Use the gear-change lock if you are driving up or downhill, or carrying out work which should only be carried out in a specific gear. As soon as you activate the gear-change lock, the selected gear is retained even if you increase engine speed to a level where the automatic transmission would normally change into a higher gear.

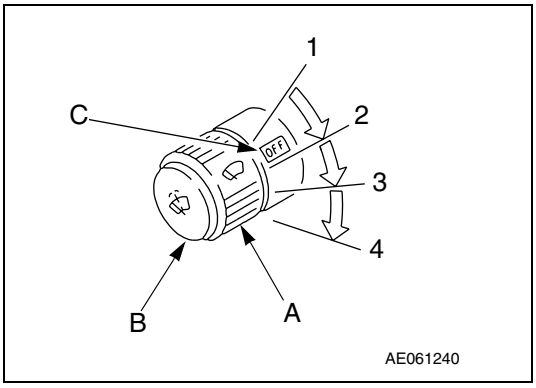
Gear-change lock on

1. Select the required gear.
2. Start the machine and increase speed until the selected gear is shown on the gear shift display.
3. Press the switch (2) at the top of the boom control lever. The gear-change lock is now switched on and the control lamp for the gear-change lock goes on.

Gear-change lock off

You can switch the gear-change lock off by pushing the gear-change lever or pressing the switch (2) again. The gear-change lock is now switched off again and the control lamp for the gear-change lock goes out.

13. Front wiper switch



- Turn the rotary control (A) to switch-on the front windscreen wiper(s).

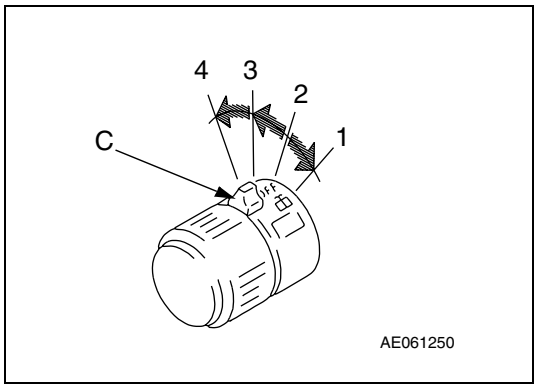
Switch position	Window display(C)	Operation
1	OFF	OFF
2	INT	Interval action
3	1	Slow
4	2	Fast

- Push button (B) and hold to spray washing fluid onto the front windscreen.

14. Rear wiper switch

- Turn lever (C) to operate the rear wiper.

Position of switch	Display	Operation
1		Washer fluid sprayed
2	OFF	OFF
3		Wiper actuated
4		Washer fluid plus wiper actuated



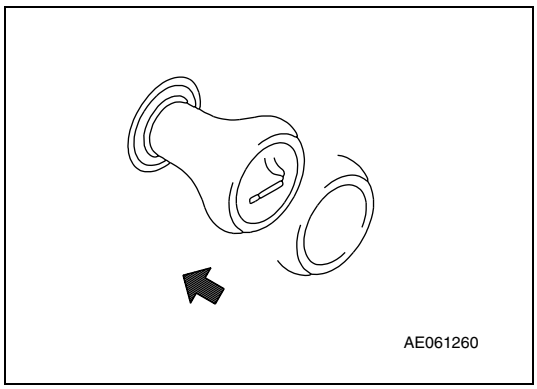
15. Cigarette lighter

This is used to light cigarettes.

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.



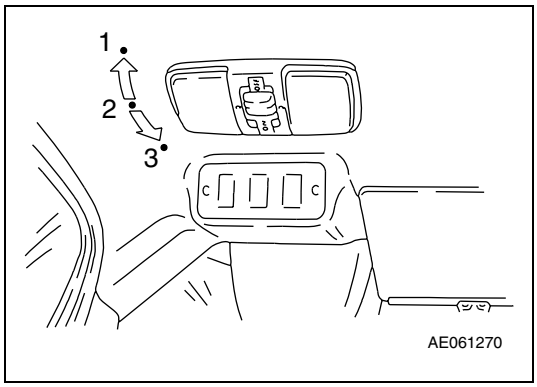
16. Room lamp switch

This lights up the room lamp.

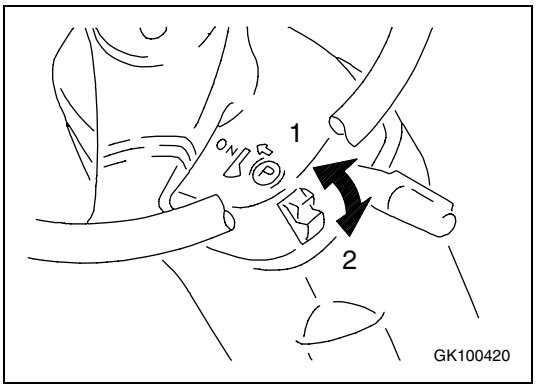
Position 1 and 2	OFF
Position 3	Lights up

NOTE

- **The room lamp lights up even when the main switch is OFF; so when leaving the operator's compartment, turn the switch to position 1 or 2.**
- **When operating with the cab door fully open, set the switch to position 1 (OFF).**



17. Parking Brake



WARNING

Always apply the parking brake when parking or leaving the machine.

The machine may still move after the parking brake is applied. Because of this the foot brake should be kept applied until the parking brake warning light comes on.

The toggle switch is used to activate the parking brake.

Pos. 1 ON The parking brake is applied. The warning light for the parking brake goes on.

Pos. 2 OFF The parking brake is released.

NOTE

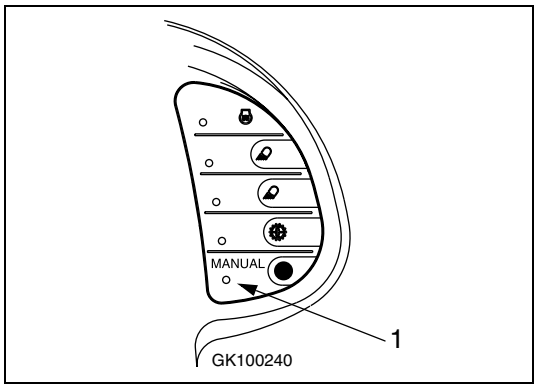
- **If the forward - reverse lever is moved to F or R, when the parking brake is applied, the warning light will come on and a buzzer will sound.**
- **If the start switch is set to OFF, the parking brake is applied automatically. Before switching on the engine switch the parking brake to ON, then OFF.**
- **The machine will not drive off if the directional lever is actuated with the parking brake on.**
- **The machine can not be moved with the parking brake on.**
- **The parking brake should not be used to stop the machine, unless there is an emergency.**
  Apply the parking brake only when the machine has stopped.
- **If the parking brake is used as a secondary brake at high speed, (top speed), then it should be checked as soon as possible by a qualified Komatsu workshop.**

18. Transmission autoshift manual switch

This switch is used to change between autoshift and manual transmission mode.

Position ON Manual shift mode (pilot lamp 1 ON)

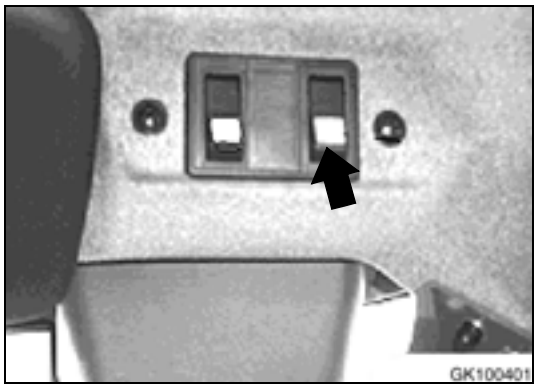
Position OFF Auto shift mode



19. Central lubrication system button

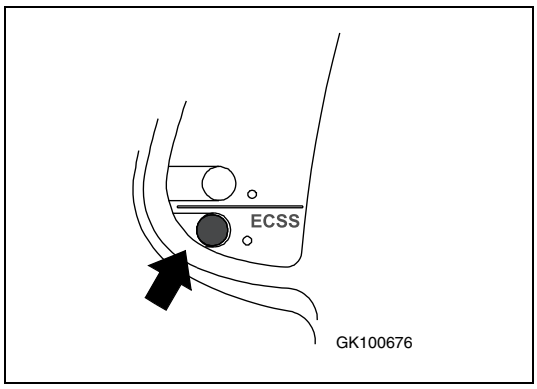
The central lubrication system can be operated manually with this button (top right in the cab).

Press the button once with the ignition switched or the engine running: the central lubrication system carries out one lubrication cycle.



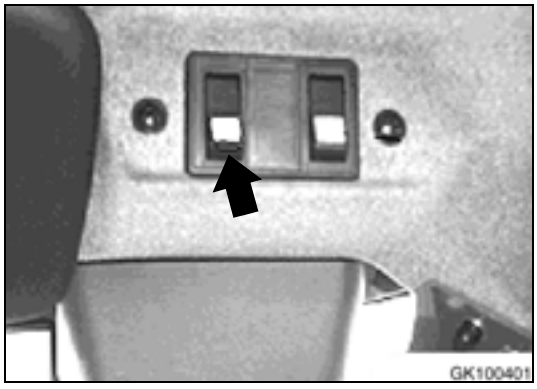
20. ECSS-electronics switch (option)

Press the push button to activate the ECSS-electronics. If the pilot lamps lights up, the ECSS-electronics is activated. If the pilot lamp does not light up, the ALS-electronics is not activated.
Also refer to chapter "7.1. ECSS-electronics" on page 7-2.



21. Turning light switch with control lamp (option)

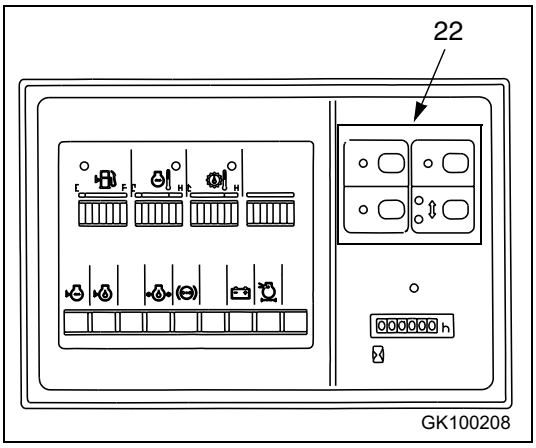
This turning light switch (top right in the cab) is only installed in machines which are provided with a turning light. If you switch on the turning light, the green control lamp in the switch lights up.



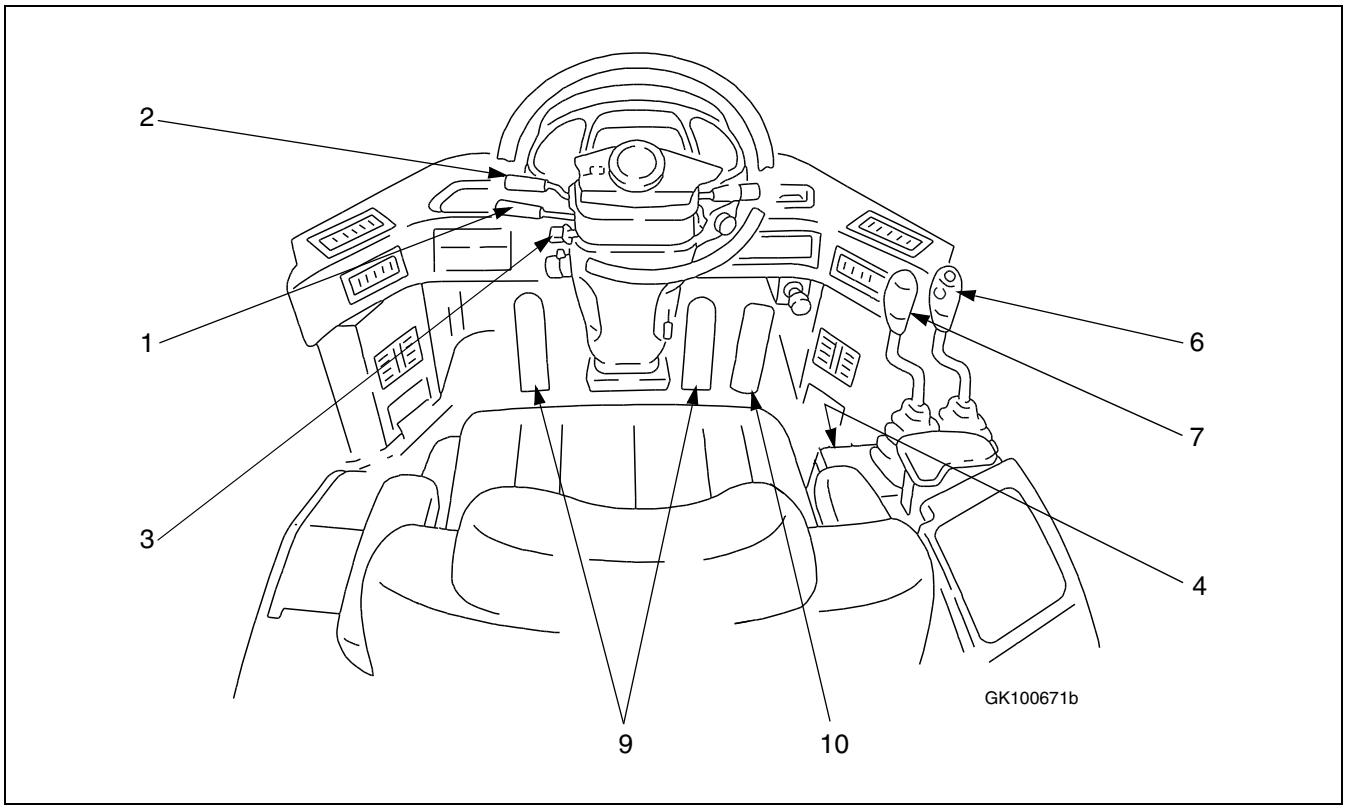
22. Auto positioning function switch (option)

The auto-positioning function enables the position in which the boom is to be held to be pre-selected from the driver's seat and stored. The impact when stopping the boom movement is cushioned.

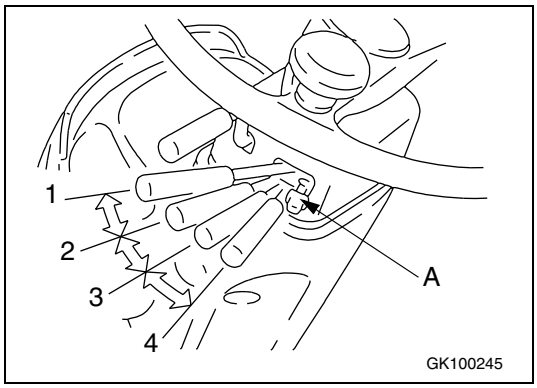
Information on operating the auto-positioning function, see section "7.2. Auto positioning" on page 7-5.



3.2.3. Control levers and pedals



1. Gear lever



This lever controls the travel speed of the machine.The machine is fitted with an automatic transmission with 4 FORWARD and 4 REVERSE GEARS.

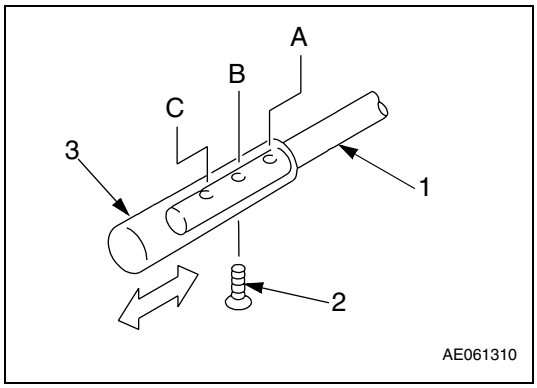
Push the gear lever into the position for the required speed range.

- 1st and 2nd gears are used for working.
- 3rd and 4th gears are used for travel.

If the gear lever stop (A) is applied (see item "3. Gear lever stop" on page 3-29), it is not possible to shift into 3rd or 4th gear. Deactivate the gear lever stop before changing gear.

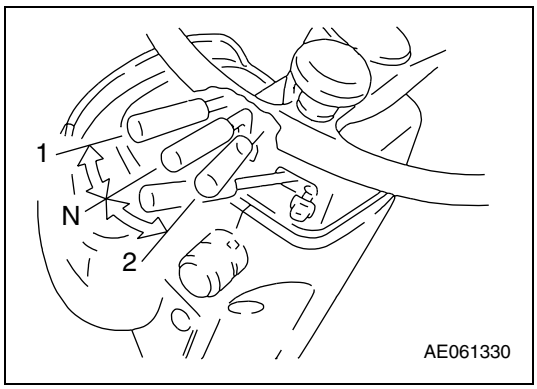
Position 1 1st gear
Position 2 2nd gear
Position 3 3rd gear
Position 4 4th gear

Adjusting the length of the gear lever



The length of the gear lever (1) can be adjusted to three different lengths (positions A, B and C). To adjust length, remove the screw (2) underneath the lever grip (3) and push the grip to the required position and then fasten in position again using the screw (the lever is set to position B at works).

2. Directional lever

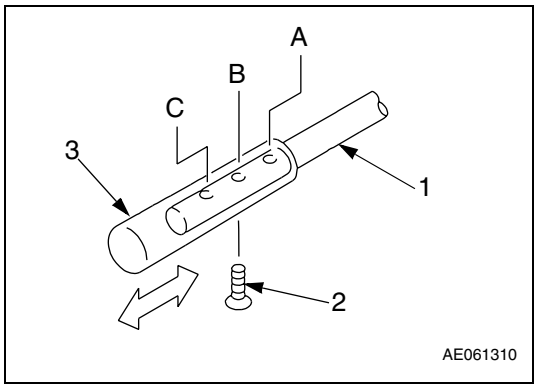


This lever is used for changing the travel direction.

The engine can only be started if the directional lever is set to the neutral N position.

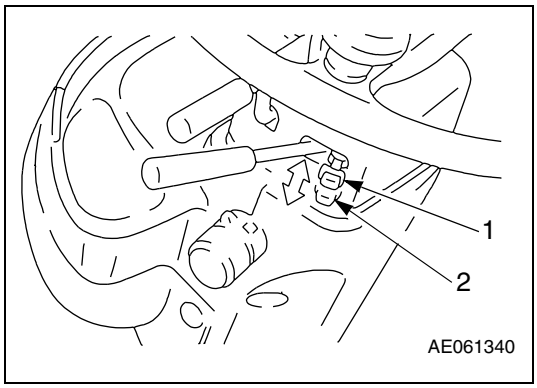
Position 1 Forward drive
Position N Neutral
Position 2 Reverse drive

Adjusting the length of the directional lever



The length of the lever (1) can be adjusted to three different lengths (positions A, B and C). To adjust length, remove the screw (2) underneath the lever grip (3) and push the grip to the required position and then fasten in position again using the screw (the lever is set to position B at works).

3. Gear lever stop

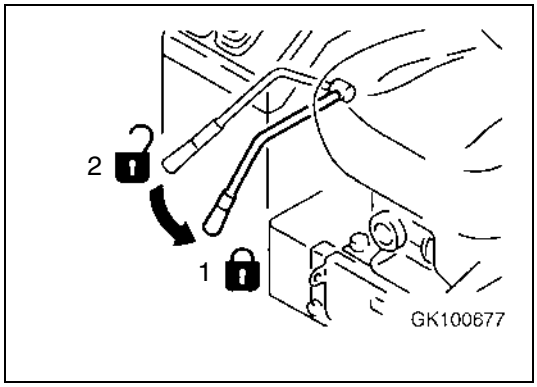


The stop prevents the gear lever being shifted into 3rd or 4th gear.

Position 1 Stop activated

Position 2 Stop deactivated

4. Safety lock lever for the work hydraulic system



WARNING

- **When leaving the operator's compartment, make sure to set the safety lock lever to the LOCK '1' position. If the control levers are not locked and are touched by mistake, this may lead to a serious accident.**
- **If the safety lock lever is not positively set to the LOCK '1' position, the control levers may not be properly locked. Make sure that the lever is set down to position '1'.**
- **When parking the machine or performing maintenance works, always lower the bucket to the ground and apply the lock.**

This is used to lock the work equipment levers.

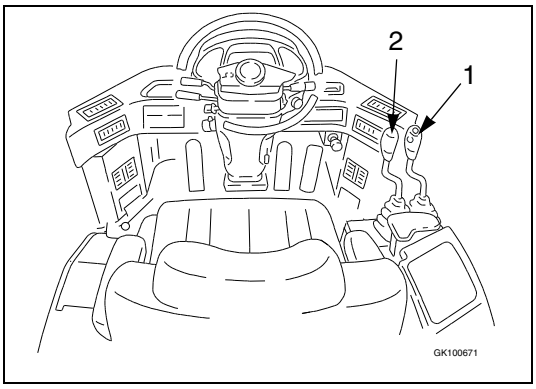
Position 1 Work hydraulic system locked

Position 2 Work hydraulic system unlocked

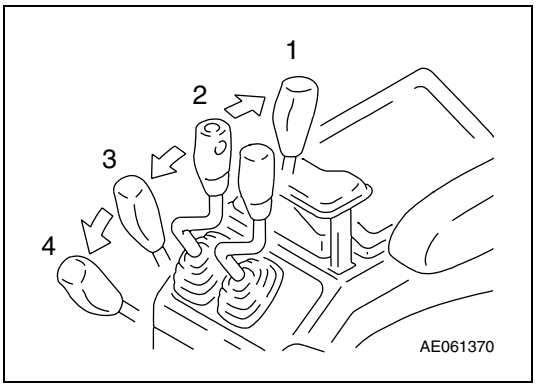
Push the lever down to apply the lock.

6. Boom control lever

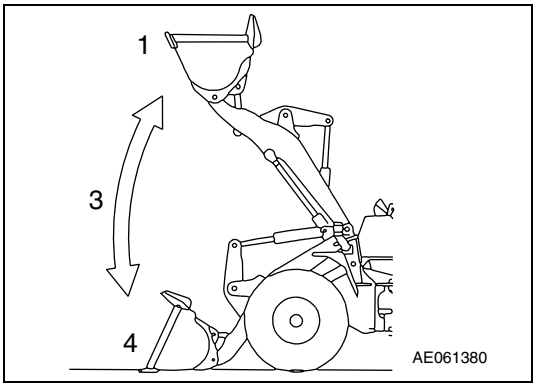
The working attachment is controlled using the boom control lever (1) and the bucket control lever (2).



Boom actuation – boom control lever (1)



1	Raise		
2	Hold		The boom is held in the set position.
3	Lower		
4	Float position		The lever is locked in this position. The boom moves freely under external force.



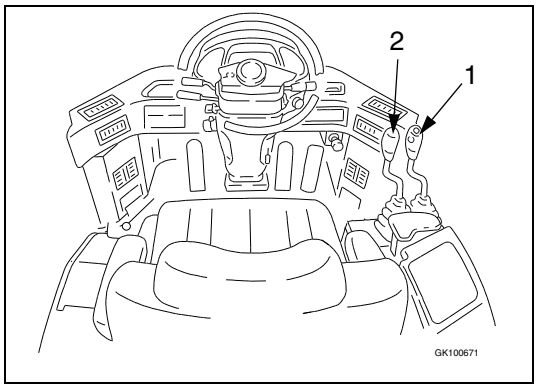
If the control lever is pulled up further from the raise position it is locked into this position. Once the boom reaches the pre-set switch-off position, the lever returns to the hold position.

NOTE

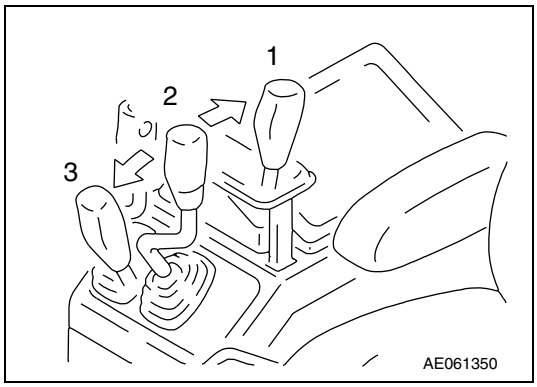
Do not use the float position (FLOAT) to lower the bucket.

7. Bucket control lever

The working attachment is controlled using the boom control lever (1) and the bucket control lever (2).



Bucket actuation – bucket control lever (2)

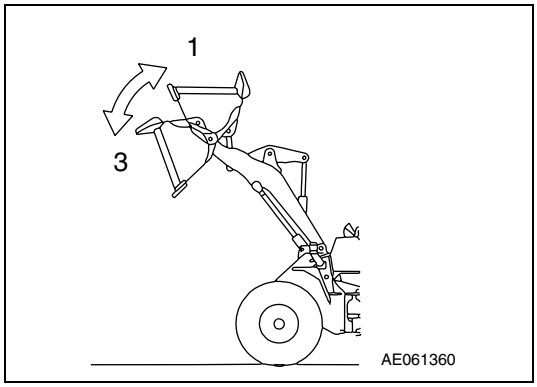


1 Tilt 

2 Hold  The bucket is held secure in the set position.

3 Dump 

If the control lever is pulled up further from the tilt position it is locked into this position. Once the bucket reaches the pre-set switch-off position, the lever returns to the hold position.



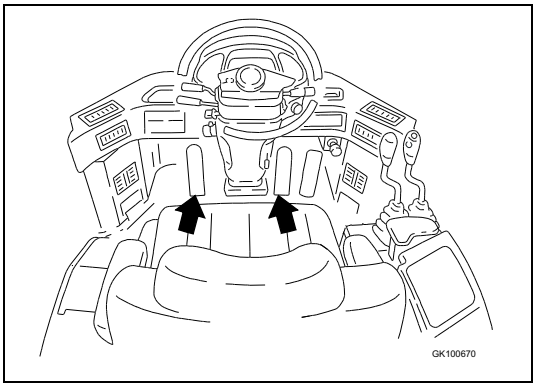
9. Brake pedals

⚠ WARNING

- **When travelling downhill, use the engine as a brake, and always use the right brake pedal.**
- **Do not use the brake pedals repeatedly unless necessary.**
- **Do not put your foot on this pedal unless necessary.**

Right brake pedal
The right brake pedal operates the wheel brakes and is used for normal braking.

Left brake pedal
The left brake pedal operates the wheel brakes, and if the transmission cut-off switch is set to ON, it also returns the transmission to neutral.



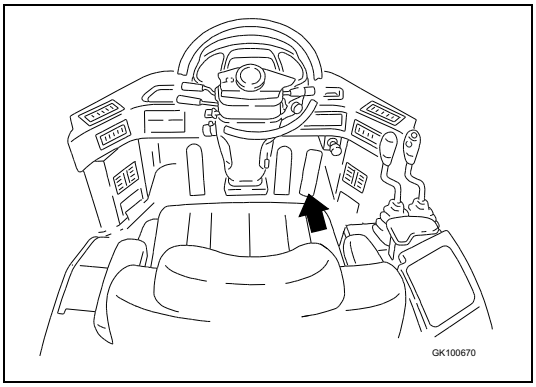
NOTE

When the accelerator is being used for operating the work equipment, always use the left brake pedal to slow down or stop the machine after setting the transmission cut-off switch to ON.

If the selection switch for the transmission cut-off switch to OFF, the left brake pedal holds the same function as the right brake pedal.

10. Accelerator pedal

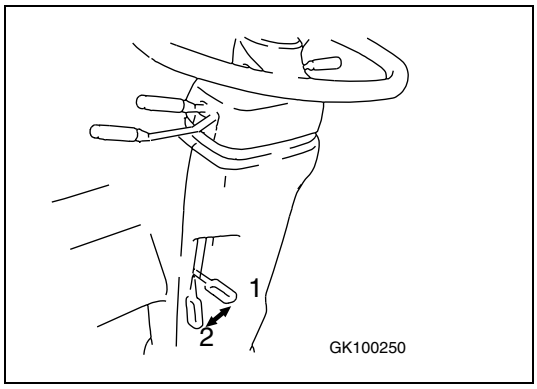
This pedal controls the engine speed and output. The engine speed can be freely controlled between low idling and full speed.



3.2.4. Steering column tilt lever

WARNING

Stop the machine before adjusting the angle of the steering wheel.



This lever allows the steering column to be tilted forward or backward.

Pull the lever up and move the steering wheel to the desired position. Then push the lever down to lock the steering wheel in position.

Range of adjustment: 125 mm (4.92 in) (stepless)

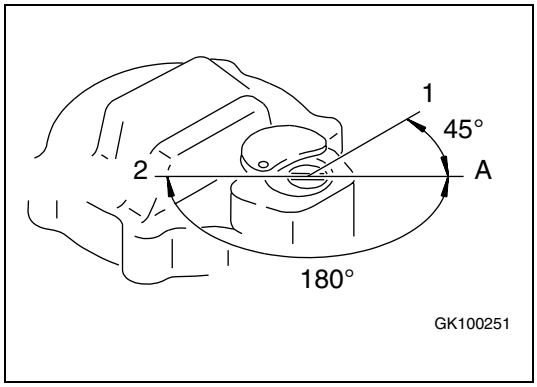
3.2.5. Cap with lock

The fuel tank, hydraulic fluid tank, filler neck for the transmission fluid and the coolant expansion tank are all provided with lockable caps.

Use the starter key to open and close the relevant cap, as shown.

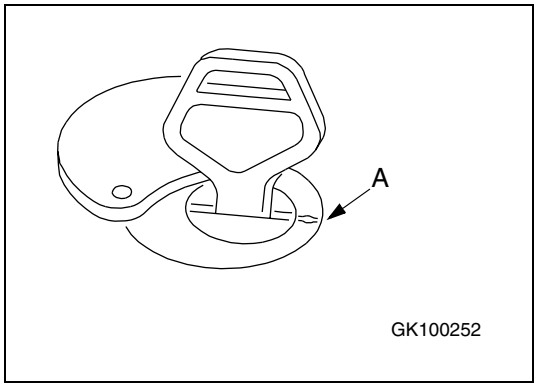
To open the cap

1. Insert the key into the cap as far as it will go. If the key is turned before it is inserted all the way, it may break.
2. Turn the key counterclockwise and bring the rotor groove in line with the aligning mark (A) on the cap. Turn the cap slowly until a "clicking" sound is audible. This releases the lock and allows the cap to be opened.



To lock the cap

1. Turn the cap into place.
2. Turn the key clockwise and take the key out.

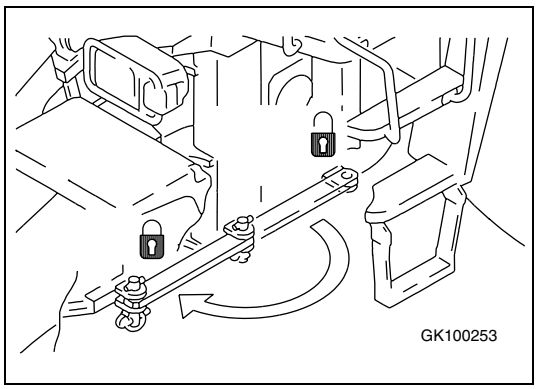


3.2.6. Safety bar

WARNING

- **Always apply the safety bar while performing maintenance operations and while transporting the machine.**
- **Always remove the safety bar during normal operations.**

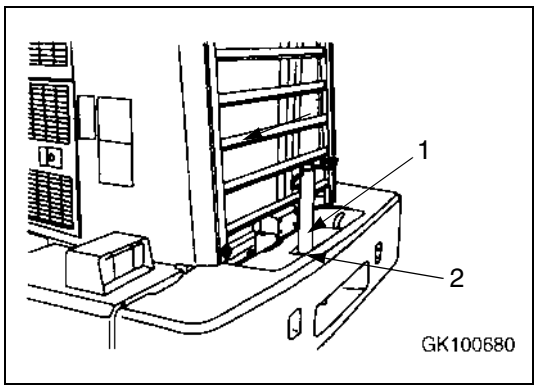
The safety bar is used during maintenance or when transporting the machine. It locks the front frame and rear frame, and prevents the front and rear frame from bending.

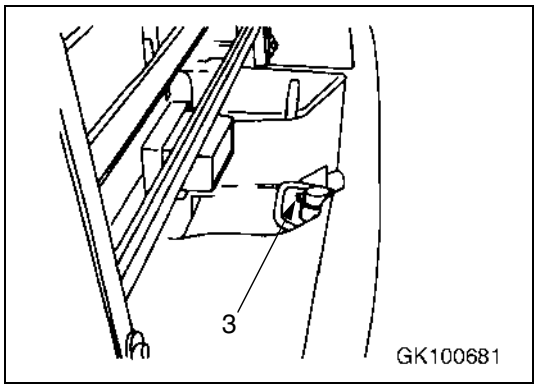


3.2.7. Towing pin

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

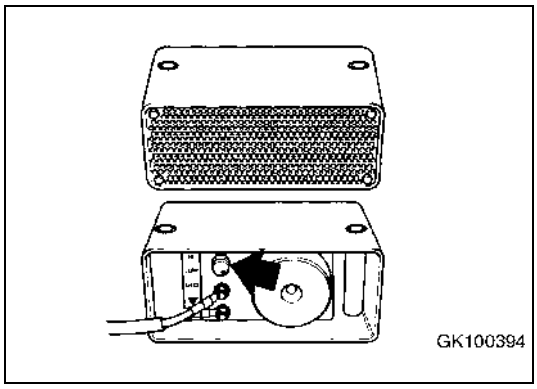
To remove the pin proceed in reverse order.





3.2.8. Backup alarm

The horn sounds when the drive direction lever has been placed in reverse drive.



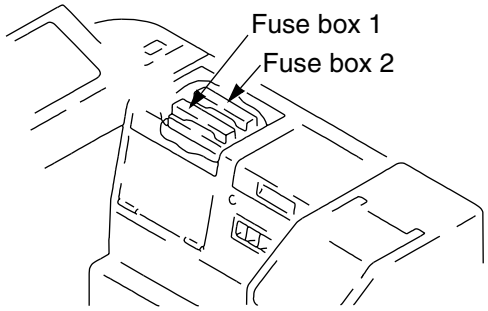
3.2.9. Fuses

NOTE

Before replacing a fuse, be sure to turn off the start switch.

The fuses protect the electrical equipment and wiring from burning out.
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

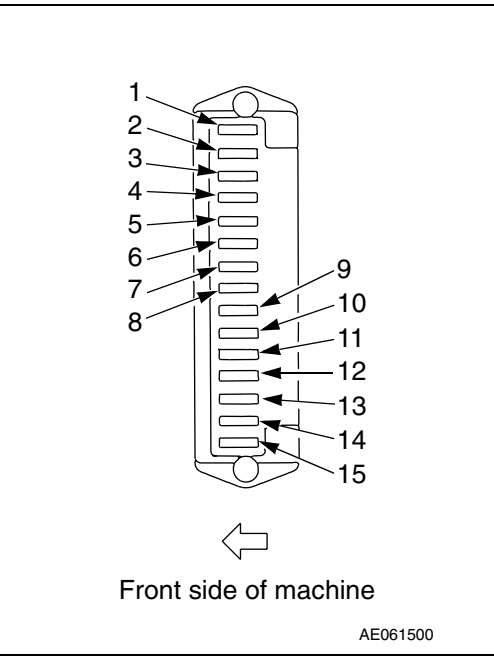
Only replace fuses with fuses of the same capacity.



Fuse capacity and circuit designations

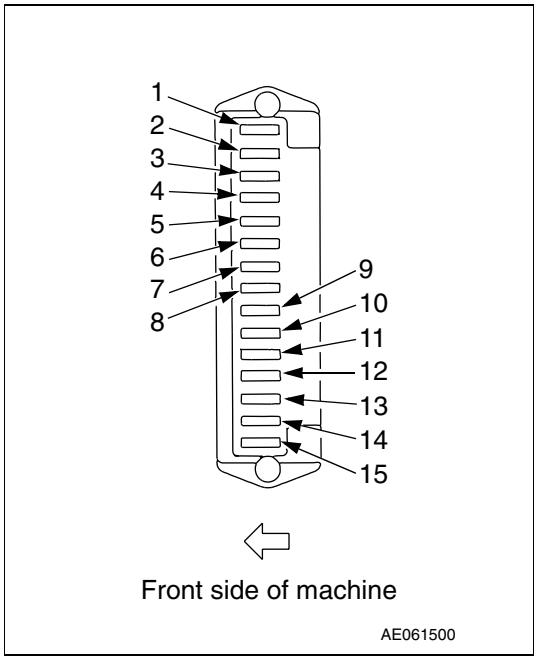
Fuse box 1

No.	Fuse Capacity	Name of circuit
1	20 A	Main fuse, headlight
2	20 A	Reverse driving light, brake light
3	10 A	Direction indicator
4	10 A	Headlight, right
5	10 A	Headlight, left
6	10 A	Parking light, right
7	10 A	Parking light, left
8	10 A	Parking brake
9	10 A	Gear-shift
10	10 A	Instrument illumination
11	10 A	Return to digg positioner, boom kickout
12	10 A	Start switch
13	20 A	Hazard warning system
14	20 A	Engine cut-off
15	10 A	(Central lubrification)



Fuse box 2

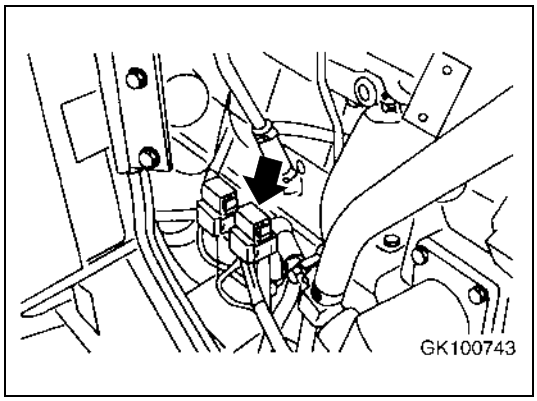
No.	Fuse Capacity	Name of circuit
1	20 A	Front working light
2	20 A	Rear working light
3	30 A	Air conditioning
4	20 A	Air conditioning
5	20 A	Windscreen wiper and washer system
6	10 A	Auto shift (option)
7	10 A	Cigarette lighter, radio
8	10 A	Turning light (option)
9	10 A	Driver´s seat with pneumatic suspension
10	10 A	Central lubrification
11	30 A	(Reserve 1)
12	20 A	Window lever left
13	20 A	Window lever right
14	10 A	(Reserve 2)
15	10 A	(Reserve 3)



3.2.10. Slow-blow fuses

If the power does not come on when the starting switch is turned ON, a slow-blow fuse may be blown; check the fuses and replace, if necessary, see "Changing the main fuse (surge-proof fuse)" on page 5-39.

he slow blow fuses are next to the engine on the left side of the machine.

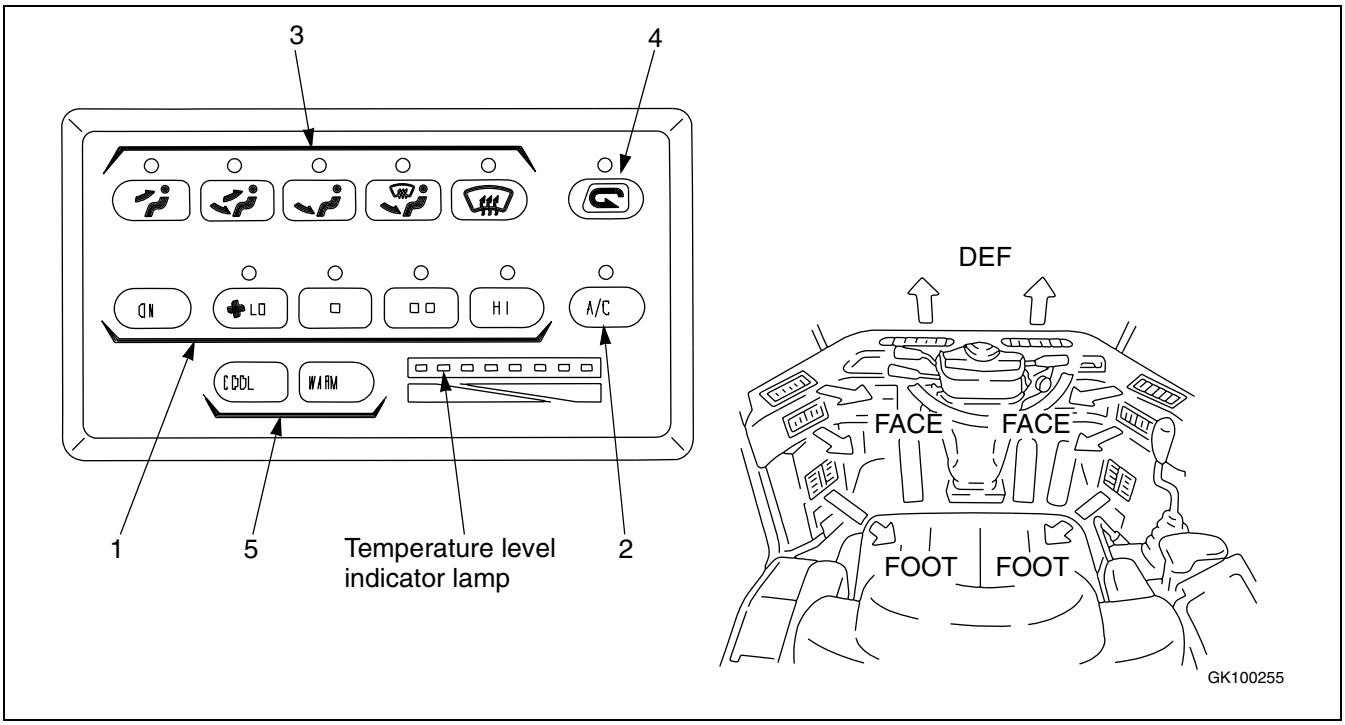


Slow-blow fuses

1 80 A Main power
2 30 A Battery power (starting switch, hazard)
3 120 A Engine pre-heating

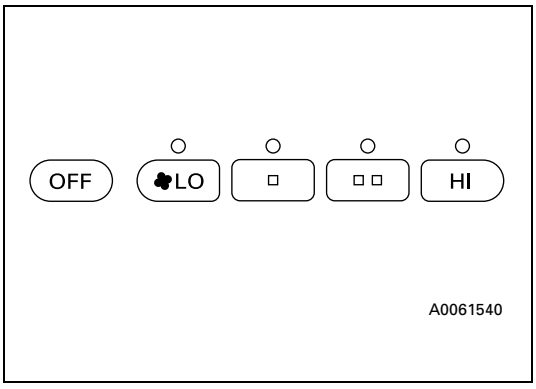
3.2.11. Air conditioning

Layout and functions of the control panel



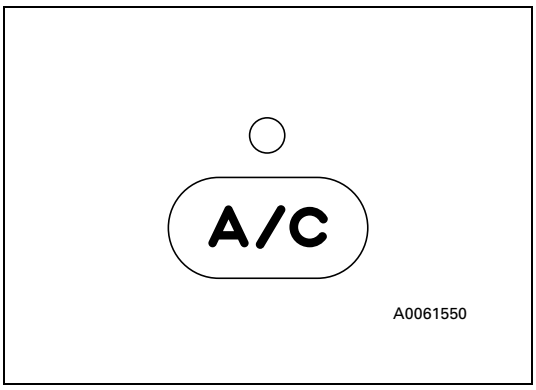
1. Fan switch

These switches can to used to set the air flow can to four different levels.
This switch also acts as the main switch for the air conditioning.
When the switch is pressed, the indicator lamp above the respective switch lights up to indicate the air flow.



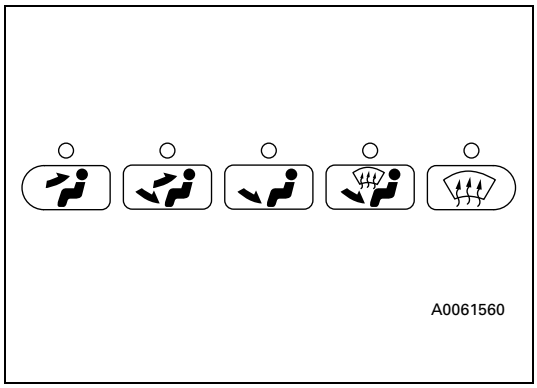
2. Air conditioning switch

This is used to start or stop the cooling or dehumidifying function.
When the fan switch is turned ON and the air conditioning switch is pressed, the indicator lamp above the switch lights up.
When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.



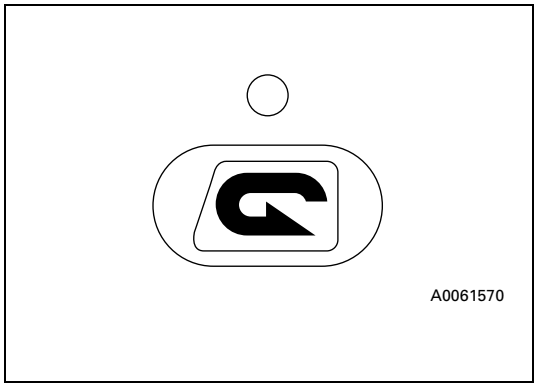
3. Mode selector switches

These are used to select the vents.
The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.
After pressing one of these switches, the indicator lamp above lights up to display the vent mode.



4. Fresh/recirc selector switch

This switch is used to select between recirculating the air inside the cab or taking in fresh air from outside.
When the RECIRC position is selected, the indicator lamp above the switch lights up.
When the switch is re-pressed, the indicator lamp goes out, and fresh air is taken in.

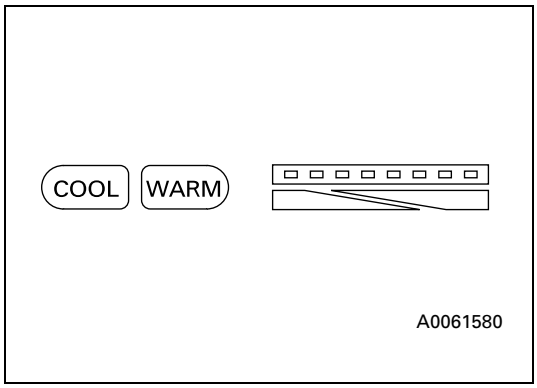


5. Temperature control switch

The temperature can be adjusted without steps from low to high.

The temperature level indicator lamps (6) light up to indicate the temperature of the air coming from the vents. The more the blue lamps light up, the lower the temperature.

The colour of the indicator lamp changes while the switch is being pressed. When the temperature reaches the desired level, release the switch to set the temperature.



The settings for each mode are retained in memory even when the starting switch is turned OFF. However, in the following cases, the setting are to be redone:

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been abnormal interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch active)

NOTE

If the air conditioner is used together with the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust. The higher the position of the fan switch, the more effective the pressurizing.

Operating instructions

Condition	Switch	Fan switch	Air conditioner switch	Temperature control switch	FRESH/ RECIRC switch	Vent mode selector switch
Cooling	Rapid	HI	ON	All blue	RECIRC	FACE
	Normal	HI-LO	ON	More than half are blue	FRESH	FACE
Dehumidifying, heating		HI-LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI-LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Ventilation of pressurizing		HI-LO	OFF	All blue	FRESH	FACE

The defrosting process is optimised, if the temperature control switch is set in such a way that all lamps light up in red.
Set the vent mode selector switch to the intermediate DEF position.
With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off.
However, do not adjust the FACE mode with the vents closed.

3.3. Operation

3.3.1. Pre-start checks

Walk-around check

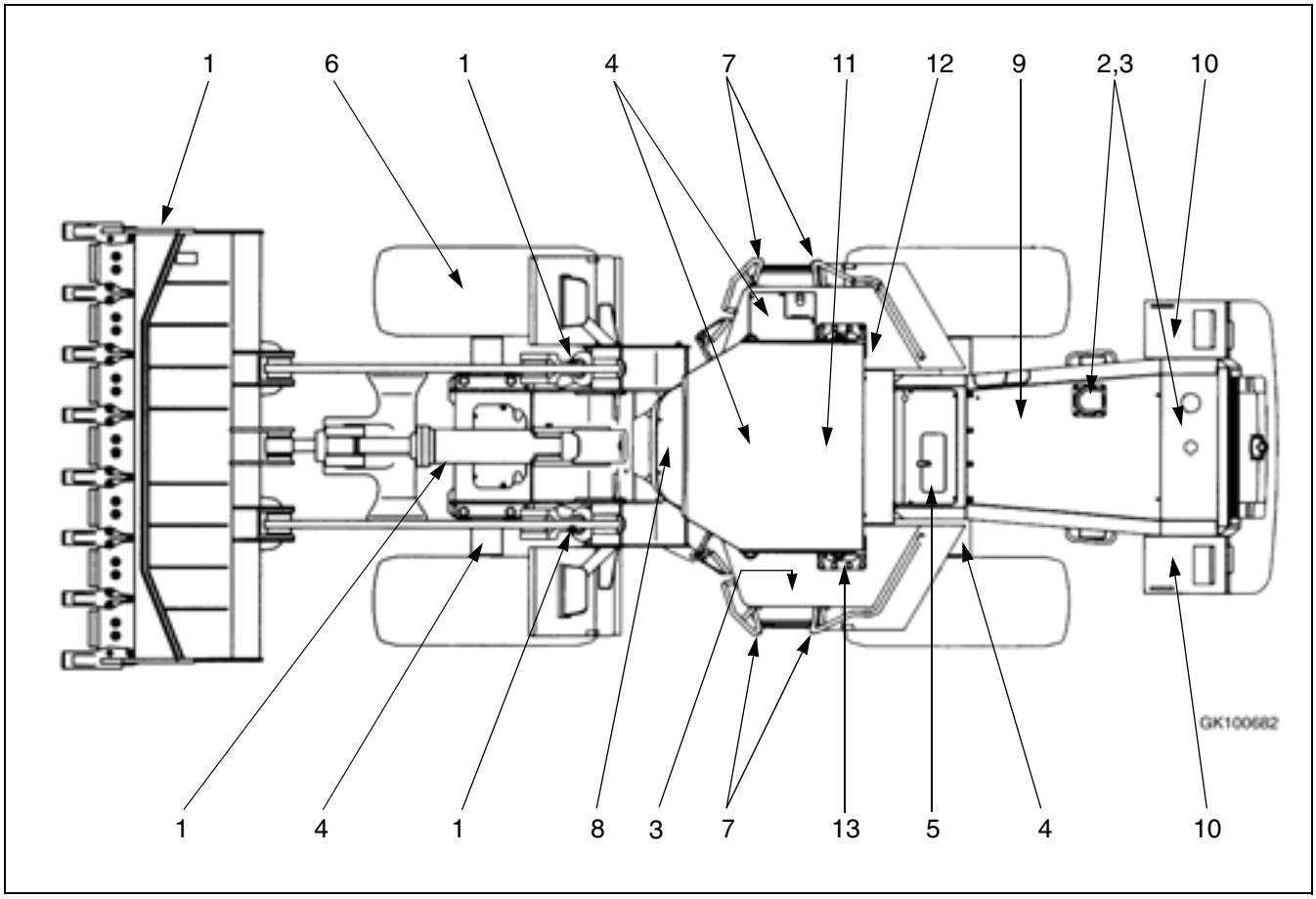
WARNING

Leaking oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.

Check these points carefully; if any abnormality is found, repair it or contact your Komatsu dealer.

Before starting the engine, look around the machine and under the machine to check for loose nuts or bolts, or leaking oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check also for loose wiring, play, and collection of dust at places which reach high temperatures.

Always carry out the items in this section before starting the engine each day.



1. Check for damage, wear, play in work equipment, cylinders, linkage, hoses

Check that there are no cracks, excessive wear and tear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.

2. Remove dirt and dust from around engine, battery, radiator

Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, grass, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler of turbocharger. Remove all such dirt or flammable material.

3. Check for leakage of water or oil around engine

Check that there is no oil leakage from the engine or water leakage from the cooling system. If any abnormality is found, repair it.

4. Check for oil leakage from transmission case, axle, hydraulic tank, hoses, joints

Check for leakage of oil. If any abnormality is found, repair it.

5. Check for oil leakage from brake line

Check for leakage of oil. If any abnormality is found, repair it.

6. Check for damage or wear to tires, loose mounting bolts

Check for cracks or peeling of the tires and for cracks or wear to the wheels (side rim, rim base, lock ring).
Tighten any loose wheel nuts.
If any abnormality is found, repair or replace the part affected.
If any valve caps are missing, install new caps.

7. Check for damage to handrail, loose bolts

Repair any damage and tighten any loose bolts.

8. Check for damage to gauges, monitor, loose bolts

Check that there is no damage to the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Remove any dirt from the surface.

9. Check air cleaner for loose mounting bolts

Check for any loose mounting bolts and tighten, if necessary.

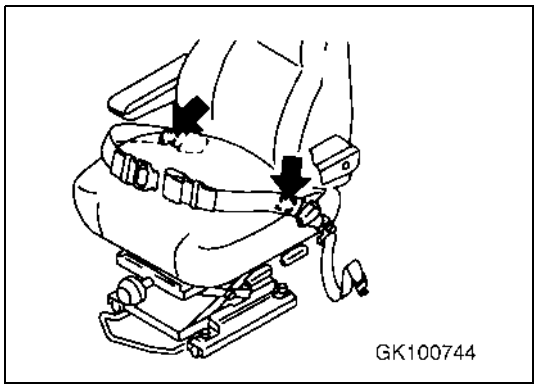
10. Check for loose battery terminals

Tighten any loose terminal.
The cover for the positive terminal must be mounted.

11. Check seat belt and equipment

WARNING

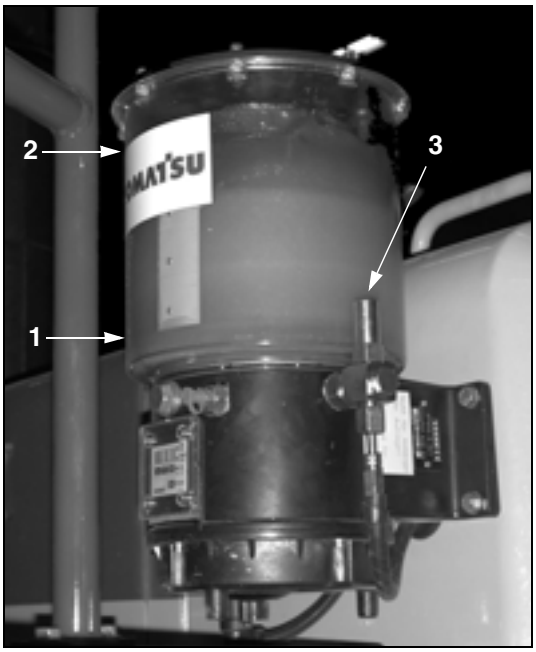
After extreme load of the seat belt, e.g. strong brake or roll-over of the machine, the seat belt must be renewed.



Check the belt, the brackets and the buckle of the seat belt.
If the bellt, the brackes or the buckle of the seat belt are damaged, the seat belt must be renewed.

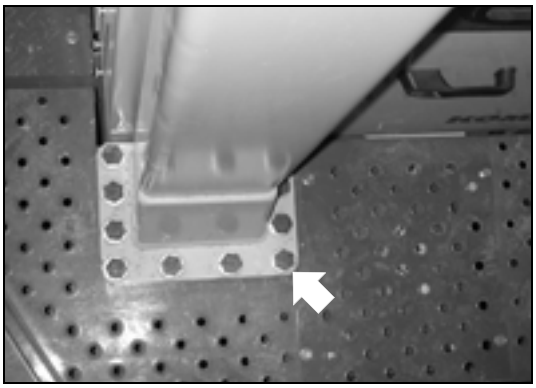
Check the tightening screws of the brackets for tightness.
Tight loose screws. Tightening torque: 25-30 Nm.

12. Checking the central lubrication system: grease level and pressure relief hole in the safety valve



Please ensure that the grease level in the grease reservoir is between the minimum (1) and maximum (2) markings.
Top up with grease if the level is too low - see section "5.8.2. Maintenance upon demand" on page 5-22.
Check pump and grease reservoir for leaks.
Grease must not emerge from the pressure relief hole in the safety valve (3). If grease is leaking, there is a fault in the central lubrication system's circuit.
Please contact your local KOMATSU dealer if there are any leaks or faults.

13. Check for loose bolts on ROPS



Check for any loose or damaged bolts. If any loose bolts are found tighten them to 925 - 930 Nm.
If any bolts are damaged, replace them with original Komatsu bolts.

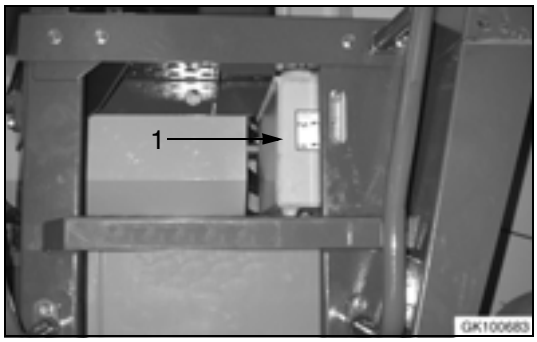
14. Clean cab window

Clean the cab window to ensure good visibility before operating the machine.

Check before starting

Perform daily the steps described in this section before starting the engine.

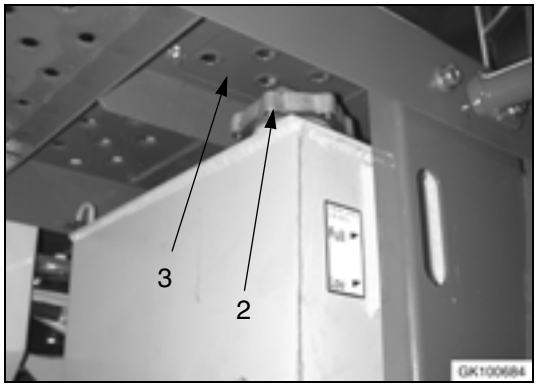
Check coolant lever, top up coolant



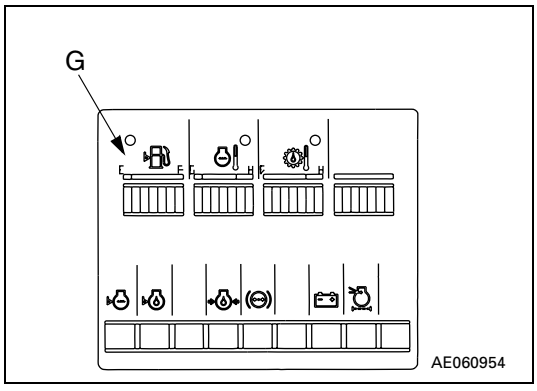
WARNING

Normally, the radiator cap must not be opened. Always wait for the engine to cool down before checking the water level in the sub-tank.

1. The expansion tank (1) is located below the rise on the left-hand side of the machine. Check, whether the coolant level in the expansion tank (1) lies between the FULL and LOW markings. Where the coolant level is too low, top up by allowing water to flow into the expansion tank (1) through the filler neck until the coolant level reaches the FULL marking. To do so unscrew the cover (3) in the grating and remove the cap (2).
2. After topping up put the cap back on again tightly and screw the cover back into place on the grating.
3. If the expansion tank (1) is empty, check for water leakage and check in addition collant level, then fill-up coolant.



Check fuel level, add fuel



WARNING

When adding fuel, never let the fuel overflow since this may cause a fire. If you spill fuel, clean it up thoroughly at once.

1. Turn the engine starting switch to the ON position, then check the fuel level at the fuel gauge (G).
   Then reset the starting switch to OFF.
2. Upon completion of work, add fuel until the fuel tank is full.

   Details about opening and closing the cap, see section "3.2.5. Cap with lock" on page 3-33.
   For details of the recommended fuel, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.
3. After adding fuel, tighten the cap securely.
   Capacity of the fuel tank: 465 l.

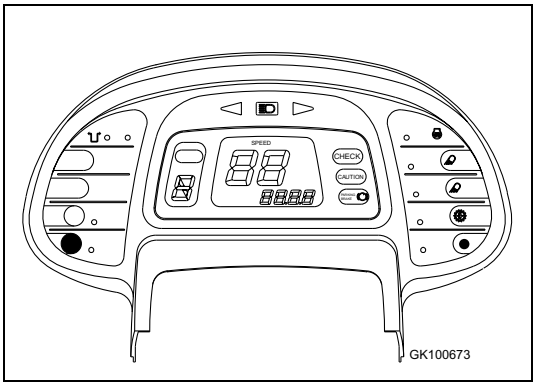
Refuelling from drum, see "Checking the fuel level, adding fuel" on page 5-41.

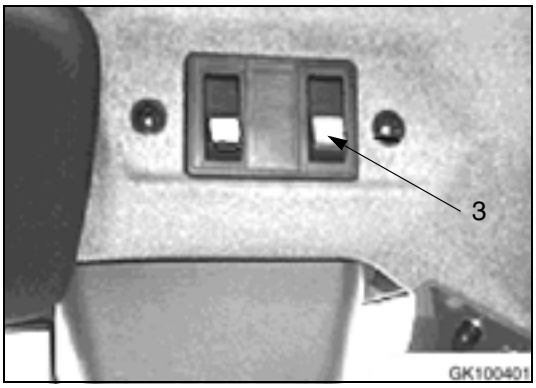
Checking the control panel

If the start switch is set to the ON operation position, all control and measuring instruments will light up briefly to indicate that they are properly functioning.
Wait at least 30 seconds after switching off the engine before performing the control check.

Set the start switch to ON position. Then, check if

- all instruments and control/warning indicators light up for approx. 3 seconds,
- the alarm buzzer produces an audible signal (approx. 1 second)
- the speedometer displays the number ’88’
- the transmission shift indicator displays the number ’8’
- The yellow control lamp (3) for the central lubrication system lights up briefly and goes out again.





If you detect a malfunction, arrange an inspection with the relevant dealer.

Before starting operation, do not rely only on checking the control panel. Perform always the specified maintenance steps in the defined intervals.

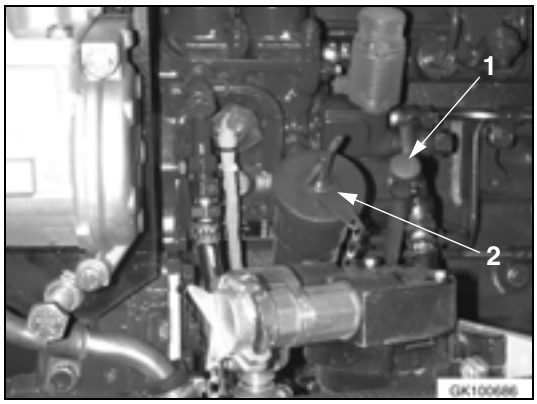
Check oil level in engine oil pan, add oil

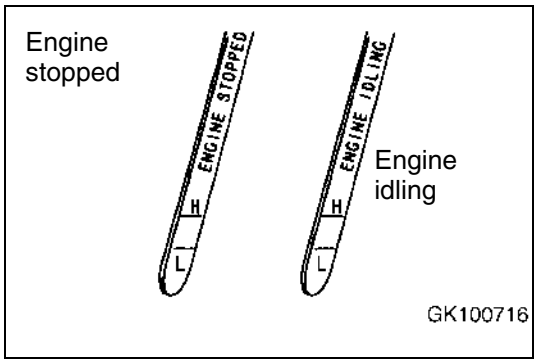
⚠ CAUTION

- **You can check the engine oil level when the engine is running (when idling) and when the engine is switched off. For this reason there are two fluid-level markings on the oil dipstick (1).**
- **Use the "Engine Stopped" marking when checking the oil level with the engine switched off.**
- **Use the "Engine Idling" marking when checking the oil level with the engine switched on and idling.**
- **CAUTION! If you mix up use of the "Engine Stopped" or "Engine Idling" markings when filling/topping up engine oil, this will lead to the wrong fluid level in the engine. This in turn can cause irreparable engine damage!**

1. Open the engine side cover at the rear right side of the machine.
2. Remove dipstick (1) and wipe off the oil with a cloth.
3. Insert dipstick (1) fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick (1). If the oil level is below the L mark, add engine oil through oil filler (2).

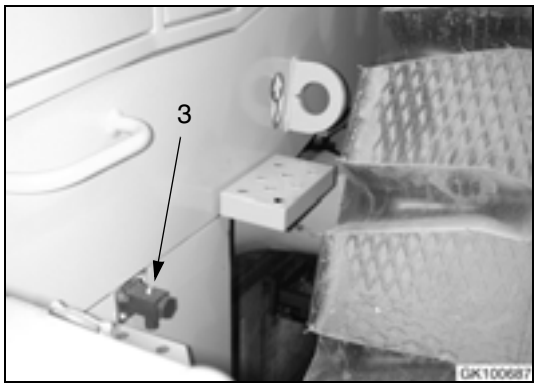
   For details of the recommended oil, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.
5. If the oil is above the H mark, drain the excess engine oil from drain plug (3), and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely, then tighten the engine side cover.





NOTE

When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking. If the machine is at an angle, move it on level ground before checking the oil level.



Check electric wiring

WARNING

If fuses are frequently blown or if there are traces of short circuit on the electrical wiring, locate the malfunction and remove the end cause.

Check for damage of the fuses and any sign of disconnection or short circuit in the electric wiring. Check also for loose terminals and tighten any loose parts.

Check the following points carefully.

- Battery
- Starting motor
- Alternator

Please contact your Komatsu dealer for any questions and trouble-shooting.

If you have electrical and electronic devices retrofitted and/or components installed in the machine and connect them to the vehicle electrical system, then you must have an inspection performed to see if the installation causes any interference to the vehicle electrics or other components. In particular, make sure that the retrofitted installation of electrical and electronic components comply with the EMC directive 89/336/EEC in each respective version and that they bear the CE marking.

WARNING

Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire, so always check and remove such material.

When carrying out walk-around checks or checks before starting, always check for and remove any accumulation of flammable material around the battery.

Check sound of horn and backup buzzer

Check for flashing lamps, dirt and damage

Check engine exhaust color and sound

Check operation of gauges

Check play of steering wheel and steering function

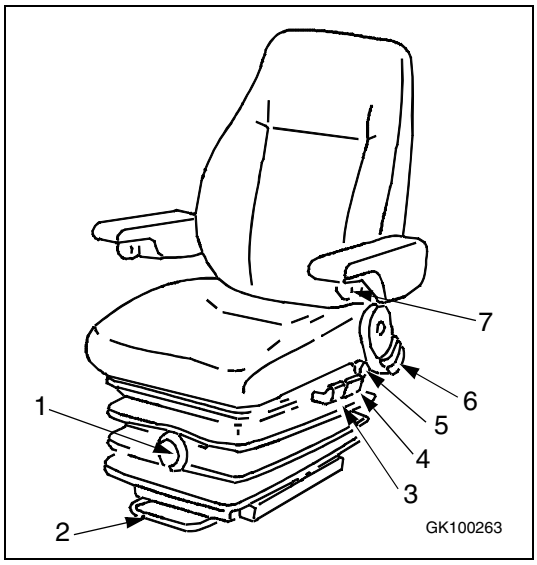
Check direction of rear view mirror, check mirror for dirt or damage

Adjustment before starting the operation

Driver's seat with air suspension

⚠ WARNING

- **Adjust the seat before starting the machine operation or when changing operators.**
- **Make sure that you can fully depress the brake pedal with your back against the seat backrest.**



1 Weight adjustment
The suspension system can be adjusted to the individual operators weight by turning the handwheel (1).

2 Longitudinal adjustment
The position of the seat can be adjusted horizontally by pulling lever (2) and pushing the seat forward or backward. Releasing lever will lock the seat.

3/4 Adjustment of height and angle of inclination
You may adjust the height and the angle of inclination with the levers (3) and (4).
Pull up the spring-supported lever (3) while at the same time sitting down or relieving your weight from the front section of the seat to change the position of the front seat cushion. If you let lever (3) go, the adjusted height and inclination of the seat is automatically locked.
Pull up the spring-supported lever (4) while at the same time sitting down or relieving your weight from the rear section of the seat to change the position of the rear seat cushion. If you let lever (3) go, the adjusted height and inclination of the seat is automatically locked.

5 Safety belt anchorage

6 Backrest adjustment
The position of the backrest can be adjusted by pulling lever (6) while a gentle load is applied to the backrest. Increasing or decreasing the load will bring the backrest to the required position. The backrest will be locked automatically if lever (6) is released.

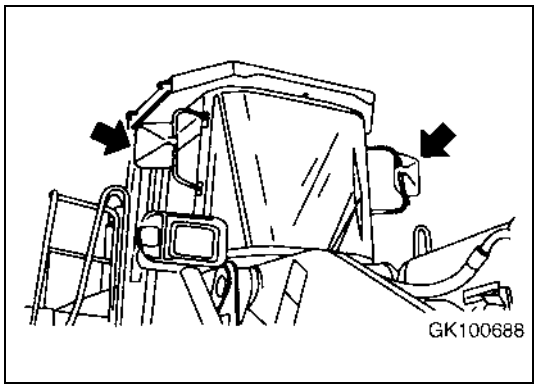
NOTE

If the seat back is reclined too far, it may hit the rear glass; therefore, make sure it does not contact the glass.

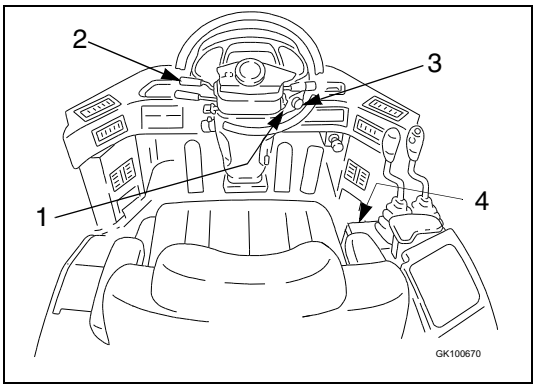
7 Armrests
The angle of inclination can be infinitely adjusted by turning the knurled button (7) at the front. The armrest should be folded up when getting in and out of the machine.

Adjusting the rear-view mirror

Sit in the operator's seat and adjust the rear-view mirror to the desired position.



Operations and checks before starting the engine



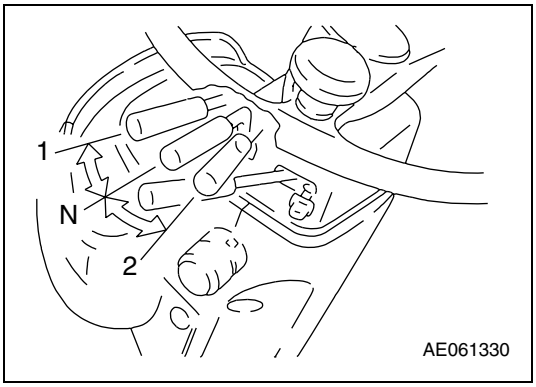
⚠ WARNING

- **If either the control levers are accidentally touched, the work equipment may move suddenly. When leaving the operator's compartment, always set the safety lever to the LOCK position.**
- **Before starting the engine, use a damp cloth to wipe off the dust accumulated on top of battery, starting motor and alternator.**

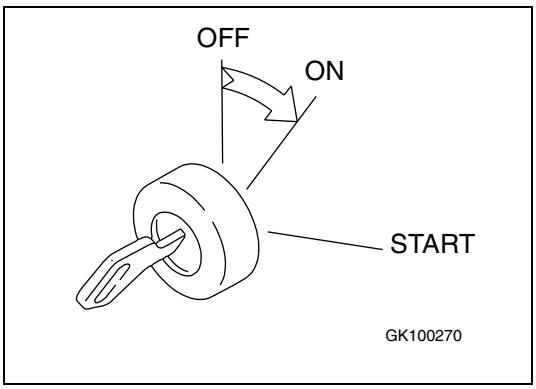
1. Check that either the directional lever (2) is set to the 'N' position.

   If directional lever (2) is not set to 'N' the engine will not start.

Position 1	Forward drive
Position N	Neutral
Position 2	Reverse drive

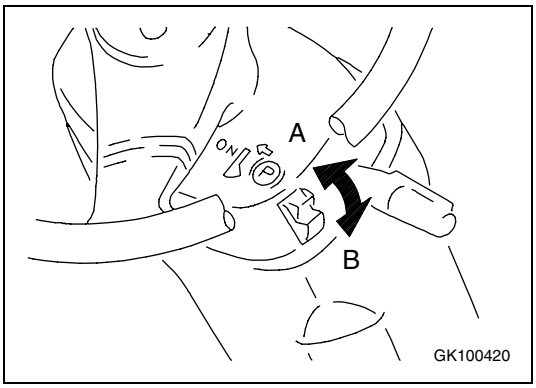


2. Insert the key in starter switch (3), turn the key to the ON position, and make sure that the pilot lamp lights up.



3. Make sure that the parking brake is applied by moving the toggle switch (1) to position A. The warning light for the parking brake then goes on.

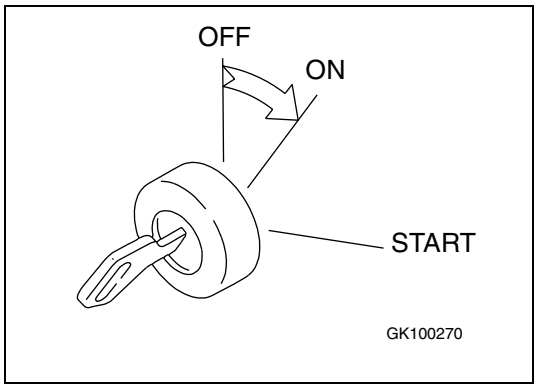
Pos. A	ON	The parking brake is applied. The warning light for the parking brake goes on.
Pos. B	OFF	The parking brake is released.



3.3.2. Starting the engine

CAUTION

Make sure that there are no persons or obstacles in the direct vicinity of the machine, then sound the horn and start the engine.

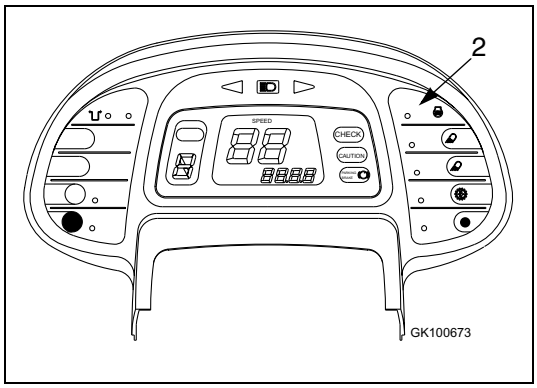


NOTE

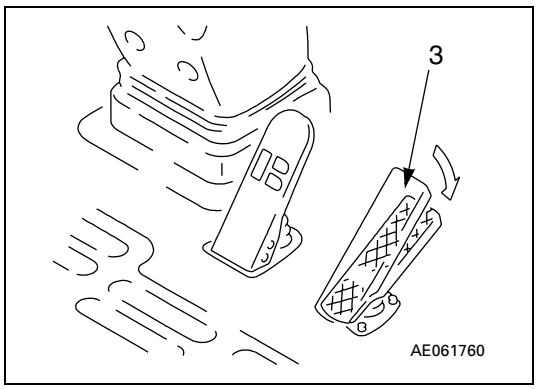
Do not operate the starter for more than 20 seconds. If the engine does not start, wait for at least 2 minutes before trying to start the engine again.

1. Turn the key in the starter switch to ON. Preheating will start automatically and the preheating control lamp (2) will light up.

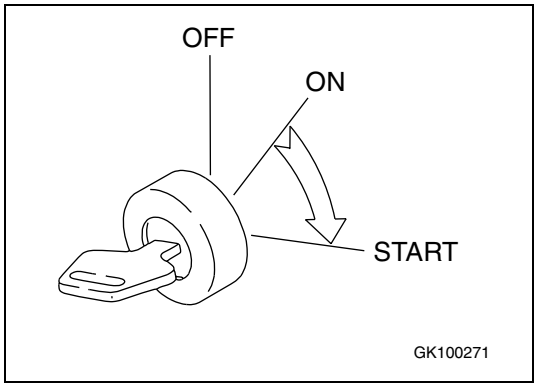
   The preaheating time required before start-up may vary, depending on the water temperature of the engine.



2. Lightly depress the accelerator pedal (3).



3. Check that the preheating control lamp (2) is out, then turn the starter key to the START position to start the engine.



4. When the engine is started, release the key; it will automatically return to ON.

3.3.3. Operation and checks after starting the engine

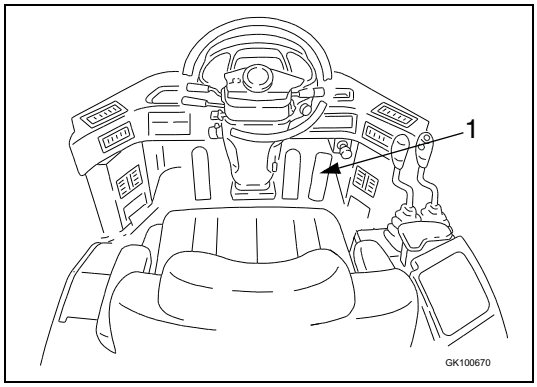
After starting the engine, do not immediately start the machine operation. First carry out the following operations and checks.

NOTE

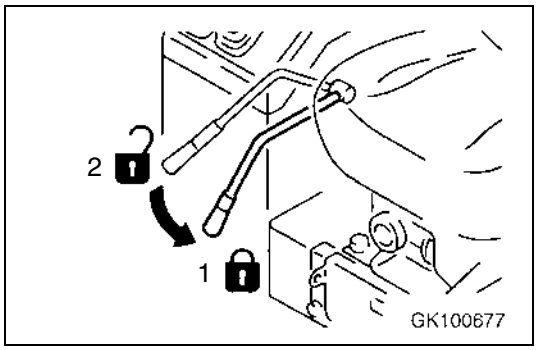
Do not suddenly accelerate the engine before the warming-up operation is completed.
Do not run the engine at low idling or high idling continuously for more than 20 minutes. If it is necessary to run the engine at idling, apply a load from time to time or let the engine run at medium speeds.

1. Depress accelerator pedal (1) lightly and run the engine with no load at medium speed for about 5 minutes.

   The engine must run smoothly during the warm-up phase.

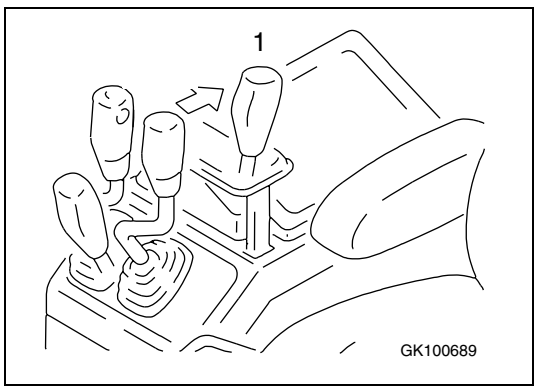


2. Move the control lever's safety lock for the working attachment to the RELEASE (2) position.



3. When temperatures are low heat up the hydraulic fluid. To heat up the hydraulic fluid proceed as follows:

   Move the bucket control level briefly to the TILT (1) position and back again.
   By doing so the hydraulic fluid will heat up quicker. The time in the tilt position must not exceed a maximum of 10 seconds.

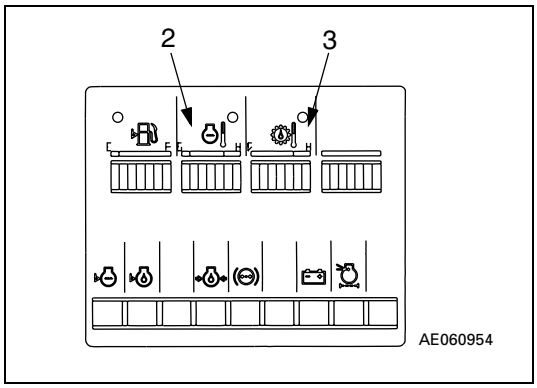


4. After carrying out the warming-up operation, check that all gauges and warning lamps are normal.

   If there is any abnormality, carry out maintenance or repair.

   Run the engine under a light load until engine water temperature gauge (2) and the torque converter oil gauge (3) have entered the green range.

5. Make sure that there is no abnormality in the exhaust color, sound, or vibration. In case of any abnormality, carry out maintenance or repair.

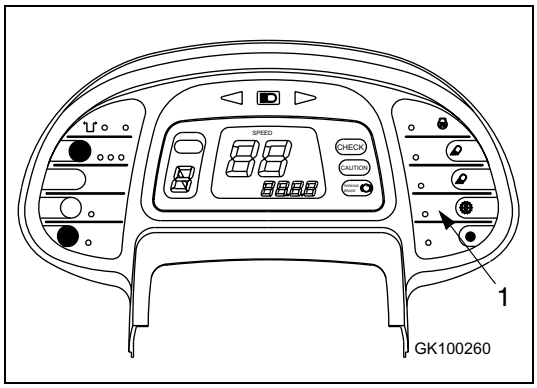


3.3.4. Driving the machine

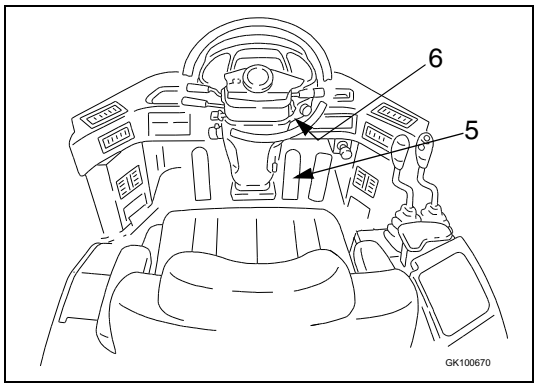
⚠ WARNING

Before starting up, make sure that the area all round the machine is clear. Sound the horn before pulling away. People must not be loitering within the area around the machine. There is a ”blind spot” for the operator behind the machine, an area which cannot be seen in the rearview mirror. For this reason, take absolute care when reversing.

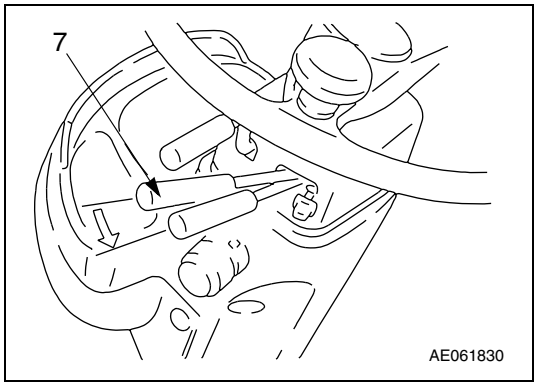
Set the transmission cut-off (1) to OFF when starting the machine on a slope.



1. Start the engine, press down the right brake pedal (5) and release the parking brake (6). Do not release pressure on the right brake pedal (5).

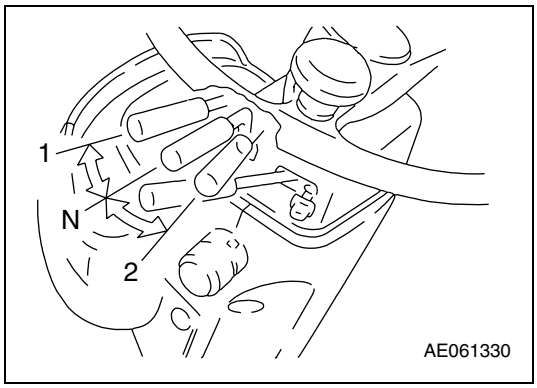


2. Shift the gear lever (7) to the required gear.

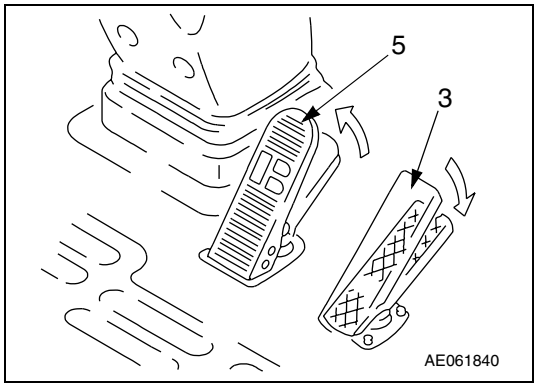


3. Shift the travel direction lever (2) on the steering wheel to the required travel direction.

   Position 1 Forward drive
   Position N Neutral
   Position 2 Reverse drive



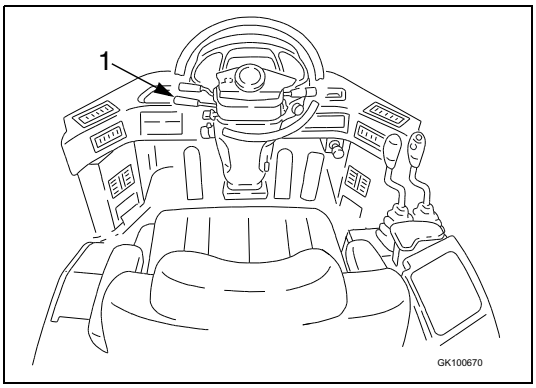
4. Release the right brake pedal (5) and press down on the accelerator (3) in order to start the machine moving.



3.3.5. Gear change

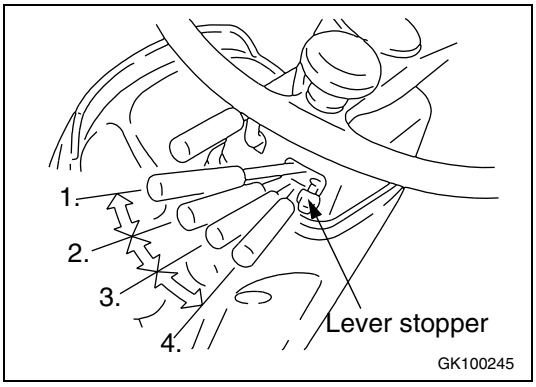
CAUTION

If travelling at high speed, never change into a lower gear suddenly. Always reduce travel speed first using the brakes and then change into the lower gear according to speed.



Gear selection

To change gear, push the gear-change lever (1) to the required position. Excavation and loading work may only be performed in 1st and 2nd gear. For this reason, activate the gear lock lever.



Automatic gear change

This machine has an automatic shift for 2nd, 3rd and 4th gears.

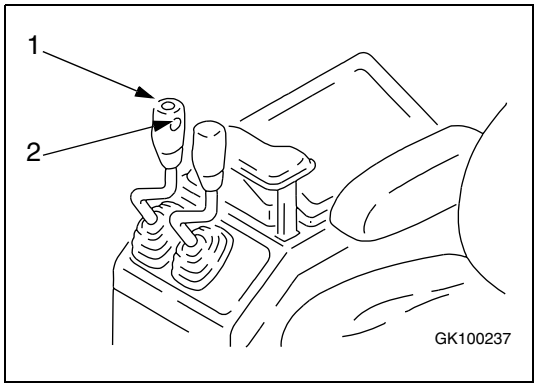
The control unit for the transmission automatically changes into the appropriate gear for operating conditions. 1st gear is not selected automatically.

Position of the gearshift lever	Automatic gearshift
1	1st gear fixed
2	2nd gear fixed
3	2nd and 3rd gear fixed
4	2nd, 3rd and 4th gear

The diagram (right) shows the possible automatic gear changes for each respective position of the gear-change lever.

		Automatic Gearshift Scheme			
Pos. of Gearshift Lever	1				
	2		2		
	3		2 ↔ 3		
	4		2 ↔ 3 ↔ 4		

Kickdown gear change



The machine is fitted with a kickdown gear change which increases thrust when carrying out excavation or loading work.

If you are driving in 2nd gear, you can activate the kickdown function by pressing the button (1) on the top of the control lever for the work hydraulic system. The transmission changes to 1st gear as soon as you activate the kickdown function. The switch (1) for the kickdown function is described in more detail see item "11. Kickdown function (1)" on page 3-21.

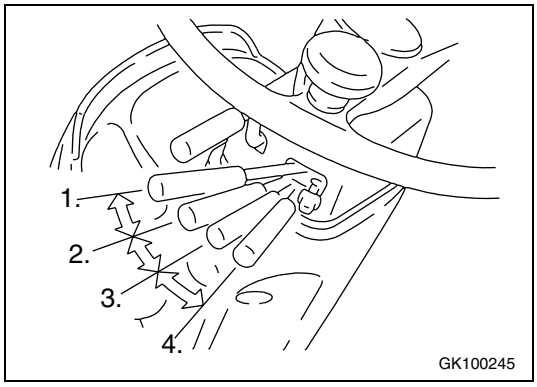
Automatic gear change is not possible if you are already in 1st gear when you activate the kickdown function. The machine remains in 1st gear.

If you are driving in 2nd, 3rd or 4th gear when you activate the kickdown function, the transmission only changes into 1st gear when your speed has reduced to below 12 kmh.

To switch off the kickdown function push the directional lever through neutral into the reverse or forward drive position or select any other gear (excluding 2nd gear) with the gear-change lever.

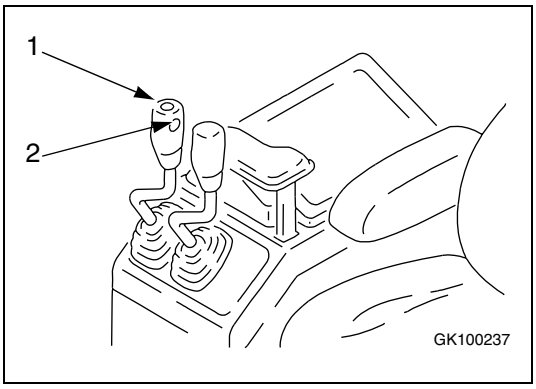
NOTE

If the transmission is shifted from 4th, 3rd or 2nd gear into 1st gear after activating the kickdown lever (1), it will change gear upwards again when speed is increased.



Gear-change lock

If you are driving up or downhill, or carrying out work which should only be carried out in a specific gear, you should use the gear-change lock. As soon as you activate the gear-change lock, the selected gear is retained even if you increase engine speed to a level where the automatic transmission would normally change into a higher gear.



Gear-change lock on

1. Select the required gear.
2. Start the machine and increase speed until the selected gear is shown on the gear shift display.
3. Press the switch (2) for the gear-change lock. The gear-change lock is now switched on and the control lamp for the gear-change lock is lit.

Gear-change lock off

You can switch the gear-change lock off by pushing the gear-change lever or pressing the switch (2) again. The gear-change lock is now switched off again and the control lamp for the gear-change lock goes out.

The switch for the gear-change lock is described in more detail see item "12. Gear-change lock (2)" on page 3-22.

Priority gear change

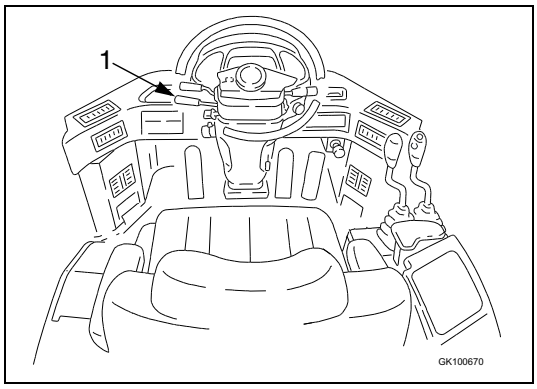
In addition to its gear-change function, the automatic shift also has the task of protecting the machine and its transmission. This protective function has priority over the kickdown function.

If the gear-change lever is shifted into a lower gear when driving downhill, the transmission shifts immediately into a lower gear so that the braking effect of the engine can be used as well. Exceptions in shifting behaviour depend on the travel speed, engine speed and the position of the gear lever and directional lever. Please contact your Komatsu dealer if you need any further information.

3.3.6. Changing direction

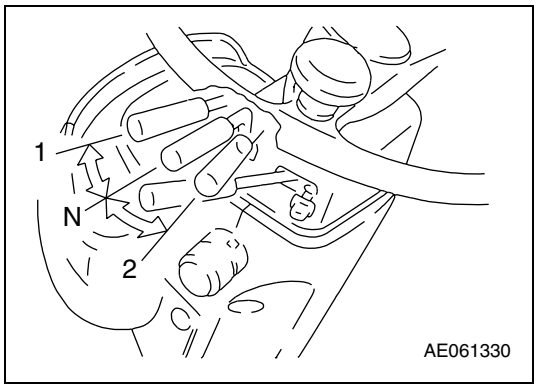
CAUTION

- **When changing the direction from FORWARD to REVERSE and vice versa, check that the new travelling direction is safe. There is a blind spot behind the machine, so be particularly careful when travelling backwards.**
- **Do not switch between FORWARD and REVERSE when travelling at high speed.**
  In this case, depress the brake to reduce the travelling speed sufficiently, then change the direction of travel (max. speed for changing direction: 12 km/h (7.5 MPH).



There is no need to stop the machine when switching from FORWARD to REVERSE or vice versa. Set the directional lever (1) to the desired position.

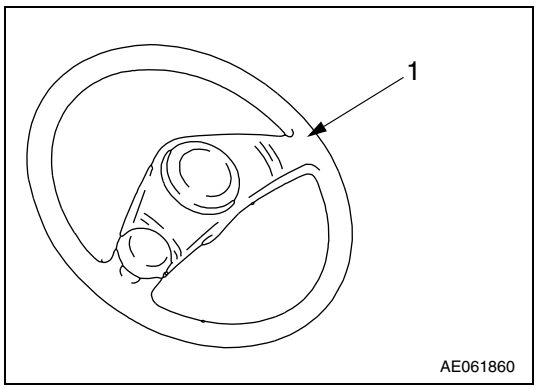
Position 1	Forward drive
Position N	Neutral
Position 2	Reverse drive



3.3.7. Turning and steering

WARNING

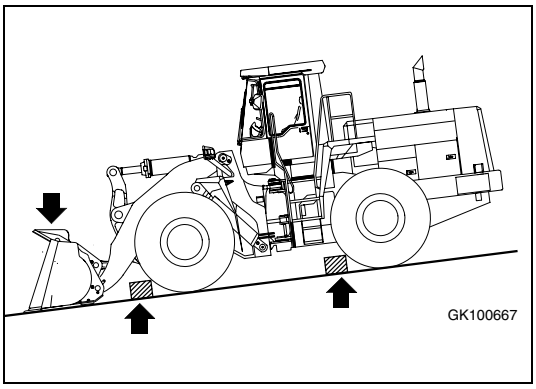
- **It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills.**
- **If the engine stops when the machine is travelling, the steering becoms inoperable.**
  This is particularly dangerous on hills; so never stop the engine when the machine is travelling.
  If the engine stops, immediately stop the machine.

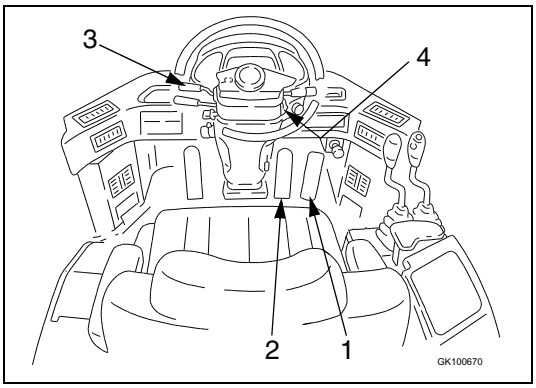


3.3.8. Stopping the machine

⚠ WARNING

- **Avoid stopping suddenly.**
- **Do not park the machine on slopes.**
  If the machine has to be parked on a slope, set it facing straight down the slope, then dig the bucket into the ground and place blocks under the tires to prevent the machine from moving.
- **If the control lever is touched accidentally, the work equipment or the machine may move suddenly, which may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever to the LOCK position.**
- **Where the parking brake is applied by using the toggle switch (4) on the steering column it may be that the parking brake may not become effective until the parking-brake control lamp illuminates; therefore depress the brake pedal (2) for as long as it takes for the control lamp to come on.**



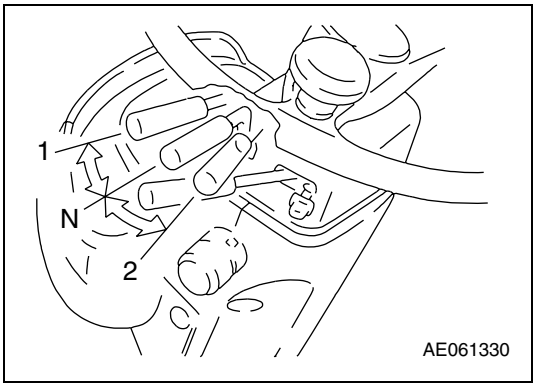


NOTE

Never use the parking brake to brake the machine, unless you are involved in an emergency. The toggle switch (4) for the parking brake must not be actuated until the machine has been brought to a standstill with the brake pedal (2).

1. Release accelerator pedal (1), and depress brake pedal (2) to stop the machine.
2. Set the directional lever (3) to 'N' (neutral).

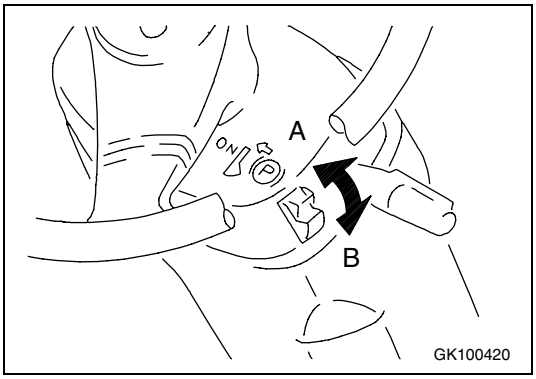
Position 1	Forward drive
Position N	Neutral
Position 2	Reverse drive



3. To apply the parking brake actuate the toggle switch (4) on the steering column.

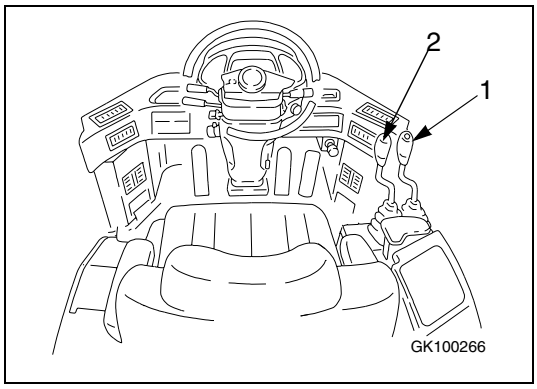
Pos. A	ON	The parking brake is applied. The warning light for the parking brake goes on.
Pos. B	OFF	The parking brake is released.

When the parking brake is applied, the transmission is automatically reset to neutral.

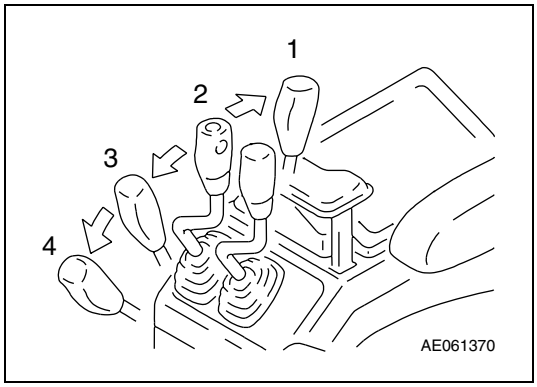


3.3.9. Operating the work equipment

Lift arm control lever (1) and bucket control (2) lever are used to operate the lift arm and bucket as follows.



Lift arm operation (control lever 1)

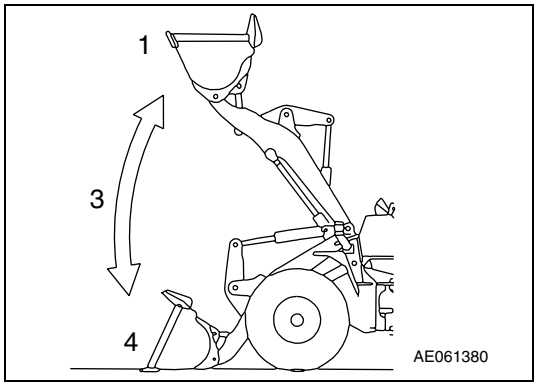


1 RAISE 

2 HOLD  The lift arm is kept in the set position.

3 LOWER 

4 FLOAT  The lift arm moves freely under external force.



When the lift arm control lever is pulled up further from the raise position, it is stopped in this position until the lift arm reaches the preset kick-out position; then the lever returns to the hold position.

NOTE

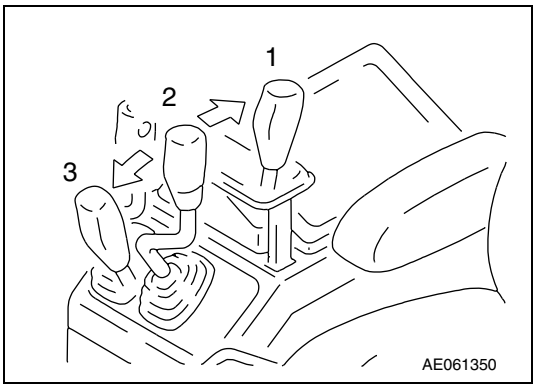
Do not use the FLOAT position to lower the bucket.

Bucket operation (control lever 2)

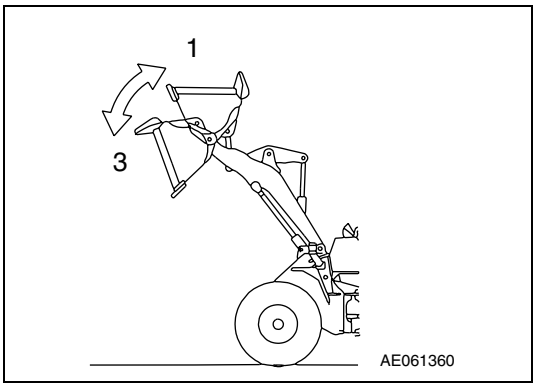
1 TILT 

2 HOLD  The bucket is kept in the set position.

3 DUMP 



When the bucket control lever is pulled up further from the tilt position, it is stopped in this position until the bucket reaches the preset position of the positioner; before it returns to the hold position.



NOTE

The work unit must not be used to lift heavy loads off-balance (i.e. only on one side).

3.3.10. Wheel loader operations

In addition to the following, it is possible to further increase the range of applications by using various attachments.

Digging

CAUTION

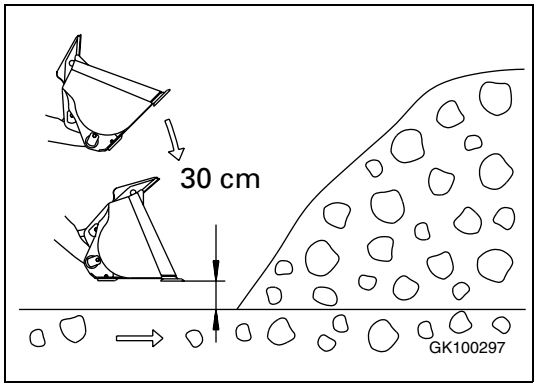
Always set the machine facing straight to the front when carrying out digging or scooping operations. Never perform these operations with the machine articulated.

NOTE

Slipping of the tires slip in operation reduces the tire life!

When loading piled soil or blasted rock, drive the machine forward and observe the following points to prevent cutting of the tires caused by slipping:
Always keep the site flat, and remove any fallen rocks.
When working with stockpiles, operate the machine in 1st or 2nd gear; when loading blasted rock, operate the machine in 1st gear.

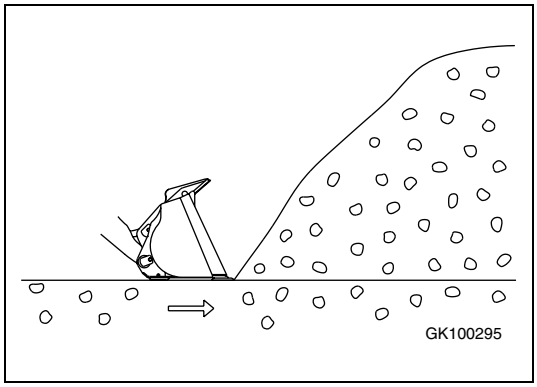
1. When driving the machine forward and lowering the bucket, stop the bucket about 30 cm (11.8 in) above the ground, then lower it slowly.



NOTE

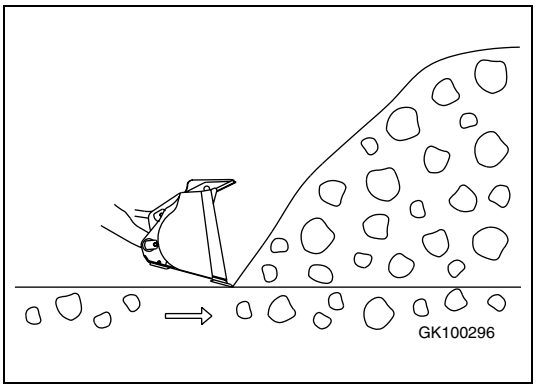
If the bucket hits the ground, the front tyres will come off the ground, and the tires will slip.

2. Shift down immediately in front of the material to be loaded. Then completing the shift down, depress the accelerator pedal and dig the bucket into the load.

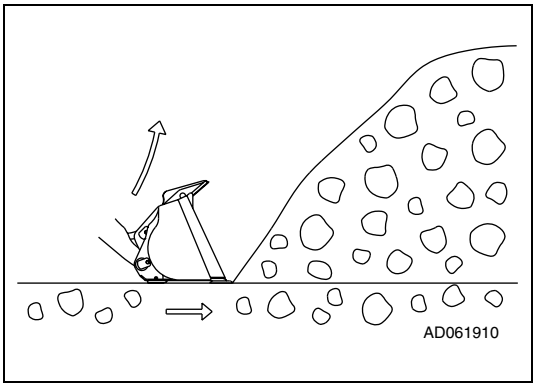


3. When the material is stockpiled, keep the cutting edge of the bucket horizontal; when loading blasted rock, have the bucket tilt slightly down.

   Be careful not to get blasted rock under the bucket. This will make the front tires come off the ground and slip.
   Try to kep the load in the center of the bucket; if the load is on one side of the bucket, it will be unbalanced.



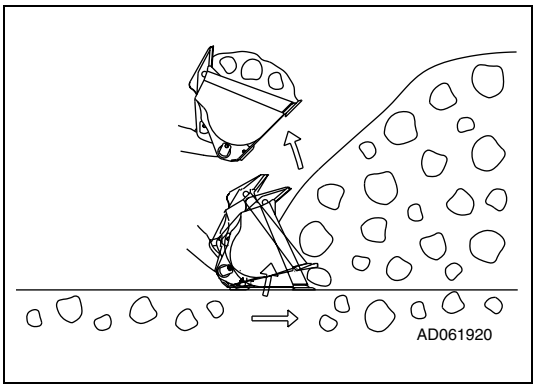
4. At the same time as thrusting the bucket into the material, raise the lift arm to prevent the bucket from digging in too far. By raising the lift arm, the front tires will have enough traction.



5. Check that there is enough material loaded into the bucket, then operate the bucket control lever to tilt the bucket and load it fully.

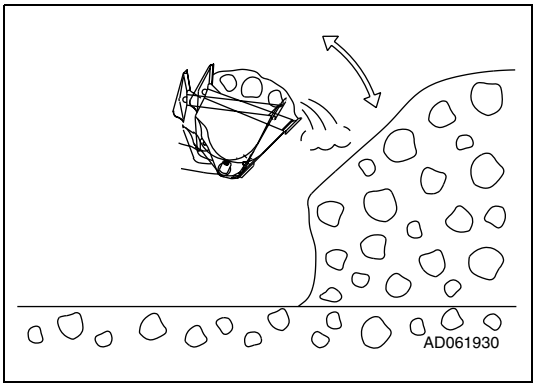
NOTE

If the bucket edge is moved up and down while pushing in the bucket and digging, the front tires will come off the ground causing the tires to slip.



If too much material has been loaded onto the bucket, "shake" the bucket by repeated rapid tilt-in/tilt-out action. Lower the boom at the same time.

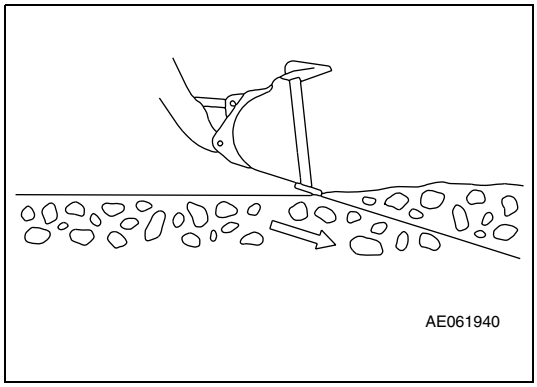
This removes excess material, takes the load off the bucket and prevents any spillage of material during transportation.



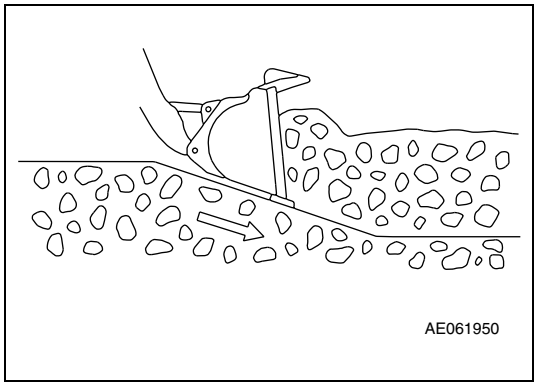
When digging and loading on level ground, set the bucket edge slightly facing down as described below and drive the machine forward. Always be careful not to load the bucket on one side thus causing an unbalanced load.

This operation should be carried out in 1st gear.

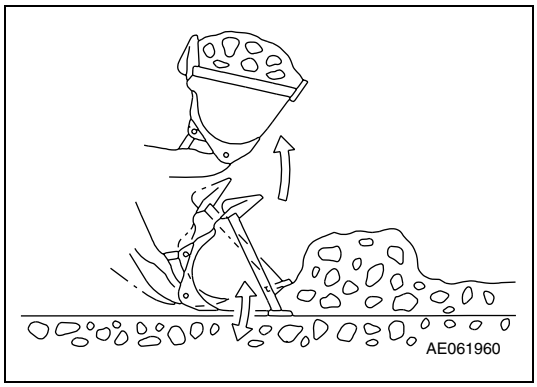
1. Set the edge of the bucket facing down slightly.



2. Drive the machine forward and operate the lift arm control lever forward to cut a thin layer off the surface each time when excavating the soil.



3. Operate the lift arm control lever slightly up and down to reduce the resistance when travelling the machine forward. When digging with the bucket, avoid applying the digging force onto one side of the bucket only.

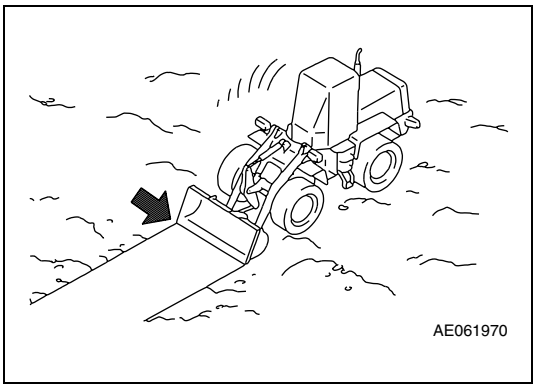


Levelling

NOTE

Always operate the machine in reverse when carrying out levelling operations.
If it is necessary to perform levelling works when travelling forward, do not set the bucket dumping angle to more than 20°.

1. Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket little by little.
2. Go over the spread soil with the bucket teeth touching the ground and level the ground by back-dragging.
3. Scoop some more soil into the bucket, set the lift arm to float position, level the bucket at ground level, and smooth the ground by moving backward.
4. Make sure that you have got clear sight behind you.



Pushing

NOTE

Never set the bucket to the DUMP position when carrying out pushing operations.

When carrying out pushing operations, set the bottom of the bucket parallel to the ground surface.

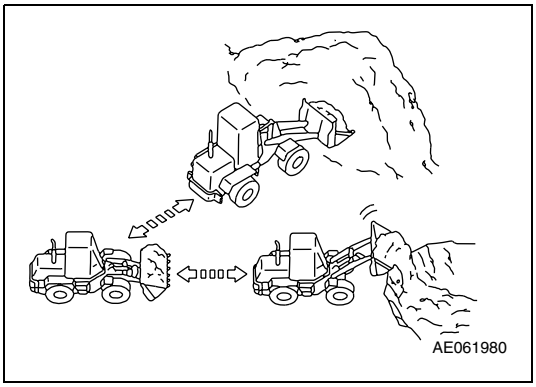
Load-and-carry operations

⚠ CAUTION

When carrying a load, lower the bucket to lower the center of gravity when travelling.

The load-and-carry method for wheel loaders consists of the following cycle: scooping ➔ hauling ➔ loading (into a hopper, glory hole, etc.)

Always keep the travel path in proper condition. For using the load-and-carry method, see section "3.3.17. Tyre handling" on page 3-78.



Loading

Select an operating mode which involves the least amount of turning and travelling in order to carry out works at the site efficiently.

⚠ WARNING

- **Always keep the working area flat. Do not turn suddenly or apply the brake suddenly when travelling with a raised load. These actions are dangerous.**
- **It is also dangerous to drive the bucket into a stockpile or pile of rocks at a high speed.**

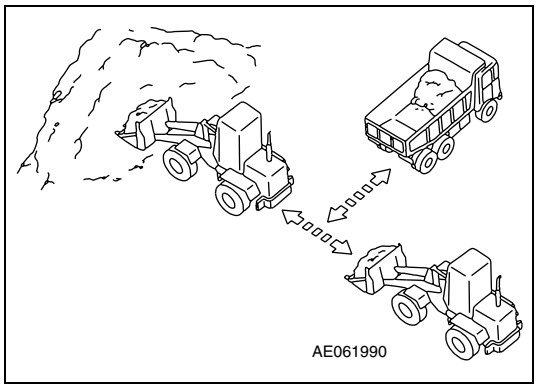
NOTE

- **Slipping of the tires reduces the tire life! Therefore, avoid any slippage during operation.**
- **Avoid excessive shaking of the bucket.**

Cross drive loading

Always set the wheel loader at right angles to the stockpile. After digging in and scooping up the load, drive the machine straight back in reverse gear, then move the dump truck between stockpile and wheel loader.

This method requires the least time for loading and reduces cycle times considerably.

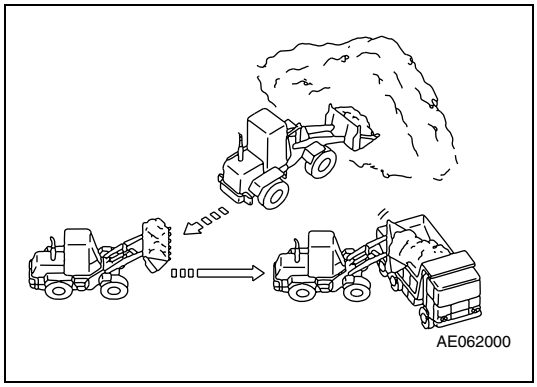


V-shape loading

Position the dump truck so that the approach direction of the wheel loader to the truck is approx. 60° apart from the approach direction to the stockpile. After loading the bucket, drive the wheel loader in reverse, then turn it to face the dump truck and travel forward to load the dump truck.

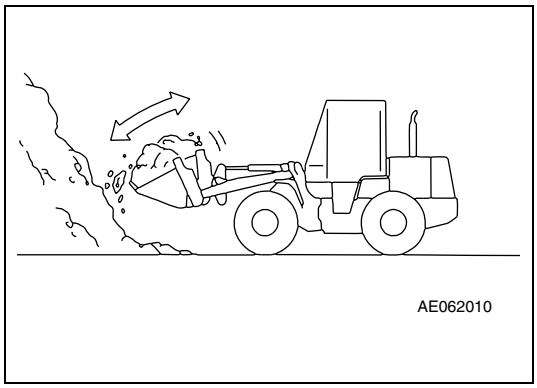
The smaller the turning angle of the wheel loader, the more efficient the operation.

When loading a full bucket and raising it to the maximum height, first shake the bucket to stabilize the load before raising it. This will prevent the load from spilling to the rear.



Precautions when piling up loads

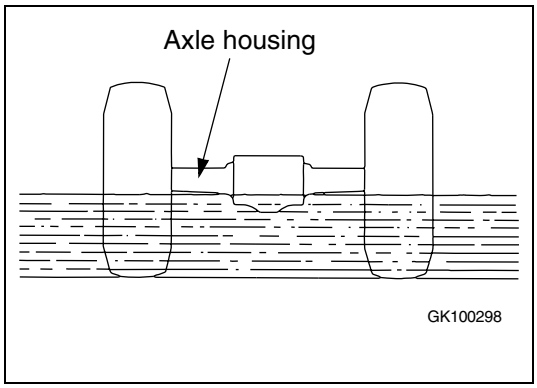
When piling up products, be careful not to let the rear counterweight come into contact with the ground. Do not set the bucket to the DUMP position when carrying out piling-up works.



3.3.11. Precautionary measures during operation

Permissible water depth

When working in water or on swampy ground, the water may not reach above the bottom of the axle housing. After finishing the operation, wash the machine and check the lubricating points.



If wheel brake fails to work

If the machine does not stop after depressing the brake pedal, use the parking brake instead.

NOTE

If the parking brake has been used as an emergency brake, contact your Komatsu distributor to have the parking brake checked for any abnormality.

Precautionary measures when driving up or down

Lower the centre of gravity when turning

When turning, lower the work equipment to lower the center of gravity before turning. It is dangerous to turn the machine with the work equipment raised.

Braking on downhill slopes

If the service brake is used too frequently when travelling downhill, the brake may overheat and become damaged. To avoid this problem, shift down to a low gear and make full use of the braking force of the engine. For braking, use the right brake pedal.

If the speed control lever is not placed in a proper speed position, the torque converter oil may overheat. In this case, place the speed control lever to the next lower speed to lower the oil temperature.

If the temperature does not lie within the green range of the scale even with the lever in the 1st speed position, stop the machine, place the lever in neutral, and run the engine at medium speed until the gauge re-enters the green range.

If engine stops

If the engine stops on a slope, depress the right brake pedal fully. Then, lower the work equipment to the ground and apply the parking brake. Set the directional and speed control levers to neutral, and restart the engine. (If the directional lever is not in neutral, the engine will not start.)

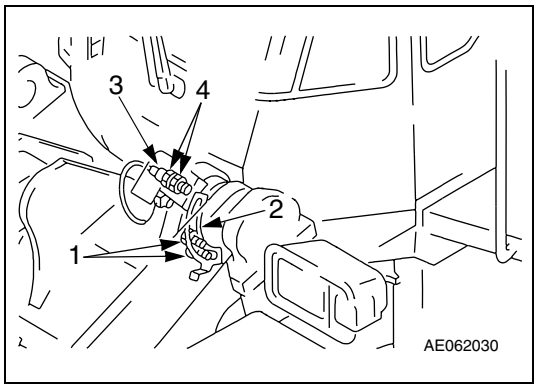
3.3.12. Adjusting the position of the work equipment

⚠ CAUTION

- **Stop machine on level ground.**
- **Apply parking brake.**
- **Lower bucket to ground level.**
- **Switch off engine.**
- **Use wedges to secure machine against rolling away.**
- **cure articulated joint with the locking bar.**

The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to match the working conditions.

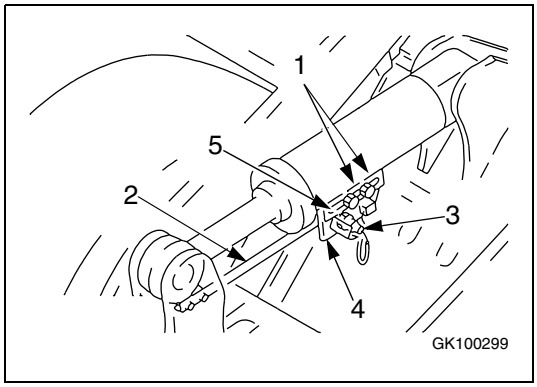
Adjusting the boom kickout



1. Raise the bucket to the desired height, set the lift arm control lever to HOLD and lock the lever in position. Then stop the engine and adjust as follows:
2. Loosen two bolts (1), and adjust plate (2) so that the bottom edge is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the plate in position.
3. Loosen two nuts (4) to give a clearance of 3 to 5 mm (0.12 to 0.20 in) between plate (2) and the sensing surface of proximity switch (3). Then re-tighten the nuts.

   Tightening torque: 17.7 +/-2 Nm
4. After the adjustment, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to HOLD when the bucket reaches the desired height.
5. Check the bucket position indicator.

Adjusting the bucket positioner

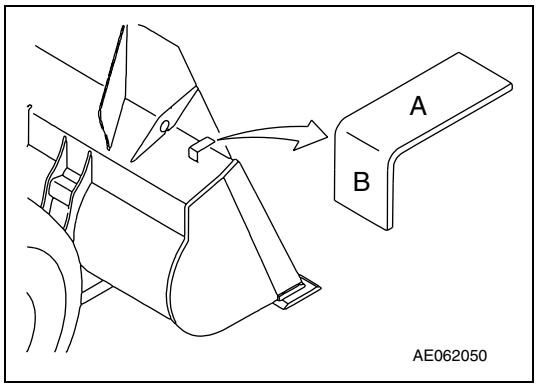


1. Lower the bucket to the ground and set the bucket to the desired digging angle. Set the bucket control lever to HOLD, stop the engine and adjust as follows:
2. Loosen two bolts (1) and adjust mounting bracket (4) of the proximity switch so that the rear tip of angle (2) is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the bracket in position.
3. Loosen two nuts (5) and adjust to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between bar (2) and the sensing surface of proximity switch (3). Then re-tighten the nuts.

   Tightening torque: 15 - 20 Nm
4. After the adjustment, start the engine and raise the lift arm. Operate the bucket control lever to the DUMP position, then operate it to the TILT position and check that the bucket control lever is automatically returned to HOLD when the bucket reaches the desired angle.

Bucket level indicator (if fitted)

At the top rear of the bucket are the level indicators, so the bucket angle can be checked in operation.



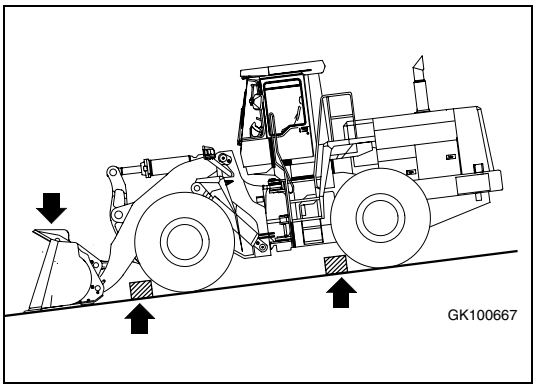
A In parallel to the cutting edge

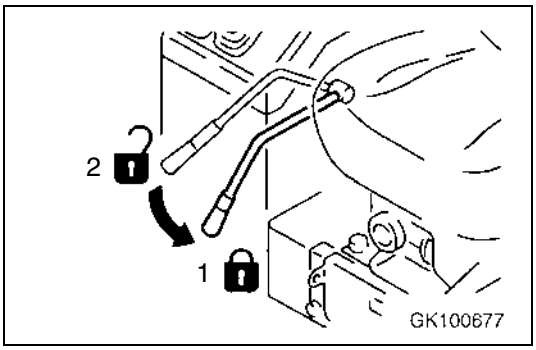
B 90° to cutting edge

3.3.13. Parking the machine

⚠ WARNING

- **Avoid stopping suddenly.**
- **Do not park the machine on slopes.**
  If the machine has to be parked on a slope, set it facing straight down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- **If the control lever is touched accidentally, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever to the position '1'.**
- **Even if the parking brake lever is pulled it may not become effective until the parking brake pilot lamp lights up. Therefore, keep the brake pedal depressed.**

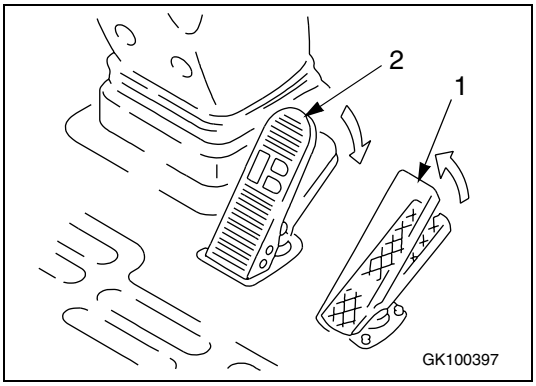




NOTE

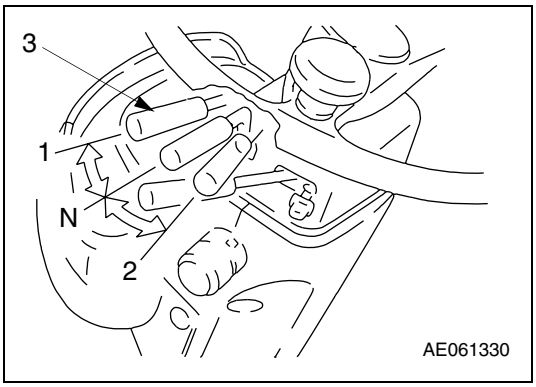
Never use the parking brake to brake the machine when travelling except in an emergency. Apply the parking brake only after the machine has stopped.

1. Release accelerator pedal (1), and depress brake pedal (2) to stop the machine.

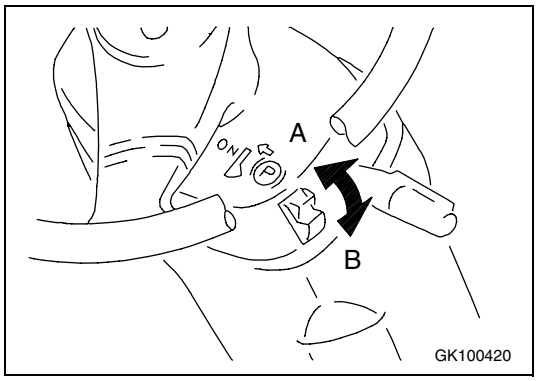


2. Set the directional lever (3) to N (neutral).

Position 1	Forward drive
Position N	Neutral
Position 2	Reverse drive



3. To apply the parking brake set the toggle switch to position ‘A’.

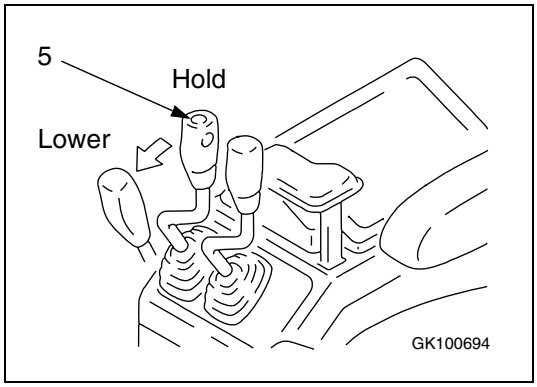


Pos. A	ON	The parking brake is applied. The warning light for the parking brake goes on.
Pos. B	OFF	The parking brake is released.

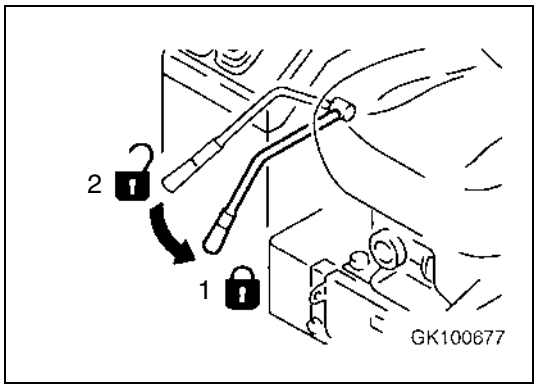
NOTE

When the parking brake is applied, the transmission is automatically returned to neutral.

4. To lower the boom actuate the boom control lever ‘5’.



5. Switch the working hydraulics safety lever to position ‘1’.

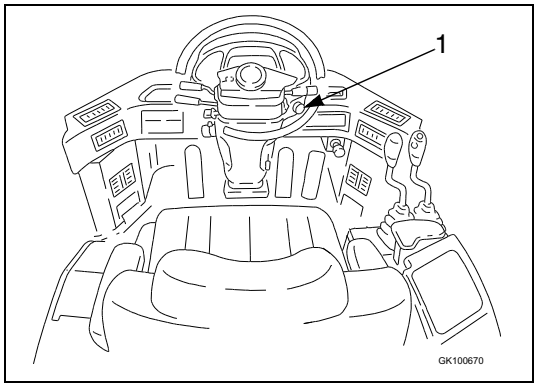


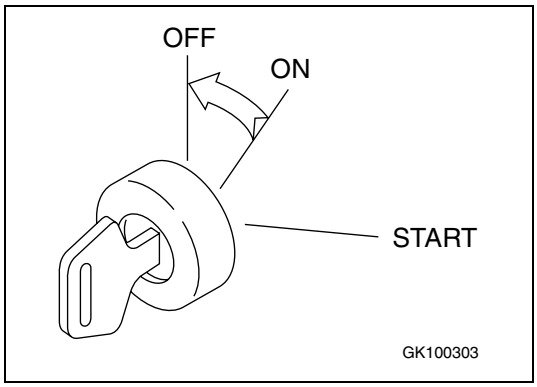
3.3.14. Stopping the engine

NOTE

If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.
In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idling speed for about 5 minutes to allow it to cool down gradually.
2. Turn the key in the starter switch (1) to the OFF position and stop the engine.
3. Remove the key from the starter switch (1).





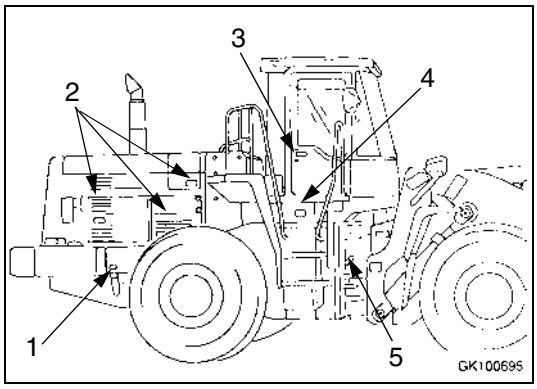
3.3.15. Check after stopping the engine

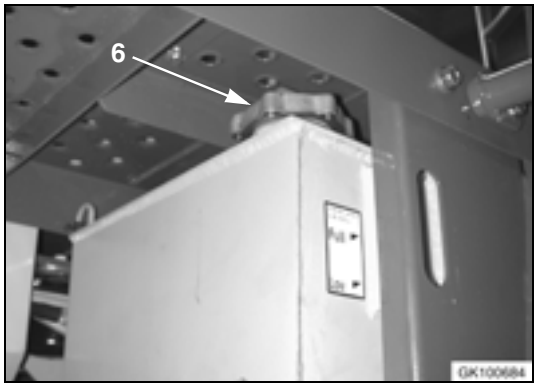
1. Walk around the machine and check the work equipment, body work, and undercarriage, and check also for leakage of oil and water. If any leakage or abnormality is found, carry out repairs.
2. Fill the fuel tank.
3. Remove any waste paper or dead leaves from inside the engine room. These may cause a fire.
4. Remove any mud stuck to the undercarriage.

3.3.16. Locking

Lock the following places:

1 Tank lock
2 Side maintenance flaps left and right
3 Cab doors left and right
4 Hydraulic tank
5 Gearbox filling cap
6 Radiator compensation tank



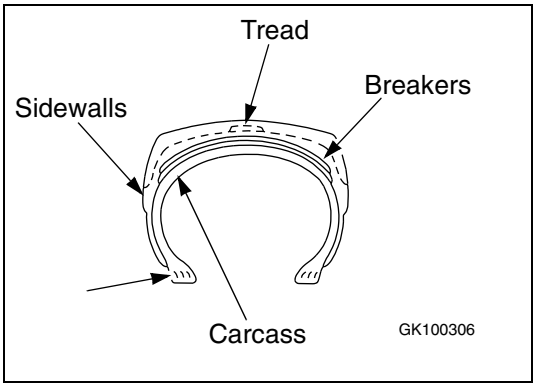


NOTE

The ignition key fits all locks.

3.3.17. Tyre handling

Precautionary measures when handling tyres



If the following defects are found in tyres, they must be replaced for safety reasons.

- Bead wire is broken or bent, or the tyre is greatly deformed.
- Excessive wear and the carcass ply (excluding breaker) is exposed for more than 1/4 of the circumference.
- Damage to the carcass exceeds 1/3 of the tire width.
- Tyre layers are separated.
- Radial cracks reach the carcass.
- Deformation or damage which makes the tyre unsuitable for use.

Tyre pressure

Measure the tyre pressure before starting the machine operation, when the tyres are cool.

If the tyre inflation pressure is too low, there will be overload; if it is too high, it will cause tyre cuts and shock burst. To prevent these problems, adjust the tyre inflation pressure according to the table on the next page.

- For operations on normal road surfaces, rock digging operations:

  _____ Upper range values in air pressure chart

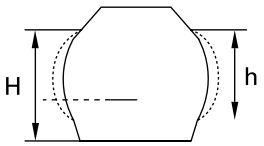
- Stockpile operations on soft ground:

  _____ Average pressure values in air pressure chart

- Operations on sand (operations not using much digging force)

  _____ Lower range values in air pressure chart

$$\text{Deflection ratio} = \frac{H - h}{H} \times 100$$



As a guideline for visual inspection, the deflection ratio of the front tyre (deflection/free height) is as follows:
When carrying normal load (lift arm horizontal): approx. 15 - 25%
When digging (rear wheels off ground): approx. 25 - 35%

When checking the tyre inflation pressure, check also for small scratches or peeling of the tire, for nails or pieces of metal which may cause punctures, and for any abnormal wear.

Clearing fallen stones and rocks from the working area and maintaining the surface will extend the tyre life and improve the economical case of the machine.

TYRES				RECOMMENDED AIR PRESSURE					
Manufacturer	Size	Type	EM-Code	Loading work		Excavation work		Soft ground	
				bar	psi	bar	psi	bar	psi
BRIDGESTONE	26,5 R25	VSMS	L 5S	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
BRIDGESTONE	26,5 R25	VALS	L 4	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
BRIDGESTONE	26,5 R25	VSDL	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
BRIDGESTONE	29,5 R25	VMT	L 3	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
BRIDGESTONE	29,5 R25	VLTS	L 4	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
BRIDGESTONE	29,5 R25	VSDL	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
GOODYEAR	29,5 R25	GP-2B 6S	L 2	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
GOODYEAR	29,5 R25	RL2+ 6S	L 2/3	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
GOODYEAR	29,5 R25	GP4B	L 4	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
GOODYEAR	29,5 R25	RL-5K	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
DUNLOP	26,5-25	EV191 SD 34PR	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	26,5 R25	XHA	L 3	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	26,5 R25	XLD/D/2A	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	26,5 R25	X-MINE D2	L 5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	26,5 R25	XLD D1A	L4	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	29,5 R25	XHA	L3	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	29,5 R25	XLD D1A	L4	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	29,5 R25	XLD/D/2A	L5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58
MICHELIN	29,5 R25	X-MINE	L5	3.5 - 4.5	51 - 65	3.5 - 4.5	51 - 65	3.0 - 4.0	44 - 58

Correct inflation pressure levels have a significant impact on the service life and efficiency of the tyres. Only correct inflation pressures protect the tyres from getting damaged. Should the pressure rise as a result of heating, do not deflate the tyres. Check and adjust inflation pressures before moving off, i.e.., with the tyres cold.

In extremlely severe applications and in load and carry applications involving lenghty hauls, the correct inflation pressure should be determined by the respective tyre manufacturer or an authorised service outlet on the spot.
If the deflection of the tyre is excessive, raise the inflation pressure accordingly (see section "Tyre pressure" on page 3-78).

3.4. Transport

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

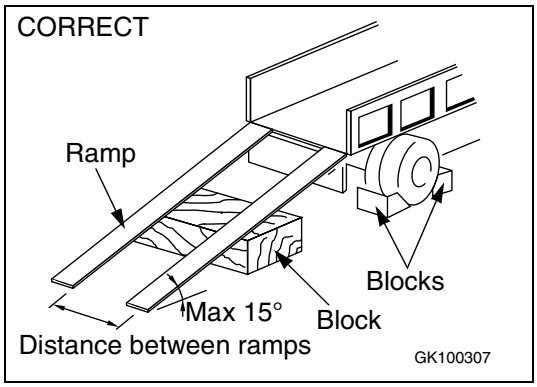
3.4.1. Loading, unloading

⚠ WARNING

- **Make sure that the ramp is sufficient with respect to width, length and carrying capacity to enable the machine to be safely loaded and unloaded.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.**
- **Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes.**
  Be sure the ramp surface is clean and free of grease, oil ice and loose material.
- **Never change the direction of travel when on the ramp. If it is necessary to change direction, drive off the ramp and correct the direction, then remount the ramp.**

When loading or unloading, always use ramps or a platform and proceed as follows:

1. Properly apply the brakes on the trailer and place blocks beneath the tyres (see fig.) to ensure that it does not move. Then fix the ramps in line with the centres of the trailer and the machine. Be sure that both sides are on the same level. If the lamp sags visibly, reinforce it with blocks, etc.
2. Determine the direction of the ramp, then slowly load or unload the machine.



NOTE

When the transmission cut-off switch is set to OFF, the left brake pedal and accelerator pedal are operated at the same time.

3. Correctly move the machine onto the specified part of the trailer.

3.4.2. Precautions for loading

After loading the machine in the specified position, secure it in place as follows:

1. Lower the work equipment slowly.
2. Apply the safety lock to lock all the control levers securely.
3. Turn the start switch to the OFF position and stop the engine. Pull off the key from the start switch.
4. Lock front frame and rear frame with safety bar.
5. Put blocks in front of and behind the wheels, and secure the machine with chains or wire rope to prevent it from moving during transport.
6. Always retract the car radio antenna fully.

3.4.3. Precautions during transport

⚠ WARNING

Determine the route for transporting the machine taking into account the width, height and weight of the machine.

- Note that, while driving on public roads, the machine is subjected to traffic regulations.
- Determine the transport route with respect to the width, length and weight of the load. If required, ask the relevant authorities for permission.

3.4.4. Removing / Fitting attachment

⚠ CAUTION

- **Stop machine on level ground.**
- **Apply parking brake.**
- **Lower bucket to ground level.**
- **Switch off engine.**
- **Use wedges to secure machine against rolling away.**
- **Secure articulated joint with the locking bar.**

Remove / Fit the attachment

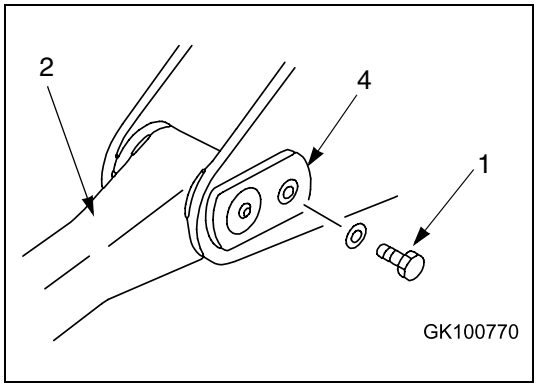
- if this is necessary for carrying out or simplifying the transportation of the machine or
- if the attachment has got to be exchanged.

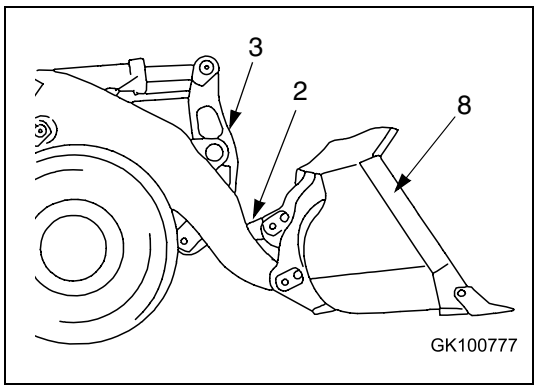
In this case, proceed as follows:

Removing the attachment

1. Undo the fastening screw (1) for the retaining bolt (4) of the tilt arm (2) and remove.

   The tilt arm (2) is the connecting piece between the tilt lever (3) and the attachment (8).

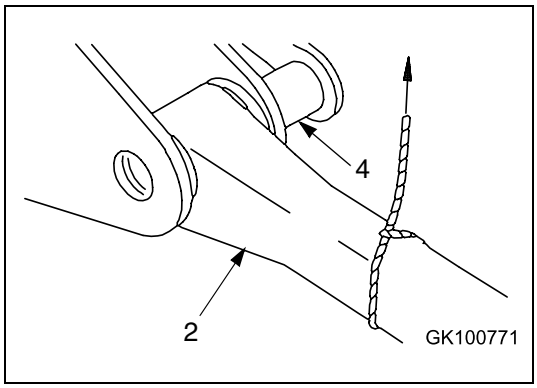




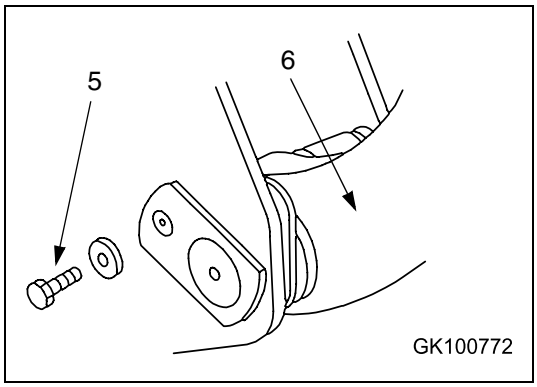
2. Raise the tilt arm (2) by crane or steel cable and take the load off the retaining bolt (4). Now pull out the retaining bolts (4).

   Weight of the tilt arm = 100 kg

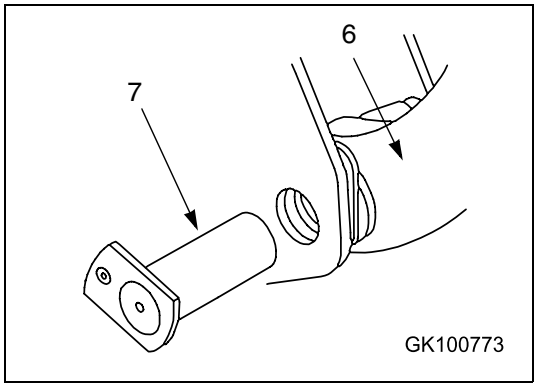
3. Lower the tilt arm (2) slowly until it is resting on the ground.



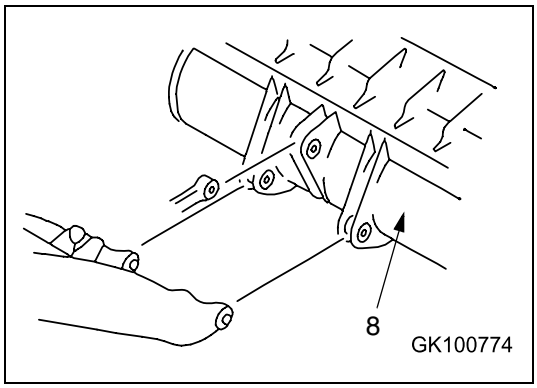
4. Undo the fastening screws (5) on both lift arms (6) and remove (one screw on each side).



5. Pull the retaining bolts (7) out of each lift arm (6) (one retaining bolt per side).

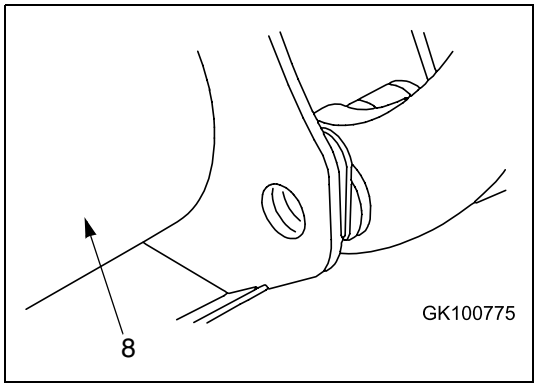


6. Remove the attachment (8).

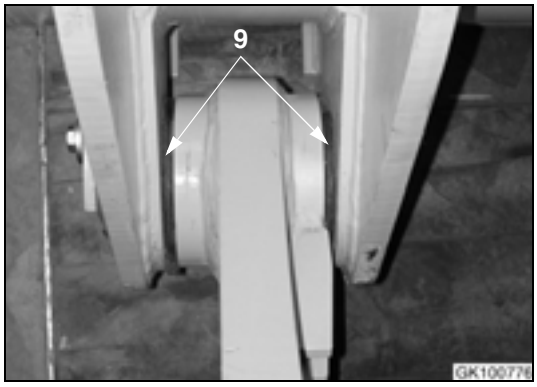


Fitting the attachment

1. Place the attachment (8) in the lift arms. Align the holes for the retaining bolts at the same time.

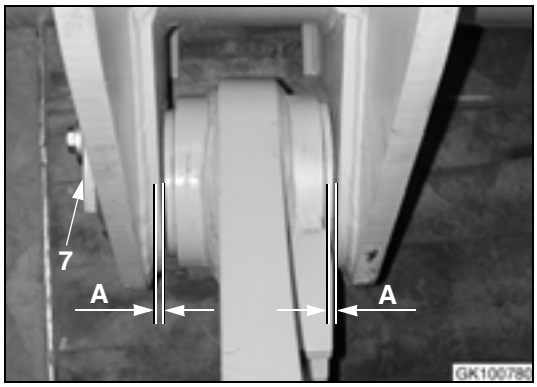


2. Grease the dust rings (9).
3. Place the dust rings (9) on the lift arms.



4. Measure the play (A) between the attachment holder and the lift arm. The play (A) must not exceed a maximum of 1 mm.

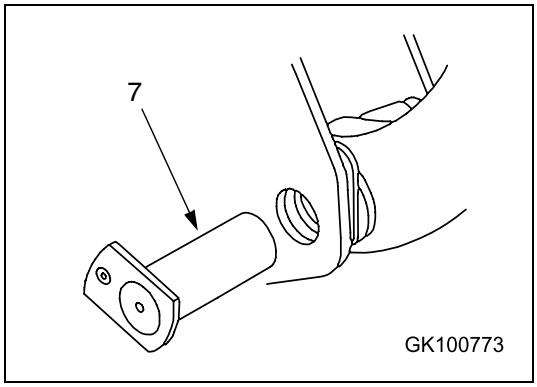
   If the play (A) is more than 1 mm, insert washers to reduce the amount of play.



5. Align the holes for the retaining bolts in both lift arms.
6. Insert the washers.
7. Grease the retaining bolts (7) and insert in both lift arms.

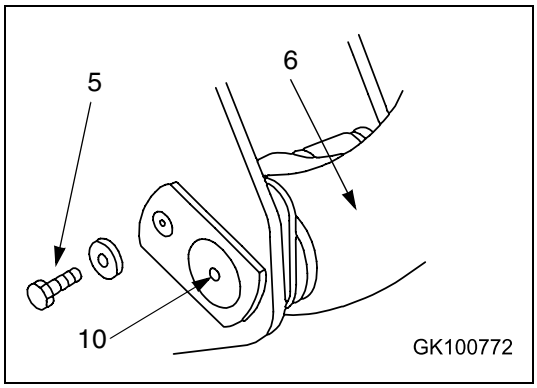
NOTE

The bearings for the lift arms are not lubricated by the central lubricating system. For this reason, only use retaining bolts with lubrication hole.



8. Insert the fastening screws (5) for the retaining bolts on both lift arms (6) and pull tight (one screw on each side).
   Torque: see "Torque" chapter

9. Lubricate the bearings of the lift arms at the grease nipples (10) in the retaining bolts.



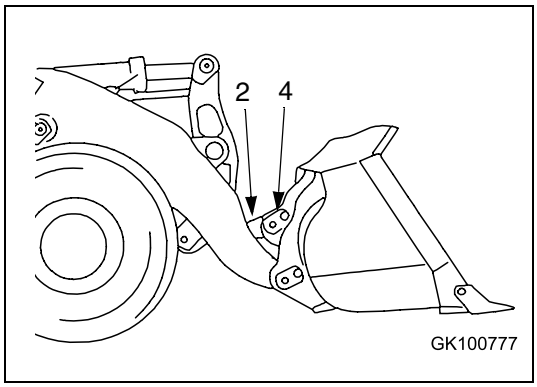
10. Raise the tilt arm (2) and align so that the retaining bolts (4) can be inserted.

    Weight of the tilt arm = 100 kg.

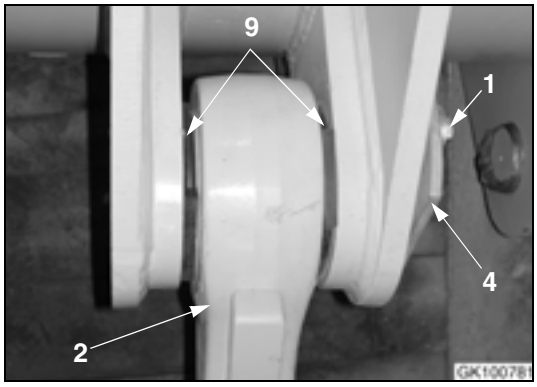
11. Grease the dust rings (9) for the tilt arm (2).

12. Place the dust rings (9) on the tilt arm (2).

13. Check the play between the tilt arm and the attachment holder. The play must not exceed a maximum of 1 mm. Use washers as for the connection between lift arms / attachment holder.



14. Grease the retaining bolt (4) and insert.



NOTE

The bearing for the tilt arm (2) is lubricated by the central lubrication system. Use a retaining bolt without lubrication hole.

15. Insert the fastening screw (1) for the retaining bolt (4) of the tilt arm (2) and pull tight.
    Torque: see "Torque" chapter.

3.5. Cold weather operation

3.5.1. Precautions for low temperatures

Under low temperatures, the engine is difficult to start and the coolant may freeze. In this case, proceed as follows:

Fuel and lubricants

Use fuel and oil with low viscosity for all components which is suitable for low-temperature operation. For details of the specified viscosity, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.

Coolant

⚠ WARNING

Keep antifreeze fluid away from open fire. Never smoke when using antifreeze.

NOTE

- **Never use antifreeze on methanol, ethanol or propanol basis.**
- **Absolutely avoid using any water leak preventing agent irrespective of wether it is used independently or mixed wih an antifreeze.**
- **Do not mix different brands of antifreeze.**

For details of the antifreeze mixture when changing the coolant, see section "5.8.2. Maintenance upon demand" on page 5-22.

NOTE

Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.

Battery

⚠ WARNING

- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

NOTE

Measure the specific gravity and calculate the rate of charge from the following conversion table:

Rate of charge	Temperature of fluid			
	20°C	0°C	-10°C	-20°C
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

3.5.2. Precautions after completion of work

Always observe the following precautionary measures to prevent mud, water, or the undercarriage from freezing which would result in inhibiting the machine operation on the following morning:

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by the water in mud or dirt get inside the seal and freeze.
- Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. The boards help to protect the tracks from freezing in the soil so that the machine can start the next morning.
- Open the drain valve in the fuel tank and allow the collected water to drain off.
- As the battery capacity drops significantly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.

3.5.3. After the cold weather period

When season changes and the weather becomes warmer, proceed as follows:

- Replace the fuel and oil for all parts with oil of the specified viscosity.
  For details, see section "5.4. Lubricants and operating means" on page 5-13.
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol based antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.

3.6. Long-term storage

3.6.1. Before storage

When storing the machine for a long time, take the following precautions:

- After every part is washed and dried, store the machine in a dry building. Never leave it outdoors.
  If the machine must be left outdoors, park it on well-drained concrete and cover it with canvas, etc.
- Completely fill the fuel tank, lubricate, and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.
- Lock the control lever for working hydraulics in place and apply the parking brake by actuating the toggle switch on the steering column.

3.6.2. During storage

⚠ CAUTION

If, for any reason, it is unavoidable to perform the rust-prevention operation indoors, open the doors and windows to improve ventilation and to prevent gas poisoning.

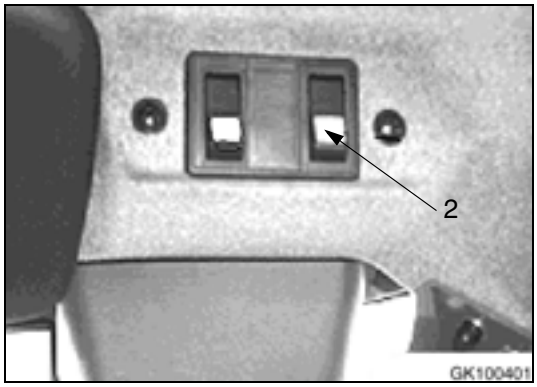
Operate the engine and move the machine over a short distance once a month so that a new film of oil will be applied to movable parts and component surfaces. At the same time, also charge the battery. Before operating the work equipment, wipe off the grease on the hydraulic piston rod.

3.6.3. After storage

NOTE

If the machine is stored without performing the monthly rust prevention operation, call your Komatsu distributor for service.

Carry out the following procedure before operating the machine after long-term storage:



- Wipe off the grease from the hydraulic piston rods.
- Add oil and grease to all places.
- Check level of grease in grease reservoir, top up if necessary. See section "5.8.2. Maintenance upon demand" on page 5-22.
- Start the engine and press the button (2) for the central lubrication system.
- Check whether the pump for the central lubrication system is operating.
- Upon completion of the lubrication process, check whether fresh grease has emerged at all lubrication points.
- Repeat the lubrication process if necessary.

4. Troubleshooting

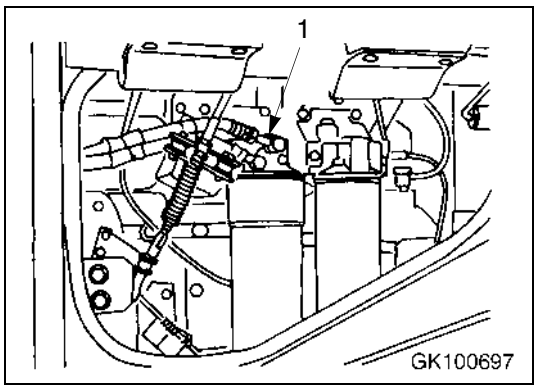
4.1. When the machine runs out of fuel

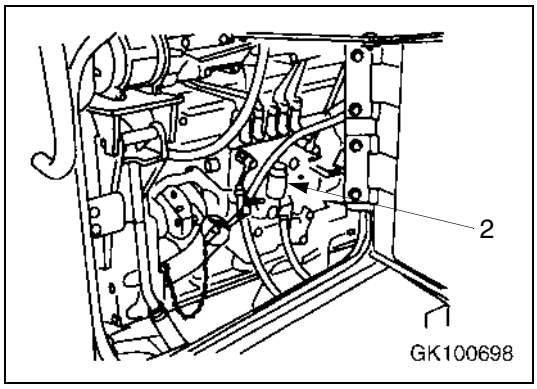
⚠ WARNING

Fire risk! Spilled fuel may ignite! Remove carefully any spilled fuel.

Proceed as follows if the fuel tank is empty:

1. Fill up with fuel. For more information see:
   "Refuelling with a fuel dispenser" on page 5-41
   or
   "Refuelling from drum" on page 5-41
2. Open the maintenance flap on the right side.
3. Loosen the vent screw (1).
4. Loosen the feed pump knob (2) and move the pump up and down until bubble-free fuel comes out of the vent screw.
5. Retighten the vent screw. Then press down and retighten the knob of the feed pump.





⚠ CAUTION

Caution during turning the engine. It may start up after a few turns!

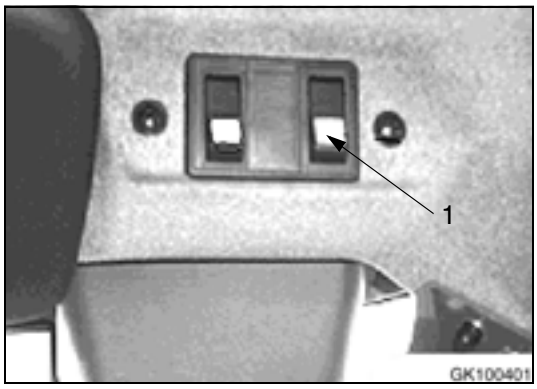
6. Set the key in the start switch to START position and start up the engine for 15-20 seconds. On no account activate the starter for longer than 20 seconds. Always wait for two minutes before restarting.

4.2. Central lubrication system

4.2.1. No grease emerging at the lubrication points

- Check level of grease in grease reservoir, top up if necessary.
- Start a manual auxiliary lubrication process.
- Switch ignition on and press button (1).
- The stirrer in the grease reservoir rotates when the pump is switched on.
- Check the distribution pipelines for leaks. Tighten any loose connections.

Please contact your local KOMATSU dealer if grease is still not emerging from the lubrication points.



4.2.2. The pump does not switch on

- Check the fuses.
- Check whether the electrical plug on the underside of the pump housing is connected tight with the power socket.
- If necessary, turn bayonet connector clockwise.
- Start a manual auxiliary lubrication process. Switch ignition on and press button (1).

Please contact your local KOMATSU dealer if the pump does not switch on.

4.3. Towing the machine

⚠ WARNING

Towing with a traction machine that is too light may result in accidents!
Use a traction machine which has at least the same weight as the machine that you want to tow off.

The machine must not be towed expect in emergencies. Determine the operation weight of the faulty or damaged machine and compare it to the maximum tractive force of the machine to be towed off. The maximum tractive force must be greater than the operation weight.

Tow the machine only to that location where it can be maintained or repaired. Use a traction machine which has at least the same weight as the machine that you want to tow off. Use always a tow bar for towing.

⚠ CAUTION

Tow bars which are attached to incorrect points may damage the machine! Use only the intended attachments points for attaching the tow bar.

The following must be observed when towing the machine.

- Make sure that the device chosen to tow the machine has sufficient tensile strength. If the machine to be towed has to be moved over mud or slopes then a tow bar with a tensile strength of at least 1.5x the machine's weight must be used.
- The machine towing must have a suitable towing device mounted to it at the rear using a tensioning bolt at the towing machine's opening.
- A suitable towing device must be attached to the defective machine at its front lashing point.
- Tow the machine at a slow speed of less than 2 km/h over a distance of a few metres only to a location where the repairs can be conducted. Towing should be done in an emergency only. A low-loading lorry should be used for longer distances.
- If the steering and braking system of the vehicle to be towed are inoperable then no one may sit on the machine.
- If the machine is moved in fits and starts then the towing device may be subjected to excessive loads whereupon it may rupture or break. For this reason the machine should only be moved slowly at a constant speed.

- Where a machine is to be towed up a slope then a larger machine should be used in order to ensure that sufficient tensile strength and braking power is available; or another machine should be coupled to the rear of the towing machine. This will help to prevent the machine from going out of control.

4.3.1. Engine can still be used

- If the transmission and steering wheel can be operated, and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance.

- The operator should sit on the machine being towed and operate the steering in the direction that the machine is towed.

4.3.2. Engine cannot be used

Proceed as follows where a machine is to be towed with the engine switched off:

1. The transmission oil does not lubricate the system, so remove the front and rear drive shafts. If necessary, block the tires to prevent the machine from moving.

2. The pressure tank is empty after a few brake applications. The machine's brakes will not function at this point.

3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.

4. The parking brake cannot be released by toggle switch when the engine is switched off and the pressure accumulator empty. The parking brake must be released as described in section "4.3.3. Releasing the parking brake (Engine not running)" on page 4-6.

4.3.3. Releasing the parking brake (Engine not running)

⚠ WARNING

- **Stop the machine on a flat surface when releasing the parking brake, and check that the surroundings are safe. In emergencies or when the parking brake must be released on a hill, block the tyres carefully before releasing the brake.**
- **When the parking brake is released, no braking force is applied, so check carefully that the situation is safe when moving the machine.**

Releasing the parking brake using the toggle switch

The procedure described below for releasing the parking brake will only function if sufficient pressure is present in the brake accumulator. If the pressure in the brake accumulator is too low the parking brake control lamp will illuminate and an alarm sound off. In this case see section "Releasing the parking brake using the adjusting screws" on page 4-7.

If the machine's engine cannot be started and the machine must be towed then proceed as follows in order to release the parking brake:

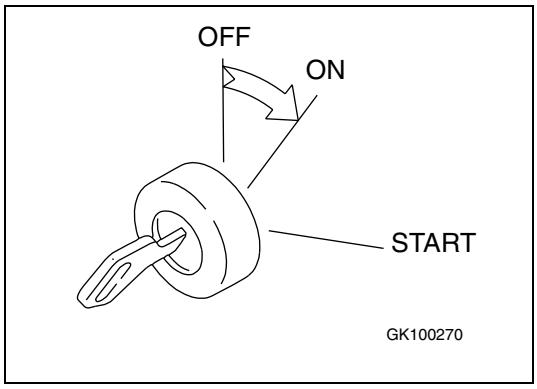
1. Insert the key into the starter switch and turn it to the ON position.
2. Move the toggle switch to position (E). Check that the control lamp for the parking brake goes out.

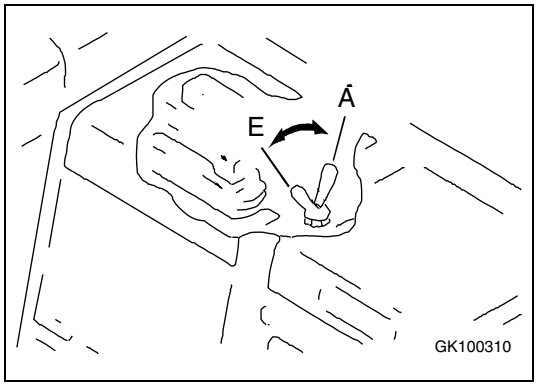
   E Release parking brake

   A Normal position

   If the toggle switch is in the (E) position a continuous warning signal is sounded.

   If the pressure in the brake accumulator is too low the parking brake control lamp will not go out. A continuous beeper is sounded. In this case see section "Releasing the parking brake using the adjusting screws" on page 4-7.



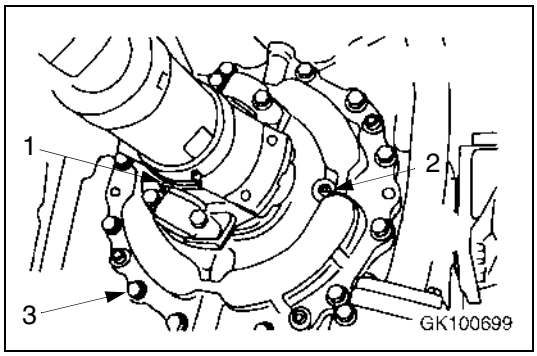


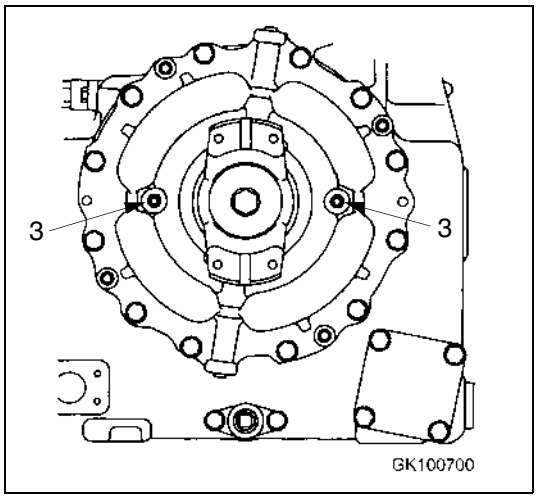
Releasing the parking brake using the adjusting screws

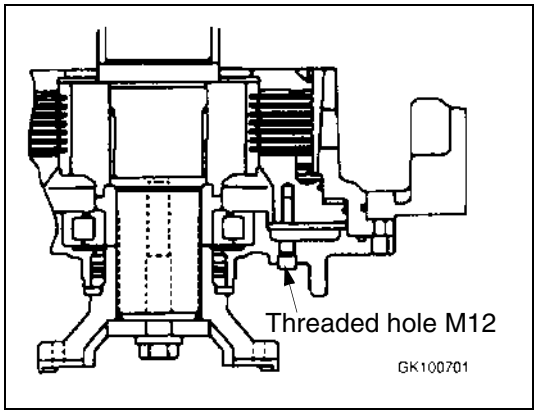
1. Unscrew the threaded plugs (1) and (2) on the transmission housing.
2. Unscrew two of the 12 fastening screws (3) with which the cap on the brake chamber is held in place.
3. Screw the two removed screws (3) into the threaded bores out of which the threaded plugs (1) and (2) were removed.
4. Tighten the screws (3) uniformly up to the limit stop in order to release the parking brake.

NOTE

The parking brake remains without impact, even when the engine is started!







4.3.4. Emergency travel operation

The normal gear shifting is carried out by electric signals. If there is a failure in the electrical system and the machine does not move, it is possible to move the machine by using the following procedure:

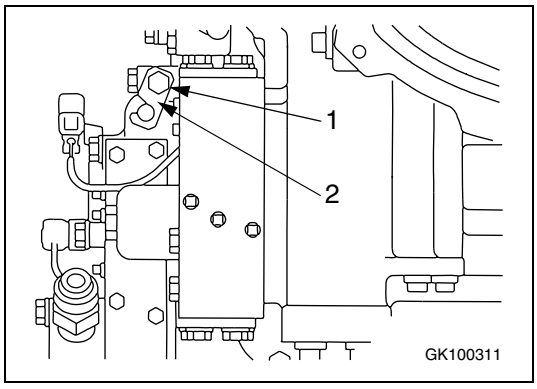
- The emergency travel operation is to enable the machine to drive under its own power to the nearest repair shop when there is a failure in the electrical system. This operation must not be used for any other purpose.
- When performing this operation, always keep the engine stopped except when starting the machine.
- When starting the engine, always depress the brake pedal and check that the surrounding area is safe and the machine is in operational condition.

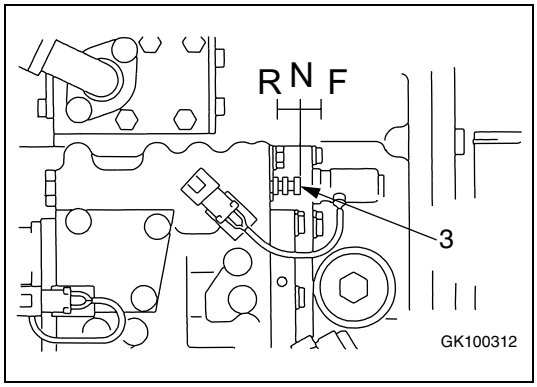
NOTE

Always request your Komatsu distributor to carry out the emergency travel operation, or consult your Komatsu distributor before carrying it out yourself.

Emergency travel operation, when the electrical circuit for gear shifting is inoperationable

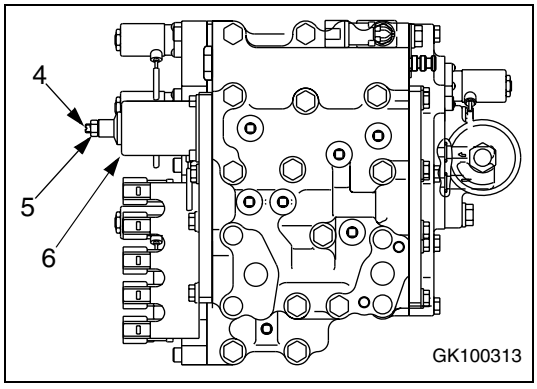
1. Apply the parking brake by actuating the toggle switch on the steering column and move the directional lever to the neutral position.
2. Remove the screw (1) and slide the plate (2) to one side.
3. Pull spool (3) in position "F" for 2nd gear forward or push it into position "R" for 2nd gear revers whatever direction is intended.
4. Disconnect all connectors to the transmission control valve.
5. Release lock-nut (5) and tighten the adjustment-screw (4) to the proportional solenoid valve (6) carefully to its stop.
6. Depress the brake pedal, start the engine, then release the parking brake and slowly release the brake pedal to allow the machine to move.





After completion of emergency travel operation:

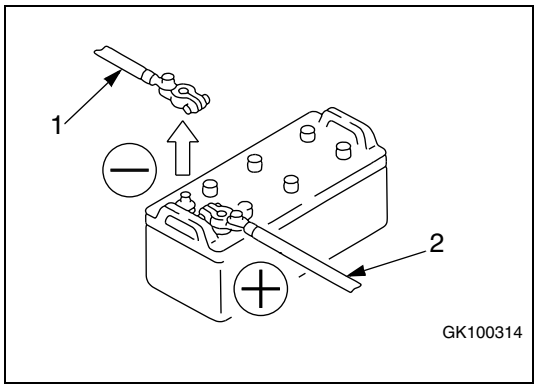
1. For normal operation set the spool (3) to the neutral position. Install plate (2) and bolt (1) securely to hold it in place as otherwise the spool may come out when the machine is travelling.
2. Carefully release adjustment-screw (4) of the proportional solenoid valve (6) up to its stop and secure with lock-nut (5).
3. Connect all connectors to the transmission control valve.

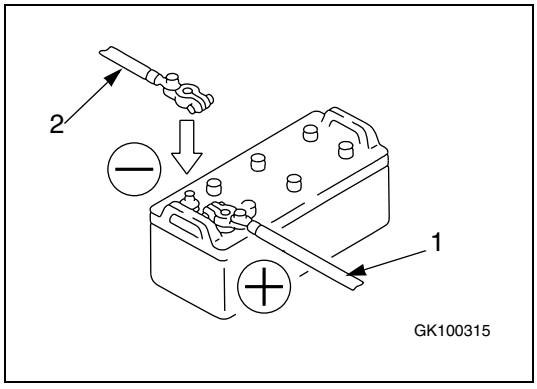


4.4. If battery is discharged

⚠ WARNING

- **Before checking or handling the battery, stop the engine and turn the starter switch key to the OFF position.**
- **Before starting the engine, use a damp cloth to wipe off the dust accumulated on the top of the battery.**
- **The battery generates hydrogen gas,so there is the danger of an explosion. Do not bring lit cigarettes near the battery and avoid anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, which will attack your clothes and skin. If it gets on your clothes or on your skin, wash it off immediately with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **When handling the battery, always wear protectives goggles.**
- **When removing the battery, first disconnect the cable from the ground (normally, from the negative (-) terminal). When installing the battery, install the positive (+) terminal first. If a tool touches the cable connecting the positive terminal and the chassis, there is the danger of spark information.**
- **If the terminals are loose the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.**
- **When removing or installing the battery, check which is the positive (+) terminal and negative (-) terminal.**
- **Make sure that the cover of the positive terminal (+) is mounted.**





4.4.1. Precautions for charging the battery

Charging with the Battery Installed in the Machine

- Before charging, disconnect the cable from the negative (-) terminal of the battery. Otherwise, an unusually high voltage will damage the alternator.
- While charging the battery, remove all battery plugs for a sufficient ventilation.
  To avoid gas explosions, do not bring fire or sparks near the battery.
- If the electrolyte temperature exceeds 45°C, stop charging for a while.
- Turn off the charger as soon as the battery is charged.
  Overcharging the battery may cause the following:
  - Overheating of the battery
  - Decreasing the quantity of electrolyte
  - Damaging the electrode plate.
- Do not mix the cables (positive (+) to negative (-) or negative (-) to positive (+)), as this will damage the alternator.
- When performing any service to the battery besides checking the electrolyte level or measuring the specific gravity, disconnect cables from the battery.

NOTE

The batteries are on both sides at the rear of the machine.

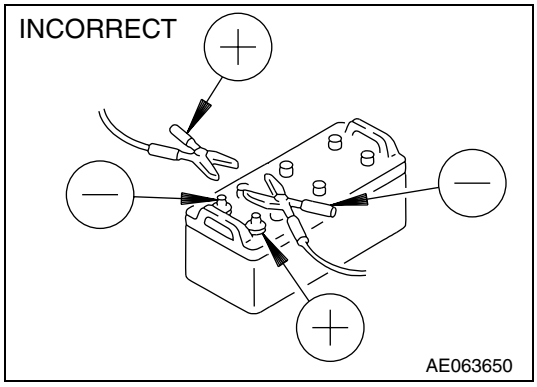
4.4.2. Starting the engine with a booster cable

For starting the engine with a booster cable, proceed as follows:

Precautions for connecting and disconnecting the booster

⚠ WARNING

- **When connecting the cables, never contact the positive (+) and negative (-) teminals.**
- **When starting the engine with a booster cable, always wear safety goggles.**
- **Be careful not to let the normal machine and defective machine contact each other. This prevents sparks from being generated near the battery which could ignite the hydrogen gas leaking from the battery. If hydrogen gas explodes, it may cause serious injury.**
- **Make sure that there is no mistake in the booster cable connections. The final connection is made to the engine block of the defective machine, but sparks will be generated when this is done, so connect it to a place as far as possible from the battery.**
- **Be careful when removing the cables from the machine that has been started. Do not allow the cable ends to contact each other or the machine to avoid hydrogen explosion.**

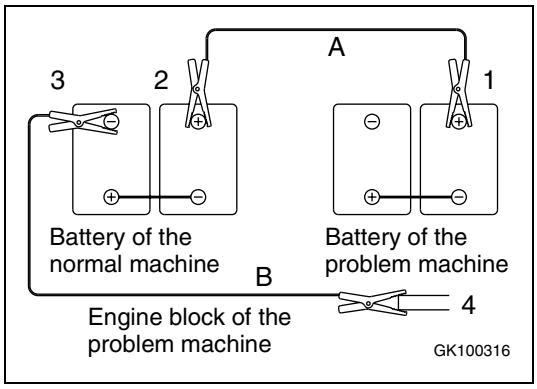


NOTE

- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must have the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**

The batteries are on both sides at the rear of the machine. The battery used for the ground is on the right side of the machine.

Connecting the booster cables



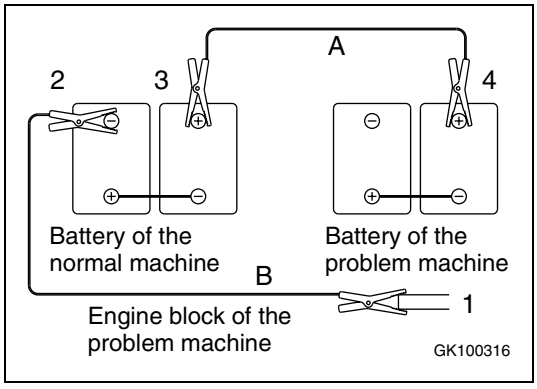
Keep the start switch set to OFF.
Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Make sure that the start switches of the normal and defective machine are both set to OFF.
2. Connect one clip of booster cable (A) to the positive (+) terminal of the defective machine.
3. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
4. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
5. Connect the other clip of booster cable (B) to the engine block of the defective machine.
6. Let the engine run with a high speed.

Starting the engine

1. Make sure the clips are firmly connected to the battery terminals.
2. Turn the start switch of the defective machine to the START position and start the engine. If the engine does not start at first, wait for at least 2 minutes before trying again.

Disconnecting the booster cables



After the engine has started, disconnect the booster cables in reverse order in which they were connected.

1. Remove one clip of booster cable (B) from the engine block of the defective machine.
2. Remove the other clip of booster cable (B) from the negative (-) terminal of the normal machine.
3. Remove one clip of booster cable (A) from the positive (+) terminal of the normal machine.
4. Remove the other clip of booster cable (A) from the positive (+) terminal of the defective machine.

4.5. For insufficient braking effect

4.5.1. Checking the brake function

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 conducted on the braking system must be conducted at a Komatsu workshop.

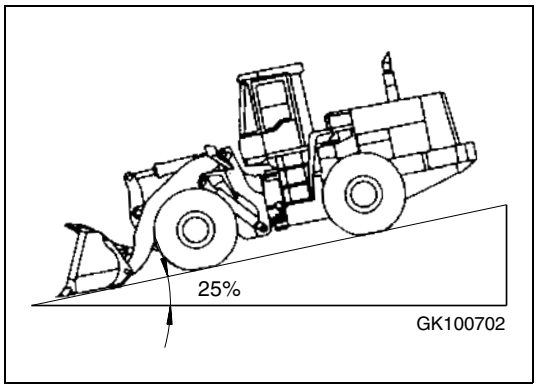
4.5.2. Checking the parking brake function

⚠ CAUTION

Even if the parking brake switch is turned ON, keep the brake pedal depressed until the parking brake control lamp lights up.

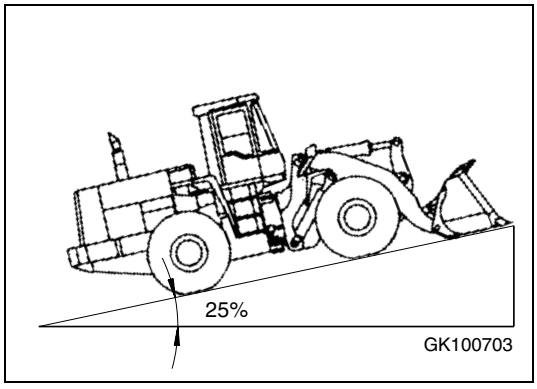
Test conditions

- Tire inflation pressure: as specified (see "Tyre pressure" on page 3-78)
- Road surface: Dry paved surface with 25% grade
- Machine: Operating condition



Test method

1. Start the engine, align the machine facing straight to the front, then drive the machine up a 25% grade with the bucket empty.
2. Depress the brake, stop the machine, return the directional lever to the neutral position and stop the engine.
3. Set the parking brake switch to ON, release the brake pedal slowly, and check whether machine is held in position.



NOTE

All repairs conducted on the braking system must be conducted at a Komatsu workshop.

4.6. Other troubles

4.6.1. Electrical system

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

ELECTRICAL SYSTEM		
Fault	**Fault cause**	**Remedy**
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	Check/repair terminals, connecting points and cables. *)
	Faulty alternator	Replace alternator or regulator.*)
	Alternator belt tension too low	Adjust belt tension.
Alternator making strange noises.	Faulty alternator	Replace alternator. *)
Starter does not turn over.	Faulty electrical connection	Check/repair terminals, connecting points and cables. *)
	Battery charge too low	Recharge battery.
Starter pinion engages/ disengages repeatedly.	Battery charge too low	Recharge battery.
	Faulty starter	Change starter. *)
Starter only turns engine over slowly.	Battery charge too low	Recharge battery.
	Faulty starter	Change starter. *)
Starter disengages before the engine has ignited.	Battery charge too low	Recharge battery.
	Faulty starter	Repair/change starter. *)
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	Check/repair terminals, connecting points and cables. *)
	Faulty bulb	Replace bulb.
If the engine is switched off the pre-heating control lamp will not illuminate (starter switch to ON)	Faulty wiring.	Check, repair.
	Glow-plug relay, glow-plug monitoring, coolant temperature sensor faulty.	Replace. *)
	Pre-heating control lamp faulty.	Replace. *)

*) Have this work performed by local dealer.

4.6.2. Chassis

If faults or causes of faults are not listed below, have them rectified by local 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.
	Screen is clogged	Disassemble, clean
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.
	Torque converter stopped for too long	Reduce down time
	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.

*) Have this work performed by local dealer.

AXLES		
Fault	**Fault cause**	**Remedy**
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 performed by local dealer.

Chassis continued

If faults or causes of faults are not listed below, have them rectified by local 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. *)
	Lack of oil	Add oil to specified level
Brake drags or remains applied	Vent hole of brake valve is clogged	Clean

*) Have this work performed by local dealer.

PARKING BRAKE		
Fault	**Fault cause**	**Remedy**
Faulty brake action.	Too much play on brake lever	Adjust brake. *)
	Brake lining worn	Replace brake linings. *)
Brake drags or remains applied	Lack of oil in transmission case	Add oil to specified level
	Screen is clogged	Disassemble and clean

*) Have this work performed by local dealer.

STEERING		
Fault	**Fault cause**	**Remedy**
Steering reaction sluggish.	Faulty hydraulic system	Repair. *)
	Lack of oil	Add oil to specified level
Steering wobbles.	Play on steering cylinder bolts too large	Repair. *)
	Hydraulic system faulty	Repair. *)
	Lack of oil	Add oil to specified level

*) Have this work performed by local dealer.

Chassis continued

If faults or causes of faults are not listed below, have them rectified by local 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.
	Air in oil line	Bleed air
Hydraulic pressure too low	Oil level too low and pump is sucking in air	Top up with oil according to specifications and bleed air
Cylinders jerking.	Oil level too low	Top up with oil according to specifications.

*) Have this work performed by local dealer.

4.6.3. Engine

If faults or causes of faults are not listed below, have them rectified by local 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	Fill up fuel filter with fuel.
	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 performed by local dealer.

Engine continued

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

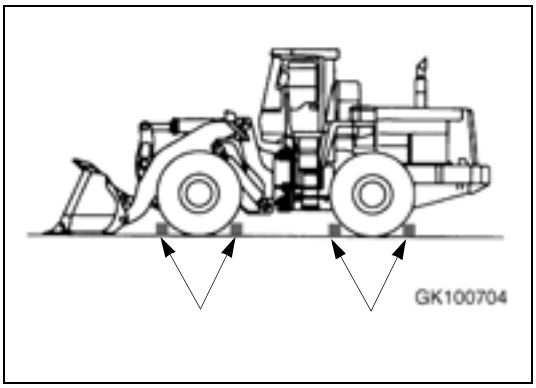
5. Maintenance

5.1. Maintenance guide

Maintenance work is to be conducted by skilled personnel only. See section "2.3. Precautions for maintenance" on page 2-21.

Perform maintenance work on hard, flat ground.

Always bring the machine in the specified maintenance and repair position.
Always carry out works with the machine in the following position unless otherwise specified.



- Lower the work equipment on the ground and set it as shown in the diagram on the right.
- Set all control levers to the neutral or HOLD position.
- Set the safety lever to the LOCK position.
- To apply the parking brake actuate the toggle switch on the steering column.
- Put blocks in front of and behind the tires.
- Lock the front and rear frames with the safety bar.

Check service meter

Check the service meter every day to see if any maintenance is due.

Komatsu original replacement parts

Only use Komatsu original parts specified in the Parts Book as replacement parts.

Oils and grease

Use only original oils and grease by Komatsu. Choose oils and grease with the specified viscosity depending on the ambient temperature.

Use only clean oil and grease. Keep also containers for oil and grease clean. Be careful not to operate with foreign substances in the vicinity of oil and grease.

Washer fluid

Use automobile window washer fluid and make sure it is not contaminated with dust or dirt.

Keep the machine clean

Always keep the machine clean. This facilitates troubleshooting considerably. In particular, keep grease fitting, breathers and oil level gauges clean and avoid any contamination with foreign materials.

Be careful with hot fluids

Draining hot oils and coolants and removing their filters immediately after stopping the engine are hazardous. Allow the engine to cool before.

If the oil has to be drained when it is cold, warm it up to a suitable temperature (approx. 20 - 40 °C), then drain!

Check for foreign particles in drained oil and on filters

After oil is changed or filters are replaced, check the oil and filters for metallic particles and foreign materials. If large quantities of metallic particles or foreign materials are found, consult your Komatsu dealer.

Refilling fuel or oil, fuel strainer

Refill only fuel or oil in sufficiently ventilated places. If your machine is equipped with a fuel strainer, do not remove it while fueling. Re-close it after fueling.

Spilled fuel or oil may cause accidents due to slipping. It may also ignite. For this reason, always remove any spilled oil or fuel.

Never use fuel for cleaning or rinsing parts. Be careful not to contaminate soil or water with oil or fuel. Dispose oil and fuel in an appropriate manner.

Oil check or change

Check or change oils only in dust-free places to keep foreign particles away from oils.

Warning tag

Attach the warning tag to the start switch or other related control elements to avoid that somebody starts the engine during maintenance.

The warning tag is supplied together with the tools.

Safety labels

During the operation, always observe the precautions on the safety label attached to the machine.

Welding instructions

- Turn off the engine start switch (OFF position).
- Disconnect the negative terminal on the battery.
- Do not apply more than 200 V continuously.
- Keep a safety distance of min. 1 m (3.28 ft) between the area to be welded and the battery.
- Connect grounding cable within 1 m (3.28 ft) from the area to be welded.
- No seals or bearings may be between the area to be welded and the grounding point.
- Never weld any pipe or tube containing fuel or oil.

Fire prevention

Use nonflammable cleaners or light oil for cleaning parts. Keep flame or cigarette light away from light oil.

Clamp faces

When O rings or gaskets are removed, clean the clamp faces and replace the O rings and gaskets with new ones. Be sure to fit O rings and gaskets during re-assembly!

Objects in your pockets

Keep your pockets free of loose objects which can fall out and drop into the machine (especially when bending over the machine).

Tyres check

When working in rocky areas, check the tyres for damage and for looseness, flaws, wear and tear. Re-tighten loose bolts and nuts.

Precautions when washing the machine

- Place the machine on a plane, even surface.
- Lower the work equipment to the ground.
- Apply the parking brake.
- Lock the wheels using support wedges to prevent the machine from rolling away.

Proceed the following general measures, if you want to clean the machine:

- Never spray steam or water directly on the radiator.
- Do not allow water to get on any electrical component.

Pre- and post-work checks

Before starting work in mud, rain, snow or at the seashore, check plugs and valves for tightness. Wash the machine immediately after the work to protect components from rusting.

Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.

On worksites where heavy-duty operations are common, reduce the maintenance and lubricating intervals.

Dusty worksites

When working at dusty worksites, take the following precautions:

- Inspect the air cleaner clogging warning lamp to see whether the air cleaner is blocked. Clean the air cleaner more frequently than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starter and alternator to avoid accumulation of dust.

Avoid mixing oils

Never mix oils of different brands. If you have only oil which is different from the oil brand used in the machine, do not add it but replace the entire oil.

5.2. Maintenance basics

- Only use original Komatsu parts for replacement.
- When changing or adding oil, do not use a different type of oil.
- Unless otherwise specified, the oil and coolant used at the time of shipment are as shown in the table below.

Item	Lubricant or substance required for operation
Engine	Engine oil: API CE, API CF-4, SAE 15W-40*)
Transmission	Engine oil: API CD, SAE 30
Axles **	For machines with standard differential TPD: Axle oil: Fuchs RENOGEAR HYDRA ZF 20W-40 or AXO75
	For machines with multiple-disk limited-slip differential: Axle oil: Fuchs RENOGEAR HYDRA ZF 20W-40
Hydraulic tank	Hydraulic oil: H-LP, DIN 51 524, part 2, ISO VG 46 or
	Engine oil: SAE 10 W, API classification CD
Lubricating nipple	EP lubricating grease on lithium basis, NLGI 2
Fuel	ASTM D975 No. 2
	ASTM D975 No. 1 in winter (from October to March)
Radiator	Komatsu super coolant AF-ACL, mixed with 30 % water
Air conditioner	cfw free refrigerant R 134a

*) If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

**) For more details refer to section "5.4.3. Axle oils (AXO)" on page 5-15 Note 1a.

5.2.1. Oil, fuel and coolant specifications

Oil

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use.
  Always use oil that matches the grade and temperature given in the Operation and Maintenance Manual. Even if the oil is not dirty, always replace the oil after the specified interval.

- Oil can be compared to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from penetrating.
  The majority of problems with machines are caused by the entry of such impurities.
  Take particular care not to let any impurities penetrate when storing or adding oil.

- Never mix oils of different grades or brands. If only an oil is available which does not match the oil grade/brand in the machine then do not top up the oil, but replace all of it.

- Always add the specified amount of oil.
  Having too much oil or too little oil may both cause problems.

- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.

- When changing the oil, always replace the related filters at the same time.

- We recommend to have an analysis of the oil made periodically to check the condition of the machine. Those who wish to use this service, are requested to their Komatsu distributor.

Fuel

- The fuel pump is a precision instrument; if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities penetrate when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature (particularly at low temperatures below -15 °C), so change to a fue matching this temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, you must fill up the fuel pre-filter with fuel and may then restart the engine. For details, see "4.1. When the machine runs out of fuel" on page 4-2.
- If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal.
  If the fuel sulphur content is more 1.0 %, the oil change interval must be 1/4 normal.

Coolant

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator causing a defective heat exchange and overheating.
- Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze prevents corrosion in the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti- freeze is flammable, so be extremely careful not to expose it to open flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing ratios, see "Cleaning the interior of the cooling system" on page 5-25.
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and corrosion due to the air in the coolant.

Grease

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they need not be lubricated.
  If any part becomes stiff after being used for a long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places where sand or dirt in the grease would cause the rotating parts to wear.

Storing oil and fuel

- Keep oil and fuel indoors to prevent any water, dirt or other impurities from penetrating.
- When keeping barrels for a long period, lay down the barrel on its side so that the filler port is at the side (to prevent moisture from being sucked in).
  If barrels have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long term storage, be sure to use in the order of 'first in - first out' (use the oldest oil or fuel first).

Filters

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
  Replace all filters periodically. For details, see the Operation and Maintenance Manual.
  However, when working under severe conditions, it is necessary to consider replacing the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are stuck to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use original Komatsu filters.

Biodegradable hydraulic oil and lubricants

The use of biodegradable hydraulic oils and lubricants - on the basis of synthetic esters - for Komatsu machines is permitted. For information on the products cleared for use and best suited for your application contact our authorized service workshops.

5.2.2. Specifications of the electrical system

- If the wiring gets wet or the insulation is damaged, the electrical system leaks resulting in hazardous malfunctions of the machine.
- Maintenance work at the electrical system includes:

  1. check fan belt tension,
  2. check damage or wear to the fan belt ,
  3. check battery fluid level.

- Never remove or disassemble any electrical components installed in the machine.
- Never install any electrical components other than those specified by Komatsu.
- Be careful to keep the electrical system free of water when washing the machine or when it is raining.
- When working on the seashore, carefully clean the electrical system to prevent corrosion.
- The optional power source must never be connected to the fuse, start switch, or battery relay.

5.3. Wearing parts list

Wearing parts such as filter elements, air cleaner elements, bolt-on edges, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits, are reached.
The wearing parts should be changed correctly in order to use the machine economically.
For replacement, KOMATSU genuine parts of excellent quality should be used.
When ordering parts, please check the part number in the parts handbook.

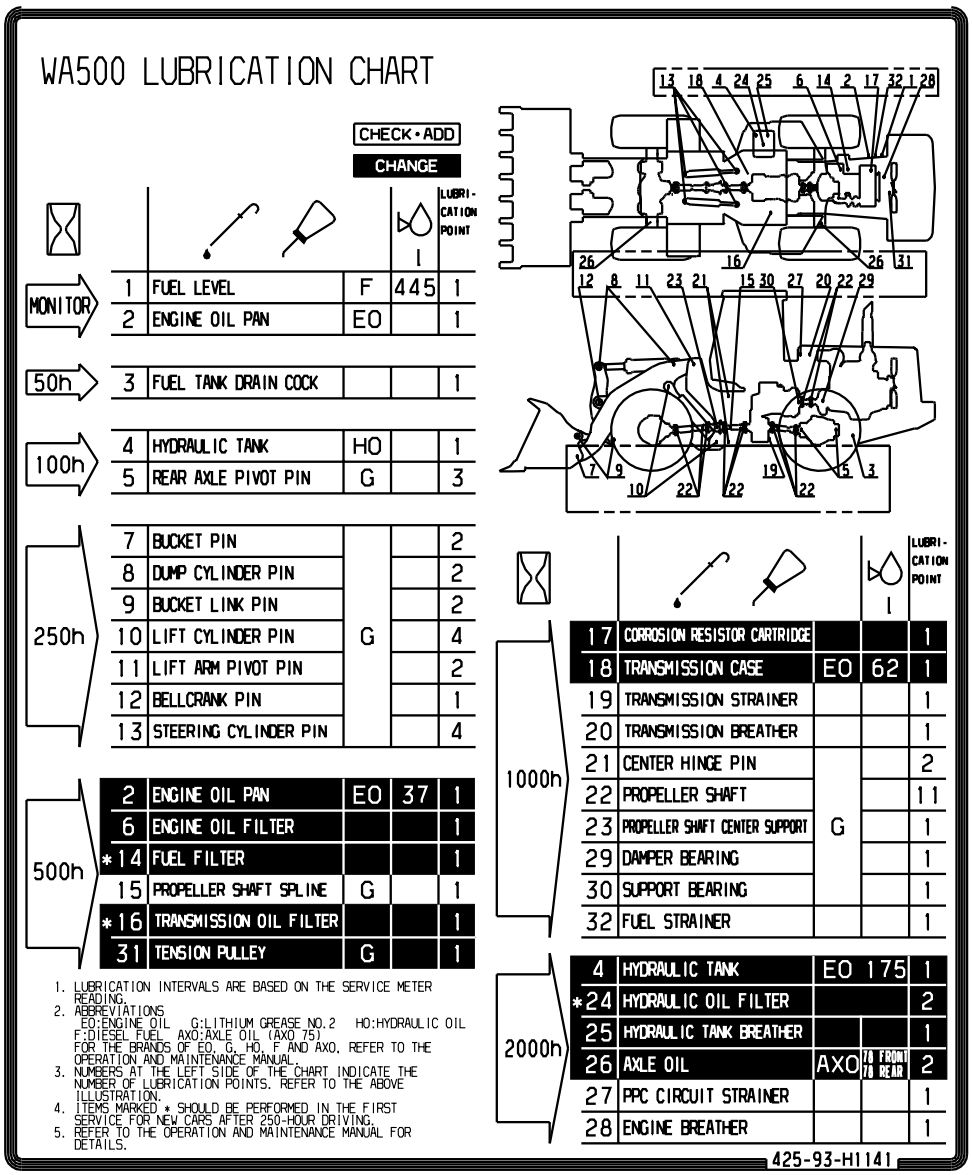
The parts in parentheses are to be replaced at the same time

Item	Part no.	Part name	Q'ty	Replacement interval
Engine oil filter	600-211-1340	Cartridge	1	every 500 hours
Fuel filter	600-311-3110	Cartridge	1	every 500 hours
Gear oil filter	424-16-11140 (07000-12125)	Element (O-ring)	2 (2)	every 500 hours
Transmission strainer	07000-02060	O-ring	1	every 1000 hours
Corrosion resistor	600-411-1161	Cartridge	1	every 1000 hours
Hydraulic filter	07063-01383 (07000-15210)	Element (O-ring)	1 (1)	every 2000 hours
Hydraulic tank breather	419-60-15231	Element	1	every 2000 hours
Air filter	600-185-6100	Filter element incl. Safety filter	1	when necessary
Air conditioner (air filter)	421-07-12312	Element	2	when necessary
Bucket tooth	*	Tooth Bolt Nut	6 18 18	when necessary
Corner tooth	*	Right corner tooth Left corner tooth Bolt Nut Washer Bolt Nut	1 1 2 2 2 4 4	when necessary
Tooth tip	*	Tooth Pin	8 8	when necessary
Edge portion	*	Edge Bolt Washer Nut	7 14 14 14	when necessary

* see spare part list WA500-3H

5.4. Lubricants and operating means

5.4.1. Lubrication chart



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1. Lubrication intervals are based on the service meter reading.
2. Abbreviations: **EO** = Engine Oil, **G** = Lithium Grease No. 2, **F** = Diesel Fuel, **AXO** = Axle Oil (AXO 75), **HO** = Hydraulic Oil.
3. Numbers at the left side of the chart indicate the number of lubrication points. Refer to the above illustration.
4. Items marked * should be performed in the first service for new machines after 250 hour driving.

5.4.2. Lubricants, fuels and filling capacities

WA500-3H	LUBRICANTS, FUELS AND FILLING CAPACITIES					
	Lubricants, fuel etc.	**BI code ****)**	**Quality grades**	**Temperature ranges**	**Viscosity ranges**	**Approx. filling capacity in litres**
Engine	Engine oil EO	EO 1540 A EO 1030 A EO 30 EO 10	CCMC D4 or, if not available, API CE or API CF -4 [2])	-10° to 50° C -20° to 40° C 0° to 40° C -40° to 20° C	SAE 15W-40 *) SAE 10W-30 SAE 30 SAE 10W	42 (37 **)
Transmission	Engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-	SAE 10W	70 (62 **)
Axles with standard locking differentials type KWA 026 W-1 KWA 026 W-2	Universal transmission and hydraulic oil	NRS	Fuchs: RENOGEAR HYDRA ZF 20W-40*) Komatsu: AXO 75 Caltex: RPM TRACTOR HYDRAULIC FLUID Chevron: TRACTOR HYDRAULIC FLUID Texaco: TDH OIL Mobil: MOBILAND SUPER UNIVERSAL			2x78
	or engine oil EO	EO 30	CCMC D4 or, if not available, API CD	-	SAE 30	
Hydraulic system, steering, brakes	Hydraulic oil HYD	HYD 0530	HVLP, HVLP D	-35° bis 50° C	ISO VG 46 *)	284 (175**)
	or engine oil EO	EO 10	CCMC D4 or, if not available, API CD	-35° bis 40° C	SAE 10W	
	or hydraulic oil BIO-E-HYD	BIO-E-HYD 0530	HEES (to VDMA fluid technology)	-35° bis 50° C	ISO VG 46	
Cooling system	Long-life coolant with anti-frost and rust prevention SP-C	SP-C	Anti-frost and rust prevention			88
Fuel tank	Diesel fuel [3])	CFPP class B CFPP class D CFPP class E CFPP Klasse F	DIN-EN 590	up to 0°C up to -10°C up to -15°C up to-20°C		465
Grease nipples, central lubrication	Multi-purpose grease MPG on a lithium base	MPG-A	KP2N-20	-10° bis 50° C -35° bis -10° C	NLGI 2 *) NLGI 0	

The specified filling capacities are approximate guidelines; test specifications are binding. The selection of the viscosity class depends on the predominantly existing outside temperature. The temperature limits are to be regarded as guidelines which can be exceeded up or down for a brief period.

*) Works filling **) Top-up quantity'

[2]) If no engine oil of the API CE or API CF-4 specification is available, API CC or API CD-classified engine oil can be used alternatively. The oil change intervals must be split in half in this case, however.

[3]) If the fuel sulphur content is between 0.5 and 1.0 %, the oil change interval must be 1/2 normal. With a sulphur content of more than 1.0 %, the oil change interval must be 1/4 normal.

****) BI codes are the "standard lubricants" for construction machinery and vehicles of the Hauptverband der Deutschen Bauindustrie e.V. (BI). The brochure "Regelschmierstoffe für Baumaschinen- und Fahrzeuge" (Standard Lubricants for Construction Machinery and Vehicles" can be obtained from bookstores or Bauverlag GmbH, Wiesbaden and Berlin, under the ISBN no. 3-7625-3102-1."

5.4.3. Axle oils (AXO)

The selection of the oils depends on the equipment of the axle:

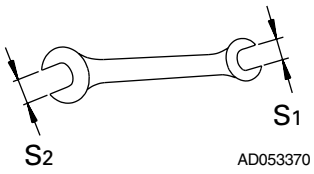
1	Characteristics	Type KWA 026 W-1, front
		Type KWA 026 W-2, rear
	These axles must be filled with the following recommended oil brands:	
	FUCHS	RENOGEAR HYDRA ZF 20W-40
	KOMATSU	AX0 75
	CALTEX	RPM TRACTOR HYDRAULIC FLUID
	CHEVRON	TRACTOR HYDRAULIC FLUID
	TEXACO	TDH OIL
	MOBIL	MOBILAND SUPER UNIVERSAL

For reasons of harmonization, engine oil in accordance API CD/ SAE 30 may be used in the standard axle instead of axle oil. Any noises from the brakes do not affect the life.

The use of not recommended axle oils may cause unnormal noises from the differential.

5.5. Tools and standard tightening torques (bolts, nuts)

5.5.1. Introduction of recommended tools

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30006	Applicable width across flats (S1 - S2) 8 mm - 10 mm 12 mm - 14 mm 13 mm - 17 mm 19 mm - 22 mm 24 mm - 27 mm 30 mm - 32 mm 
2	Screwdriver	421-98-H1120	–
3	Screwdriver	421-98-H1110	–
4	Wrench	09014-10200	–
5	Pliers	09036-00150	–
6	Grease gun	424-98-H1010	–
7	Hose	424-98-H1020	(for grease gun)
8	Grease cartridge	07950-90403	(Lithium base grease: 400g)
9	Hammer	421-98-H1140	–
10	Pocket	421-98-H1130	–
13	Screws	04530-11628	(Qty 4)
14	Meter	09989-13301	–

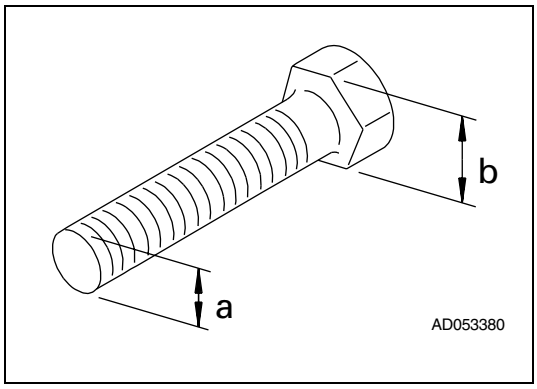
If any of the above tools are broken, please order them from your KOMATSU distributor.

5.5.2. Torque list

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table.

The tightening torque is determined by the width across flats of the nut and bolt.

If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.



Tread diameter of the bolt (mm) (a)	Width across flat (mm) (b)	  AD054300		
		Nm	kgm	lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31.4 ± 2.9	3.2 ± 0.3	23.2 ± 2.1
10	17	65.7 ± 6.8	6.7 ± 0.7	48.5 ± 5.0
12	19	112 ± 9.8	11.5 ± 1.0	82.6 ± 7.2
14	22	177 ± 19	18.0 ± 2.0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1,320 ± 140	135 ± 15	973 ± 100
30	46	1,720 ± 190	175 ± 20	1,270 ± 140
33	50	2,210 ± 240	225 ± 25	1,630 ± 180
36	55	2,750 ± 290	280 ± 30	2,030 ± 210
39	60	3,280 ± 340	335 ± 35	2,420 ± 250

NOTE

When tightening panels or other parts having tightening fixtures made of plastic, be careful not to use excessive tightening torque: doing so will damage the plastic parts.

5.6. Periodical replacement of safety-critical parts

To ensure trouble-free operation of the machine, the user of the machine must always carry out periodic maintenance. In addition, to maintain safety standards, the user should also periodically replace all safety related parts, which are particularly closely connected to safety and fire prevention.

- The standard service life under normal conditions should not exceed 6 years.
- Hoses must be replaced as soon as the following damage is noticeable:
  - damage to the outer layer through to the intermediate layer,
  - brittleness in the outer layer,
  - distortions in pressurised or unpressurised state not conforming with the original shape of the installed hose,
  - leakages,
  - damage to the hose fittings or to the connection between fittings and hose,
  - storage damage (the shelf life of the hose should not exceed 2 years).

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

Ask your Komatsu distributor to replace the safety critical parts.

5.7. Maintenance schedule chart

	Service Procedure	see page
5.8.1	**Initial 250 hours service**	**5-22**
5.8.2	**Maintenance upon demand**	**5-22**
	Check, clean or replace air cleaner element	5-22
	Cleaning the interior of the cooling system	5-25
	Checking the transmission oil level, adding oil	5-29
	Checking the axle oil level, adding oil	5-31
	Checking axle case breather	5-32
	Cleaning radiator fins	5-32
	Replacing the bolt-on cutting edge	5-33
	Replacing the bucket teeth	5-34
	Checking the air-conditioning system	5-36
	Cleaning the condenser of air conditioner	5-37
	Checking the window washing-fluid level, adding fluid	5-37
	Topping up the grease reservoir of the central lubrication system	5-38
5.8.3	**Checks before starting**	**5-40**
	Checking the monitor panel	5-40
	Checking the coolant level, adding coolant	5-40
	Checking the fuel level, adding fuel	5-41
	Checking the oil level in engine oil pan, add oil	5-43
	Checking the electrical connections	5-44
	Checking the sound of horn and backup buzzer	5-44
	Checking flashing of lamps, checking for dirt or damage	5-44
	Checking engine exhaust colour and sound	5-44
	Checking the gauge functions	5-44
	Checking steering wheel play, checking the steering function	5-44
	Checking direction of rear view mirror, checking for dirt or damage	5-44
5.8.4	**Every 50 hours service**	**5-45**
	Checking the tyre inflation pressure	5-45
	Draining water and deposits from fuel tank	5-45
5.8.5	**Every 100 hours service**	**5-46**
	Checking the oil level in the hydraulic tank, adding oil	5-46
	Cleaning the inserts of the fresh air filter of the air-conditioning system	5-47

	Service Procedure	see page
5.8.6	**Every 250 service hours**	**5-48**
	Checking and adjusting the fan belt and V-belt tension	5-48
	Checking and adjusting alternator belt tension	5-50
	Checking and adjusting the compressor belt tension of the air-conditioning system	5-51
	Checking for loose wheel hub nuts, tightening the nuts	5-52
	Cleaning the inserts of the recirculation filter of the airconditioning system	5-52
	Checking the battery electrolyte level	5-53
	Lubrication (every 250 service hours)	5-54
5.8.7	**Every 500 service hours**	**5-56**
	Changing oil in the engine oil pan, replacing engine oil filter cartridge	5-56
	Replacing the fuel filter cartridge	5-58
	Replacing the transmission oil filter insert	5-59
	Lubrication (every 500 service hours)	5-60
5.8.8	**Every 1000 service hours**	**5-61**
	Changing the oil in the transmission case, cleaning the strainer	5-61
	Cleaning the transmission case breather	5-62
	Cleaning the fuel screen of the fuel tank	5-62
	Lubrication (every 1000 service hours)	5-63
	Checking the tightening parts of the turbo-charger	5-65
	Checking the play of the turbo-charger rotor	5-65
	Replacing the anti-corrosive filter cartridge	5-65
5.8.9	**Every 2000 service hours**	**5-66**
	Changing the oil in the hydraulic tank, replacing the hydraulic filter inserts	5-66
	Replacing the hydraulic tank breather element	5-68
	Changing the axle oil	5-69
	Clean PPC circuit strainer	5-70
	Clean engine breather element	5-70
	Checking the alternator starter motor	5-71
	Checking and adjusting the valve clearance of the engine	5-71
	Checking the brake disc wear	5-71
	Checking the shock absorber	5-71
	Replacing the element in the recirculating and fresh air filter of the air-conditioning system	5-71
	Cleaning and checking the turbo-charger	5-71
	Checking the accumulator	5-72

	Service Procedure	see page
	Checking the ECSS-accumulator gas pressure	5-72
5.8.10	**Every 4000 service hours**	**5-73**
	Checking the water pump	5-73
	Check fan pulley and tension pulley	5-73
	Check vibration damper	5-73

5.8. Service procedure

5.8.1. Initial 250 hours service

Carry out the following maintenance works after the first 250 hours only.

- Replace fuel filter cartridge.
- Replace transmission oil filter element.
- Replace hydraulic tank filter element.
- Check and adjust the valve clearance of the engine.

For details about replacement or maintenance, see section "5.8.7. Every 500 service hours" on page 5-56 and "5.8.9. Every 2000 service hours" on page 5-66.

5.8.2. Maintenance upon demand

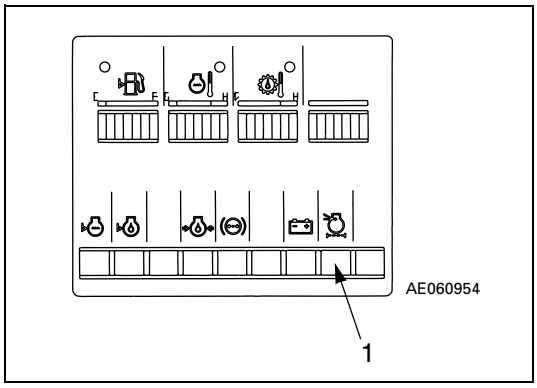
Check, clean or replace air cleaner element

⚠ WARNING

- **Never clean or replace the air cleaner element with the engine running.**
- **When using compressed air to clean the element always wear eye protection in form of safety glasses or goggles.**

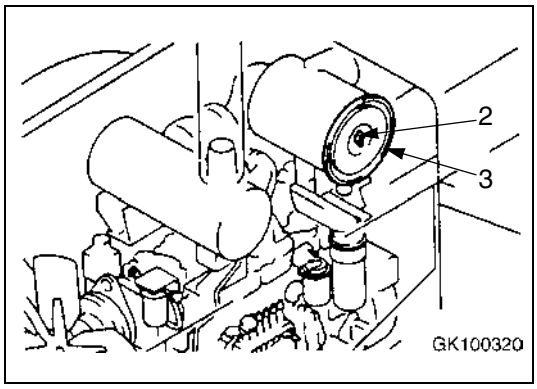
Checking

If the air cleaner clogging warning lamp (1) on the maintenance monitor flashes, clean the air cleaner element.

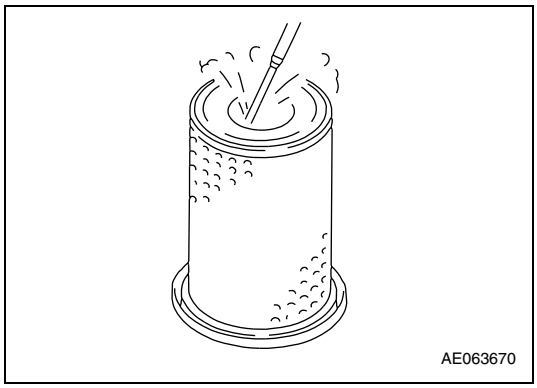


Cleaning or replacing the air cleaner element

1. Release the wing nut (2) and remove the element (3).
2. Clean the inside of the air cleaner element.



3. Blow dry compressed air (less than 7 bar, 100 psi) through the element from the inside along the grooves, then apply from the outside and again from the inside.



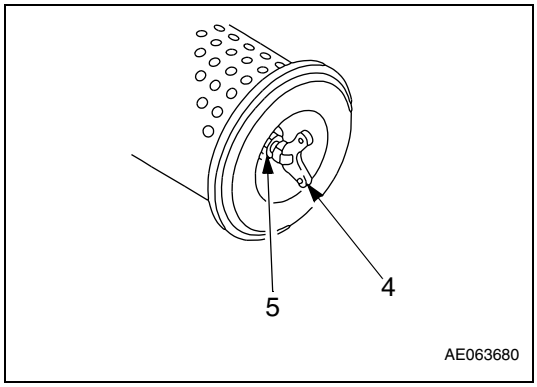
4. Remove the seal from the outer element after cleaning it.

   The outer element must be replaced after 6 times of cleaning or after one year of use. Always replace outer and inner element together.

   If the dust indicator displays red immediately after the outer element has been cleaned, replace both the inner and outer element, even if the outer element has not been cleaned 6 times.

   Check the inner element mounting nuts for looseness and, if necessary, retighten.Check the inner element mounting nuts for looseness and, if necessary, retighten.

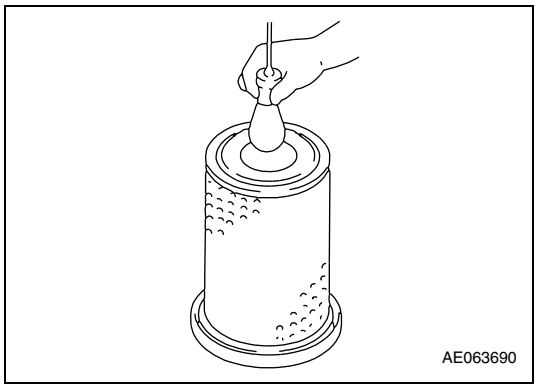
   Replace seal washer (5) or wing nut (4) with new parts if they are broken.



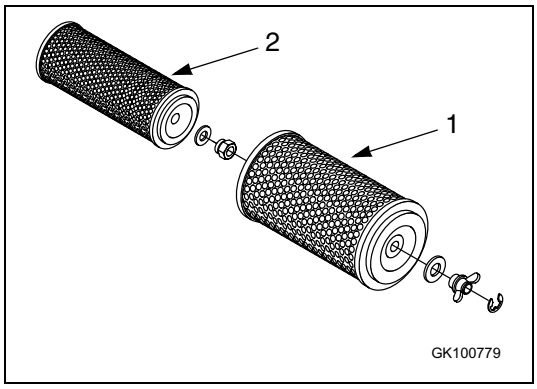
NOTE

If small holes or thinner parts are found on the element when checking it with an electric bulb after cleaning and drying, replace the element.
When cleaning the element, do not hit it or beat it against other objects.
Do not use elements with damaged gasket or seal or groove.

5. Reinstall the cleaned element.



Replacing the internal element (in the air-cleaner insert)



1. First remove the outer element (1) of the air cleaner and then the internal protective element (2).
2. To prevent dust from intruding, use a clean cloth or tape to cover the air connector (outlet side).
3. Clean the interior of the air cleaner body, then remove the cover installed in step 2.
4. Fit a new internal element to the connector and tighten it with nuts. Do not clean and reinstall an inner element.
5. Install the outer element.

With water

Flush tap water (less than 3 bar, 43 psi) through the element from the inside along the grooves, then from the outside and again from the inside. Dry and check.

With cleaning agent

For removing oils and fats as well as carbon etc. sticking to the element, the element may be cleaned in lukewarm solution of mild detergent; then rinse in clean water and let dry.
Drying can be speeded up by blowing dried compressed air with less than 7 bar (100 psi) from the inside to the outside of the element.
Never attempt to heat the element.
Using warm water (about 40°C) instead of soapy water may also help.

Cleaning the interior of the cooling system

⚠ WARNING

- **Immediately after the engine has stopped, the coolant is hot and may cause injuries. Allow the engine to cool before draining the water.**
- **Since cleaning is performed while the engine is running, it is very dangerous to walk or stand under the machine as the machine may suddenly start moving. Therefore, never go under the machine while the engine is running.**
- **Never remove the radiator cap when the engine is at operating temperature as the coolant is under pressure. Boiling water and steam spurting out from the radiator may cause injuries. Allow the engine to cool until the radiator filler cap is cool enough to be touched with your hand. Remove the filler cap slowly to allow pressure to be relieved.**

- Stop the machine on level ground when cleaning or changing the coolant.
- Clean the inside of the cooling system change the coolant and replace the corrosion resistor according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replacing corrosion resistor
Permanent type antifreeze (all season)	Every year (autumn) or every 2000 hours, whichever comes first	Every 1000 hours, when cleaning the inside of the cooling system and when changing the coolant
Non-permanent type anti-freeze containing ethylene glycol (winter, one-season)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours, whichever comes first	

- When determining the ratio between antifreeze and water, check the lowest temperature in the past, and mix the components according to the table below.
  It is recommended to use a temperature for determining the mixing ratio which is approx. 10°C lower.

Mixing ratio - water : antifreeze

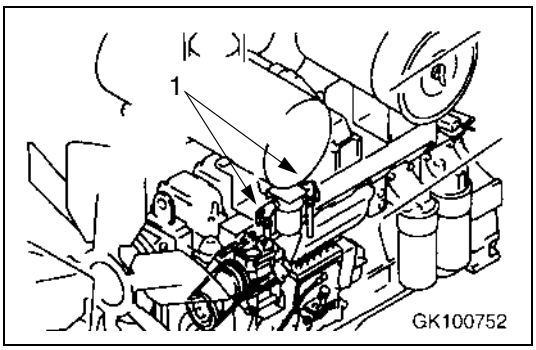
Min. Atmospheric temperature	°C	-5	-10	-15	-20	-25	-30
	°F	23	14	5	-4	-13	-22
Amount of antifreeze	l	15.6	20.4	23.8	27.2	30.6	34.0
	US gal	4.12	5.39	6.28	7.18	8.08	8.98
	UK gal	3.43	4.49	5.24	5.98	6.73	7.48
Amount of water	l	52.4	47.6	44.2	40.8	37.4	34.0
	US gal	13.84	12.57	11.68	10.78	9.88	8.98
	UK gal	11.53	10.47	9.72	8.98	8.23	7.48

⚠ WARNING

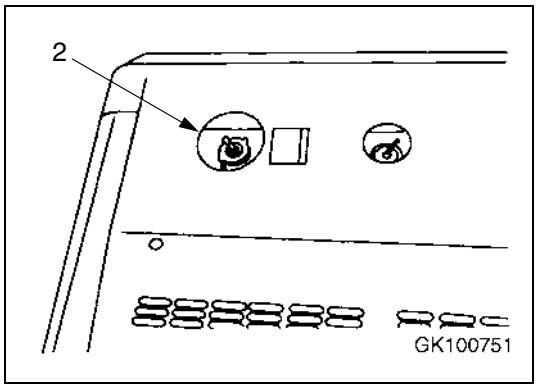
- **Antifreeze is flammable, so keep it away from any flame.**
- **The concentration of the antifreeze must not exceed 68%. If the concentration of the antifreeze exceeds 68%, the freezing point of the water/antifreeze mixture increases again.**

- Use tap water as cooling water.
  If river water, well water etc. must be used, contact your Komatsu dealer.
- We recommend the use of an antifreeze density gauge to control the mixing ratios.

1. Switch off the engine and close the shutoff valve for the corrosion protection filter (1).



2. Climb up at the rear of the machine and turn the radiator cap (2) slowly to the first detent and allow the pressure to escape. Then push the cap downwards, continue to turn it and take it off.



3. Prepare a container (capacity approx. 90 l) to catch the coolant, then open drain valve (3) of the radiator and drain plug (4) at the side of the cylinder block to drain the coolant.

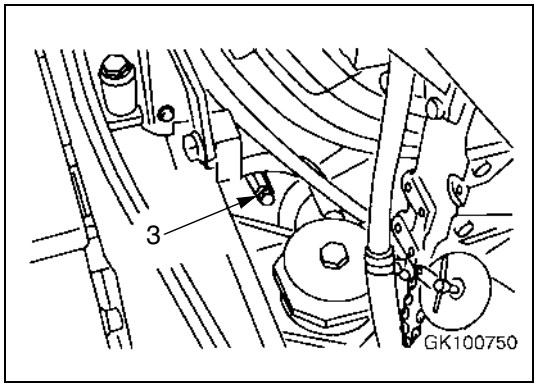
4. After draining the water, close drain valve (3) and plug (4), and fill with tap water.

5. When the radiator is filled, start the engine and run it at low idling.

   Open drain valve (3) and plug (4), run the engine at low idling, and flush water through the system for 10 minutes.

   During this process, adjust the speed of filling and draining the water so that the radiator is always full.

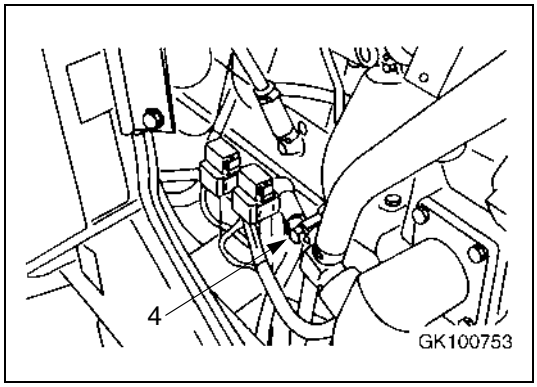
   While flushing water through the system, watch carefully that the water inlet hose does not come off the radiator water filler.



6. After flushing, stop the engine, open drain valve (3) and plug (4), then close it again after draining the water completely.

7. After that, clean with a detergent.
   For details of the cleaning method, see the instructions for the detergent.

8. After cleaning, open drain valve (3) and plug (4) to drain all the cooling water, then close them and slowly fill up clean water.



9. When the water almost reaches up to the water filler port, open drain valve (3) and plug (4), run the engine at low idling, and continue to run water through the system until clean colorless water comes out.

   During this process, adjust the speed of filling and draining the water so that the radiator is always full.

10. When the water is completely clean, stop the engine, close drain valve (3) and plug (4).

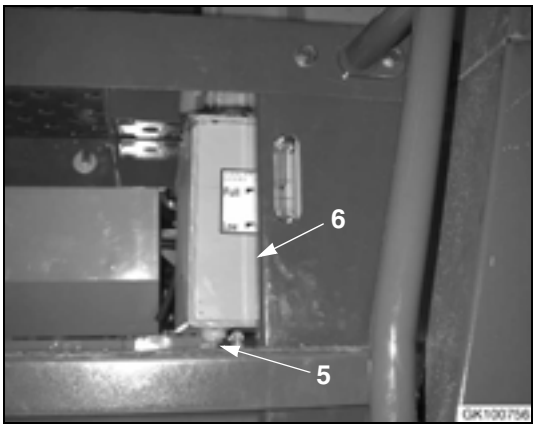
11. Replace the corrosion resistor cartridge and open valves.
    For details about replacing the corrosion resistor, see "5.8.8. Every 1000 service hours" on page 5-61.

12. Add cooling water until it overflows from the water filler.

13. To remove the air in the cooling water, run for five minutes at low idling, then for another five minutes at high idling with the radiator cap (2) removed.

14. Unscrew the expansion tank's (6) drain plug (5), allow the coolant to drain off and clean the inside of the expansion tank. Screw the drain plug back in and tighten. Top up with coolant until the coolant level is located between the FULL and LOW markings.

15. Stop the engine, wait for about three minutes, add cooling water up close to the radiator water filler port, then retighten the cap.



Checking the transmission oil level, adding oil

⚠ WARNING

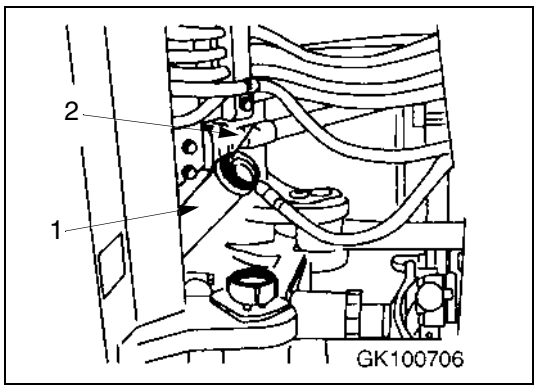
- **When checking the oil level, apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**

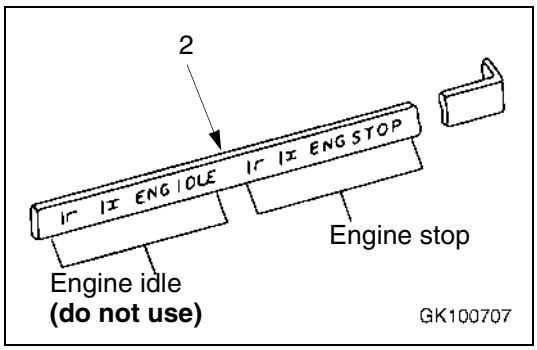
Perform this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water. The oil level must be checked with the engine switched off.

NOTE

Use the "Eng Stop" marking only when filling/topping up with engine oil.
If you mix up use of the "Engine Idle" or "Engine Stop" markings when filling/topping up transmission oil, this will lead to the wrong fluid level in the engine. This in turn can cause irreparable damage!

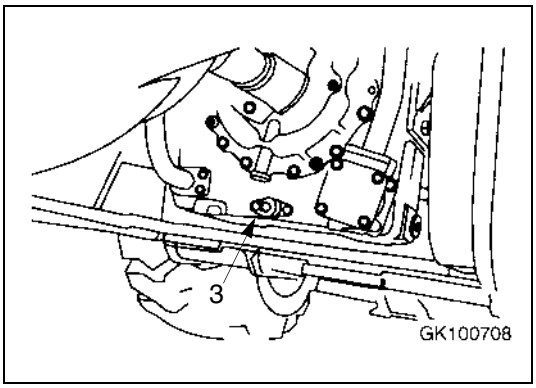
1. Switch off the engine and wait for at least 60 minutes. Then remove the oil filler neck's cap (1).
2. Remove dipstick (2) , and wipe the oil off with a cloth.
3. Insert dipstick (2) fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick (2) (in the range Engine stop). If the oil level is below the L mark, add engine oil through oil filler (1).
   For details of the oil to be used, see section "5.4. Lubricants and operating means" on page 5-13.





5. If the oil is above the H mark, drain the excessive transmission oil through drain plug (3), then check the oil level again.

6. If the oil level is correct, insert dipstick (2) into the oil filler pipe, then re-tighten the cap.



Checking the axle oil level, adding oil

⚠ WARNING

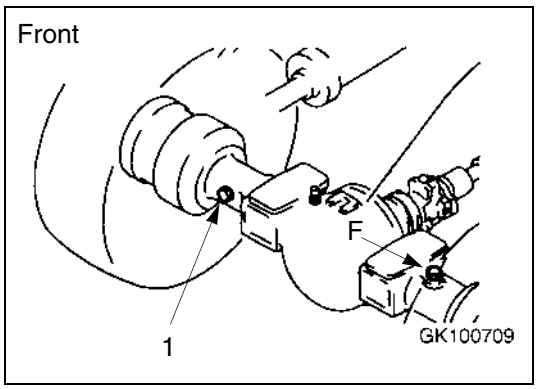
- **When checking the oil level, apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to cool down before starting this operation.**

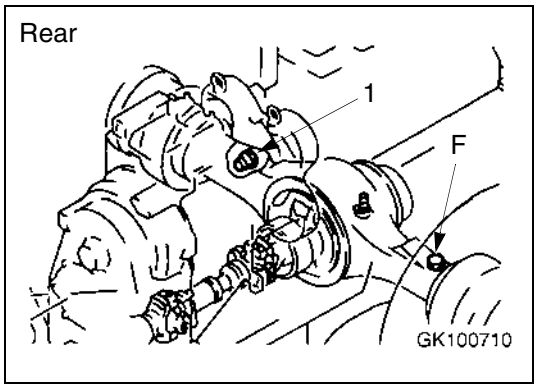
Carry out this procedure if there is any oil on the axle case.

Perform the inspection with the machine on a horizontal road surface. (On slopes or inclined surfaces the oil level cannot be checked correctly).

1. Stop the engine and remove oil level plug (1).
2. Check that the oil level reaches up to the bottom of the plug hole.
3. If the oil is not close to the bottom edge, add axle oil through filler port (F).
   For details of the oil to be used, see section "5.4. Lubricants and operating means" on page 5-13.
4. If the oil level is correct, re-install the plug.

   Tightening torque: 125 - 175 Nm





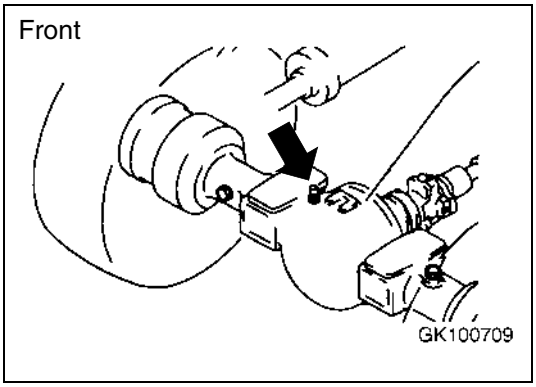
Checking axle case breather

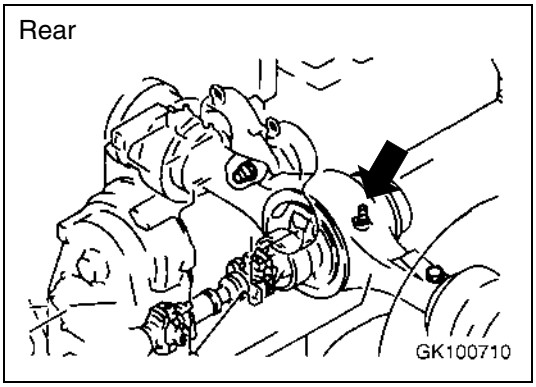
⚠ WARNING

When cleaning, apply the parking brake, and lock the front and rear frames with the safety bar and pin.

Remove all mud and dirt from around the breather with a brush.

Always clean both breathers at the front and rear.

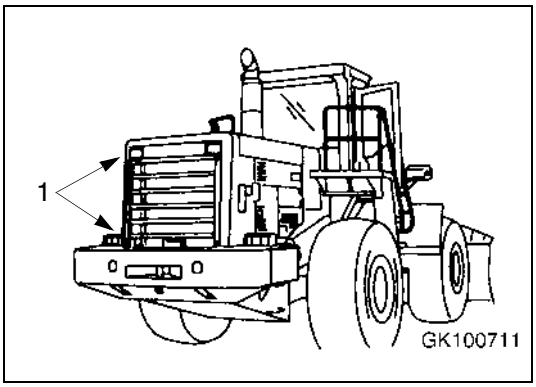




Cleaning radiator fins

Carry out this procedure, if there is any mud or dirt sticking to the radiator.

1. Unscrew the radiator grill's (1) four fastening screws on both sides of the radiator and remove the radiator guard. Remove the connector of the rear working lamp at the same time.
2. Use compressed air to clean the mud, dust, and leaves from the radiator fins. Steam or water may be used instead of compressed air.
3. The rubber hose should be checked at the same time. If the hose is found to have cracks or to be hardened by ageing, it should be replaced with a new one. Loose hose clamps must also be tightened.



Replacing the bolt-on cutting edge

⚠ DANGER

- **It is extremely dangerous if the work equipment moves while turning around or replacing the cutting edge.**
- **Lower the work equipment to the ground, stop the engine, then set the safety lock for the work equipment control lever securely to the LOCK position.**

Turn over or replace the cutting edge before it is worn down to the edge of the bucket.

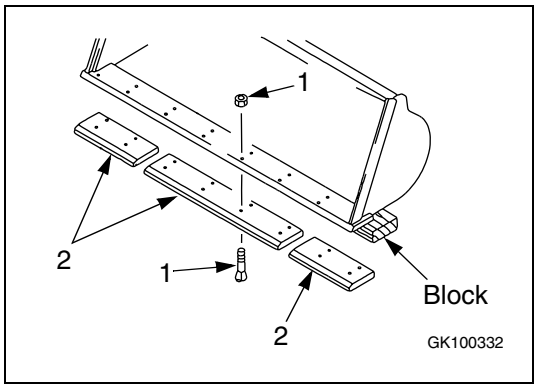
1. Raise the bucket to a suitable height, then put blocks under the bucket to prevent the bucket from coming down.

   Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove nuts and bolts (1), then remove cutting edge (2).

3. Clean the mounting surface of cutting edge (2).

4. Turn around the cutting edge (2) and install it to the bucket. Turning around the cutting edge means, installing it the other way round (left edge to right side, right edge to left side).



NOTE

If both sides of the cutting edge are worn, it must be replaced. If the edge is worn down to the mounting surface, repair the mounting surface before installing the new cutting edge.

5. Tighten nuts and bolts (1) uniformly so that there is no gap between bucket and cutting edge.

   Tightening torque for mounting bolt: 650 - 850 Nm

6. After a couple of operating hours, re-tighten the mounting bolts.

Replacing the bucket teeth

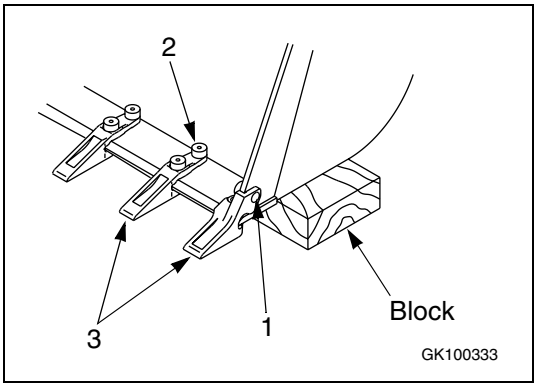
Bucket with bolted-on teeth

DANGER

Any movement of the work equipment when replacing the teeth is extremely dangerous. For this reason the working attachment should be lowered to the ground and the parking brake applied by means of actuating the toggle switch on the steering column. After this, switch the engine off and secure the control lever for the working attachment.

When the bucket teeth are worn, replace them as follows:

1. Raise the bucket to a convenient height, and put blocks under the bucket to prevent it from coming down.
   Raise the bucket so that the bottom is horizontal.
2. Remove the bolt and nuts (1) and (2), then remove bucket tooth (3).
3. Clean the installation surface of bucket tooth (3).
4. Install new teeth to the bucket. If necessary, insert shims so that there is no clearance between the teeth and the top surface of the bucket.



NOTE

Continue to add shims until it becomes impossible to add a 0.5 mm shim. If the mounting surface is worn, repair it before installing the teeth.

5. To prevent any gap between the teeth and tip of the bucket, tighten bolts and nuts (1) and (2) temporarily, then hit the tip of the teeth with a hammer.

   Tightening torque of mounting bolt (1):
   900 ± 40 Nm (665 ± 30 lbft)

   Tightening torque of mounting bolt (2):
   620 ± 30 Nm (460 ± 22 lbft)

6. After operating the machine for a few hours, retighten the mounting bolts.

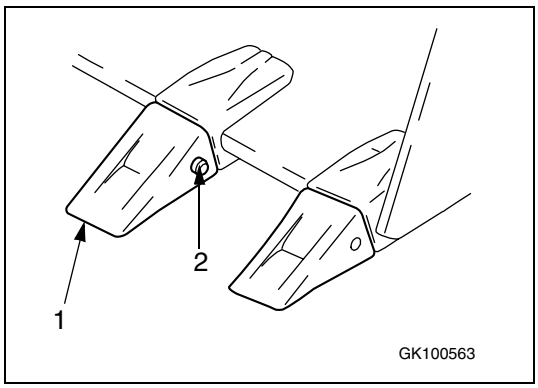
Bucket with matched teeth

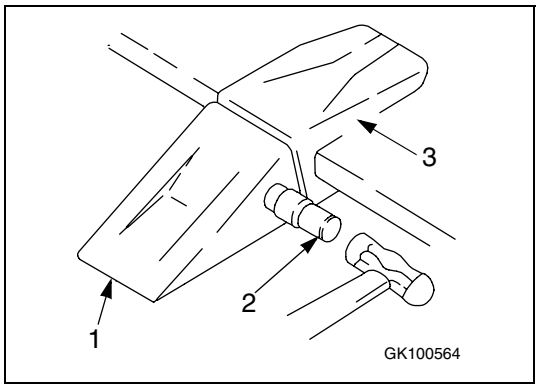
WARNING

Every movement of the working attachment when replacing the teeth is extremely dangerous. For this reason the working attachment should be lowered to the ground and the parking brake applied by means of actuating the toggle switch on the steering column. After this, switch the engine off and secure the control lever for the working attachment.

Replace the teeth before they are worn down to the adapter.

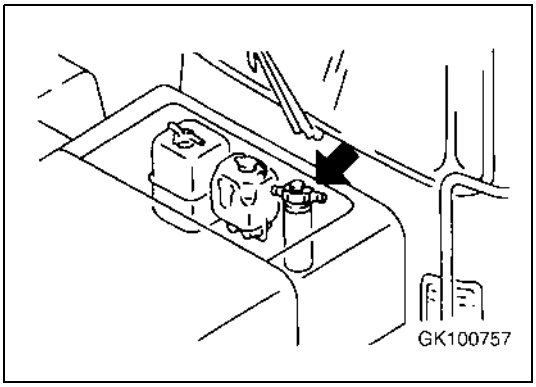
1. Remove the bolt (2) inserted into the bucket and the remove the tooth (1). To remove the bolt (2) it should be impacted by using a pointed object (from either the left or right). After this the bolt can then be taken out from the opposite side.
2. Place the new tooth (1) into the adapter (3) and insert a part of the bolt (2). Then knock the bolt all the way down using a hammer.





Checking the air-conditioning system

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



Checking the coolant level

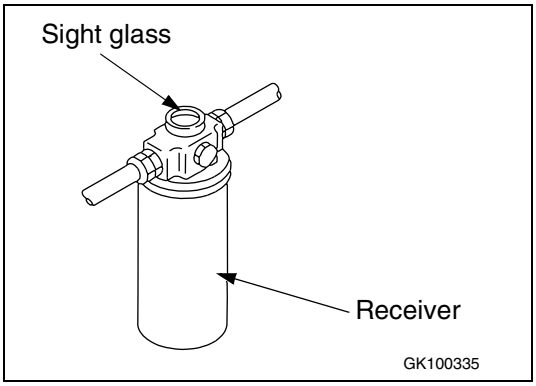
⚠ WARNING

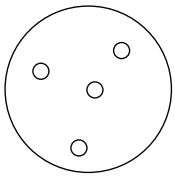
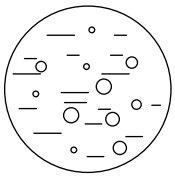
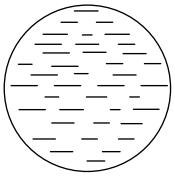
If the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite: Therefore never loosen any part of the refrigerant circuit.

Operate the cooler of the air-conditioning system for 5 - 10 minutes, then touch the high pressure portion and low pressure portion of the compressor (or high pressure hose and low pressure hose joint) with your hand. At the same time, inspect the flow of coolant (R134a) through the sight glass to check the gas level.

Contact your Komatsu dealer for this inspection.

The sight glass is installed next to the receiver at the side of the condenser.



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

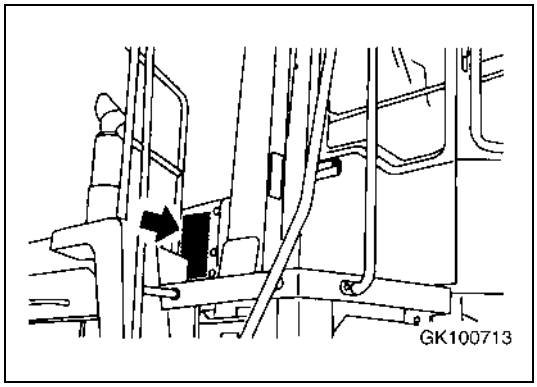
Cleaning the condenser of air conditioner

⚠ CAUTION

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

If there is mud or dust sticking to the air conditioner condenser, clean it with water.

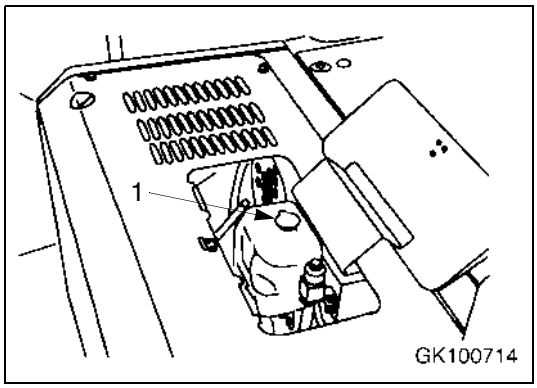
If the water pressure is too high, the fins may get deformed. When washing with a high pressure washing device, apply the water from a reasonable distance.



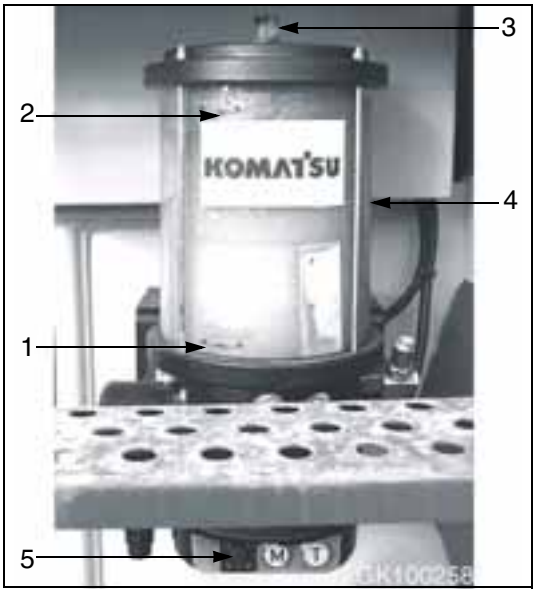
Checking the window washing-fluid level, adding fluid

Check the washing-fluid level in washer tank (1). When the fluid has run short, add window washing fluid for cars.

To prevent the nozzles from clogging, be careful not to let dust get into the fluid.



Topping up the grease reservoir of the central lubrication system



1. The grease reservoir must be topped up at the latest when the grease level has reached the "Minimum" marking (1).
2. Grease is topped up through the filler nipple (3) on the cover of the grease reservoir using a high-pressure grease gun.
3. Remove the protective cover from the filler nipple (3) on the cover of the grease reservoir.
4. Clean the filler nipple (3) and surrounding area as well as the end of the nozzle of the high-pressure grease gun.
5. Place the nozzle of the high-pressure grease gun on the filler nipple.
6. Switch the ignition on.
7. Activate the high-pressure grease gun.
8. Press button (5) on the pump so that the pump switches on and carries out a lubrication cycle while topping up takes place. This ensures that the grease is more evenly spread in the grease reservoir and prevents the formation of air bubbles.
9. Top the grease reservoir up to the "Maximum" marking (2).

   See section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14 for the type of grease to be used.

NOTE

The reservoir must not be topped up beyond the "Maximum" marking, otherwise the compensation hole (4) will be blocked. A vacuum is caused in the grease reservoir as the grease level drops if there is a blockage in the compensation hole. This can result in a fault in the lubrication circuit.

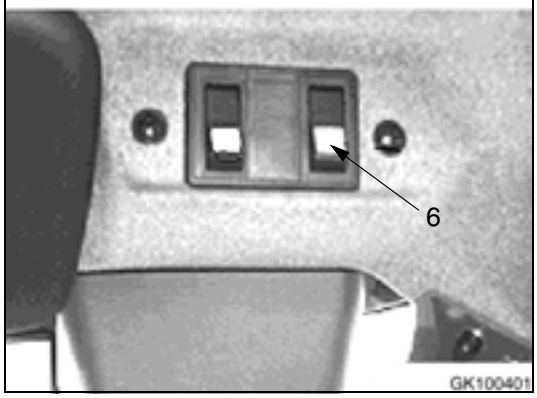
10. After topping up, remove the high-pressure grease gun nozzle from the filler nipple and put the protective cap back on the filler nipple.
11. Upon completion of the lubrication cycle, check whether fresh grease has emerged at all lubrication points. If not, press button (5) on the pump again so that another lubrication cycle is carried out. Repeat this process as long as necessary until fresh grease has emerged at all lubrication points.
12. Check the distribution and line system regularly for leaks and damage (breakage, buckled lines).

13. In particular, check the lubrication lines for leaks because a fault of this kind does not lead to the yellow warning lamp (6) lighting up on the button in the cab.

NOTE

Dirt, snow or water must not be allowed to get into the system when carrying out any work on the central lubrication system, particularly when filling/topping-up or carrying out maintenance and inspection work, as this could lead to malfunctions!

In the cab, top right

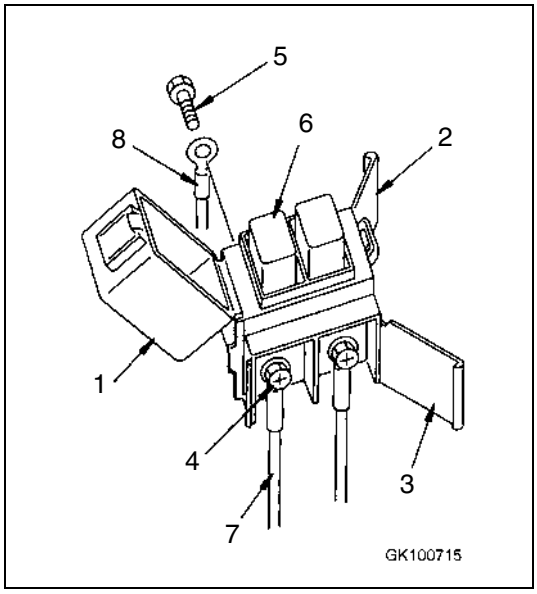


Changing the main fuse (surge-proof fuse)

NOTE

- **The ignition should always be switched off when replacing the main fuse (turn the ignition key to the OFF position).**
- **Always replace the main fuse with an identically rated one.**

1. Turn the key in the starter switch to the switch OFF position.
2. Open the covers (1), (2) and (3).
3. Remove screws (4) and (5).
4. Remove the main fuse (6).
5. Insert a new fuse, then fasten the cables (7) and (8) using the screws (4) and (5).
6. Close the covers (1), (2) and (3) again.



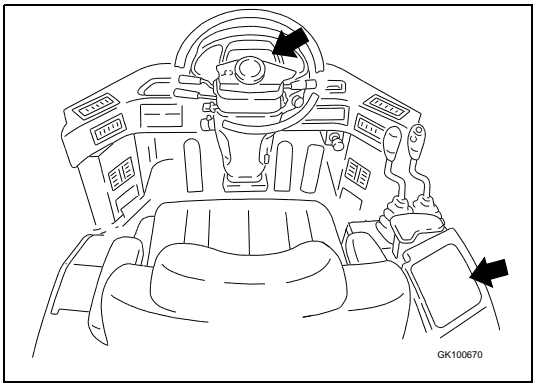
5.8.3. Checks before starting

Checking the monitor panel

1. Turn the starter switch to the ON position.
2. Check that all the monitor lamps, the gauges and the warning lamp light up for about 3 seconds and the alarm buzzer sounds for aobut 1 second.

If any monitor lamp does not light up, ask your Komatsu distributor to inspect it.

Do not carry out pre-start checks on the monitor alone; always carry out the items specified for the periodic maintenance, as well.

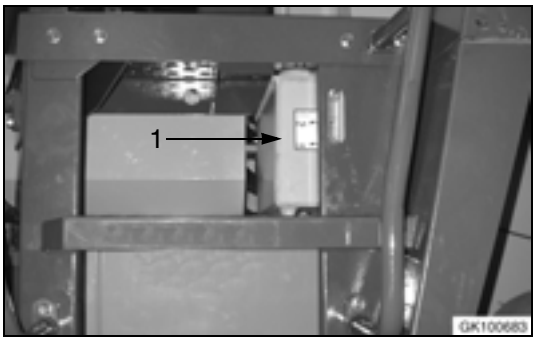


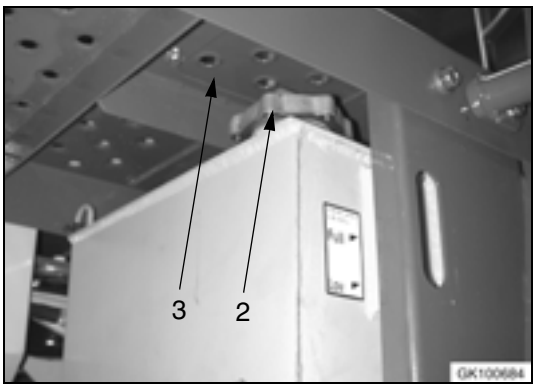
Checking the coolant level, adding coolant

⚠ WARNING

Normally, do not open the radiator cap. Always wait for the engine to cool down before checking the water level in the expansion tank.

1. The expansion tank (1) is located below the rise on the left-hand side of the machine. Check, whether the coolant level in the expansion tank (1) lies between the FULL and LOW markings. Where the coolant level is too low, top up by allowing water to flow into the expansion tank (1) through the filler neck until the coolant level reaches the FULL marking. To do so unscrew the cover (3) in the grating and remove the cap (2).
2. After topping up put the cap back on again tightly and screw the cover back into place on the grating.
3. If the expansion tank (1) is empty check the system for signs of any leaks and additionally check the coolant level in the radiator. If necessary top up with coolant.



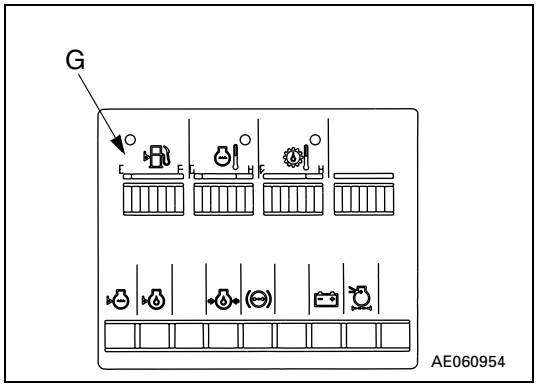


Checking the fuel level, adding fuel

WARNING

When adding fuel, never let the fuel overflow. This may cause a fire. If spilling fuel, thoroughly clean it up.

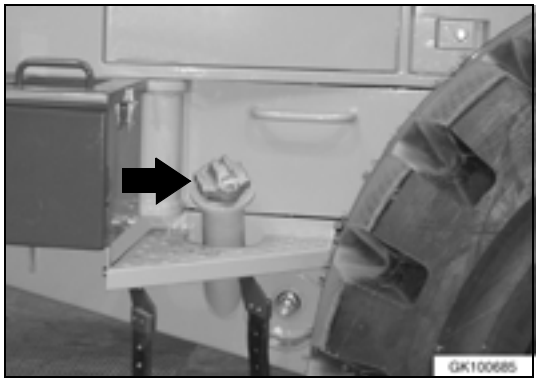
Refuelling with a fuel dispenser



1. Turn the engine starter switch to the ON position, then check the fuel level with fuel gauge (G).
   Then, reset the start switch to OFF.

2. Upon completion of work, add fuel through filler until the fuel tank is full.

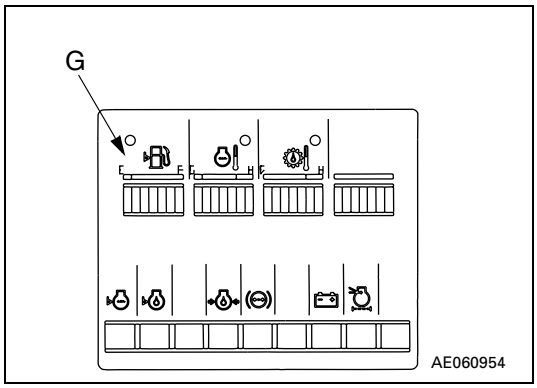
   For details about opening and closing the cap, see section "3.2.5. Cap with lock" on page 3-33.
   For details of the fuel to be used, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.



3. After adding fuel, tighten the cap securely.
   Fuel capacity: 465 l.

Refuelling from drum

The machine is equipped with a pump in order to be able to refuel from a drum.



1. Turn the starter switch to the ON position. Check the fuel level using the fuel indicator (G).
   Finally, turn the starter switch back to OFF.

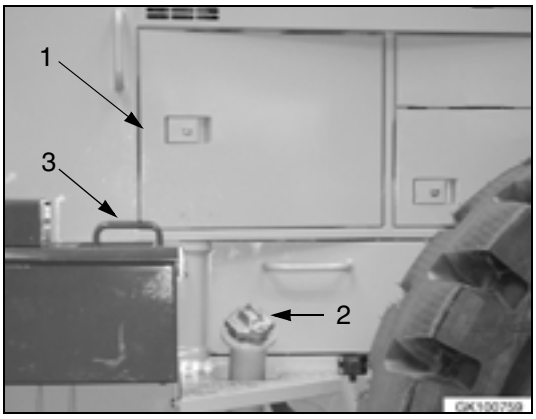
2. Have the recommended fuel available in drums.
   Fuel-tank capacity: 465 l.

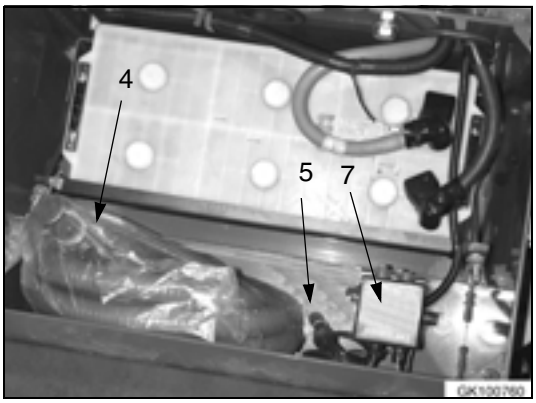
   Details on recommended fuels are available in the section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.

   The pump is located behind the engine cover (1) above the filler neck (2). The control button for the pump, the pump hose and the fluid-level sensor are located in the battery box (3).

3. Remove the filler neck cover (2) and hang the fluid-level sensor (5) into the filler neck.

   More details on opening and closing the tank cap are available in section "3.2.5. Cap with lock" on page 3-33.



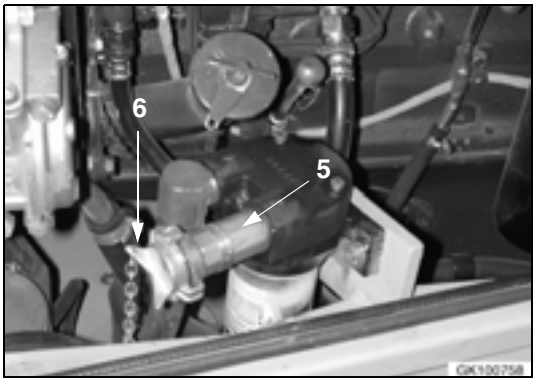


4. Unscrew the pump support's cap (6). Take the pump hose (4) out of the battery box and connect the end of the hose to the socket on the pump support (5).

5. Place the end of the hose with the sieve into the drum.

6. Press the 'Start' control button on the pump (7). Fuel is then delivered to the tank until the fuel-level sensor (5) indicates that the tank is full.

   The fuel delivery can be interrupted at any time by pressing the 'Stop' control button on the pump's control panel (7).



7. Once refuelling is over take the fluid-level sensor out of the filler neck and detach the pump hose from the pump support (5).

8. Fit the pump support's cap (6), screw tight and then seal the filler neck (2).

9. Clean the pump hose and the fluid-level sensor, then stow them away in the battery box (3).

Checking the oil level in engine oil pan, add oil

NOTE

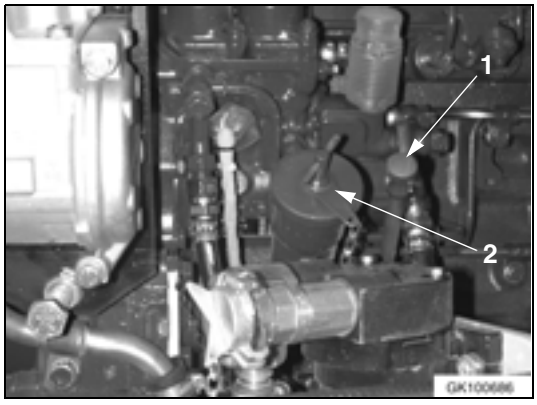
- **You can check the engine oil level when the engine is running (when idling) and when the engine is switched off. For this reason there are two fluid-level markings on the oil dipstick (1).**
- **Use the "Engine Stopped" marking when checking the oil level with the engine switched off.**
- **Use the "Engine Idling" marking when checking the oil level with the engine switched on and idling.**
- **If you mix up use of the "Engine Stopped" or "Engine Idling" markings when filling/topping up engine oil, this will lead to the wrong fluid level in the engine. This in turn can cause irreparable engine damage!**

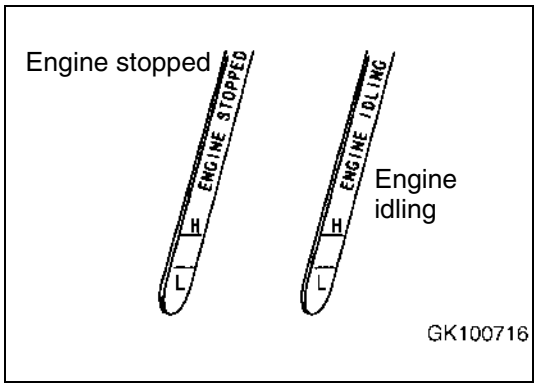
1. Open the engine side cover at the rear right side of the machine.
2. Remove dipstick (1) and wipe off the oil with a cloth.
3. Insert dipstick (1) fully in the oil filler pipe, then pull it out again.
4. The oil level should be between the H and L mark on dipstick (1). If the oil level is below the L mark, add engine oil through oil filler (2) .

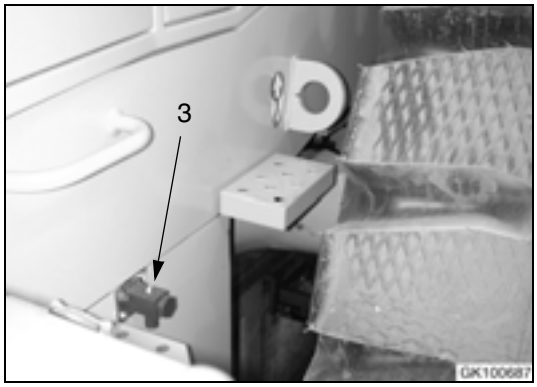
   For details of the oil to be used, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.
5. If the oil is above the H mark, drain the excess engine oil from drain plug (3), and re-check the oil level.
6. If the oil level is correct, tighten the oil filler cap securely, then tighten the engine side cover.

NOTE

When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking. If the machine is at an angle, make it horizontal before checking.







Checking the electrical connections

⚠ WARNING

If the fuse blows frequently, or there are traces of shortcircuiting in the electric wiring, always locate and repair the cause.

⚠ CAUTION

Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire; therefore, always check and remove it, if necessary.

Check for damage to the fuses and any sign of disconnection or short circuit in the electrical wiring. Check also for loose terminals and tighten any loose parts.

Check the following points carefully:

- Battery
- Starter motor
- Alternator

Please contact your Komatsu distributor for troubleshooting.

Checking the sound of horn and backup buzzer

Checking flashing of lamps, checking for dirt or damage

Checking engine exhaust colour and sound

Checking the gauge functions

Checking steering wheel play, checking the steering function

Checking direction of rear view mirror, checking for dirt or damage

5.8.4. Every 50 hours service

Checking the tyre inflation pressure

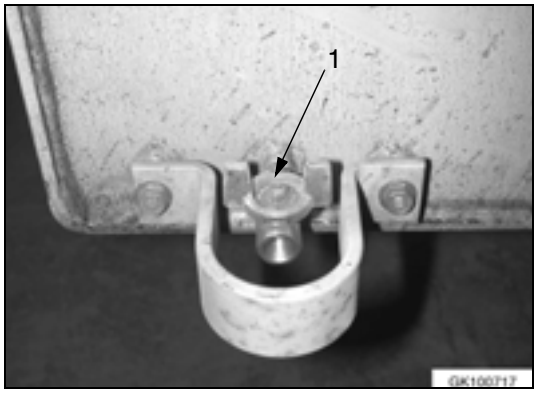
Measure the inflation pressure before the machine operation when the tires are cool.

NOTE

The appropriate tyre inflation pressure differs according to the type of work; see section "3.3.17. Tyre handling" on page 3-78.

Draining water and deposits from fuel tank

Open the drain tap (1) on the right-hand side of the tank and allow water containing dirt deposits to drain off into a collector pan. Close the drain tap as soon as clear fuel is emitted.



Check tightness.

NOTE

The maintenance interval depends to a large extent on the purity of the used fuel.

5.8.5. Every 100 hours service

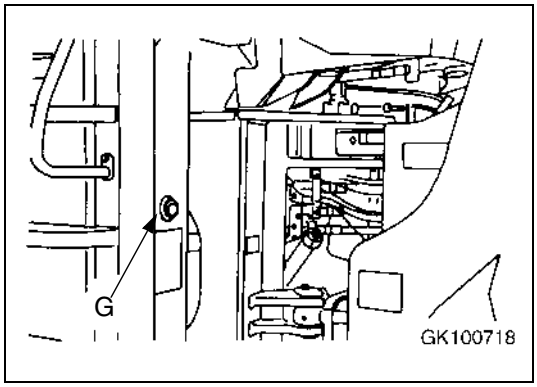
This coincides with the 50 hours service.

Checking the oil level in the hydraulic tank, adding oil

⚠ WARNING

- **When the oil filler cap is removed, oil may spurt out, so stop the engine and wait for the oil temperature to cool down; then turn the cap slowly to release the internal pressure before removing the cap.**
- **If oil has been filled up above the H mark, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.**

1. Lower the bucket horizontally to the ground and stop the engine. Wait for 5 minutes, then check sight gauge (G). The oil level should be between the H and L marks.

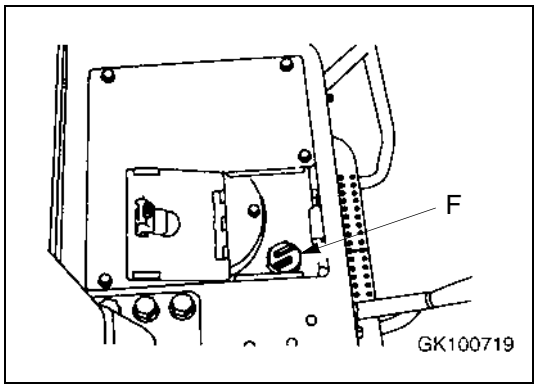


NOTE

Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.

2. If the oil level is too low, open the cover above the increment and top up with oil at the oil-filling orifice (F).

   For details of the oil to be used, see section "5.4. Lubricants and operating means" on page 5-13.



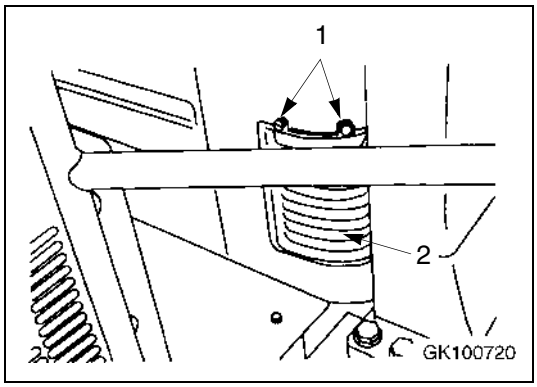
Cleaning the inserts of the fresh air filter of the air-conditioning system

CAUTION

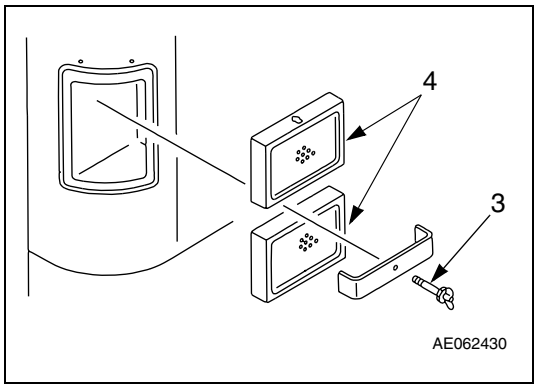
When using compressed air, wear safety glasses and other protective clothes.

After using the air-conditioning, the air filter should be cleaned. Switch off the air-conditioning before cleaning the insert.

1. Loosen bolt (1) and remove cover (2).



2. Loosen screw (3), then take out the insert (4) and clean it.
3. Blow compressed air (max. 7 bar) along the folds from the inside of the insert; repeat from the outside, then blow again from the inside.



NOTE

When re-assembling the insert; the arrow on top of the element must point toward the interior of the cab.

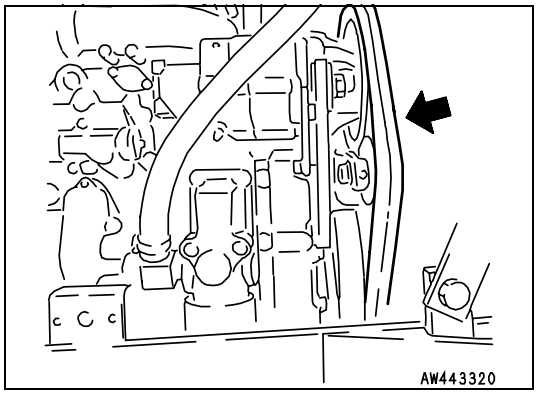
5.8.6. Every 250 service hours

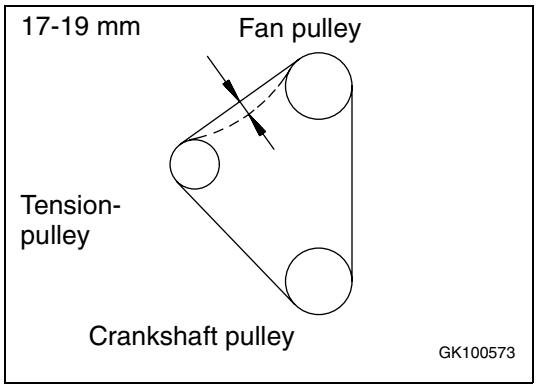
Maintenance for every 50 and 100 hours should be performed at the same time.

Checking and adjusting the fan belt and V-belt tension

Check

Tension is checked by placing a thumb on the back of the V-belt and pushing it inwards. This test should be conducted at a point in the middle between the fan's belt pulley and the alternator. During the test the V-belt should be capable of being pushed in by approx. 17 - 19 mm.

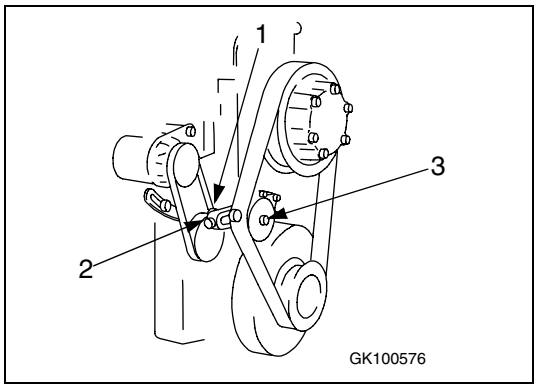


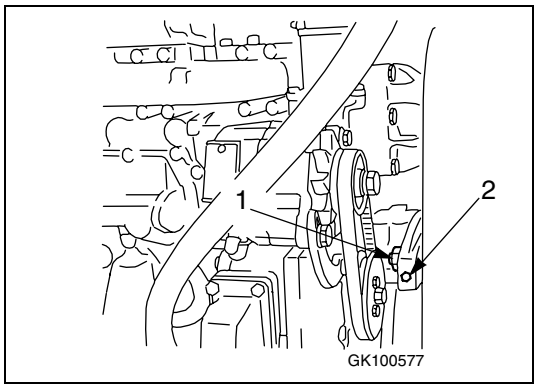


Adjustment

1. Loosen nut (1)
2. Move pulley (3) with adjustment bolt (2) so that the belt tension is approx. 17 - 19 mm (0.67 - 0.75 in, pressure: approx. 10 kg each)

   When replacing, the standard deflection for a new belt is 13 - 15 mm (0.51 - 0.59 in)
3. Tighten nuts (1) and secure pulley (3) in position.
4. Check each pulley for damage, wear of the groove, and wear of the belt. In particular, make sure that the belt does not touch the bottom of the groove.
5. Replace the belt if it has been over streched, leaving no allowance for adjustment, or if the belt shows any cuts or cracks.
6. When replacing the V belt, re-adjust the tension after one hour of operation.

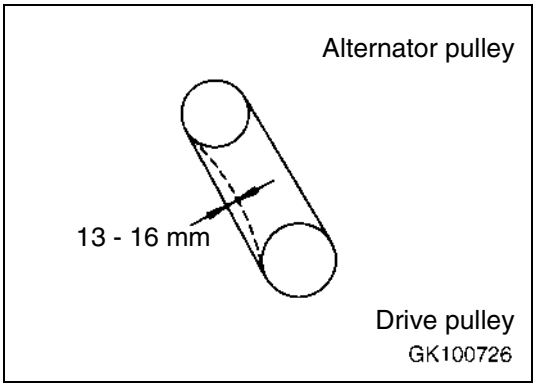




Checking and adjusting alternator belt tension

Check

Tension is checked by exerting a pressure of approx. 100 Nm using a thumb on the back of the V-belt and pushing it inwards. This test should be conducted at a point in the middle of the alternator's belt pulley. The V-belt should be capable of being pushed in by approx. 10 mm.



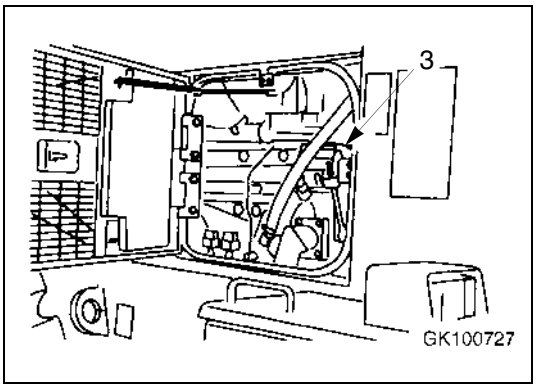
Adjustment

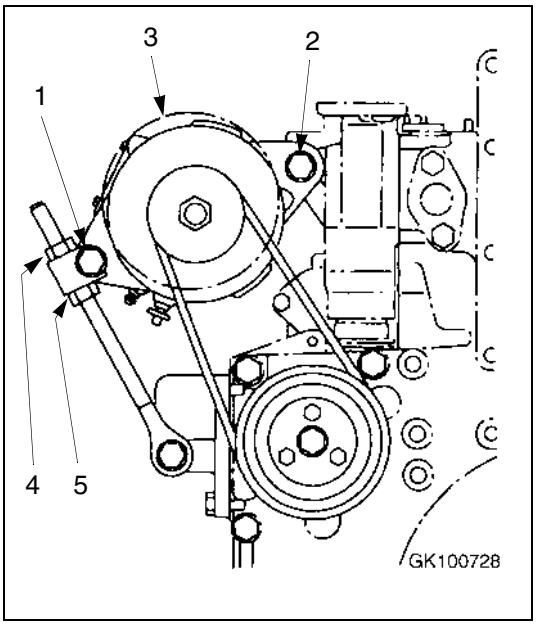
1. Loosen bolts and nuts (1), (2), and (5), then turn nut (4) and adjust the belt tension.
2. After adjusting, tighten bolts and nuts (1), (2), and (5) to secure alternator (3) in position.

NOTE

When adjusting the V-belt, do not push the alternator directly with a bar. Insert a wooden block and push the block with a bar.

3. Check each pulley for damage, wear of the groove, and wear of the belt. In particular, make sure that the belt does not touch the bottom of the groove.
4. Replace the belt if it has been over streched, leaving no allowance for adjustment, or if the belt shows any cuts or cracks.
5. When replacing the V belt, re-adjust the tension after one hour of operation.

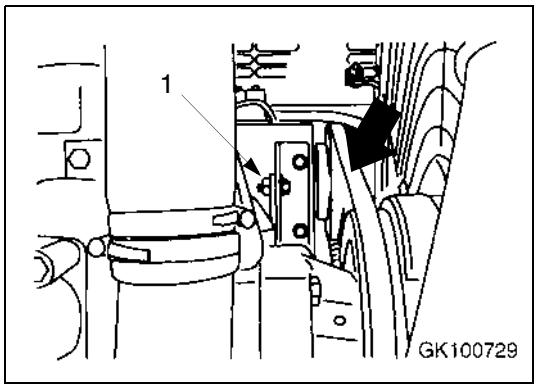




Checking and adjusting the compressor belt tension of the air-conditioning system

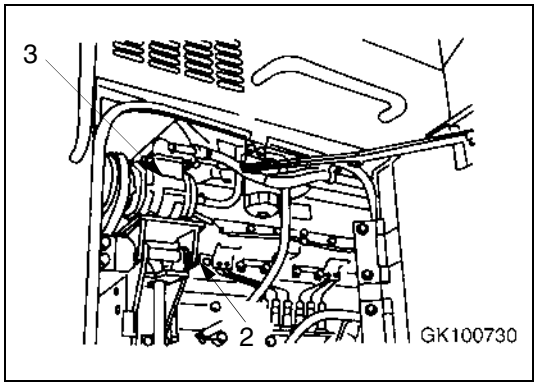
Check

Tension is checked by exerting a slight thumb pressure on the back of the V-belt and pushing it inwards. This test should be conducted at a point in between the two belt pulleys. The V-belt should be capable of being pushed in by approx. 10 mm.



Adjustment

1. Loosen bolt (1), (2) and move compressor (3) to adjust the belt tension.
2. After the adjustment tighten the screws (1) and (2) in order to fasten the compressor in place.
3. Check each pulley for damage, wear of the groove, and wear of the belt. In particular, make sure that the belt does not touch the bottom of the groove.
4. Replace the belt if it has been over streched, leaving no allowance for adjustment, or if the belt shows any cuts or cracks.
5. When replacing the V belt, re-adjust the tension after one hour of operation.

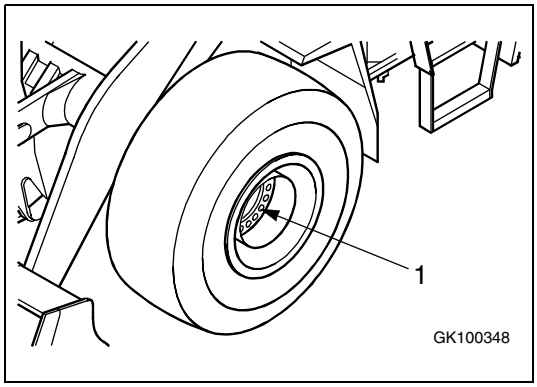


Checking for loose wheel hub nuts, tightening the nuts

WARNING

If wheel hub nuts (1) are loose, the tire wear will increase and accidents may occur.

1. Check for loose nuts and tighten, if necessary.
   Tightening torque: 420 - 520 Nm
2. If any stud bolt is broken, all stud bolts for that wheel must be replaced.

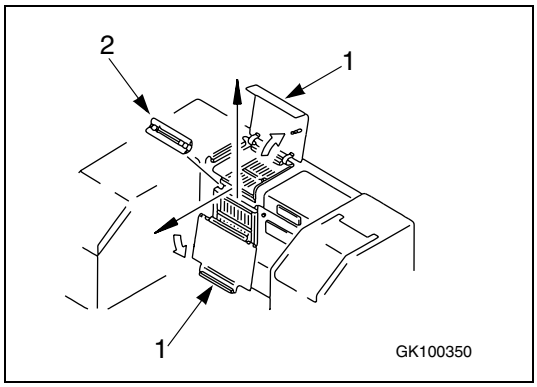


Cleaning the inserts of the recirculation filter of the airconditioning system

1. Open the filter inspection cover (1) behind the operator's seat and remove the filter cover (2), then remove the filter in the direction of the arrow.

   When removing the filter to the side, put your weight on the seat and push down.
2. Clean with compressed air in the same way as for the fresh air filter.

   If the filter is extremely dirty, rinse it in water. After that, dry it completely before the re-assembly.

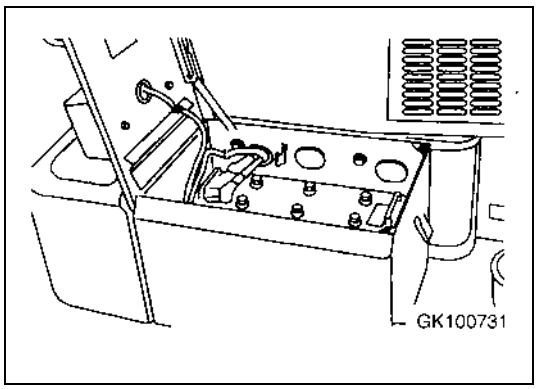


Checking the battery electrolyte level

⚠ WARNING

- **Danger of explosions! Do not come near the battery with nacked fire or sparks.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

Carry out this check before operating the machine.



1. Open the cover of the battery box.

   There are two battery boxes: One on each side at the rear of the machine.

2. Remove caps and check that electrolyte is at the specified level (10 to 12 mm) above the plate. If the electrolyte level is low, add distilled water to the specified level.

   If the battery electrolyte is spilled, add dilute sulphuric acid.

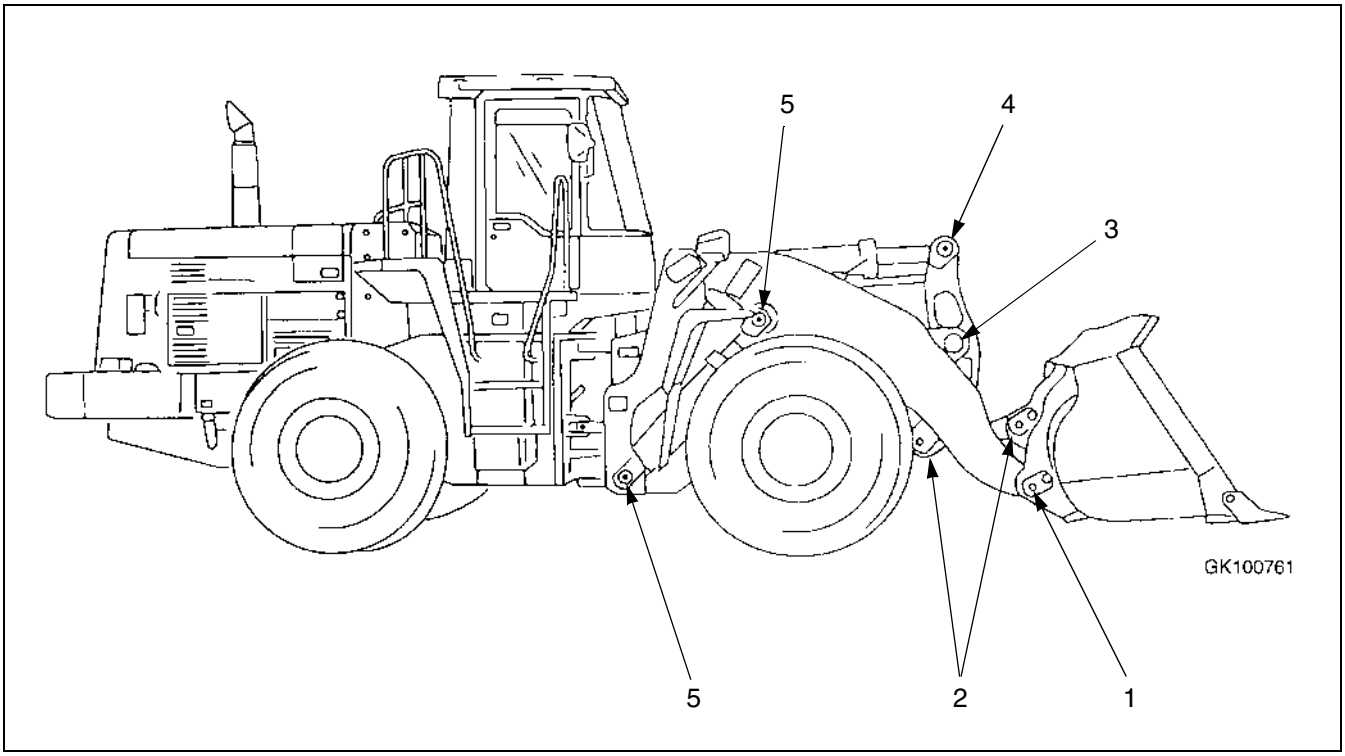
3. Check all cells and top up with destilled water, if required.

4. Close cells with cleaned plugs.

NOTE

When adding distilled water in cold weather, add it before starting the operation in the morning to prevent the electrolyte from freezing.

Lubrication (every 250 service hours)

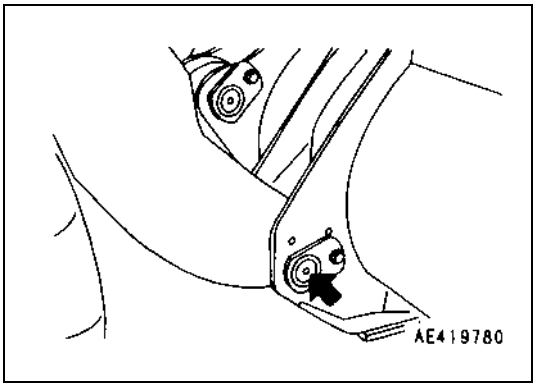


⚠ WARNING

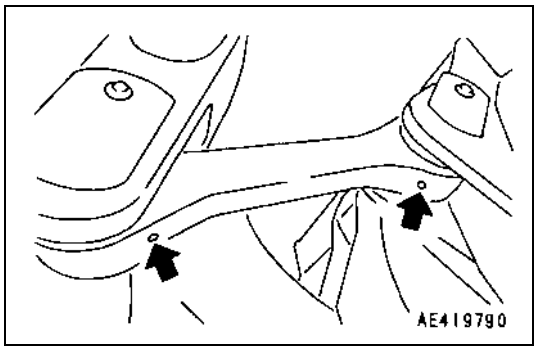
- **Apply the parking brake, and lock the front and rear frame with the safety bar and pin.**
- **Lower the work equipment to the ground, then stop the engine and securely lock the work equipment control levers.**

Use a grease gun to lubricate the lubricating nipples marked by an arrow.
Wipe off old grease.

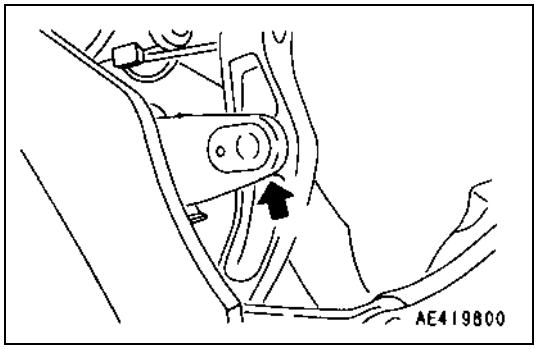
1. Bucket bolts (2 lubricating points).



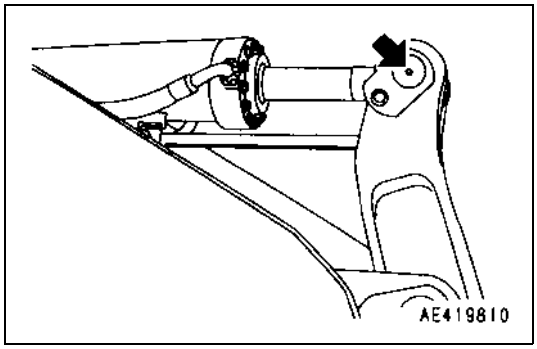
2. Bucket knuckle bolts (2 lubricating points).



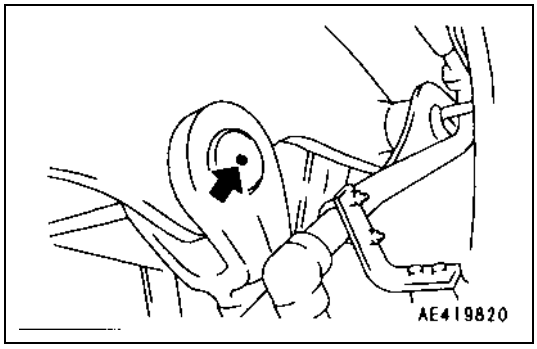
3. Toggle joint bolt (1 lubricating point)

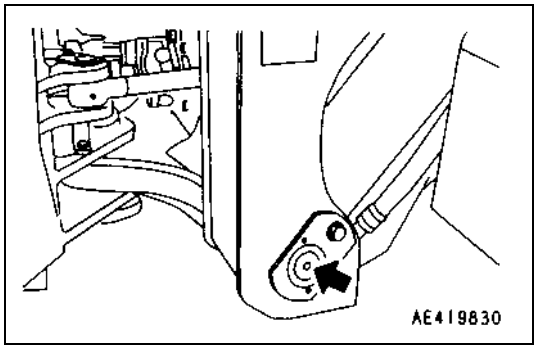


4. End of dumping cylinder rod (1 lubricating point)



5. Lifting cylinder bolts (4 lubricating points).





5.8.7. Every 500 service hours

Maintenance for every 50, 100 and 250 hours should be performed at the same time.

Changing oil in the engine oil pan, replacing engine oil filter cartridge

⚠ DANGER

Danger of scalding! Engine oil must be drained while being still warm after operation.
Wear protective gloves,while draining the engine oil. Avoid any contact with the hot oil.

NOTE

Change oil and oil filter every 500 hours of operation, however at the latest every 12 months.
Use oils from the API CE or CF-4 class. Change oil and oil filter after 250 hours of operation if oil from the CD or CC class is used.

Prepare the following

- Collecting container: min. 40 l capacity
- Refill capacity: 37 l
- Filter wrench

NOTE

Drain off engine oil only in operation-warm condition.

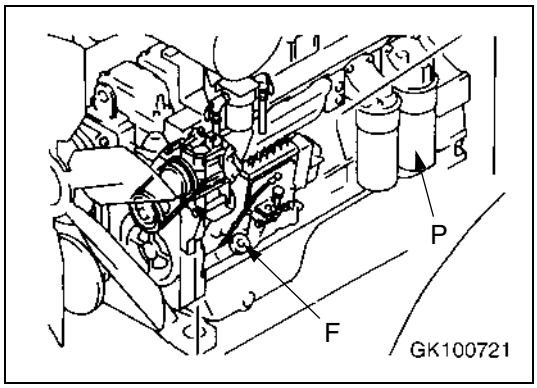
1. Open the engine side cover located on the right-hand side of the machine.
2. Open the oil filler port (F).
3. Place a collecting container under the drain plug (1).
4. Loosen the drain plug (1), and drain the oil.
5. Check the drained oil; if there are metal particles or foreign material, please contact your Komatsu dealer.
6. Install drain plug (1).
7. After switching off the engine wait for at least 10 minutes before using a filter spanner to turn the filter insert (P) in an anti-clockwise direction.
8. Clean the filter holder.
9. Fill up the new filter insert with engine oil.
10. Coat the seal and thread of the cartridge with engine oil (or coat thinly with grease). Re-install the engine oil filter cartridge.
11. For the re-assembly, bring the sealing surface into contact with the filter holder, then tighten it by a further 2/3 - 1 turn. (Observe manufacturer's specifications)
12. After replacing the filter insert fill up with engine oil until the oil level is located between the H and L markings. When doing so use the "Engine Stopped" marking.

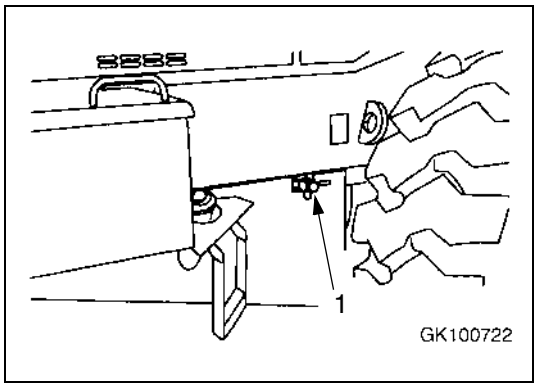
    If the wrong marking is used (Engine Idling), you will end up with the wrong oil level in the engine – which may lead to severe engine damage. In such a case, drain off the engine oil again and fill in the correct quantity.

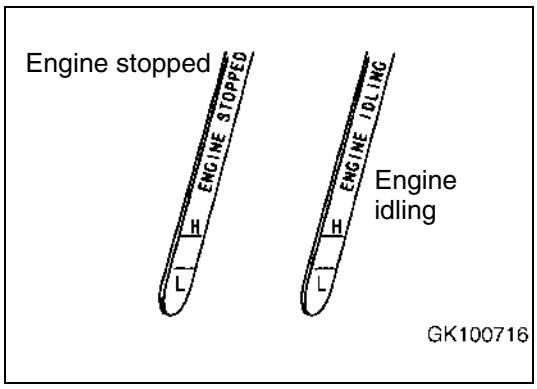
    For details about the recommended oil types, see section "5.4. Lubricants and operating means" on page 5-13.

13. Let the engine run idle for a short time, then stop it and check whether the oil level is correct.

    For details, see section "Checking the oil level in engine oil pan, add oil" on page 5-43.







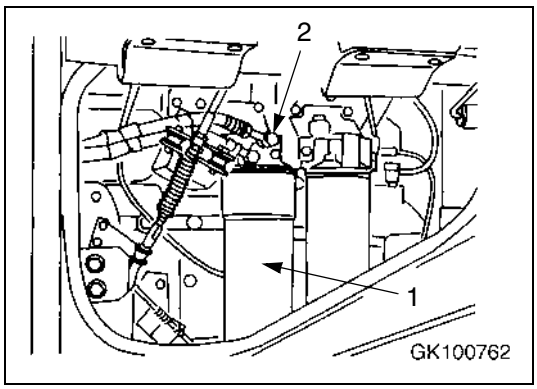
Replacing the fuel filter cartridge

⚠ WARNING

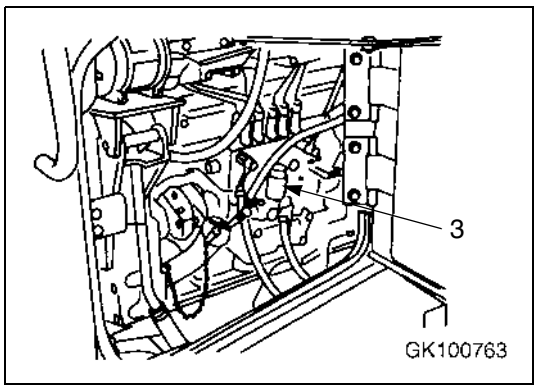
- **Immediately after machine operation, the engine is hot. Therefore, wait for the engine to cool down before replacing the filter.**
- **Avoid any open fire or sparks near the fuel.**

Prepare a filter wrench and a container to catch the fuel.

1. Open the right-hand engine cover plate.
2. Put the drip container in place below the filter cartridge (1).
3. Use the filter wrench to unscrew the filter cartridge.
4. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then re-install it in the filter holder.
5. For the re-assembly, tighten the cartridge until the packing surface contacts the seal surface of the filter holder, then tighten another 2/3 turn (approx.). If the filter cartridge is tightened too far, the packing will be damaged leading to fuel leakage. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.



6. Now loosen air bleed plug (2).
7. Loosen the feed pump knob (3) and move the pump up and down until bubble-free fuel comes out of the plug.
8. Tighten air bleed plug, then push and tighten the knob of feed pump.



⚠ CAUTION

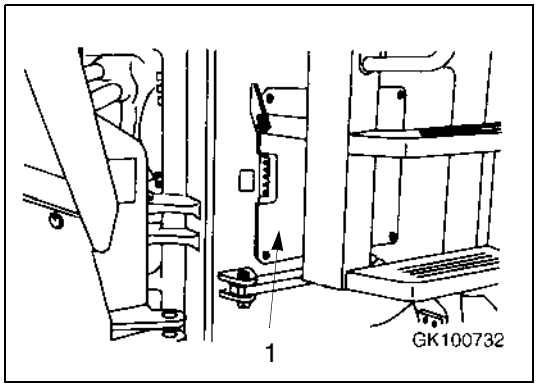
Caution during turning the engine. It may start up after a few turns!

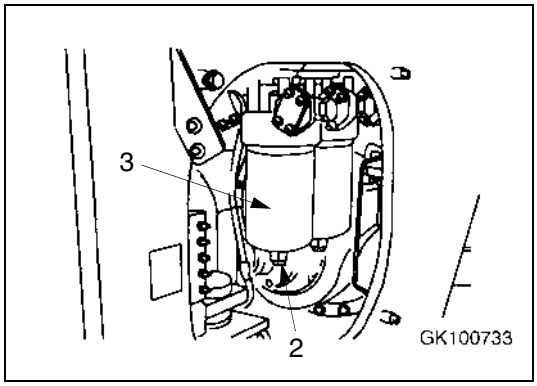
9. After replacing the filter cartridge, turn the key in the starter switch to the START position. The air will be bled within a few seconds and the engine will start. When the engine starts, check for any leakage from the filter seal surface.

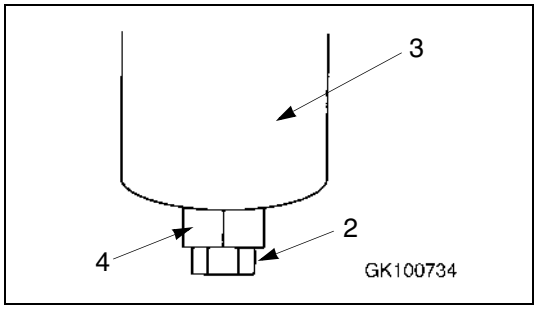
Replacing the transmission oil filter insert

1. Open the cover (1) and set the container to catch the oil under the filter case.
2. Unscrew the filter housing's (3) drain plugs (2) and allow the oil to drain off. After draining off the oil insert the plugs again and make sure they fit tightly.
3. Loosen hexagonal portion (4) of case (3), then remove case (3).
4. Remove the element and clean the inside of the case.
5. Replace the filter gasket and O rings. Coat the new gasket and O rings with clean oil before their installation.
6. Assemble the new element, then set the case in position and install it.

   Drain mount tightening torque (2): 49 - 59 Nm
   Case tightening torque (3): 69 - 79 Nm
7. Run the engine at idling for a short time, then check that the oil is at the correct level. For details, see section "5.8.2. Maintenance upon demand" on page 5-22.







Lubrication (every 500 service hours)

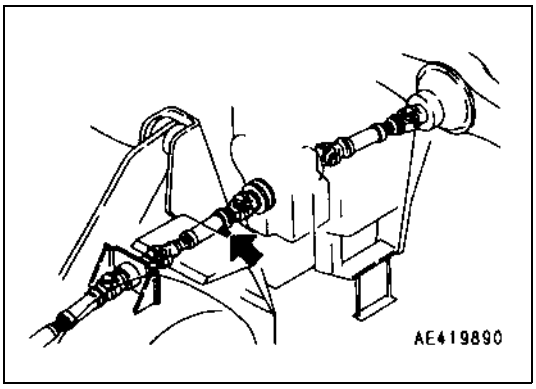
⚠ WARNING

- **Apply the parking brake, and lock the front and rear frame with the safety bar and pin.**
- **Lower the work equipment to the ground, then stop the engine and securely lock the work equipment control levers.**

Using a grease gun, pump in grease through the grease fittings marked by the arrows.

After greasing, wipe off any old grease that is pressed out.

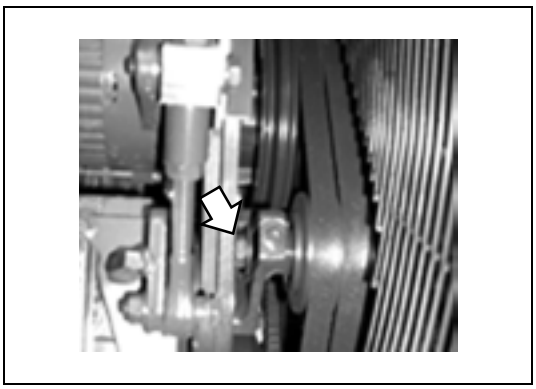
Centre cardan shaft (1 points)



Lubricate the spring washer of the ventilator belt pulley.

Open the maintenance flap on left at rear.

Lubricate the grease nipple on the spring washer of the belt pulley using a grease gun.



5.8.8. Every 1000 service hours

Maintenance for every 50, 100, 250 and 500 hours should be carried out simultaneously.

Changing the oil in the transmission case, cleaning the strainer

⚠ WARNING

Immediately after the machine operation, the oil is hot. Therefore, wait for the oil to cool down before carrying out maintenance.

- Collecting container: min. 70 l capacity
- Refill capacity: see Section "5.4. Lubricants and operating means" on page 5-13.

1. Set the collecting container under drain plug (P), then remove drain plug (P) and drain the oil.

   To prevent the oil from pouring out suddenly, lossen and remove drain plug (P) gradually.

2. After draining the oil, re-install drain plug (P).

   Tightening torque: 99 - 117 Nm

3. Set a collection container under the transmission oil filter.

4. Remove transmission filter drain plug (1), drain the oil, then tighten the plug again.

   Tightening torque: 94 - 123 Nm

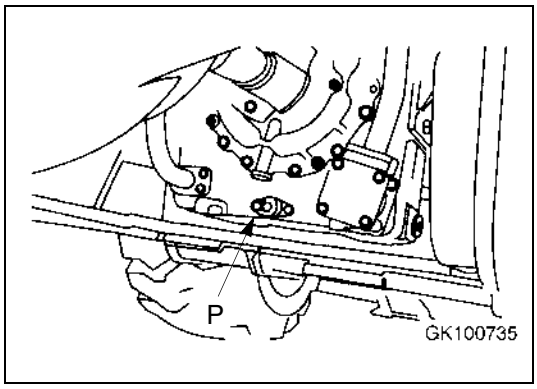
5. Remove the screws (2) and dismount the cover (3). Unscrew the strainer (5) from the cover (3).

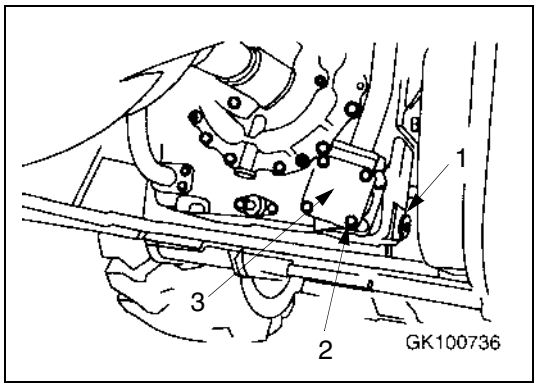
6. Remove any dirt stuck to strainer, then wash it in clean diesel oil or flushing oil. If the strainer is damaged, it must be replaced.

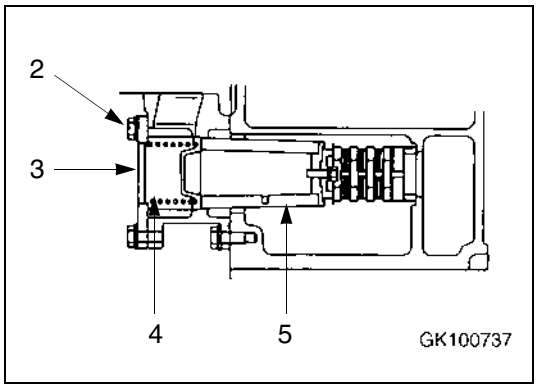
7. Screw the spring (4) and strainer (5) into the cover (3).

   Strainer tightening torque 95 - 120 Nm

   Replace the O ring on the cover, then re-install the cover.







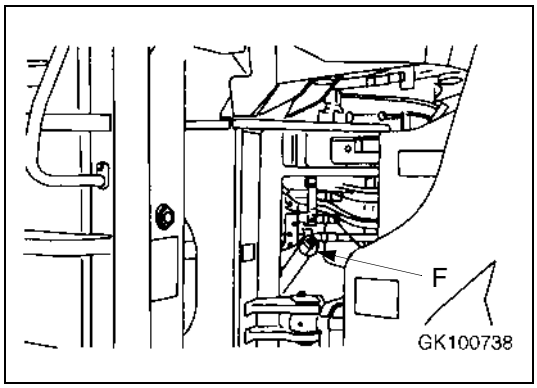
8. Pour in the specified amount of engine oil through the oil filler port (F) .

   For details about the recommended oil, see section "5.4. Lubricants and operating means" on page 5-13.

9. After re-fitting oil, check that the oil is at the specified level.

   For details, see section "5.8.2. Maintenance upon demand" on page 5-22.

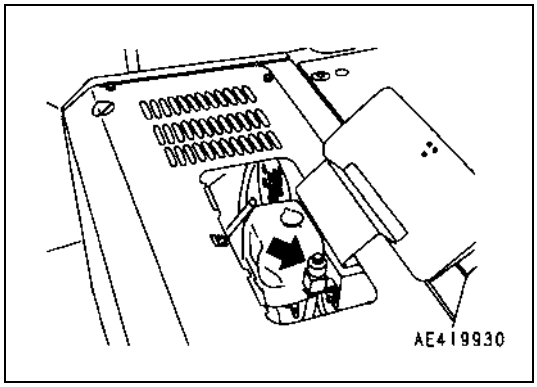
10. Check for oil leakage from the transmission case and filter.



Cleaning the transmission case breather

Remove all mud and dirt from around the breather, then remove the breather. Pour in cleaning fluid and clean the breather.

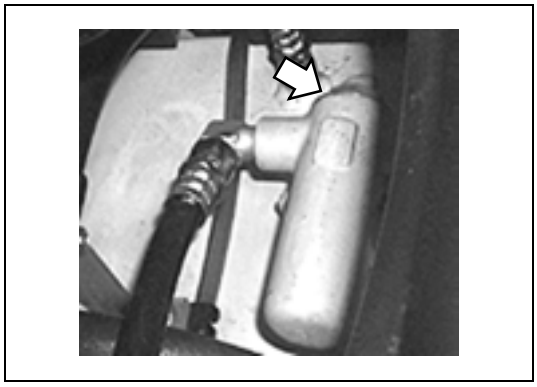
Take care that no dust and dirt enters the transmission case through the port while the breather is removed.



Cleaning the fuel screen of the fuel tank

Open the maintenance flap on right at rear. There is a housing with a screen located on the fuel tank underneath the fuel filter.

Remove the sealing screw (arrow) from the housing, remove the screen and clean.



Lubrication (every 1000 service hours)

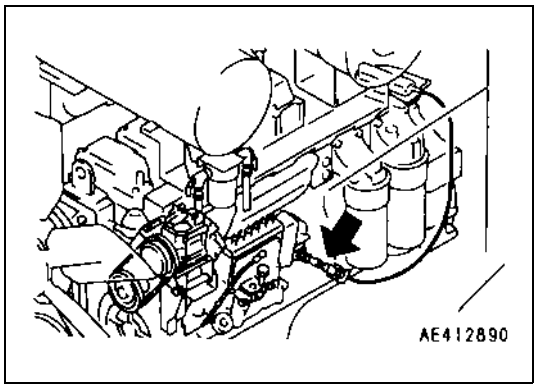
⚠ WARNING

- **Apply the parking brake, and lock the front and rear frame with the safety bar and pin.**
- **Lower the work equipment to the ground, then stop the engine and securely lock the work equipment control lever.**

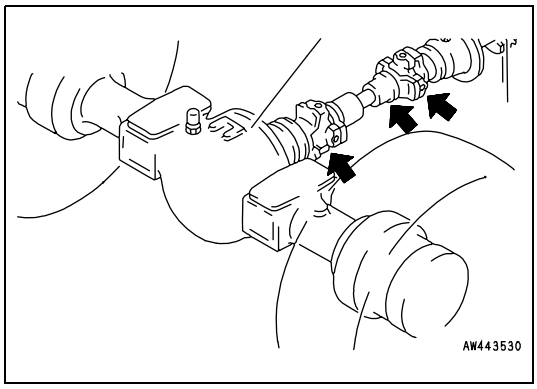
Using a grease gun, pump in grease through the grease fittings marked by the arrows.

After greasing, wipe off any old grease that is pressed out.

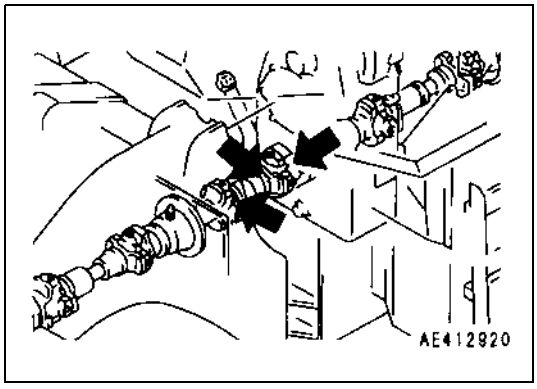
1. Engine stop motor linkage (1 point)



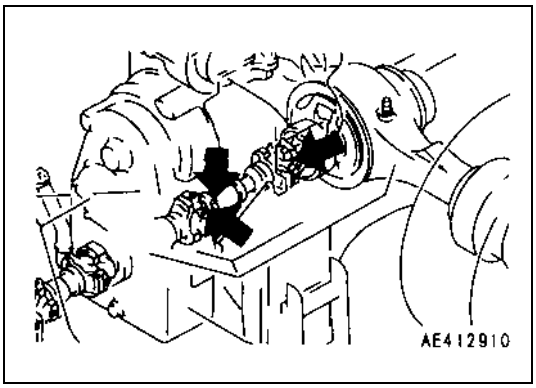
2. Front cardan shaft (3 points)



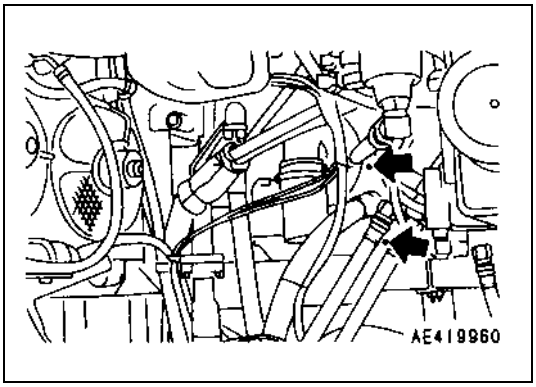
3. Centre cardan shaft (3 points)



4. Rear cardan shaft (2 points)



5. Upper cardan shaft (2 points)



Checking the tightening parts of the turbo-charger

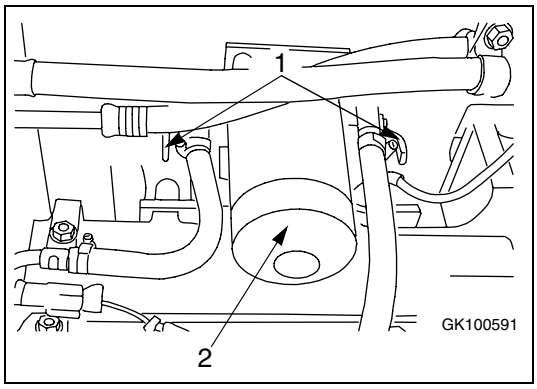
Contact your responsible Komatsu dealer to have the tightening parts checked.

Checking the play of the turbo-charger rotor

Ask your responsible Komatsu dealer to check the play of the turbo-charger rotor.

Replacing the anti-corrosive filter cartridge

1. Screw in valve (1) at the side of the corrosion resistor.
2. Using the filter wrench provided, screw off the cartridge (2).
3. Coat the seal surface of the new cartridge with engine oil and install it to the filter holder.
4. For the re-assembly, bring the gasket into contact with the seal surface of the filter holder, then tighten by approx. 2/3 turn.
5. After replacement, open valves (1) at the side of the corrosion resistor.
6. Start the engine and check that there is no water leaking from the filter seal surface.



5.8.9. Every 2000 service hours

It is recommended to include all maintenance operations described in the sections Every 50, Every 100, Every 250, Every 500 and Every 1000 Service Hours while performing the following tasks.

Changing the oil in the hydraulic tank, replacing the hydraulic filter inserts

⚠ WARNING

Immediately after machine operation, the oil is hot. Therefore, wait for the oil to cool down before changing it. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

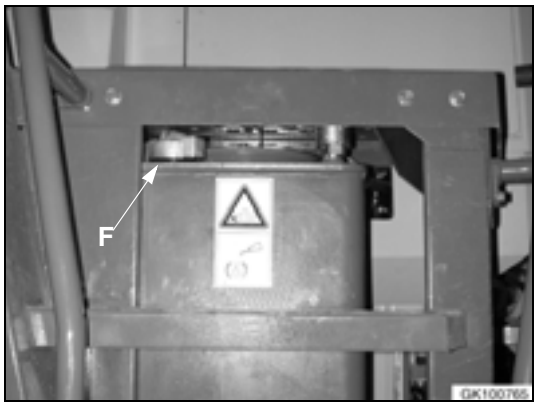
Keep the following items at hand for the oil change:

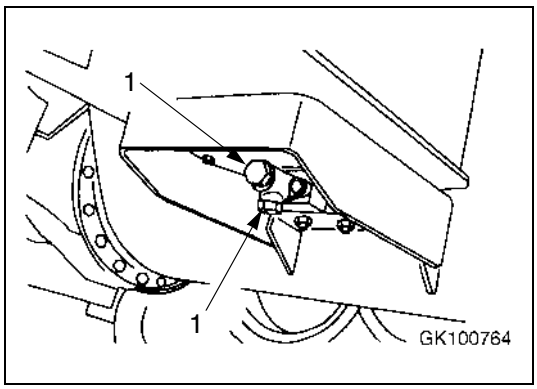
- Collecting container with sufficient capacity (min. 180 l).
- Oil quantity required for refilling according to the table "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.

1. Lower the bucket horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove the cover screws above the oil filler neck (F) and the take off the cover.
3. Remove the cap from oil filler port (F).
4. Set a collecting container under drain plug (1).
5. Remove drain plug (1).
6. Open drain valve (2) gradually to drain the oil.
7. After draining the oil, close drain valve (2), then tighten drain plug (1).

   Tightening torque:

Drain plug (1)	60 - 78 Nm
Drain plug (2)	50 - 78 Nm





8. Remove mounting bolts (4) from the 2 filter covers (3) at the top of the tank, then remove the covers.
   When doing this, the cover may fly off because of the string force, so press down on the cover while removing the bolts.

9. Remove spring (5) and bypass valve (6), then remove the insert (7).

10. Check that there is no foreign matter inside the tank before cleaning it.

11. Install a new insert (/), then install bypass valve (6), spring (5) and cover (3).
    If the O ring of the cover is damaged or detoriated, replace it with a new part.

12. When installing the cover bolts, press down on the cover and tighten the bolts evenly.

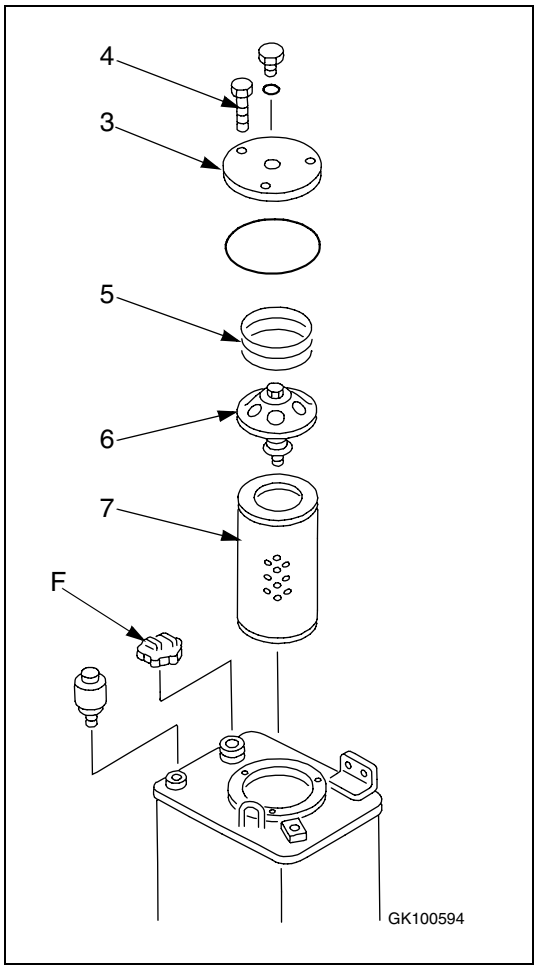
13. Add engine oil through oil filler port to the specified level, then install caüp.

    For details about the recommended oil, see section "5.4. Lubricants and operating means" on page 5-13.

14. Check that the hydraulic oil is at the correct level.

    For details, see section "Checking the oil level in the hydraulic tank, adding oil" on page 5-46.

15. Run the engine at low idling and extend and retract the steering, bucket and lift arm cylinders 4 - 5 times. Be careful not to move the cylinder up to its stroke end (stop approx. 100 mm (3.94 in) before.



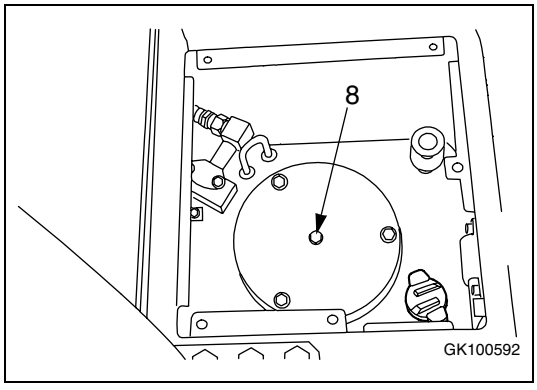
NOTE

If the engine is run immediately at high speed or the cylinder is moved up to its stroke, the air inside the cylinder will damage the piston packing.

16. Then, move the steering, bucket and lift arm cylinders up to their stroke end 3 - 4 times, then stop the engine and loosen bleed plug (8) to bleed the air from the hydraulic tank. After bleeding the air, re-tighten plug (8). Run the engine at low idling when bleeding the air.

17. Check the hydraulic oil level and fill up oil to the specified level. For details, see section "Checking the oil level in the hydraulic tank, adding oil" on page 5-46.
    Tightening torque 11.3 ± 1.5 Nm

18. Next, increase the engine speed and repeat the procedure in step 16 to bleed the air. Repeat this operation until no more air comes out from plug (8).



19. Check that the hydraulic oil is at the correct level.

    For details, see section "Checking the oil level in the hydraulic tank, adding oil" on page 5-46.

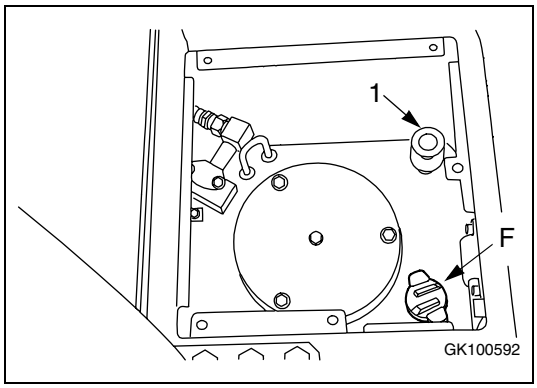
20. Check that there is no leakage of oil from the filter cover mount.

Replacing the hydraulic tank breather element

⚠ WARNING

Immediately after machine operation, the oil is hot. Therefore, wait for the oil to cool down before changing it. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

1. Remove the cap of oil filler port (F).
2. Remove the snap ring on breather (1), then remove the breather cap.
3. Replace the filter element, then re-install cap and snap ring.
4. Tighten the cap of oil filler port (F).
5. Clean off any mud, dirt, or dust from around the breather (on top of the tank).



NOTE

- **If there is mud or dirt around the breather, the breather will not be able to function properly, and this will have and adverse effect on the hydraulic equipment. Clean the area around the breather also when replacing the breather.**
- **It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape before its re-assembly, and do not re-tighten too hard.**

Changing the axle oil

WARNING

After machine operation, the oil is hot. Therefore, always wait for the temperature to go down before starting these works.

Prepare the following:

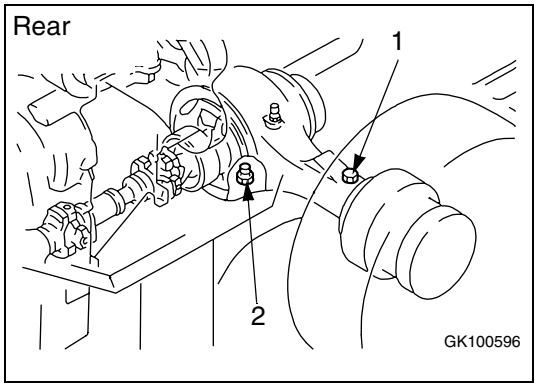
- Collecting container: min. 156 l capacity
- Oil-filling quantity at front and rear axles: 78 l each

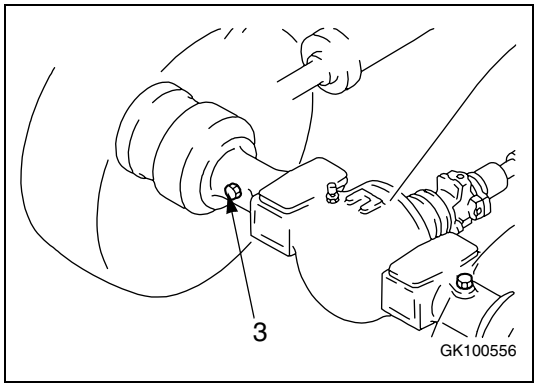
1. Remove front and rear oil filler plugs (1) at the front and rear, then remove drain plugs (2) to drain the oil.
2. Remove drain plug (3) to drain the oil.
3. Stop the machine so that drain plug (4) of the final drive is at the bottom. Remove oil filler plug (5) and drain plug (4), and drain the oil.
4. After draining the oil, clean drain plugs (2), (3) and (4) then re-install it.
5. Add oil to the specified level through the oil filler ports (1) and (5) of the axle housing and left and right final drives.

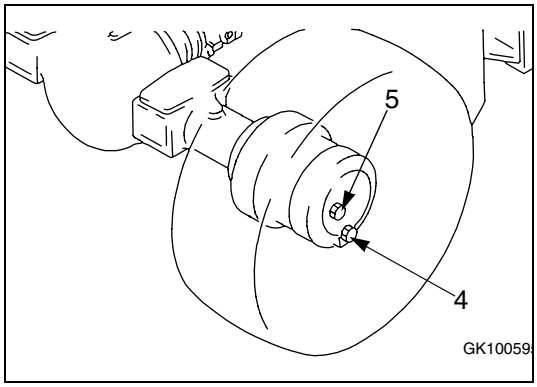
   For details about the recommended oil, see section "5.4.2. Lubricants, fuels and filling capacities" on page 5-14.
6. After adding oil, check whether the oil is at the specified level. For details, see section "5.8.2. Maintenance upon demand" on page 5-22.

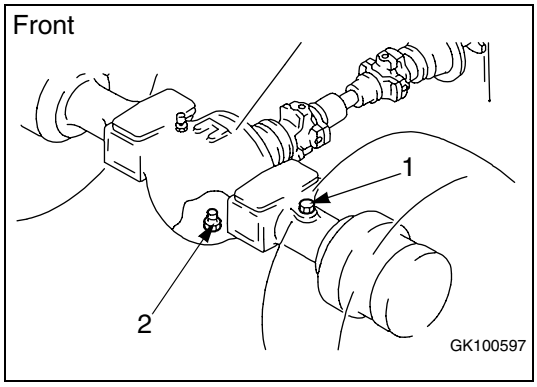
NOTE

For operations requiring the brake to be used frequently, change the axle oil in shorter intervals.



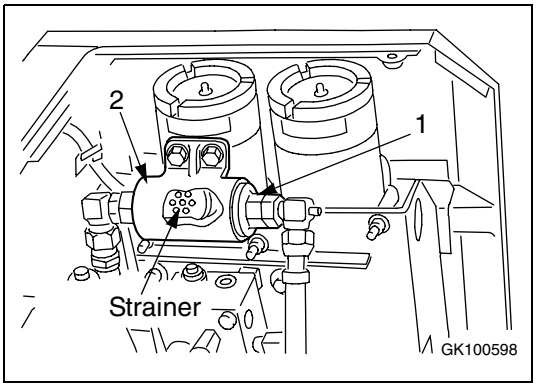






Clean PPC circuit strainer

1. Remove flange (1).
2. Remove strainer case (2), take out the strainer, wash it in clean diesel oil.
3. Assemble the strainer to strainer case (2), then install with flange (1).



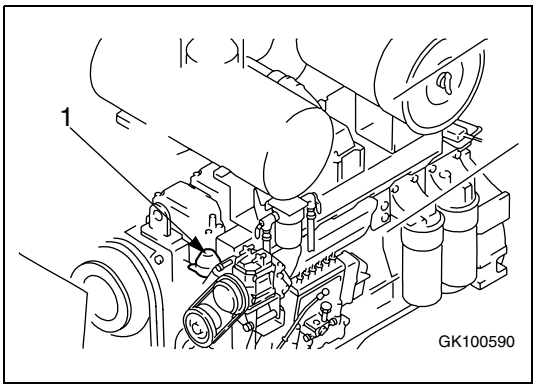
Clean engine breather element

WARNING

The parts and oil are at high temperature immediately after the engine has been stopped, and there is danger of burns, so wait for the temperature to go down before starting the operation. When using compressed air, there is danger that dust may fly and cause personal injury.
Always wear protective glasses, dust mask, or other protective clothing.

1. Remove breather (1).
2. Wash the breather in clean light oil, then dry it with compressed air and install it again.
3. Coat the installing surface with liquid gasket and install breather (1).

Before remove the breather, clean around the breather to remove dirt.



Checking the alternator starter motor

Contact your Komatsu dealer to arrange an inspection or repair. If the engine is started frequently, let the inspection be performed every 1000 service hours.

Checking and adjusting the valve clearance of the engine

Since special-purpose tools are required for the check and adjustment, it is recommended to have this check performed by the responsible Komatsu trader.

Checking the brake disc wear

Ask your Komatsu dealer to check and repair the brake disc.

Checking the shock absorber

Check that there are no cracks or peeling on the external surface of the rubber. If any cracks or peeling are found, contact your Komatsu dealer to have the parts replaced.

Replacing the element in the recirculating and fresh air filter of the air-conditioning system

Remove both the recirculating and fresh air filter in the same way as for cleaning and replace them.

For cleaning and recirculating air filter, see section "Cleaning the inserts of the recirculation filter of the airconditioning system" on page 5-52.

For cleaning the fresh air filter, see section "Cleaning the inserts of the fresh air filter of the air-conditioning system" on page 5-47.

Cleaning and checking the turbo-charger

If there is carbon or oil sludge stuck to the blower impeller, it will lower the performance of the turbocharger or cause it to break; thus you should ask your Komatsu dealer to perform the cleaning.

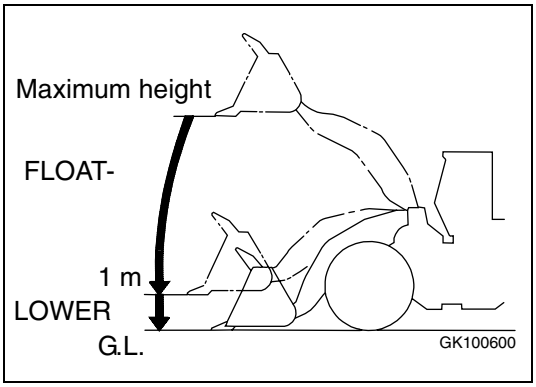
Checking the accumulator

Check the gas pressure of the accumulator as follows.

Checking

1. Stop the machine on level ground and apply the parking brake.
2. Raise the work equipment to the maximum height, then place the lift arm control lever at HOLD.
3. Leave the work equipment in this position, and stop the engine.
4. Confirm that it is safe around the machine, then set the lift arm at FLOAT and lower the work equipment to a position 1 m (3.28 ft) from the ground.
5. When the work quipment reaches a position 1 m from the ground, move the lift arm control lever to LOWER, and lower the work equipment slowly to the ground.

   If the work equipment stops moving during checking, the gas pressure may be below the service limit (7 bar, 99.4 PSI), so contact your Komatsu distributor to have the gas pressure measured or gas charged.



Carry out the checks within five minutes of stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to carry out the check.

Checking the ECSS-accumulator gas pressure

Please ask your Komatsu distributor to check the accumulator gas pressure.

5.8.10. Every 4000 service hours

Maintenance for every 50, 100, 250, 500, 1000, 1500 and 2000 hours should be performed at the same time.

Checking the water pump

Check that there is no play in the pulley, grease leakage, water leakage or clogging of the drain hole. If any abnomality is found, please contact your Komatsu distributor for disassembly and repair or replacement.

Check fan pulley and tension pulley

Check the pulley to see if there is any leaking grease. If any abnormality is found, ask your Komatsu distributor to repair or replace it.

Check vibration damper

Check that there are no cracks or peeling in the outside surface of the rubber. If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

6. Technical data

6.1. Technical data

WA500-3H

Performance			
Bucket loading capacity			5 m³
Normal load			8,000 kg
Travelling speed	Forward	1st	6.7 km/h
		2nd	12.0 km/h
		3rd	20.2 km/h
		4th	33.0 km/h
	Reverse	1st	7.5 km/h
		2nd	13.4 km/h
		3rd	22.5 km/h
		4th	36.1 km/h
Tractive force, max.			274.4 KN
Min. turning radius 40°	Over bucket		7,615 mm
	Over tires		6,865 mm

Engine	
Model	Komatsu diesel engine SA6D140E-3
Flywheel horsepower (DIN 70020)	235 kW / 316 PS / 259 hp / 2,100 rpm
Max. torque	1,370 Nm / 1,400 rpm
Starting motor	24 V 11 kW
Alternator	24 V 50 A
Battery	2 x 12 V 170 Ah

6.2. Noise emission levels

Two labels must be attached bearing details on the machine's noise level.

In accordance with EC Directive 86/662:

1	plate for the sound pressure level	L_{pA} =	77 dB/A
1	plate for the sound power level	L_{WA}=	110 dB/A

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

6.3. Vibration level

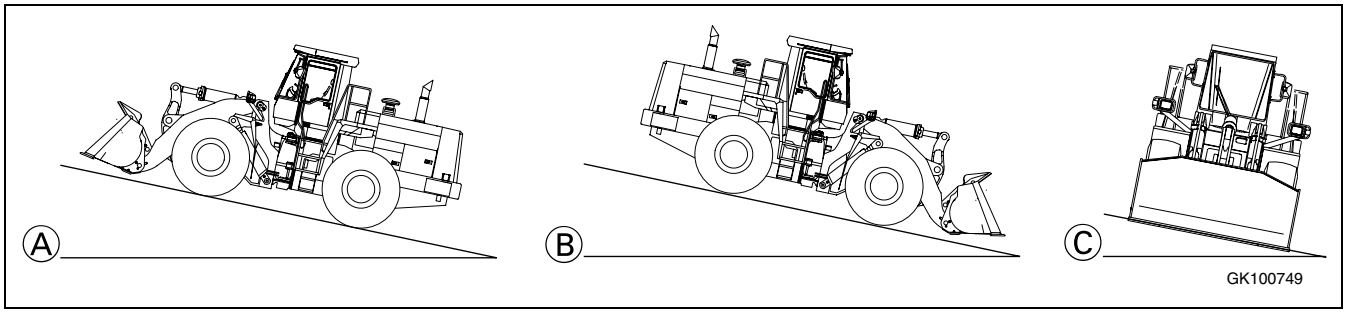
When used for its intended purpose, levels of vibration for the earthworking machine transmitted from the operator's seat are lower or equal to the test vibrations for the relative machinery class in compliance with ISO 7096. The actual accelaration value of the upper limbs is less than 2.5 m/s². The actual acceleration value for the body is less than 0.76 m/s². 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.

6.4. Limit values for slopes

Maximum slope angle for machine operation

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°



7. Special equipment and attachments

7.1. ECSS-electronics

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

7.1.1. Structure and functioning principle of the ECSS-electronics

- The ECSS-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 ECSS-Electronics consists of the ECSS-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.

7.1.2. Precautionary measures for switching on the ECSS-electronics

⚠ WARNING

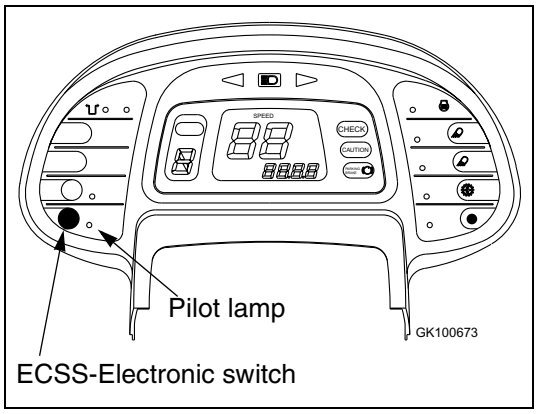
If the ECSS system is switched on during a journey, or when the working attachment is in raised position, it may move up or down depending upon the bucket load.
For this reason, extreme caution is advised when operating the switch.

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

NOTE

The ECSS 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.

7.1.3. Operating the ECSS-electronics



Switching ON the ECSS-Electronics:	Press the ECSS-Electronics switch; the control lamp is lit.
Switching OFF the ECSS-Electronics:	Re-press the ECSS-Electronics switch; the control lamp goes out.

NOTE

- **If, when the boom is raised, the boom-lift limit feature is activated, the ECSS system is automatically switched off.**
- **To ensure that the ECSS 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.**

7.1.4. Precautions when handling the accumulator

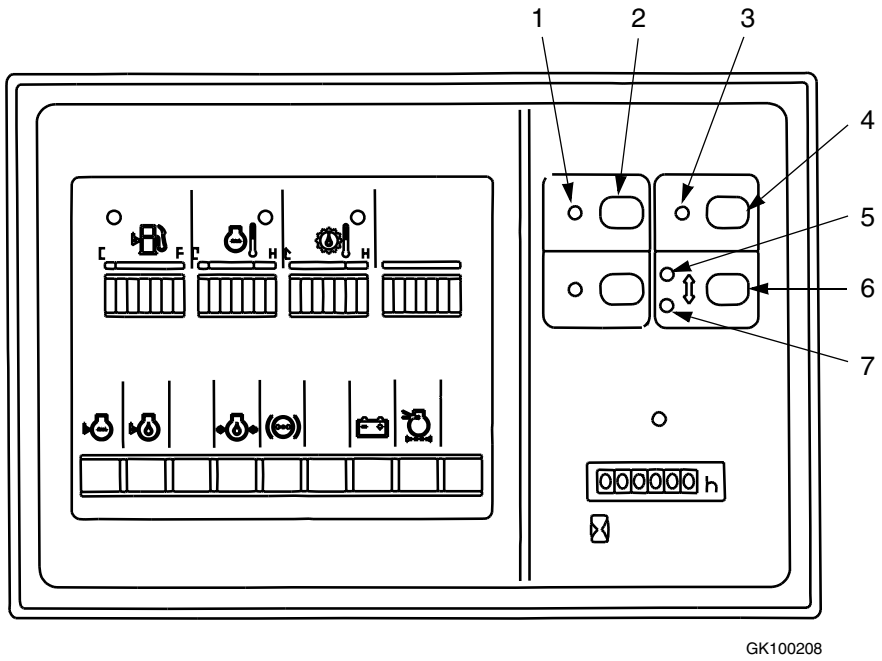
⚠ WARNING

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 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.

7.2. Auto positioning

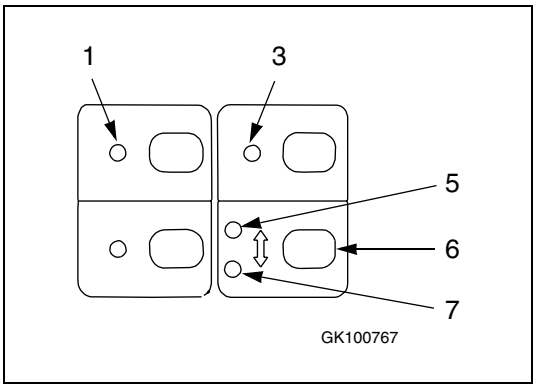
The auto-positioning function enables the position in which the boom is to be held to be pre-selected from the driver's seat and stored. The impact when stopping the boom movement is cushioned.



1 LOWER position control lamp
2 LOWER POSITION button
3 UPPER position control lamp
4 UPPER POSITION button
5 LIFT hold control lamp
6 RAISE/LOWER button
7 LOWER hold control lamp

7.2.1. Auto positioning control

After pressing the RAISE/LOWER select button (6) the control lamps (5 and 7) will illuminate in the following combinations.



Press one time	→	(5) Raise on; (7) Lower off
Press two times	→	(5) Raise off; (7) Lower on
Press three times	→	(5) Raise on; (7) Lower on
Press four times	→	(5) Raise off; (7) Lower off

This enables the auto positioning mode to be configured.

Example: Press selector button (6) 3 times.
The boom automatically moves to the upper and lower hold positions.

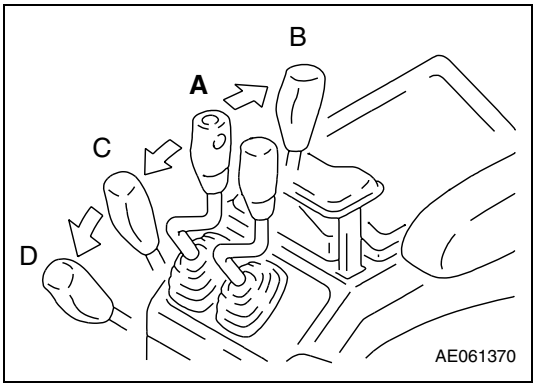
1. The system is switched on by pressing the RAISE/LOWER button (6). The control lamps for the holding points (5 and 7) are illuminated.

2. If the boom control lever is moved from the HOLD (A) position to the RAISE (B) position the boom is raised until it reaches the full lift position. The control lamp (3) for the full lift position illuminates.

   Shortly before the boom reaches its full lift position, it is braked and held at a pre-set position. At the same time the control lever is returned to the HOLD (A) position.

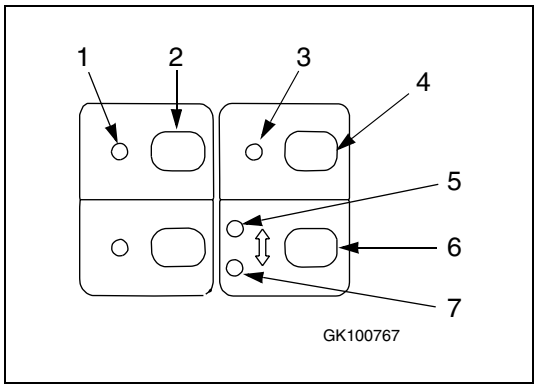
3. If the boom control lever is moved from the HOLD (A) position to the LOWER (C) position the boom is lowered until it reaches the lowest end position. The control lamp (1) for the lower end position illuminates.

   Shortly before the boom reaches its lower end position, it is braked and held at a pre-set position. At the same time the control lever is returned to the HOLD (A) position.



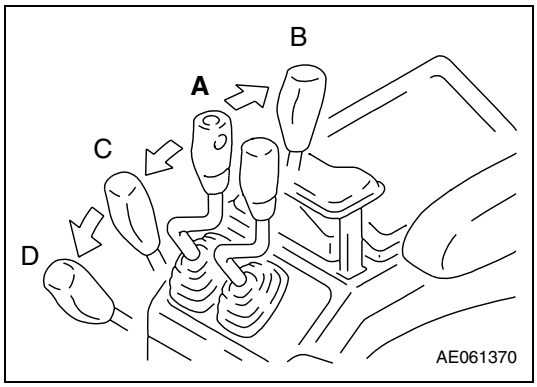
7.2.2. Setting hold points of auto positioning

After pressing the RAISE/LOWER select button (6) the control lamps (5 and 7) will illuminate in the following combinations.



Press one time	→	(5) Raise on; (7) Lower off
Press two times	→	(5) Raise off; (7) Lower on
Press three times	→	(5) Raise on; (7) Lower on
Press four times	→	(5) Raise off; (7) Lower off

Setting boom's upper hold point



1. Press the RAISE/LOWER (6) button several times until the control lamp (5) illuminates.
2. Use the control lever to raise the boom to the desired height while the control lamp (5) is on (higher than horizontal).
3. Then move the control lever to the HOLD (A) position and press the UPPER POSITION (4) button.

   The control lamp (5) goes out and the control lamp (3) at the full lift position will flash for 2.5 seconds.

   If the control lamp (3) goes out and the control lamp (5) goes on again then the position that the boom moved to previously is stored.

Setting boom lower hold point

1. Press the RAISE/LOWER (6) button until the control lamp (7) goes on.
2. Use the control lever to lower the boom to the desired level while the control lamp (7) is on (lower than horizontal).
3. Then move the control lever to the HOLD (A) position and press the LOWER POSITION (2) button.

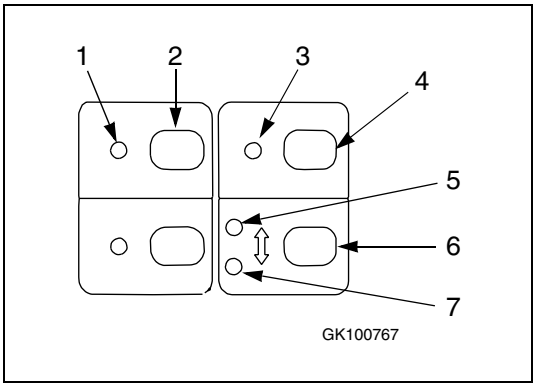
   The control lamp (7) goes out and the control lamp (1) at the lower end position will flash for 2.5 seconds.
4. If the control lamp (1) goes out and the control lamp (7) goes on again then the position that the boom moved to previously is stored.

7.2.3. Auto positioning calibration

Always perform an auto positioning calibration after the working attachment or the potentiometer has been replaced.

1. Use the control lever to raise the boom to the highest position.
2. Once the boom has reached the highest position, press the LOWER POSITION button (2) and the UPPER POSITION button (4) at the same time. Hold the button down for at least three seconds.
3. After the control lamps (1) and (3) have been on for approx. two seconds release the buttons (2) and (4). The calibration function is switched on.

   If the control lamps (1) and (3) go out the calibration is over. The settings are stored.



NOTE

- **If the control lamps (1 and 3) start flashing when step 3 is performed, the potentiometer's output signal is not within the usual measuring range. Where this is the case the potentiometer has to be fastened in a different manner.**
- **After doing so perform steps 1 to 3 again.**
- **If the boom has been replaced or the auto positioning does not function correctly please get in touch with your local Komatsu dealer.**

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