WEAM005900

# Operation & Maintenance Manual

# WH609-1 WH613-1 WH713-1 WH714-1 WH714H-1 WH716-1

## TELESCOPIC HANDLERS

| MODEL | SERIAL NUMBER |
|---|---|
| WH609-1 | 395F60001 and up |
| WH613-1 | 395F60003 and up |
| WH713-1 | 395F70001 and up |
| WH714-1 | 395F70002 and up |
| WH714H-1 | 395F70003 and up |
| WH716-1 | 395F70004 and up |

**WARNING**

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

KOMATSU Utility

# 1.1 FOREWORD

- This manual has been developed by Komatsu Utility in order to supply their customers with all the necessary information on the machine and the safety regulations related to it, as well as with the use and maintenance instructions that enable the operator to exploit the capacity of the machine with optimal results and to keep the machine efficient over time.
- The operation manual, together with the spare parts catalogue, is an integral part of the machine and must accompany it, even when it is resold, until its final disposal.
- The manual must be handled with the greatest care and always kept on board, so that it can be consulted at any moment; it must be placed in the appropriate compartment behind the seat, where also the owner's and registration documents are usually kept.
- This manual must be given to the personnel who have to use the machine and carry out the routine maintenance operations; they must read the contents carefully more than once, in such a way as to clearly understand what are the correct operating conditions and the dangerous conditions that must be avoided.
  In case of loss or damage, request a new copy to Komatsu Utility or your Komatsu Utility Dealer.
- The illustrations contained in this manual may represent machine configurations available on request.
  The machines are constantly upgraded in order to increase their efficiency and reliability; this manual sums up all the information regarding the state of the art at the moment when the machine is launched on the market.
  Consult your Komatsu Utility Dealer for any updated information.
- Punctual periodic annotations regarding the maintenance operations that have been carried out are important to have a clear prospect of the situation and to know exactly what has been done and what has to be done after the next maintenance interval.
  Therefore, it is advisable to consult either the hour meter and the maintenance plan frequently.
- Over the years Komatsu Utility Dealers have gathered considerable experience in customer service.
  If more information is needed, do not hesitate to contact your Komatsu Utility Dealer: he always knows how to get the best performance from the machine, he can suggest the use of the equipment that is most suitable for specific needs and can provide the technical assistance necessary for any change that may be required to conform the machine to the safety standards and traffic rules.
  Furthermore, Komatsu Utility Dealers also ensure their assistance for the supply of Komatsu Utility genuine spare parts, which alone guarantee safety and interchangeability.
- The table included in this manual must be filled in with the machine data, which must always be indicated to the Dealer when requiring assistance and ordering spare parts.

## ⚠ ATTENTION

- **Incorrect use and maintenance of the machine may be hazardous and cause serious injury and even death.**
- **Operators and maintenance personnel must carefully read this manual before using the machine or performing maintenance operations.**
- **Some actions involved in the operation and maintenance of the machine may cause serious injury or even death, if they are not performed in compliance with the instructions given herein.**
- **The procedures and precautions described in this manual are valid for application to the machine only when it is used correctly. If the machine is used for any purpose or in any way other than those described herein, the operator shall be responsible for his own safety and for the safety of any other person involved.**

# 1.2 INFORMATION ON SAFETY

Many accidents are caused by insufficient knowledge of and failure to comply with the safety regulations prescribed for the maintenance operations that must be performed on the machine.
In order to avoid accidents, before starting work and before carrying out any maintenance operation, carefully read and be sure to understand all the information and warnings contained in this manual and given on the plates applied onto the machine.
To identify the messages regarding safety that are included in this manual and written on the machine plates, the following words have been used.

## ⚠ DANGER

- **This word is used in safety messages and on safety labels where there is a high probability of serious injury or death if the hazard is not avoided.**
  **These safety messages or labels usually describe the precautions that must be taken to avoid the hazard.**
  **Failure to take these precautions may also result in serious damage to the machine.**

## ⚠ WARNING

- **This word is used in safety messages and on safety labels to signal a potentially dangerous situation which could result in serious injury or even death.**
  **These safety messages or labels usually describe the precautions that must be taken to avoid the hazard.**
  **Failure to take these precautions may also result in serious damage to the machine.**

## ⚠ ATTENTION

- **This word is used in safety messages and on safety labels to signal hazards which could result in minor or moderate injury or damage.**
  **This kind of warning is used even to signal hazards which may cause damage only to the machine.**

**IMPORTANT**

- **This word is used when precautions are indicated, which must be taken to avoid actions that may shorten the service life of the machine.**

**NOTE**

- **This word is used to indicate a useful piece of information.**

Komatsu Utility cannot reasonably predict every circumstance that might involve a potential hazard during the operation or maintenance of the machine; for this reason, the safety messages included in this manual and applied onto the machine may not include all possible safety precautions.
If all the procedures and operations prescribed for this machine are kept to, you can be sure that the operator and the persons in the vicinity will work in total safety, with no risk of damaging the machine.
In case of doubt regarding the safety measures necessary for some procedures, contact Komatsu Utility or your local Dealer.

## ⚠ DANGER

- **Before starting any maintenance operation, position the machine on a firm and level surface, engage the safety locks of the equipment and the controls, stop the engine and apply the parking brake.**

- **For the sake of clarity, some illustrations contained in this manual may represent the machine without guards.**
  **Do not use the machine without guards and do not start the engine when the engine hood is open, unless this is expressly required for some maintenance operations.**

- **It is strictly forbidden to modify the setting of the hydraulic system safety valves; Komatsu cannot be held liable for any damage to persons, property, or the machine, if the machine has been tampered with by modifying the standard setting of the hydraulic system.**

- **Before carrying out any electrical welding, disconnect the battery, the alternator and the connector of the gearshift unit installed under the steering wheel.**
  **(See «2.8.12 PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR» and «2.8.14 PRECAUTIONS CONCERNING THE GEAR LEVER»).**

- **Install only authorized additional equipment.**

- **The machine can travel on roads only if fitted with homologated equipment; before travelling on roads, make sure that the equipment fitted is homologated and that the safety locks provided are correctly engaged.**

- **Incorrect use of this machine may cause serious injury or death.**
  **Operators and maintenance personnel must read this manual before operating or servicing the machine. This manual must be kept inside the cab for reference and periodically reviewed by the personnel using the machine.**

# 1.3 INTRODUCTION

## 1.3.1 INTENDED USES

The Komatsu Utility TELESCOPIC HANDLERS described in this manual are suitable for operation at temperatures ranging from –16°C to +45°C and for use by operators skilled mainly in the following types of work:

- Lifting and handling of palletized or free loads on even or uneven ground.

**NOTE**
- **Free loads and loads with particular shapes must be secured to the forks or to the lifting equipment.**

Through the application of approved optional attachments, the machine can also be used for:

- loading work
- handling loose material (cereals, sand, gravel, etc.) with STANDARD BUCKET or 4 IN 1 BUCKET.
- handling piles, trees, etc. with specific forks.

## 1.3.2 IMPROPER OR UNAUTHORIZED USE

**⚠ ATTENTION**

- **This paragraph describes some of the improper or unauthorized uses of the machine; since it is impossible to predict all the possible improper uses, if the machine happens to be used for particular applications, contact your Komatsu Utility Dealer before carrying out the work.**

**IMPORTANT**
- **The instructions regarding the authorized optional equipment are given in the relevant operation and maintenance manuals; if the equipment is supplied by Komatsu Utility, these publications are enclosed to this manual.**
- **The instructions regarding the assembly of the authorized equipment, the controls requiring special machine configurations and the hydraulic couplings necessary for the operation of the equipment are grouped in the final section of this manual.**

The Komatsu Utility TELESCOPIC HANDLERS are designed and built exclusively for handling and transporting inert materials; the following applications are forbidden:

- Use of the machine at temperatures different from those indicated.
- Use of the machine by minors or unexperienced persons.
- Use of the machine by persons under the effect of alcohol, medicines that may affect attention levels, drugs.
- Use of the machine to lift persons or with forks, or pallets or equipment not approved from Komatsu Utility for this specific type of application.
- Use the machine for lifting operations in combination with other machines.
- Transport of people, even if they are in the operator’s cab.
- Transport and lifting of containers containing flammable fluids or fluids that can be considered dangerous without using the apposite retaining equipment (harness).
- Transport and lifting (even if in exceptional cases) of equipment or loose materials that protrude from the forks and are not secured with cables or chains.
- Use of the bucket to drive or extract piles.
- Use of the machine to tow damaged or failed vehicles.
- Use of the machine to lift damaged or failed vehicles.

## 1.3.3 MAIN CHARACTERISTICS

- Simple and easy to use.
- Cab (ROPS/FOPS level 2).
- Servo steering through hydraulic system with priority to steering needs.
  Three steering modes selected with push buttons:
  - Two-wheel steering (compulsory for travelling on roads)
  - Four-wheel steering (round steering)
  - Crab steering
- Selection of the machine operating mode (travel – travel + work - work).
- Gearshift with electronic selection of gears through solenoid actuators and transmission with hydraulic converter; reversal and speed change with controls on a single lever.
- Boom lifting and equipment swinging control with servo lever that makes it possible to modulate the movements in a proportional and continuous way.
- Boom extension with potentiometer acting on a proportional solenoid valve.
- Safety valves for each movement of the cylinders.
- Controls and instrumentation visible form the work position.
- Accelerator pedal.
- Service brakes with foot control acting on the two axles.
- Simplified maintenance with reduced intervals.
- Independent controls for the stabilizers (optional).
- Frame levelling controlled through a water level (spirit level) and a rocker switch control with automatic return to the central position (optional).
- SLI-Safe Load Indicator.
- Axle-frame lock that engages automatically when the boom inclination exceeds approximately 30° (optional).

## 1.3.4 RUNNING-IN

Every machine is scrupulously adjusted and tested before delivery.
A new machine, however, must be used carefully for the first 100 hours, in order to ensure proper running-in of the various components.
Every new machine must be used carefully, paying special attention to the following indications:

- After the start, let the engine idle for 5 minutes, in such a way as to warm it up gradually before actual operation.
- When warming the engine up, carry out some lifting cycles with an average load and extend the boom a few times, so that the hydraulic oil warms up more easily.
- Cover short distances at low speed to warm up the axles and transmission oil.
- Avoid operating the machine reaching the load limits allowed or at high speed.
- Avoid abrupt starts or accelerations, useless sudden decelerations and abrupt reversals, especially when travelling at the maximum speed allowed for each gear.
- After the first 250 hours of operation, besides the maintenance operations to be performed every 250 hours of operation, it is also necessary to:

  1 - Change the transmission filter.

  2 - Change the oil in the differential unit (front and rear axle).

  3 - Change the oil in the final reduction gears (front and rear axle).

  4 - Change the hydraulic circuit oil drain filter.

**SYNTHETIC BIODEGRADABLE OIL TYPE HEES**

On machines in which the synthetic biodegradable oil type HEES is used, the following operations are to be performed together with the standard maintenance operations:

- After the first 250 hours of operation, change the hydraulic circuit drain filter.
- After the first 500 hours of operation, change the hydraulic circuit oil and the intake filter.

**IMPORTANT**

- **When changing the oil filters (cartridges), check their innner part to make sure that there are no deposits.**
  **If abundant deposits are observed, find out what may have caused their accumulation before starting the machine.**
- **The number of operating hours is indicated by the hour meter.**

# 1.4 PRODUCT IDENTIFICATION

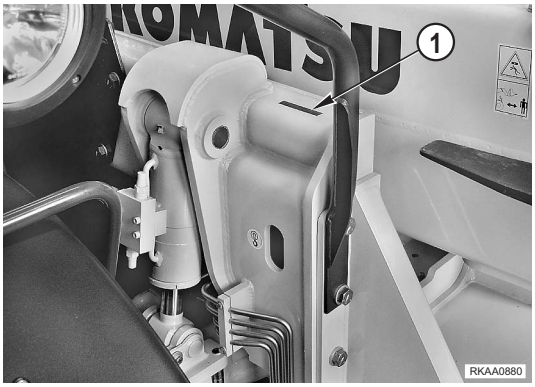
The Komatsu Utility TELESCOPIC HANDLERS and their main components are identified by serial numbers stamped on the identification plates.
The serial number and the identification numbers of the components are the only numbers that must be indicated to the Dealer when requiring assistance and ordering spare parts.

## 1.4.1 MACHINE IDENTIFICATION PLATE AND PRODUCT IDENTIFICATION NUMBER (PIN)

The machine bears the data required by the EC Directives, as well as the Product Identification Number (PIN) (1).

The PIN is:

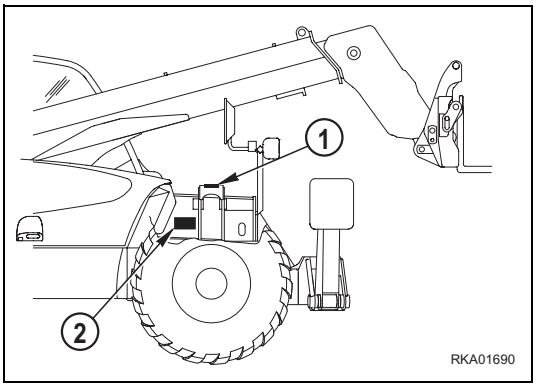
a - stamped on the front right part of the machine.



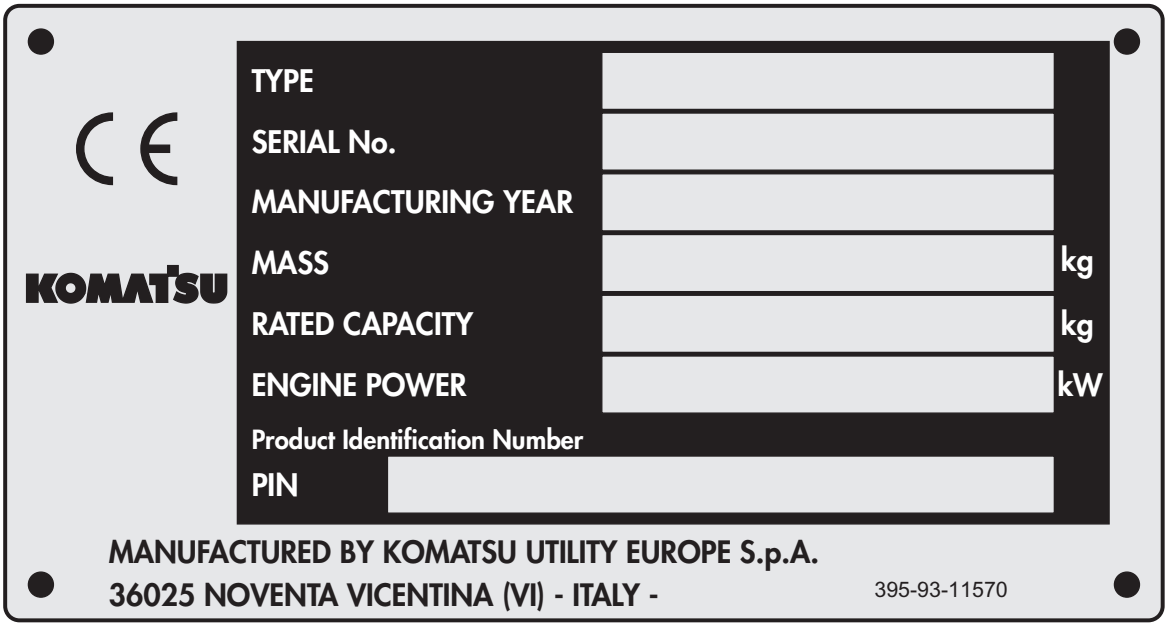

b - indicated on the identification plate as alphanumeric stamping and as a bar code.

The identification plate (2) is fixed to the front right part of the frame, in a protected place, in such a way as to prevent it from getting damaged and becoming illegible.

**NOTE**
- **If the serial number on the plate has been damaged, it can be obtained by separating the last 6 digits of the PIN.**



## 1.4.2 MACHINE IDENTIFICATION PLATE

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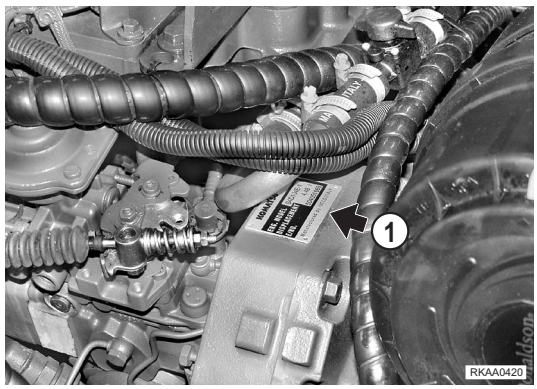
## 1.4.3 ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE

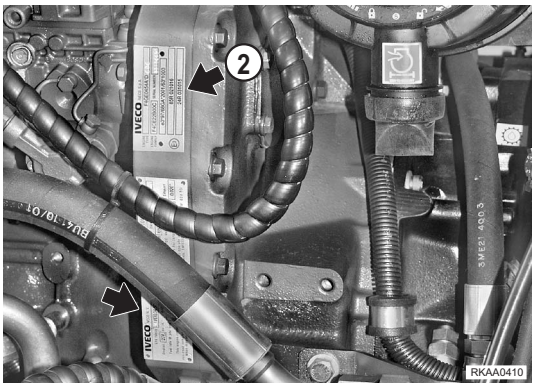
The identification plate (1) is fixed to the timing case and indicates the engine model, total displacement and serial number.
In addition to the Manufacturer's trademark, the identification plate (2) also indicates the following:

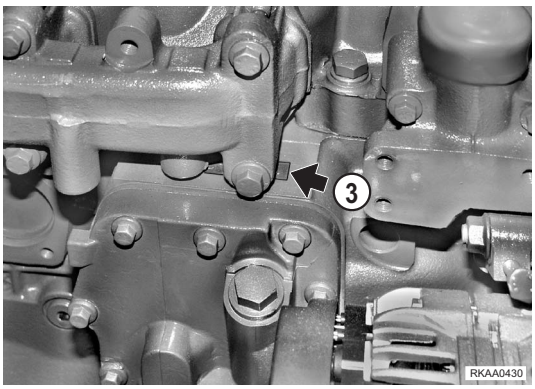
1 - Engine type
2 - Engine Family
3 - Serial no.
4 - EC Type Approval

The serial number (3) is also stamped on the right side of the cylinder block, on the upper part of the oil cooling heat exchanger.

The engine class plate (4) and the engine details (EPA Family, engine model, engine displacement, engine power/RPM, idle speed, quantity of fuel/cycle, valve clearance and U.S.EPA CARB conformity) can be found on the plate positioned below the Manufacturer's plate.
Both plates (2) and (4) are applied to the left side of the timing case.

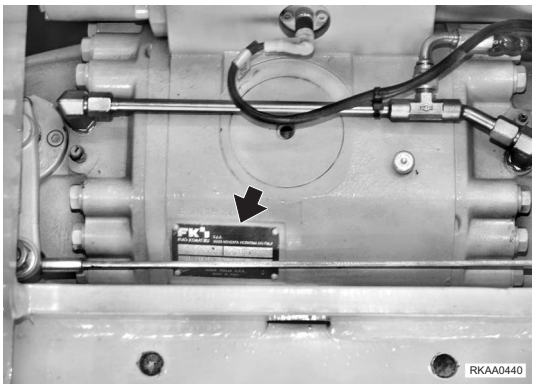


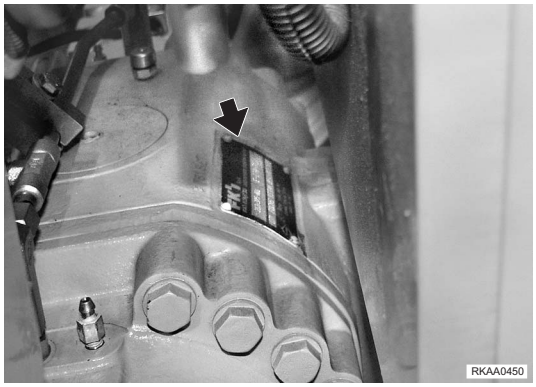

## 1.4.4 FRONT AXLE SERIAL NUMBER

The front axle serial number is stamped on the plate positioned on the central body.



## 1.4.5 REAR AXLE SERIAL NUMBER

The rear axle serial number is stamped on the plate positioned on the central body.




## 1.4.6 TRANSMISSION SERIAL NUMBER

The transmission serial number is stamped on the plate positioned on the transmission case, on the engine coupling side.


## 1.4.7 CAB SERIAL NUMBER

The cab serial number is stamped on the plate positioned on the front right base crosspiece.

## 1.4.8 SERIAL NUMBERS AND DEALER'S ADDRESS

Machine No. _____ Model _____

Product identification number (PIN) _____

Engine No. _____

Front axle No. _____

Rear axle No. _____

Transmission No. _____

Cab No. _____

Optional equipment: _____

_____

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Dealer:

_____

_____

_____

_____

Address: _____

_____

_____ Tel. _____

Contact person: _____

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NOTES: _____

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## DESCRIPTION AND OPERATION OF THE MACHINE

## MAINTENANCE

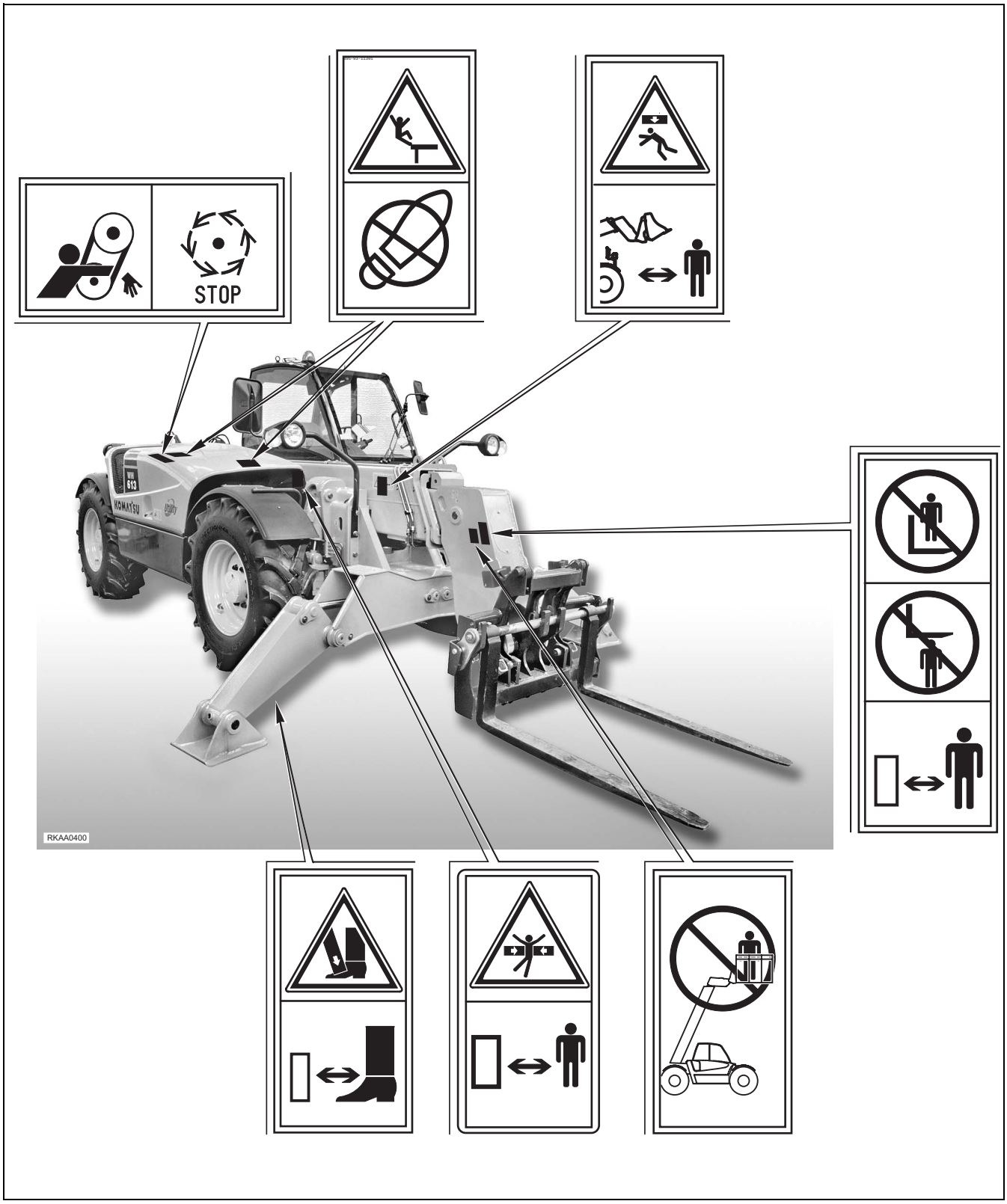
## TECHNICAL DATA

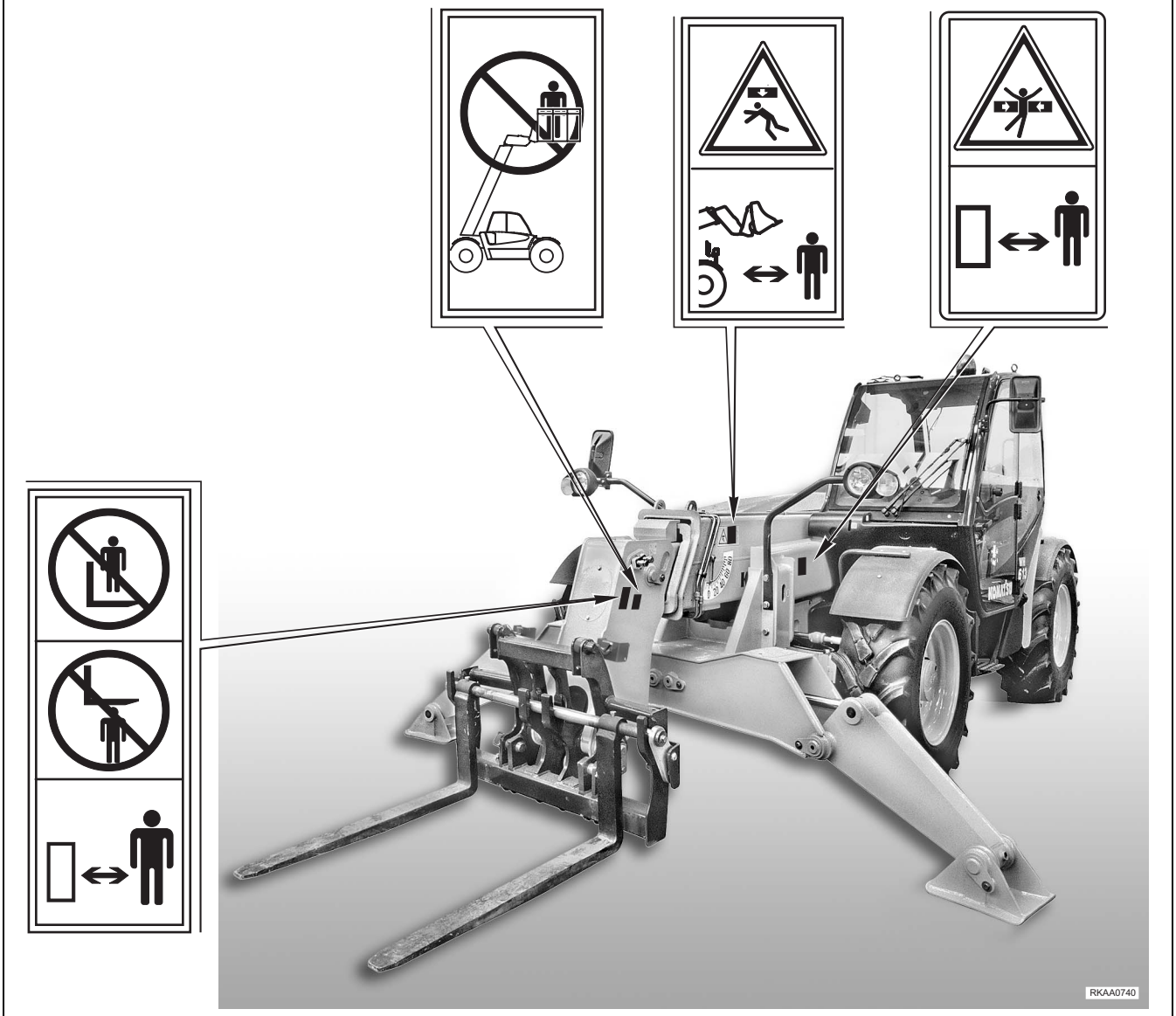
# SAFETY DEVICES AND ACCIDENT-PREVENTION MEASURES

# 2.1 SAFETY, NOISE AND VIBRATION PLATES

## 2.1.1 POSITION OF THE SAFETY PLATES

- The safety plates must always be legible and in good conditions; for this reason, if they are dirty with dust, oil or grease, it is necessary to clean them with a solution made of water and detergent.
  Do not use fuel, petrol or solvents.
- If the plates are damaged, ask for new ones to Komatsu Utility or to your Komatsu Utility Dealer.
- In case of replacement of a component provided with a safety plate, make sure that this plate is applied also to the new piece.
- The machine can be provided with other plates in addition to those indicated below: keep also to the instructions given in the additional plates, in any case.


STOP
KOMATSU
RKAA0400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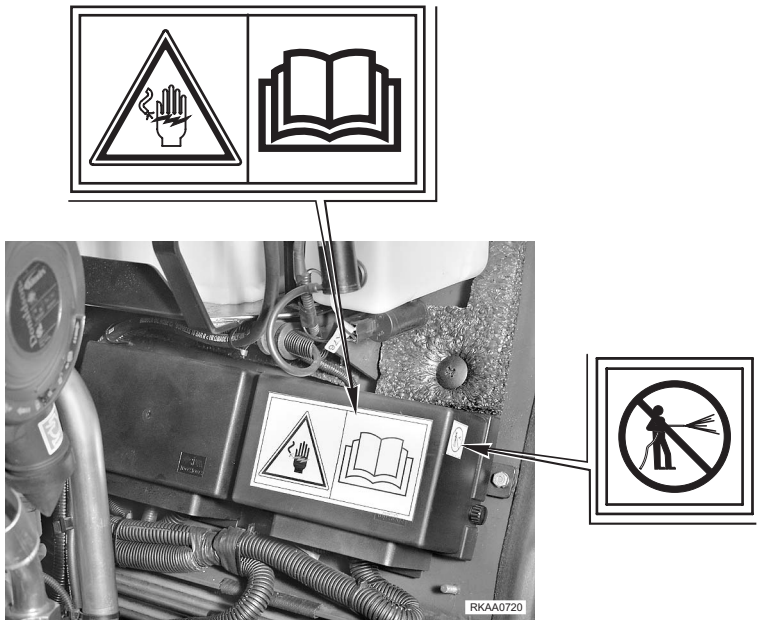

RKAA0720


RKAA0710

## 2.1.2 PICTOGRAMS AND RELEVANT MEANINGS

The warning and danger signs applied onto the machine are accompanied by or illustrated through pictograms. The personnel in charge with handling and maintenance operations must know the symbols contained in the pictograms perfectly; the symbols and the relevant meanings are explained in the following list.

### WORK AREA

- Do not stand within the operating range of the equipment when it is lifted and loaded.


RKA00150

### DO NOT OPEN THE HOOD

- Do not open or remove the hood while the engine is running.


RKA00140

### CONSULT THE MANUAL

- Carefully read the contents of the manual before using the machine or performing maintenance operations.


RKA00130

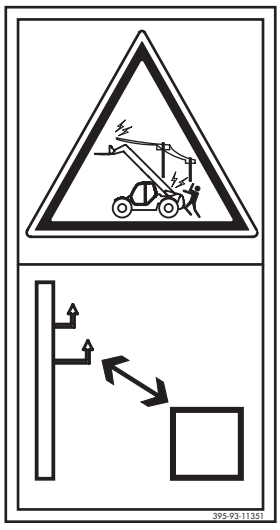
## SAFETY DISTANCE

- Do not get near or stand within the machine operating area.


RKA00160


RKA01670

## RISK OF ELECTROCUTION

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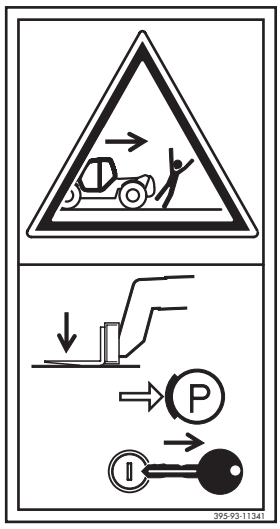
## BEFORE LEAVING THE WORK POSITION




RKA00180

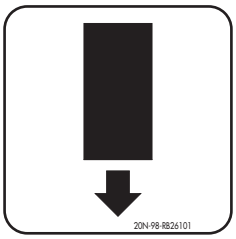
## DO NOT CLIMB ON THE ENGINE HOOD


RKA00700

## RISK OF CRUSHING

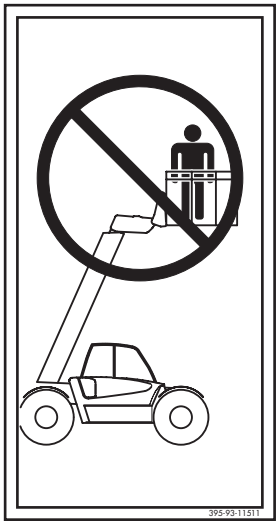

RKA00690

## EMERGENCY EXIT



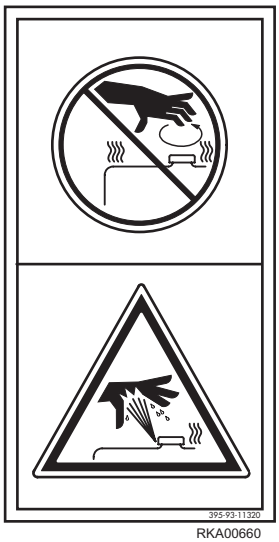

RKA00520

## DO NOT USE AS A PLATFORM



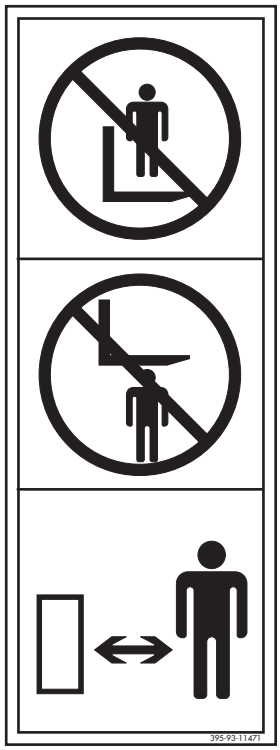

RKA00790

## DO NOT OPEN THE RADIATOR AND THE HYDRAULIC OIL TANK WHEN THE ENGINE IS HOT




RKA00660

## KEEP AT A SAFETY DISTANCE FROM THE EQUIPMENT – DO NOT CLIMB ON THE FORKS, NOR STAND UNDER THEM



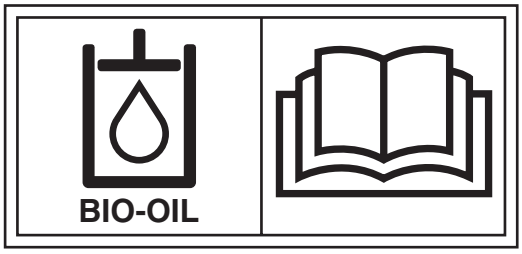

RKA00770

## DO NOT WASH THE ENGINE CENTRAL UNIT WITH HIGH-PRESSURE JETS


RKA00780

## FILLING THE HYDRAULIC SYSTEM WITH OIL

- **Only for machines in which synthetic biodegradable oil type HEES is used.**

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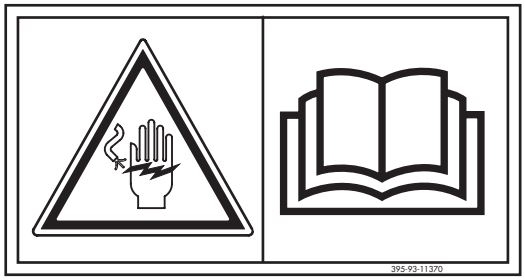
## PRECAUTIONS TO BE TAKEN WHEN HANDLING THE BATTERY

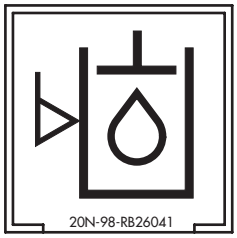



RKA00680

## HYDRAULIC OIL TOPPING UP


RWA00620

## HYDRAULIC OIL LEVEL




RKA00560

## HYDRAULIC OIL FILTER


RKA00550

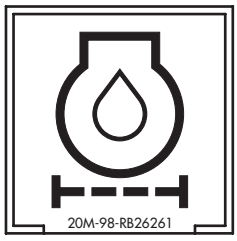
## REFUELLING


RWA00610

## FUEL FILTER

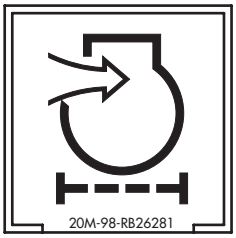

RWA00590

## ENGINE LUBRICATING OIL FILTER



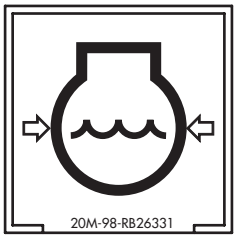

RWA00600

## ENGINE INTAKE FILTER



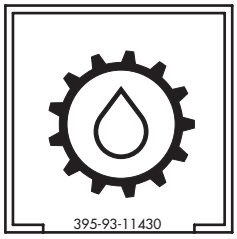

RWA00580

## ENGINE COOLANT PRESSURE



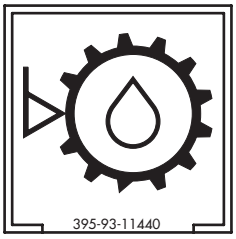

RKA00570

## TRANSMISSION OIL TOPPING UP




RWA00730

## TRANSMISSION OIL LEVEL

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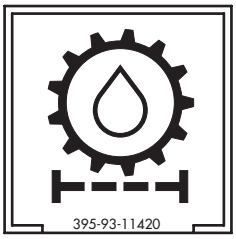
## TRANSMISSION OIL FILTER

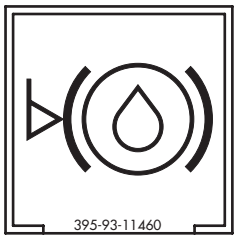



RWA00720

## BRAKE OIL TOPPING UP

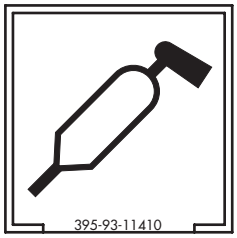

RWA00750

## BRAKE OIL LEVEL




RWA00760

## LUBRICATION POINTS

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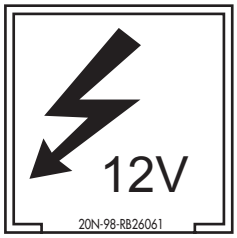
## POWER OUTLET

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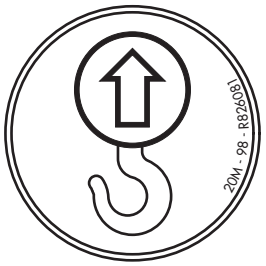
## ANCHORING POINT FOR TRANSPORT AND LIFTING OPERATIONS




RKA00530

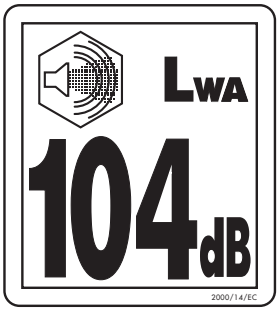
## 2.1.3 POSITION OF THE NOISE PLATES


- The noise plates must always be legible and in good conditions; for this reason, if they are dirty with dust, oil or grease, it is necessary to clean them with a solution made of water and detergent.
  Do not use fuel, petrol or solvents.
- If the plates are damaged, ask for new ones to Komatsu Utility or to your Komatsu Utility Dealer.
- In case of replacement of the cab door to which the noise plates are fixed, make sure that the plates are applied also to the new door.

## NOISE OUTSIDE THE CAB

- This value indicates the noise level outside the machine and refers to the noise perceived by the persons who are in the vicinity of the work area.

**WH609 - WH613**

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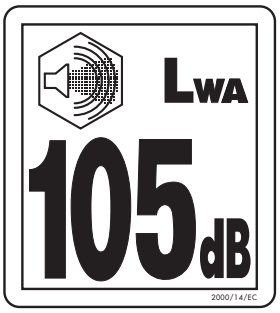
**WH713 - WH714 - WH714H - WH716**




RKA02470

## NOISE INSIDE THE CAB

- This value indicates the maximum noise level perceived by the operator’s ears inside the cab when this is completely closed.


RKA00190

# 2.2 GENERAL PRECAUTIONS

## 2.2.1 GENERAL SAFETY RULES

- Only trained and authorized personnel can use the machine and perform maintenance operations.
- When using the machine or performing maintenance operations, follow all the applicable safety rules, the precautions and the instructions indicated herein.
- When working with other operators or when the work site is often occupied by other operators, make sure that everyone knows and understands all the agreed signals (sound or light signals) and, in any case, that everyone works in such a way as to be able to see the machine and to be visible to the operator.

## 2.2.2 SAFETY DEVICES AND GUARDS

- Make sure that all the guards and covers are in the correct position. If they are damaged, replace or repair them immediately. Do not use the machine without guards, nor remove the guards when the engine is running.
- Always use the safety locks provided to secure the machine when parking or when removing/installing the equipment.
- When using the machine, always fasten the safety belt.
- For the safety devices, see «3.5.8 SAFETY BELT».
- Do not remove the safety devices and always keep them in good operating conditions.
- Carry out the prescribed functional checks, respecting the indicated intervals.
- Improper use of the safety devices may result in serious injury or even death.

## 2.2.3 CLOTHING AND PERSONAL PROTECTION ITEMS

- Do not wear large or loose clothes, rings and watches and do not go near the machine with loose long hair, since they can get entagled in the moving parts of the machine and cause serious injury and damage.
  Avoid also wearing clothes dirty with oil or fuel, since they are flammable.
- When using the machine or performing maintenance operations, wear a hard hat, goggles, safety shoes, mask, gloves and earmuffs.
- Always wear safety goggles, a hard hat and heavy gloves if your job involves scattering metal chips or minute materials; these precautions are particularly useful when driving the equipment connection pins with a hammer and when blowing compressed air (max. 2 bars) into the air filter and the radiator to clean them .
  During these operations, make also sure that no one is standing or working near the machine without the necessary protections.
- When working for 8 hours with a noise level exceeding 90 dBA, it is necessary to use earmuffs or ear plugs and to be particularly careful, especially at the end of the work shift.

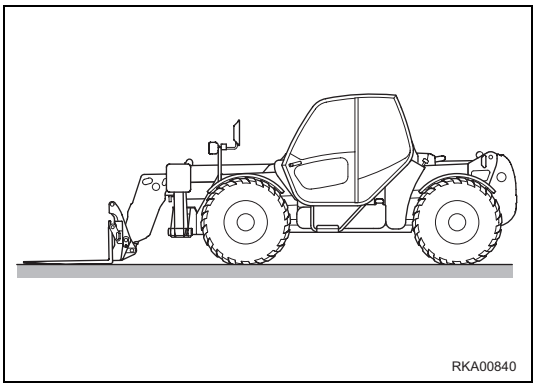
## 2.2.4 UNAUTHORIZED MODIFICATIONS

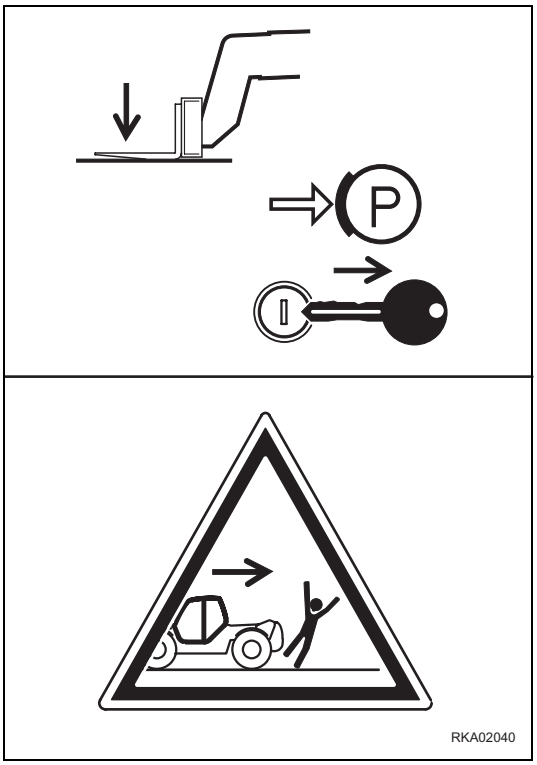
- Any modifications made without the authorization of Komatsu Utility can involve hazards.
- Before making a modification, consult your Komatsu Utility Dealer. Komatsu Utility declines any responsibility for injury or damage caused by unauthorized modifications.

## 2.2.5 LEAVING THE OPERATOR'S SEAT

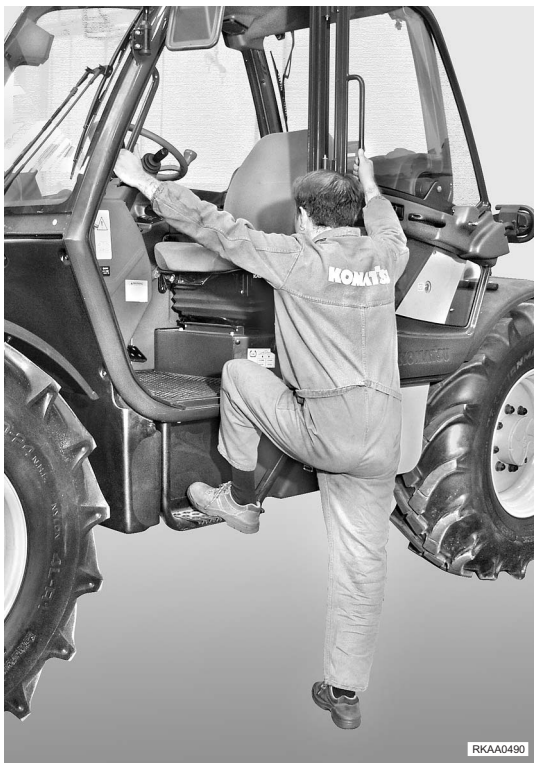
- When leaving the operator's seat, even if for a short time, make sure that the machine is in a safe position.
  (See «3.7 PARKING THE MACHINE»).
- Before leaving the operator's seat, carry out the following operations in the sequence indicated below:
  1 - Lower the equipment to the ground.
  2 - Apply the parking brake.
  3 - Shift the gearshift-reverse lever to the neutral position.
  4 - Stop the engine. (See «3.8 STOPPING THE ENGINE»).

If you have to go so far away that you will not be able to see the machine, remove the ignition key and lock the cab.



## 2.2.6 GETTING ON AND OFF THE MACHINE




- Do not jump on or off the machine when it is at rest, nor when it is moving.
- When getting on or off the machine, always use the handles and the safety ladders; get on and off the machine very carefully.
- Do not hold, nor rest on the steering wheel or the gearshift lever.
- When getting on and off the machine, always maintain three points of contact (holding or resting points), in order to avoid losing your balance and falling down.
- Tighten the ladder connection screws if they are loose and clean the handles and the steps if they are dirty with oil or grease.
  Carefully clean the cab floor if it is dirty with oil, grease, mud or rubble.

## 2.2.7 CHECKING THE REAR-VIEW MIRRORS



- Working without checking the back of the machine is dangerous, since the machine may hit persons who are incautiously standing in the work area, fixed obstacles or manoeuvring vehicles.
- Make sure that the rear-view mirrors are clean and correcly positioned; they must allow the operator to see the rear of the machine with no need to move his trunk with respect to the normal work position.
- If the rear-view mirrors should move or break during work, stop the machine immediately and fasten or change them.

## 2.2.8 PREVENTING FIRES DUE TO FUEL AND OIL

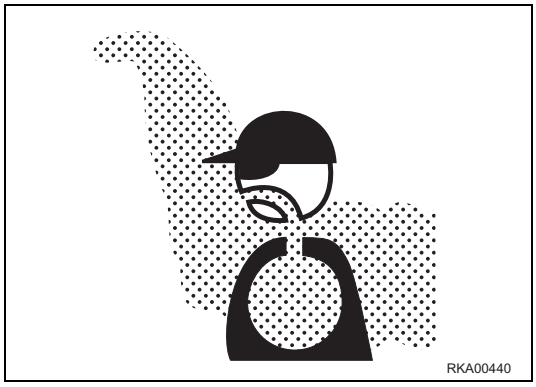

Fuel, oil and some types of antifreeze can be easily ignited if they get in contact with a flame. Fuel is flammable and therefore very dangerous.

- Keep any naked flame away from flammable fluids.
- Stop the engine and do not smoke when refuelling.
- Top up with fuel and oil only after stopping the engine and in well ventilated areas.
- Top up with fuel and oil in a well delimited area and do not allow unauthorized persons to approach.
- When refuelling, hold the fuel gun firmly and keep it constantly in contact with the filler until you have finished, in order to avoid any accidental leakage and spilling of fuel.
- After topping up, tighten the fuel and oil safety caps securely.
- Do not fill the tank completely, in order to leave room for the fuel to expand.
- In case some fuel is spilled, wipe it up immediately.

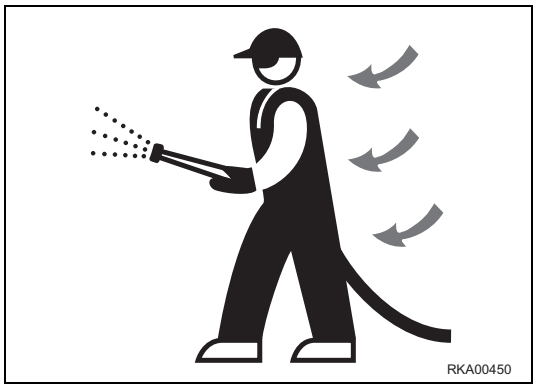

## 2.2.9 PREVENTING BURNS


- If the engine coolant, the engine oil and the hydraulic oil are hot, use heavy cloths and wear gloves, heavy clothing and safety goggles before carrying out any check or touching the hot parts.
- Before checking the coolant level, stop the engine and let the fluid cool down to a temperature below 42°C.
  If a check is necessary due to the overheating of the engine, loosen the radiator plug slowly, to release any residual pressure before removing it. The hot fluid contained therein may spurt out and cause serious burns.
- Before checking the engine oil and hydraulic circuit oil level, stop the engine and let the oil cool down. The hot oil contained in the tanks may be sprayed out and cause serious burns.

## 2.2.10 PREVENTING DAMAGE DUE TO ASBESTOS POWDER




- Asbestos powder can be hazardous to health if it is inhaled.
- If you handle materials containing asbestos fibers, keep to the instructions given below:
  1 - **Do not use compressed air, but only exhaust fans** to clean the machine, and make sure that the room in which you are working is properly ventilated.
  2 - Use low-pressure water to abate dust when cleaning.
  3 - If there is danger that there may be asbestos powder in the air, operate the machine with the wind to your back whenever possible.
  4 - Even if the cab provides suitable protection, use an approved and homologated respirator.
  5 - The powder gathered during the cleaning operations must be wet and put in a sealed and marked container, so that it can be safely disposed of according to the regulations in force.

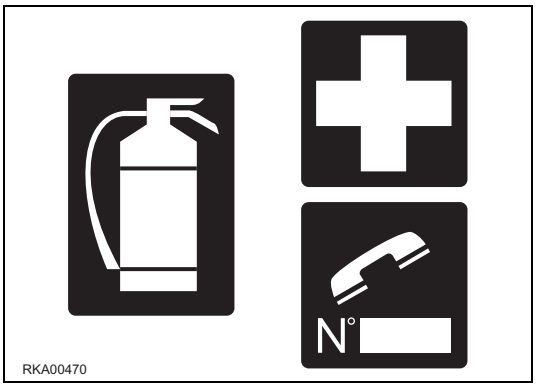



## 2.2.11 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT


- Do not stand within the operating radius of the work equipment, even if the operator is on board the machine and the engine is running.
- Do not stand, nor work, nor adjust the load under the lifted boom, unless a support stand has been positioned under the boom.

## 2.2.12 FIRE EXTINGUISHERS AND FIRST AID KIT

- Make sure that fire extinguishers have been provided and check their position in the work site.
- Periodically make sure that the fire extinguishers are loaded and that you know how to use them.
- It is necessary to know what to do in case of fire.
- Find out where the first aid kit has been located.
- Periodically make sure that the first aid kit contains the necessary disinfectants, bandages, medicines, etc.
- Make sure that you have the phone numbers of the persons or structures you may need to contact in case of emergency at hand (both at the work site and where maintenance operations are performed).




## 2.2.13 PRECAUTIONS CONCERNING THE CAB STRUCTURE

- If the cab is inadvertently hit or the machine overturns during work, the cab may be damaged with consequent reduction of its stiffness and of the safety that must be guaranteed to the operator.
  Contact Komatsu Utility or a Komatsu Utility Dealer to have the cab structure and resistance checked in case of impact or damage.

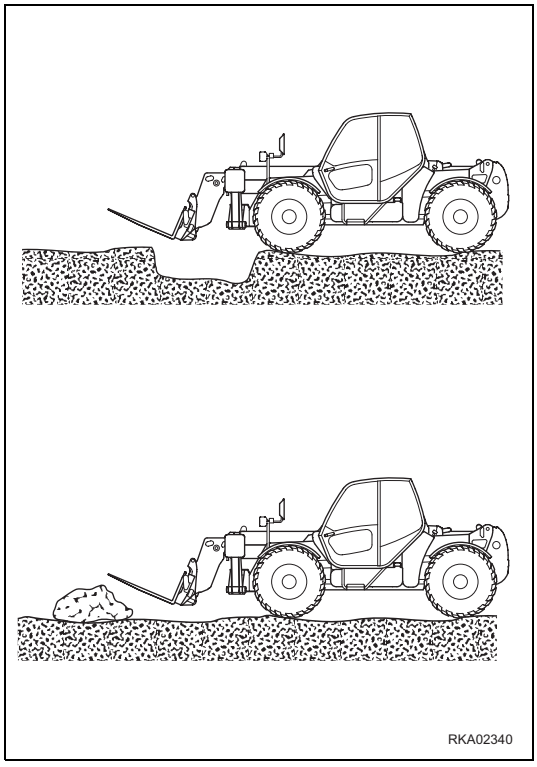
## 2.2.14 PRECAUTIONS CONCERNING THE EQUIPMENT

- When installing and using optional equipment, carefully read the relevant instruction manual and keep to the indications given therein.
- Do not use optional or special equipment without the authorization of Komatsu Utility or the Komatsu Utility Dealer.
  The installation and use of unauthorized equipment may create safety problems and adversely affect the efficiency and service life of the machine.
- Komatsu Utility cannot be held liable for any injury, accident, product failure resulting from the installation and use of unauthorized equipment.

# 2.3 PRECAUTIONS TO BE TAKEN BEFORE STARTING WORK

## 2.3.1 SAFETY ON THE WORKSITE

- Before starting a new work, carefully check if there are holes, depressions, obstacles, yielding areas, deep mud, still water, wet points or slippery surfaces, and to do this ask the help of the supervisor or the site coordinator.
  If one or more of the problems listed above can be observed, it is necessary to level the ground, reclaim the yielding areas and remove the objects that may cause tyre punctures.
- Check the conditions of the ground at the work site and before starting the engine define the work plan and the best and safest operating procedure.
- In case of work on roads, protect pedestrians and cars by designating a person for work site traffic duty and install fences around the work site.
- Proceed very slowly when getting near crossroads.
- Avoid crossing overhead rails, grooves, pavements, traffic dividers or ditches.
  If these obstacles cannot be avoided, be very careful and lower the speed as much as possible.
- If it is necessary to cross rivers, check the depth of the water and the force and direction of the current.


RKA02340

## 2.3.2 FIRE PREVENTION

- Completely remove all wood chips, rubbish, paper and other flammable materials that may have accumulated inside the engine compartment and on the radiator, since they can cause fires.
- Check the fuel and hydraulic system pipes for leaks and if necessary repair them.
  Wipe up any excess oil, fuel or other flammable fluids.
- Make sure that fire extinguishers are available in the work area.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## 2.3.3 PRECAUTIONS CONCERNING THE DRIVING POSITION

- Do not keep objects or tools in the operator's cab. They may hinder the application of the brakes and cause serious accidents.
- Keep the cab floor and the controls (pedals, steering wheel and levers) clean, by removing any trace of oil and grease and, as far as the floor is concerned, remove any excess dirt (earth, stones, etc.).
- Check the safety belt and change it if it is broken or damaged.
  Replace any component only with homologated parts available at Komatsu Utility or its Dealers.

## 2.3.4 ROOM VENTILATION

- Before starting the machine in confined or poorly ventilated places, provide for proper ventilation or connect the engine exhaust pipe to a suction duct.
  The engine exhaust gases can be deadly.


## 2.3.5 PRECAUTIONS CONCERNING THE LIGHTS

- Remove any trace of dirt from the lights, in such a way as to ensure perfect visibility on the work area.
- Make sure that the lights for road circulation, the stoplights, the direction indicators and the work lights are functioning properly; if necessary, replace any faulty bulbs with new ones, making sure that the power is correct.

## 2.3.6 CLEANING THE WINDOWS AND THE REAR-VIEW MIRRORS- CHECKING THE WINDSHIELD WIPER BLADES

- Remove any trace of dirt from the cab windows and clean the rear-view mirrors, in order to ensure perfect visibility on the work area.
- Adjust the rear-view mirrors that may have moved, so that the operator seated in the driving position can clearly see the area behind the machine.
  Replace any damaged windows or rear-view mirrors with new ones.
- Check the conditions of the windshield wiper blades; the scraping wire must be smooth, with no indentations and attached to the rubber back of the blade.
  In case of doubts on the efficiency of the scraping wire, change the blades.

# 2.4 PRECAUTIONS TO BE TAKEN DURING WORK

## 2.4.1 WHEN STARTING THE ENGINE

- Before getting on the cab, walk around the machine and check if there are leakages (fuel, engine coolant, oil), damage to the cab, lights and indicators, loose screws, damaged tyres, etc.
- Make sure that there are no people or obstacles along the trajectory of the machine.
- Get on the cab and make sure that there is no warning plate signalling that the machine cannot be started.
- Make sure that the parking brake has been applied.
- Make sure that the gearshift-reverse lever is in neutral (N).
- Turn the ignition key until it makes a first click and check the correct operation of the indicator lights for machine lights, direction indicators, horn, alarms and Sli-safe Load Indicator (see «3.2.5 MACHINE CONTROLS» pos. 7 - SLI-SAFE LOAD INDICATOR).
- Adjust the position of the seat, considering that the ideal position for the operator is when he is seated with his back resting on the backrest and at the same time he can press the brake pedal completely.
- Adjust the rear-view mirrors.
- Fasten the safety belt and adjust its length, if necessary.
- Do not allow anyone to get on the machine or enter the cab.
- Start the engine (see «3.6.2 STARTING THE ENGINE») and warn the persons in the vicinity by sounding the horn.
- Turn the steering wheel in both directions and check the movements of the front wheels.

## 2.4.2 RULES FOR TRAVELLING ON ROADS

- Before travelling on roads, it is necessary to study and plan the route, checking the road width, the presence of tight curves, the bearing capacity of the bridges, the presence of ditches or of excavations filled with earth that isn't well compacted, etc.
- To travel on roads it is necessary to remove or fold and secure the forks and to place the lifting equipment in a safe position (see «3.12.7 PREPARING THE MACHINE FOR TRAVELLING ON ROADS»).
- If the machine is fitted with a loader and this protrudes from the machine outline, beside the teeth guards it will also be necessary to apply specific warning signs to indicate this condition, as required (in some countries) by the traffic regulations.
- When it is necessary to travel on roads, proceed as follows:

  1 - Level the frame.

  2- Select the TRAVEL operating mode (see «3.2.5 MACHINE CONTROLS» pos. 3 - OPERATING MODE SELECTION UNIT).

  3 - Fold the front loader or the equipment-carrier completely, then raise the side stabilizers.

  4 - If the machine is fitted with the front loader, apply the teeth guard.

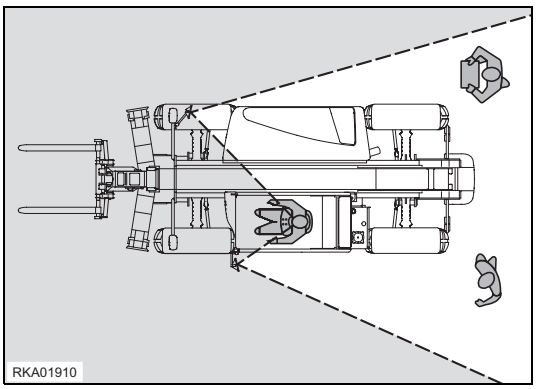
  5 - Lift the telescopic boom until the distance between the lowest point of the boom and the ground is approximately 30 cm.

  6 - Make sure that the work lights are off or at least covered by a screen.

  7 - If required by the traffic regulations, operate the revolving light.

  8 - Strictly respect the traffic regulations in force.

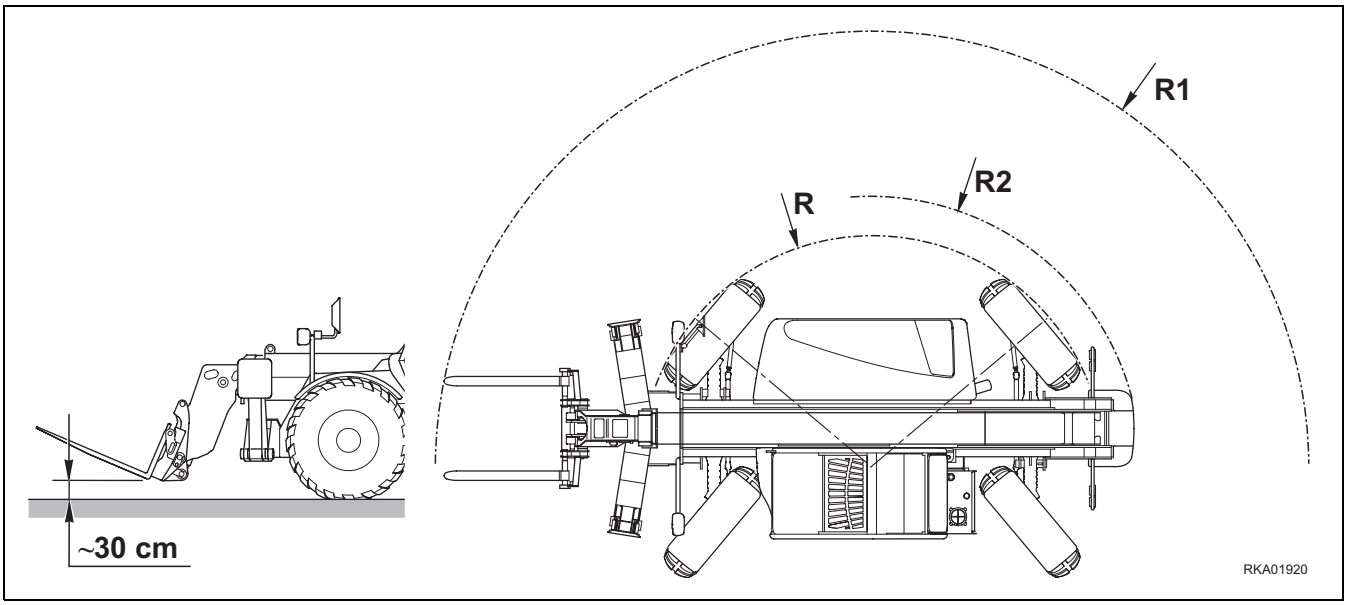
## 2.4.3 CHECKS FOR TRAVELLING IN REVERSE.




- When operating in areas that may be hazardous or have poor visibility, designate a person to direct the movements of the machine and traffic on the work site.
- Make sure that no unauthorized person is standing in the area or in the machine trajectory.
  If necessary, erect suitable fencing.
- Before moving the machine, warn the persons in the vicinity by sounding the horn.
- There are blind spots behind the machine, which cannot be seen and where someone may be standing: therefore, it is necessary to make sure that there is no one behind the machine before travelling in reverse.

## 2.4.4 MOVING THE MACHINE

- The machine must always be moved with the telescopic boom completely retracted and the equipment lowered until their distance from the ground is approximately 30 cm.
- The machine must travel with the frame in horizontal positions, in such a way as to be able to stand any inclination due to the unevenness of the ground.
- When turning, make sure that there is a suitable distance between the machine and any wall or obstacle; when the machine is steering, in fact, **the front equipment** (and therefore the load) (**R1**) **and the rear part** (**R2**) **of the machine** protrude beyond the trajectory of the wheels (**R**).
- When travelling with the TRAVEL-WORK mode selected, absolutely avoid lifting or extending the boom; this applies both when the machine is loaded and when it carries no load.
- When travelling, always raise the stabilizers, if provided.
- Always travel at low speed, in particular on uneven, wet or irregularly compacted ground; if one of the wheels travels over an obstacle or gets into a hole in the ground, there is a serious risk of machine overturning.
  In these cases, travel very slowly and carefully while passing over the obstacle.



## 2.4.5 MOVING ON SLOPES

- Before travelling on inclined surfaces, besides taking all the preacautions recommended for travelling on horizontal surfaces, it is also necessary to carry out some checks that are fundamental for the safety and stability of the machine. In particular:

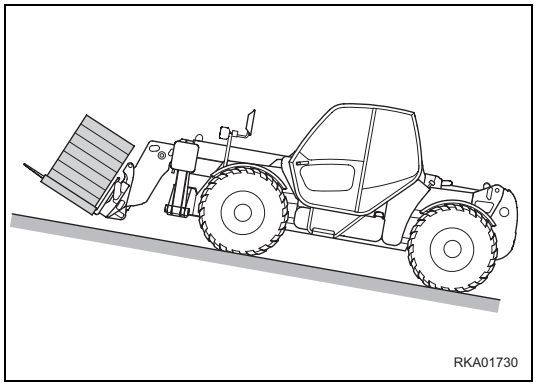
1 - Check the fuel level in the tank; since the machine is going to travel in inclined position, the engine may suck air and stop abruptly, which represents a risk for the operator and for anyone standing in front of the machine.
If the engine stops abruptly, apply the parking brakes and immediately contact your Komatsu Utility Dealer.

2 - Check the tyre inflation pressure; excessively low pressure may increase the bending of the tyre sidewalls and in limit conditions cause the tyres to slip.

3 - Check the area and in particular check if there are grass, layers of leaves, or recent excavations, since in these conditions the machine may run the risk of slipping or overturning.

4 - Check the weather conditions, since fog, rain or wind may cause the machine to slip or overturn (See «2.4.8 WORKING IN WINDY WEATHER CONDITIONS»).

- For movements that are perpendicular to the slope, the load must be directed upwards.
- Do not change direction on slopes and, if possible, avoid travelling obliquely; if possible, move laterally at the foot or at the top of the slope.
- Do not move laterally or obliquely if the gradient exceeds 10°.
- Do not travel downhill with the machine in neutral; in this condition it is easy to lose control of the machine and to cause serious injury and even death.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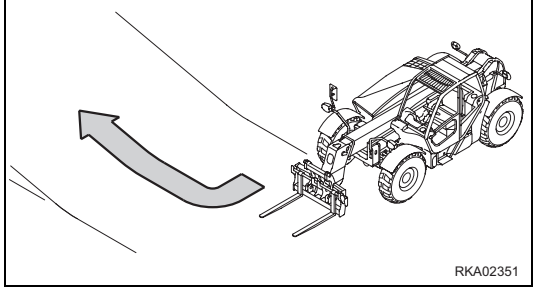
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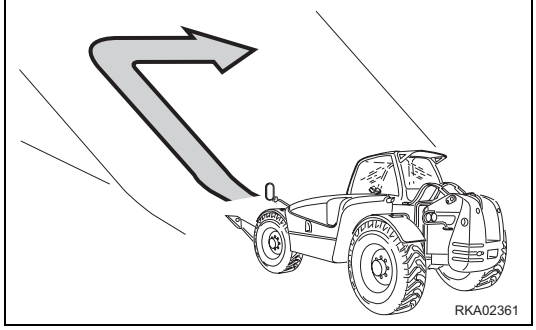
**WRONG**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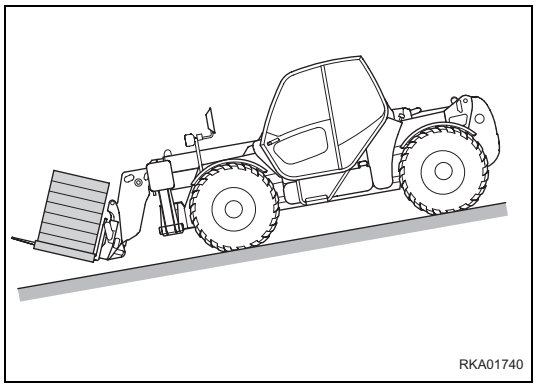
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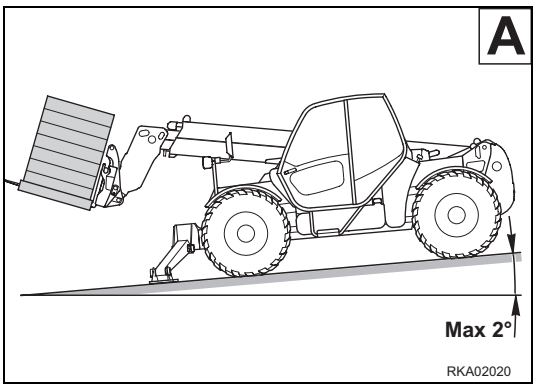
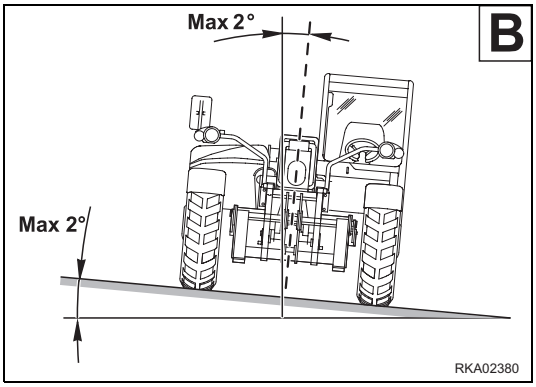
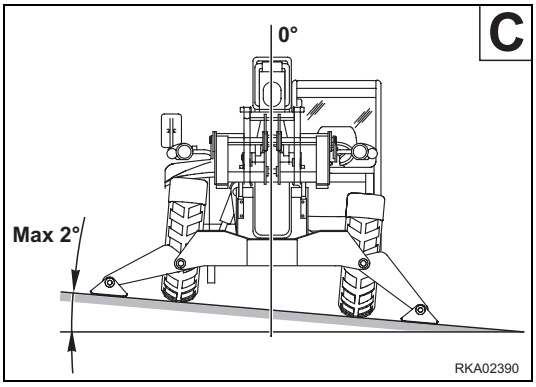
## 2.4.6 WORKING ON SLOPES

The use of the machine on slopes must be regulated as follows:

- **Wheeled machine without frame levelling system and stabilizers:** max. longitudinal and transversal inclination 2° (A - B).
- **Machine with frame levelling system and stabilizers:** transversal inclination 0°; longitudinal inclination max. 2° (C - A).

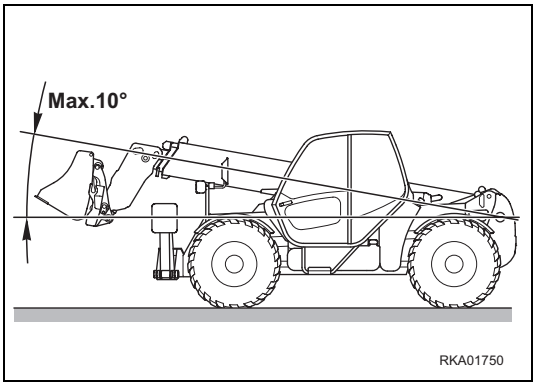



## 2.4.7 UNAUTHORIZED OPERATIONS

- Do not use the machine equipped **with front loader** to remove soil when the inclination of the boom exceeds 10°, since this may overload the rear axle and the transmission.



## 2.4.8 WORKING IN WINDY WEATHER CONDITIONS

**⚠ DANGER**

- **Do not use the machine to lift large loads when the weather is windy.**
  **If the wind reaches degree 5 on the Beaufort scale (on dry land) and the boom must be extended as much as possible, the resulting sail effect may cause the overturning of the machine. DO NOT USE the machine if the wind reaches or exceeds the limit indicated above.**

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- The table below can be used to determine the maximum wind allowed with reference to a surface of less than 1 m² for each ton lifted; if the exposed surface is larger than 1 m²/ton, interrupt work.

**WIND FORCE TABLE (THE BEAUFORT SCALE)**

| Intensity of the wind | | Speed | | Effects |
|---|---|---|---|---|
| **Force** | **Description** | **m/sec** | **km/h** | **Land based specification** |
| **0** | Calm | 0–0.2 | 1 | Smoke raises vertically |
| **1** | Light air | 0.3–1.5 | 1–5 | Direction of wind shown by smoke drift, but not by wind vanes |
| **2** | Light breeze | 1.6–3.3 | 6–11 | Leaves rustle, ordinary vanes moved by wind |
| **3** | Gentle breeze | 3.4–5.4 | 12–19 | Leaves and small twigs in constant motion; wind extends light flags |
| **4** | Moderate breeze | 5.5–7.9 | 20–28 | Dust and paper sheets are raised, twigs and small branches move |
| **5** | Fresh breeze | 8–10.7 | 29–38 | Small trees sway, water ripples. |

## 2.4.9 MAIN OPERATING MODES

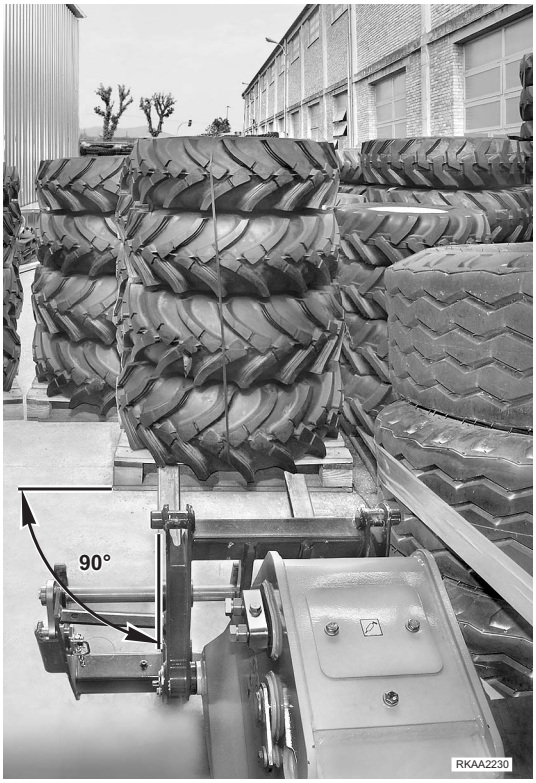
After performing the checks regarding the safety conditions of the machine (cab or canopy, tyre pressure, soundness of the forks or equipment and of the fastening parts), always adopt the following procedure, with no exception:

### 2.4.9.1 LOADING THE MATERIAL

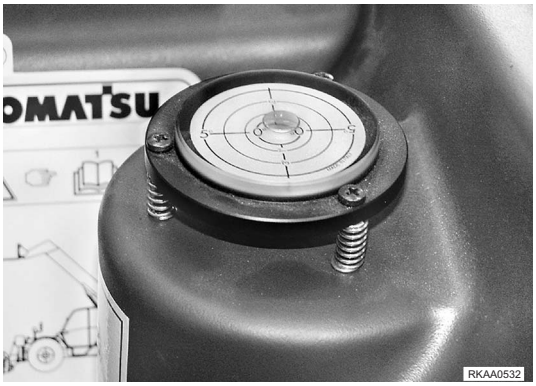
**⚠ ATTENTION**

- **The operator must know or be able to estimate the weight of the load to be handled and its center of gravity. If the operator is not sure about these data, he must contact his supervisor or the supplier of the material to be handled.**
  **Once the weight of the material has been determined, consult the machine load chart corresponding to the conditions of use (on tyres or stabilizers) and to the equipment fitted; this is important in order to ensure that the lifting, transport and definitive positioning of the load are carried out within the safety range indicated (see «3.3.1 READING THE LOAD CHARTS»).**

1 - Move the machine as near the load as possible, perpendicularly, without using the lifting equipment.




2 - If necessary, before starting the loading operations level the frame and make sure that the water level is centered.

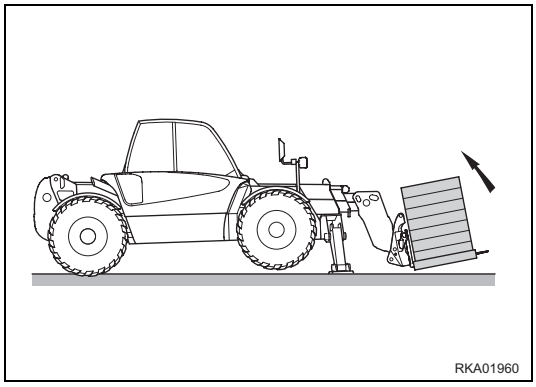


3 - If the machine is equipped with stabilizers, lower them until raising the front tyres from the ground, keeping the frame level.


4 - Adjust the equipment or the forks until they are perfectly level; if the forks are used on loose loads, open them as much as possible to increase the stability of the load, or adjust them in order to center the wider part of the load to be handled.

5 - Slowly extend and lower the boom to take hold of the load with the equipment; the forks or other equipment must hold the load firmly and completely in the apposite areas.

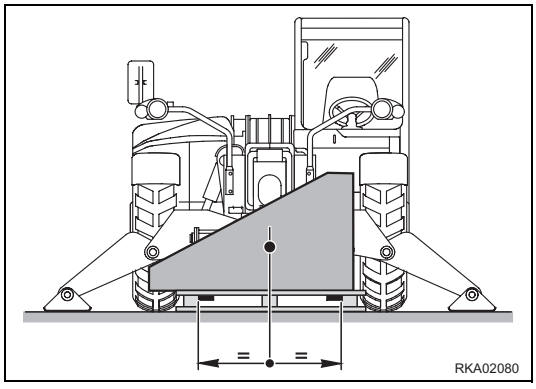
6 - After making sure that the load is being held securely, fold the forks or the equipment completely to stabilize the load and maintain the center of gravity of the load in the prescribed position with respect to the forks.




## ⚠ DANGER

- **The load must be retained or released only through the movements of the boom; do not move the machine to take hold of the load or release it.**
- **Be extremely careful, in order to avoid moving the load.**

7 - Slowly lift the load a few centimeters and make sure that it is level (center of gravity centered on the equipment).

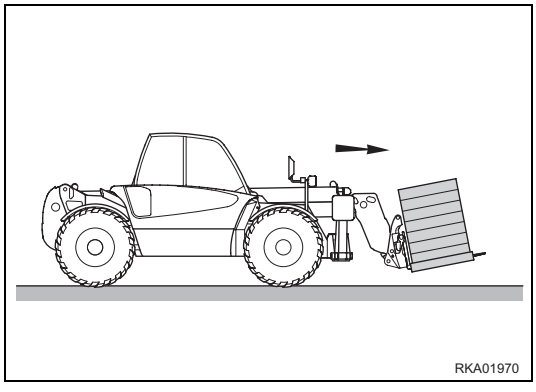



## ⚠ DANGER

- **If the shape of the load is irregular, or the center of gravity is offset, repeat the operations described above until centering the load perfectly.**

8 - With lifted load, retract the telescopic boom to the travel position.

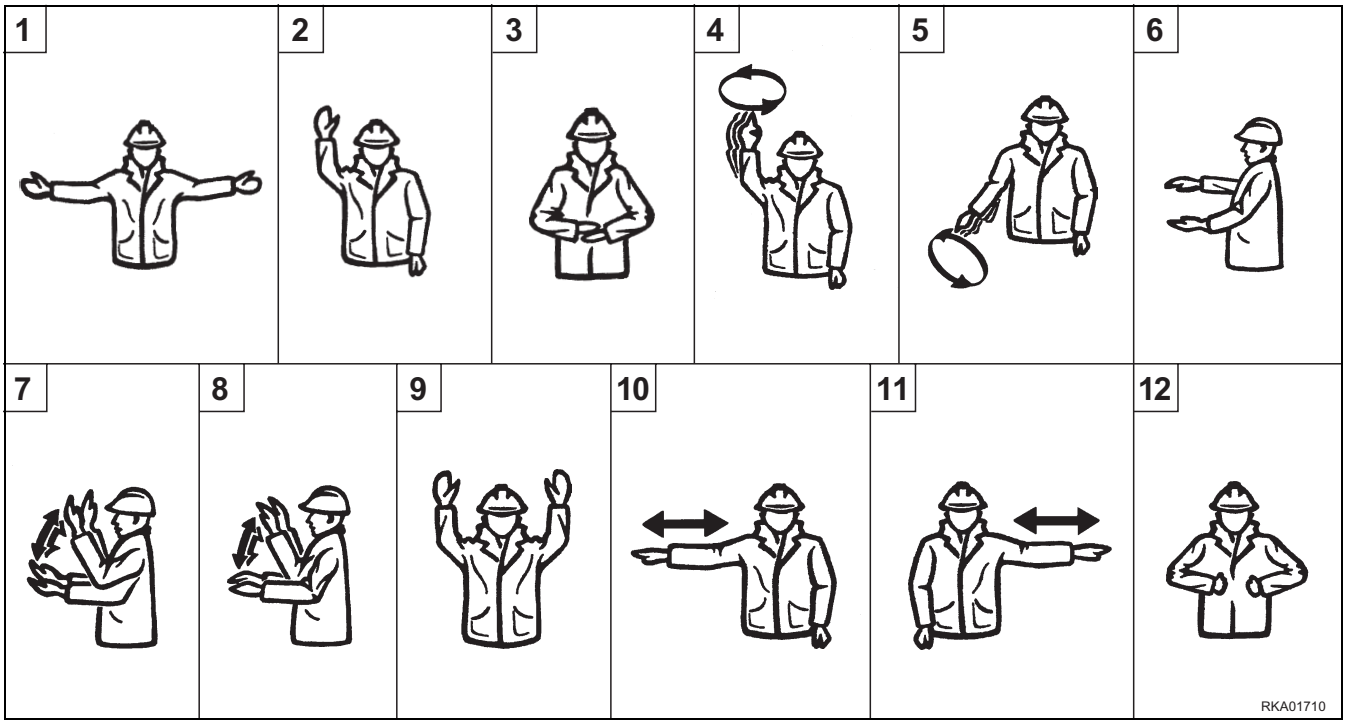
9 - Position the load at a distance of approximately 30 cm from the ground, raise the stabilizers completely and, travelling very slowly, move to the unloading area.



### 2.4.9.2 UNLOADING THE MATERIAL

**⚠ ATTENTION**

- **When placing loads in a high position, keep in mind that your visual perception is altered because of the distance.**
  **In this case, appoint an assistant who will signal what manoeuvres must be carried out, using the specific signs agreed for handlers.**
- **The signals must be given by one person only.**
- **The operator must make sure that he is always able to see the assistant.**
- **The operator must look only at the assistant and not at the load, whose movements shall in turn be followed only by the assistant.**




**1 - START:** both arms are extended horizontally with the palms facing forward.

**2 - STOP:** the right arm points upward with the palm facing forward.

**3 - END:** both hands are clasped at chest height.

**4 - RAISE:** the right arm points upward with the palm facing forward and the hand slowly makes a circle.

**5 - LOWER:** the right arm points downward with the palm facing forward and the hand slowly makes a circle.

**6 - HORIZONTAL DISTANCE:** the hands indicates the relevant distance.

**7 - MOVE FORWARD:** both arms are bent with the palms facing upward, and the forearms make slow movements toward the body several times.

**8 - MOVE BACKWARD:** both arms are bent with the palms facing downward, and the forearms make slow movements away from the body several times.

**9 - DANGER (EMERGENCY STOP):** both arms point upward with the palms facing forward.

**10 - RIGHT:** the right arm is extended more or less horizontally with the palm facing downward and slowly makes small movements to the right.

**11 - LEFT:** the left arm is extended more or less horizontally with the palm facing downward and slowly makes small movements to the left.

**12 - VERTICAL DISTANCE:** the hands indicate the relevant distance.

## ⚠ DANGER

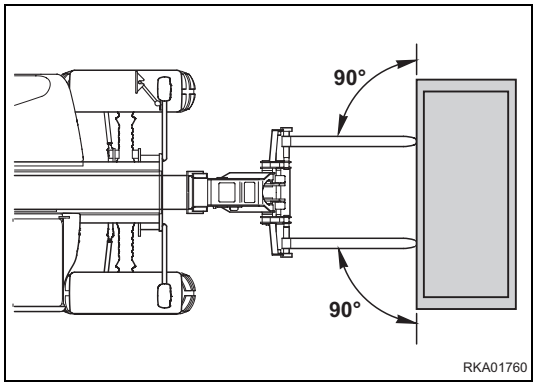
- **Do not move or handle the load over people working in the manoeuvre area or passing through it.**
- **Pay the utmost attention to overhead lines, systems, lights, etc.**

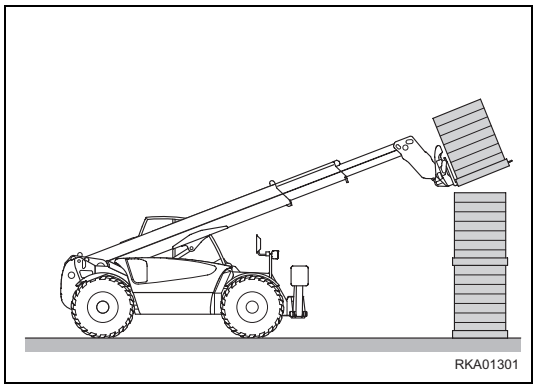
1 - Move slowly, in perpendicular direction, trying to get as near the unloading area as possible; apply the parking brake and put the machine in neutral.

2 - If necessary, level the frame. If the machine is equipped with stabilizers, lower them until raising the wheels from the ground keeping the frame level.

3- Select the TRAVEL operating mode (see «3.2.5 MACHINE CONTROLS» pos. 3 - OPERATING MODE SELECTION UNIT).

4 - Lift and extend the boom to the point where the load must be deposited, making sure not to exceed the maximum angle and extension allowed by the load chart corresponding to the operating conditions (on wheels or stabilizers) and to the equipment installed.




## ⚠ DANGER

- **If the maximum extension and angle allowed are exceeded, the machine isn't stable and this condition will be signalled by the acoustic alarm.**
  **If the stability limit indicated and signalled by the SLI-Safe Load Indicator is reached, the machine cannot get nearer the unloading area and the operation must be interrupted, since the load exceeds the capacity of the machine.**

4 - Incline the load forward until it is in horizontal position, in any case slightly raised from the place where it must be unloaded.

5 - Lower the boom until the load rests on the chosen support and, after making sure that it is stable, carry out combined boom lifting and retracting manoeuvres until releasing the fork or the equipment completely.

## ⚠ ATTENTION

- **To release the load, carry out only and exclusively the manoeuvres described above.**
  **Do not release the load using the reverse gear.**
- **Before moving the machine:**
  **a - retract the boom and lower it to the travel position;**
  **b - raise the stabilizers completely.**

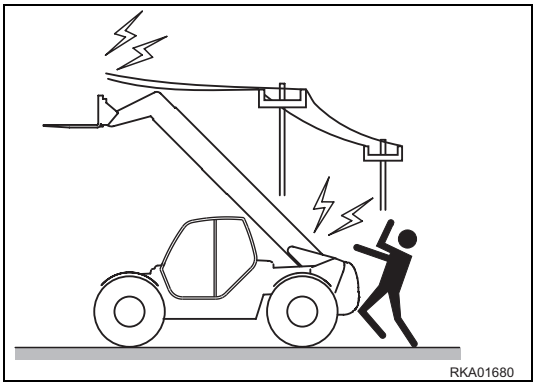
## 2.4.10 PREVENTING ELECTROCUTION

- Digging operations near overhead electric lines are extremely dangerous and they may also cause death due to electrocution; for this reason, when working near overhead electrical lines always respect the minimum safety distances prescribed by the competent authorities and by the accident-prevention rules in force.
- As far as underground long-distance lines are concerned, the minimum distance depends on the covering of the ducts in which the cables are laid.
- The basic safety precautions to be taken to prevent this risk are the following:
  1 - Wear shoes with thick rubber or leather soles.
  2 - Request the aid of another person who can warn you if the machine gets too close to the electric line.
  3 - Operate at low speed.
  4 - Learn what is to be done first in case of electrocution.
  5 - Keep the phone number of the electricity company and of the nearest first aid station at hand.
- If the work equipment gets accidentally entangled in the cables, the operator must not leave the cab until the electricity company has insulated the line.
- When carrying out this kind of operations, ask everyone standing in the work area to keep away from the machine and the work equipment and to respect the minimum safety distance prescribed.
- Ask the electricity company in advance what are the voltage of the cables and the minimum safety distance.

**⚠ DANGER**

- **The minimum distances from overhead lines can vary in the different countries, according to the climate and to the percentage of humidity in the air.**
  **Indicatively, the distances indicated in the table below should be respected.**

| Cable voltage | Min. safety distance |
|---|---|
| 1.0 kV (distribution line) | 5 m |
| 6.6 kV (2–3 insulators) | 5.2 m |
| 33 kV (min. 3 insulators) | 5.5 m |
| 66 kV (min. 6 insulators) | 6 m |
| 154 kV (min. 10 insulators) | 8 m |
| 275 kV (min. 19 insulators) | 10 m |




## 2.4.11 VISIBILITY

- Switch on the headlights or the work lights as soon as visibility decreases.
- If visibility decreases due to mist, smoke or heavy rain, stop the machine in a safe position and wait for the weather to improve until visibility becomes acceptable.

## 2.4.12 WORKING ON ICY OR SNOW-COVERED SURFACES

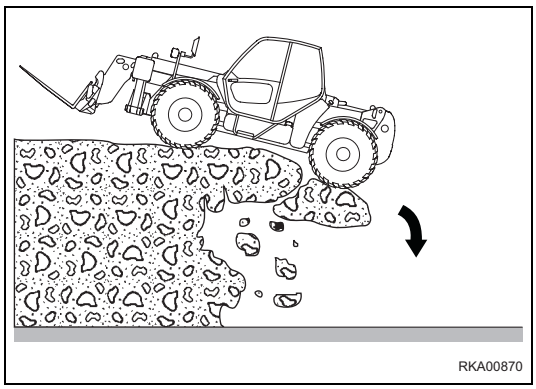
- If the ground is icy or covered with snow, the machine may not react with precision to the movements of the steering wheel. To reduce the risks connected with poor manoeuvrability, proceed as follows:
  1 - travel using the accelerator smoothly and gradually;
  2 - brake smoothly and only after slowing down, using the engine deceleration as much as possible;
  3 - absolutely avoid any sudden braking, abrupt acceleration and sudden steering with short steering radius.
- When it has snowed heavily, the road shoulders and any obstacle are buried in the snow and are not visible, therefore proceed with care when clearing the snow.

## 2.4.13 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT

- When working in tunnels, galleries, under electric cables or other ducts (air, telephone lines) and wherever the height is limited, proceed with the greatest care to prevent the bucket or the forks from causing any damage.

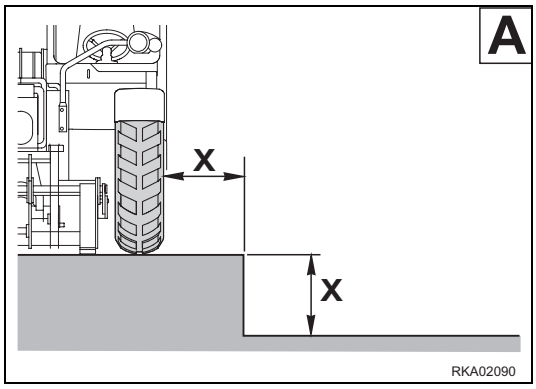
## 2.4.14 WORKING ON LOOSE GROUND

- Avoid operating the machine too close to the edge of cliffs, overhangs and deep ditches.
  These areas may collapse, making the machine fall down or tip over and this could result in serious injury or even death.
  Remember that after heavy rain or earthquakes these dangerous conditions usually get worse.
- Indicatively, the minimum safety distances to be kept from the edges of ditches, slopes, excavations, or sites when travelling and wishing to ensure the stability of the machine, are the following:
  a - **with compact ground**: distance (X) **equal** to the depth of the ditch (fig. A);
  b - **with not compacted ground, subject to landslides**: distance (X) **twice** the depth of the ditch (fig. B).

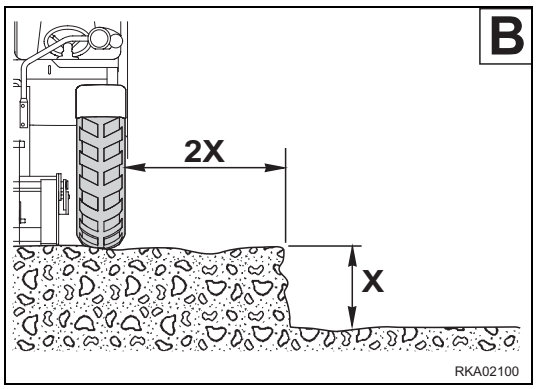



**NOTE**

- **The safety distance must be measured at the upper edge of the ditch.**
- **If it isn't possible to respect the safety distance, it will be necessary to make a counterscarp on the ditch or the excavation.**

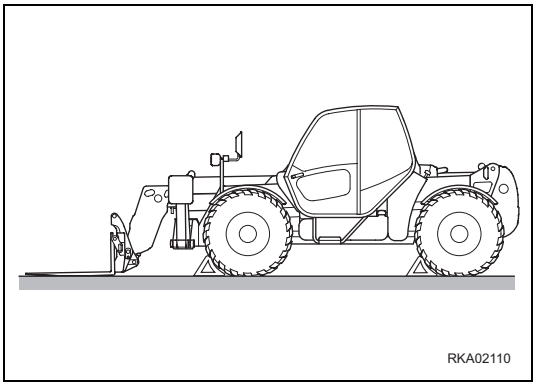



- Ditch edges are likely to collapse easily, since the capacity of the ground may vary depending on the type of soil; the collapse may be caused by the weight of the machine, the vibrations transmitted by the latter to the ground and by the rolling effect of the tyres.
  Be very careful; always fasten the safety belt and close the cab door.



## 2.4.15 PARKING THE MACHINE

- Park the machine on firm and level ground.
  If this is not possible and it is necessary to park on a slope, position the machine with the equipment directed downwards and carry out the following operations:
  1 - Select the four-wheel steering mode and steer completely to the right or to the left, choosing the direction in which there are fewer obstacles.
  2 - Stop the machine, applying the parking brake.
  3 - Lower the equipment to the ground.
  4 - Stop the engine.
  5 - Position wedges or safety blocks under the front and rear wheels.
- When leaving the machine, remove the ignition key and lock the door.
- If it is necessary to park on public roads, signal the presence of the machine according to the local regulations in force (signalling fires, fences, roadworks ahead signs, alternated direction and direction signs, etc.).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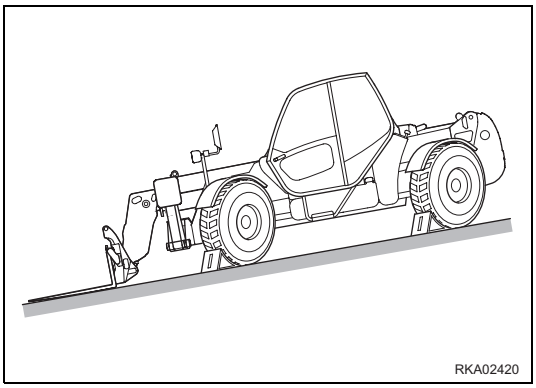
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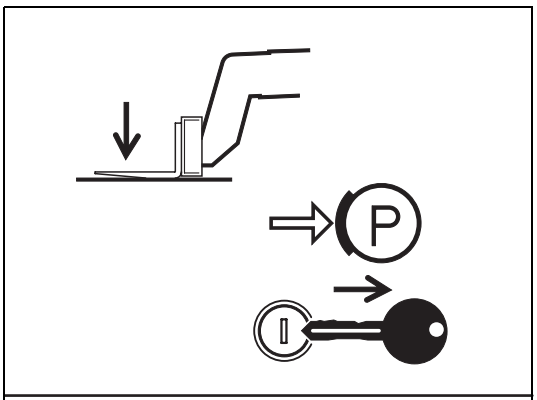


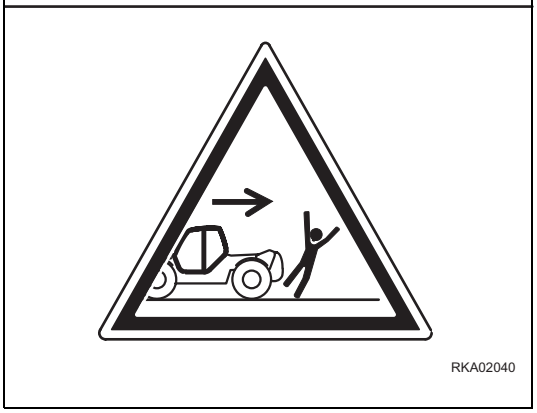
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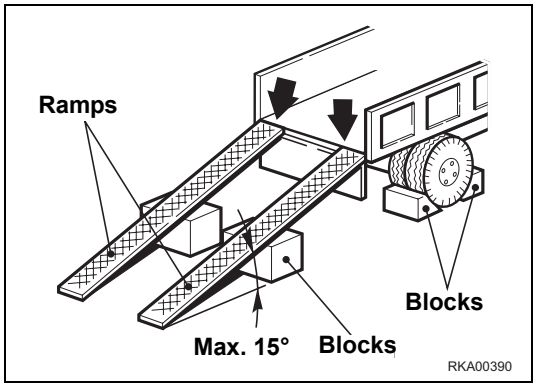
# 2.5 TRANSPORTING THE MACHINE ON OTHER VEHICLES

## 2.5.1 LOADING AND UNLOADING THE MACHINE



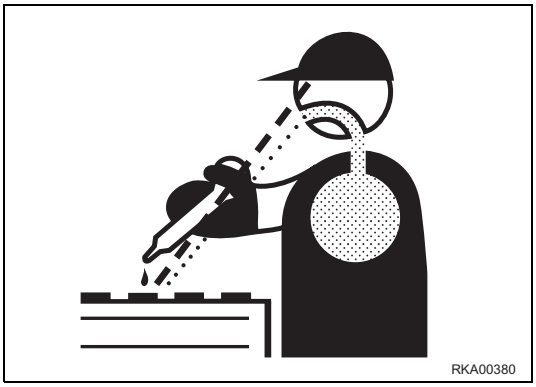

- Loading and unloading the machine on/from another vehicle always involve potential hazards; pay the utmost attention during the entire operation.
- Perform loading and unloading operations on firm, level ground; keep at a safety distance from the edges of ditches or from road sides.
- If the vehicles used have not been adequately equipped, put support blocks under the ramps, in order to prevent them from bending.
- Always block the wheels of the transporting vehicle with wedges.
- Always use ramps that are sufficiently wide and can support the weight of the machine. The longitudinal axes of the ramps must be parallel to each other and perpendicular to the loading board and their distance must be suitable for the tread of the machine.
- Make sure that the ramps are securely positioned and fastened to the loading board and that they have the same length.
- Position the ramps with a maximum inclination of 15°.
- Make sure that the ramp surface is clean and there is no trace of grease, oil, soil and ice; remove dirt from the wheels before starting to load the machine on the vehicle.
- Do not correct the trajectory of the machine while it is on the ramps. If necessary, move it down the ramps and start the operation again.
- When loading or unloading the machine, make sure that no part of the same gets in contact with the ground, the ramps, or the loading platform of the transport means.
- After loading the machine, make sure that the boom is completely lowered and retracted; block its wheels with wedges and secure it with tie-downs or chains that prevent even any sideward shift (see «3.9 TRANSPORTING THE MACHINE ON OTHER VEHICLES»).

## 2.5.2 THE ROUTE

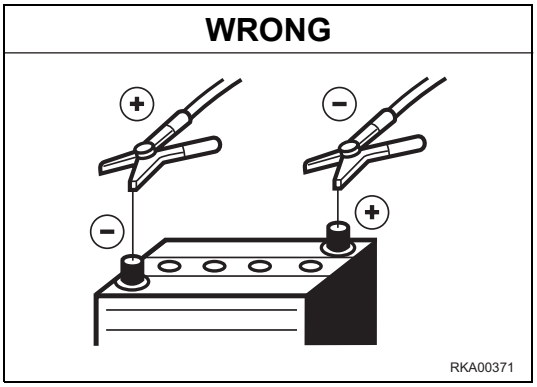
- Define the route to be followed, taking in consideration the width, height and weight of the transport means and of the machine.
  Make sure that the dimensions of the machine are compatible with the road and any galleries, subways, bridges, electric and telephone lines, etc.
- Keep to the regulations in force regarding the allowed width, height, weight of the machine and the transport speed.

# 2.6 BATTERY

## 2.6.1 SAFETY PRECAUTIONS FOR WORK ON BATTERIES


RKA00380

- Electrolytic batteries contain sulphuric acid, which can cause burns. It can also corrode clothing and make holes in it. In case of contact with battery acid, immediately wash the affected part with plenty of water.
- Battery acid may cause blindness if it comes in contact with the eyes.
  If acid accidentally gets into your eyes, wash them immediately with plenty of water and consult a doctor without delay.
- If you accidentally swallow battery acid, drink a large quantity of water or milk, beaten egg white or vegetable oil and in any case antiacid substances like magnesia, bicarbonate, etc., call a doctor or a poison treatment center immediately.
- Always wear safety goggles when working on batteries.
- Batteries produce hydrogen, which is highly explosive and can be easily ignited with small sparks or naked flames.
- Before working on the battery, stop the engine and remove the ignition key.
- Avoid short-circuiting the battery terminals through any contact, even if accidental, with metal objects or tools or through the inversion of the terminals.
- Tighten the battery terminals securely. Loose terminals may generate sparks and even cause the explosion of the battery.



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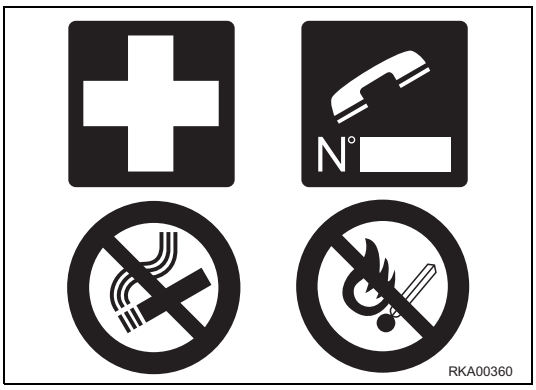

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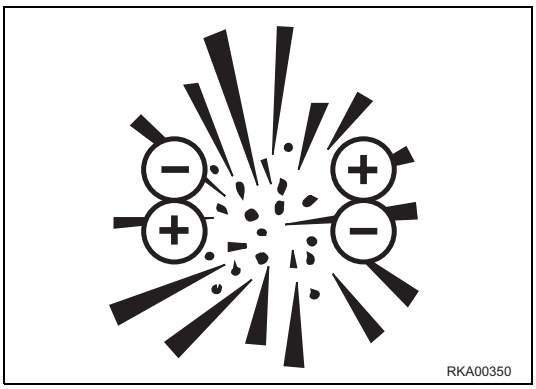
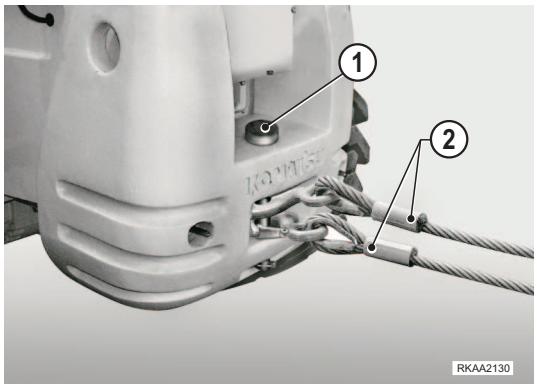
## 2.6.2 STARTING WITH BOOSTER CABLES


RKA00350

- The booster cables must be connected to the battery; DO NOT connect the cables to the starter.
- When starting the machine with booster cables, always wear safety goggles.
- When starting the engine by means of another machine, avoid any contact between the two machines.
- Be sure to connect the positive cable (+) first and then the negative or earth cable (-) when connecting the booster cables.
  After the start, disconnect first the negative or earth (–) cable and then the positive cable (+).
- Connect the batteries in parallel: positive to positive and negative to negative.
- When connecting the earth cable to the frame of the machine to be started, operate as far as possible from the battery. (See «3.14.4 IF THE ENGINE FAILS TO START BECAUSE THE BATTERY HAS RUN DOWN»).

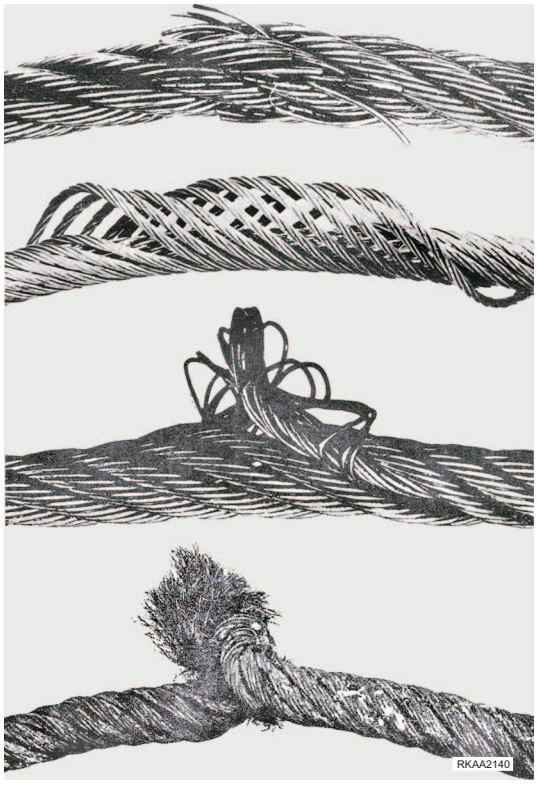
# 2.7 PRECAUTIONS FOR EMERGENCY RECOVERY

- The machine must be towed by using a pin inserted in the apposite rear hole and secured with safety pins (1).
- No special operations are required to tow the machine, provided that the engine has been stopped.
- Incorrect manoeuvres may cause serious damage, injury and even death.
- To move the machine, use properly dimensioned steel cables (2); do not use worn cables or cables with broken strands, twisted cables, deformed cables.
- During the recovery operation, no one can be allowed to approach the machines or the cables.
- Do not stand astride the cables.
- Move the machine only as far as necessary to allow the required repairs to be carried out.
- Do not remove the machine in any way other than that indicated in paragraph «3.14.2 REMOVING THE MACHINE IN CASE OF FAILURE».



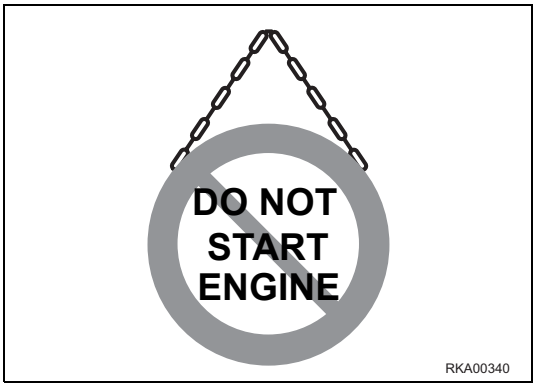

**⚠ ATTENTION**

- **The maximum force to be applied for towing the machine corresponds to 75% of the machine mass indicated on the identification plate.**
- **Use cables of the same length and pull continuously, without jerking movements.**
- **Position and connect the machine to be removed taking care that it is on the same axis as the towing vehicle; the traction force exerted must be parallel to the axis of movement of the machine.**



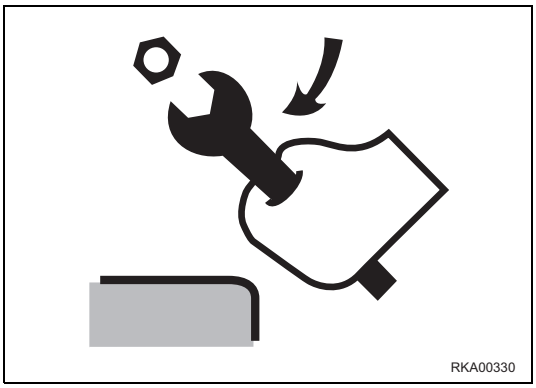
# 2.8 PRECAUTIONS TO BE TAKEN DURING MAINTENANCE

## 2.8.1 WARNING PLATES

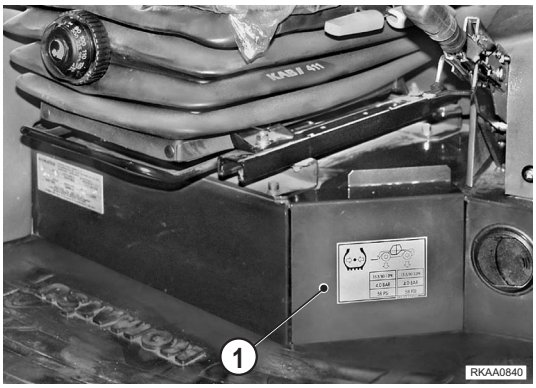



- Before starting any maintenance operation, position the machine on a firm and level surface, rest the equipment onto the ground, engage the safety locks of the equipment and the controls and stop the engine.
- If another person starts the engine and operates the control levers while the operator is servicing the machine, this may result in serious injury or even death.
- To avoid these risks, always attach warning signs to the steering wheel, the control levers and the ignition key before performing any maintenance operation; if necessary, attach additional warning tags also around the machine and in particular on the cab handles.

## 2.8.2 TOOLS




- Use only the tools supplied together with the machine and high-quality tools suitable for the tasks to be performed.
- Do not use worn, damaged, low-quality tools or tools that are not suitable for the tasks to be performed, in order to avoid any personal injury.
- After use, always store the tools in the apposite compartment (1) under the seat.




## 2.8.3 PERSONNEL

- Only authorized and duly trained personnel can service and repair the machine; additional precautions must be taken when grinding, welding and using a sledge hammer or heavy hammers.
- When assembling the equipment or cylinder connection pins, use wooden, plastic or in any case not excessively hard tools to check the centering of the holes.
  Do not use your fingers, since you run the risk of cutting them.

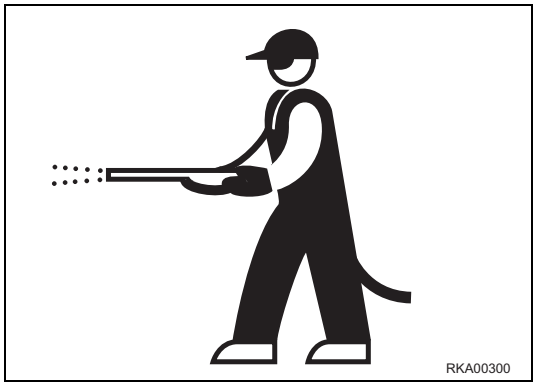
## 2.8.4 EQUIPMENT


- The normal or special equipment that must be installed on the machine or that have been removed must be stored in a safe place and positioned in such a way as to prevent them from falling down. If they fall on someone, they can cause serious bodily harm.
- When assemblying or removing any equipment, make sure that the ropes and the lifting hook are in good conditions and properly dimensioned for the load to be lifted.

## 2.8.5 WORKING UNDER THE MACHINE


- Before performing service or repairs under the machine, always lower the work equipment to the ground or in any case lower it as much as possible.
- If it is necessary to work under the boom when this is extended, even if partially, make sure to prevent it from accidentally lowering, using a suitable support stand.
- Always block the machine tyres.
- Do not work under the machine, if this is not sufficiently supported.

## 2.8.6 KEEPING THE MACHINE CLEAN




- Spilled oil or grease, scattered tools or broken pieces are dangerous, because they may cause someone to slip or trip. Always keep the machine and the work site clean and tidy.
- Before carrying out any cleaning operation, protect the areas where there are electric parts, in particular the engine central unit, identified by the apposite pictogram.
- To clean the machine, use a pressurized jet of warm water or steam and the specific detergents available on the market. Do not use diesel oil, oil or solvents, since the former leave an oily coat that favours the sticking of dust, while the latter (even if weak) damage the painted surfaces and therefore facilitate rusting.
- While cleaning the machine, keep the pressurized jet at a minimum distance of approx. 60 cm, in order not to damage the warning plates and the pictograms. If any plate should be damaged, request Komatsu Utility or your Komatsu Utility Dealer to send you a new one and change it.
- Water into the electric system provokes the oxidation of the contacts and may hinder the start of the machine or even make it start suddenly and abruptly. For this reason, avoid using water or steam jets to clean sensors, connectors or the inside of the operator's cab.

## 2.8.7 USE OF THE ENGINE DURING MAINTENANCE

- Before starting the engine, make sure that the parking brake has been applied.
- Always stop the machine on a firm and flat surface and stop the engine before carrying out any maintenance operation or check.
- During maintenance operations, run the engine only when indispensable. If it is necessary to have the engine running (for example, to wash the cooling circuit or to check the functionality of the alternator), an operator should constantly remain in the cab, in order to be able to stop the engine whenever necessary.
- During maintenance operations with running engine, never change the position of the gear lever. Service personnel must not move any control lever.
- When carrying out maintenance operations, do not touch the moving parts of the machine and avoid wearing large and loose clothes.

## 2.8.8 PERIODICAL CHANGE OF THE PARTS THAT ARE CRITICAL FOR SAFETY

- Periodically change the following parts, which are important to prevent fires.
  Fuel system: fuel delivery and return pipes.
  Hydraulic system: main delivery pipes of the hydraulic pump.
  Hydraulic system: work circuit pipes from the distributor to the hydraulic cylinders.
- Even if they seem to be in good conditions, these components must be periodically changed with new ones. In fact, these components tend to deteriorate over time.
- If one of these parts is defective, change or repair it even if the prescribed change interval has not elapsed yet. (See «4.6 PERIODICAL CHANGE OF THE SAFETY-RELATED COMPONENTS»).

## 2.8.9 RULES TO BE FOLLOWED WHEN REFUELLING OR ADDING OIL

- Keep away from naked flames while refuelling or adding oil.
- Always tighten the fuel tank and hydraulic oil tank safety caps securely.
- Do not use fuel to clean any part of the machine that is dirty with oil or dust.
- Always top up the fuel and oil tanks in properly ventilated areas and refrain from smoking.
- When refuelling, hold the fuel gun firmly and keep it constantly in contact with the filler until you have finished, in order to avoid spilling fuel.
- Do not fill the tank completely, in order to leave room for the fuel to expand.
- Spilled fuel or oil make the ground slippery and may cause accidents; clean any dirty area carefully and without delay.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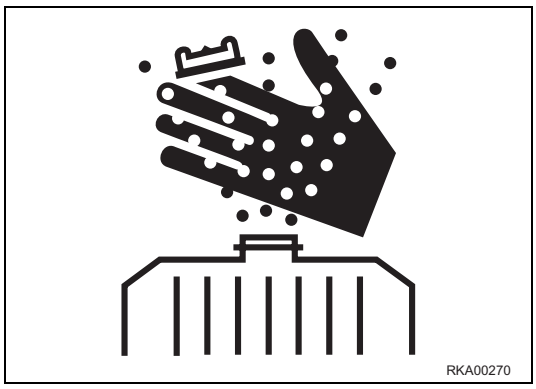
## 2.8.10 CHECKING THE COOLANT LEVEL IN THE RADIATOR

- Let the engine and the radiator cool down to a temperature below 42°C before checking the coolant level.
- If it is necessary to remove the cap with hot engine, wear suitable clothes and protections and loosen the cap slowly, in order to release the pressure gradually.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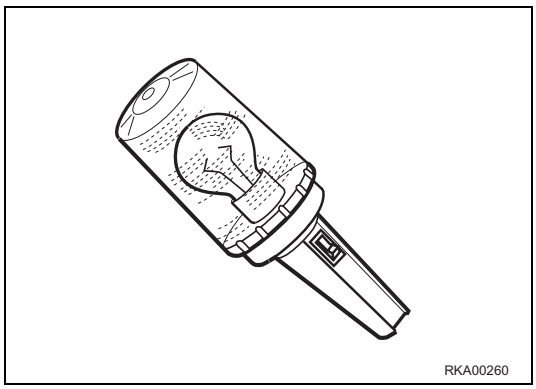
## 2.8.11 USING LAMPS

- Use only homologated explosion-proof lamps to check fuel, oil, coolant or battery electrolyte levels.
  Unsuitable lamps can cause fires or explosions.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## 2.8.12 PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR

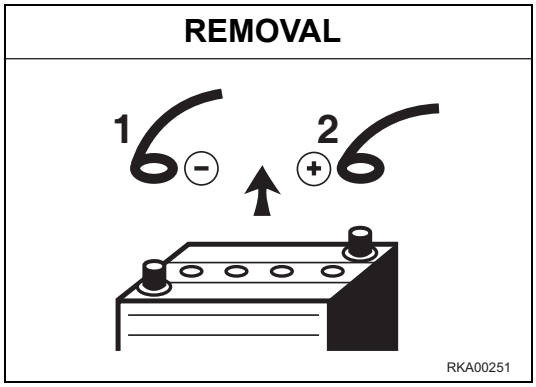
- When repairing the electric system, disconnet the battery in order to stop the flow of current.

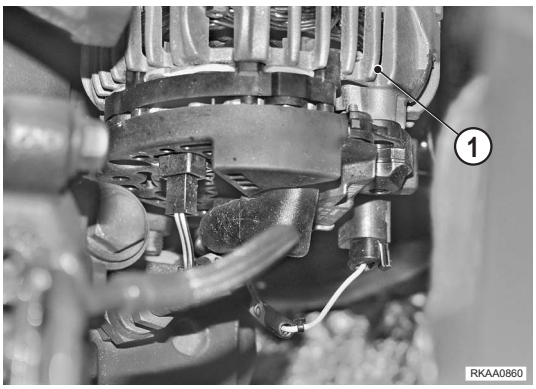
**IMPORTANT**

- **Disconnect first the negative earth cable (–) and then the positive cable (+).**
  **At the end of the operation, reconnect first the positive cable (+) and then the negative cable (–).**

---

- If electric welding operations are to be carried out on the machine, it is necessary to disconnect the battery and also the alternator.
  The negative (EARTH) cable of the welding machine must be connected near the point where the welding must be carried out, avoiding the interposition of painted parts, bearings, cylinders and bushings.



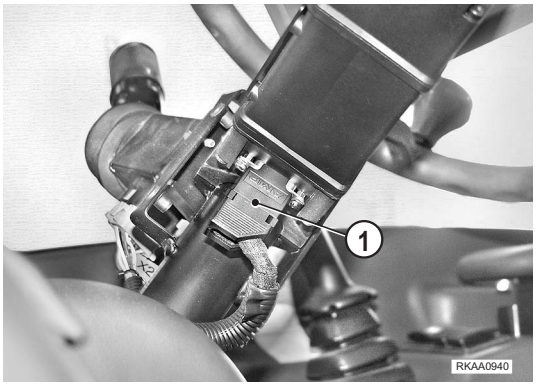



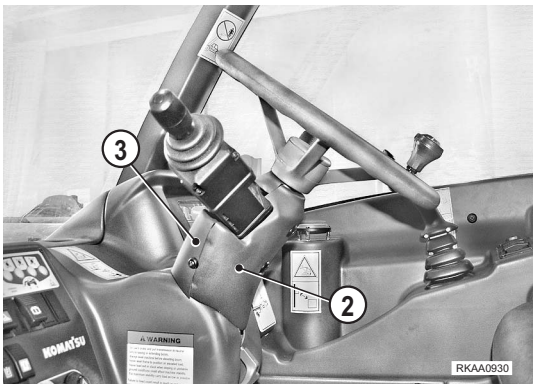
## 2.8.13 PRECAUTIONS CONCERNING THE STARTER


- Do not start the engine with a jumper connection between the starter terminals in the central unit or on the starter itself; if there is a short circuit, the whole electric system of the engine may be damaged and this may affect the reliability of the machine in critical conditions like low temperatures and the engine stop in case of emergency.
- Do not start the engine with the booster cables connected to the starter.

## 2.8.14 PRECAUTIONS CONCERNING THE GEAR LEVER

- If it is necessary to carry out any electric welding on the machine, disconnect the gearshift connector (1), which can be reached by removing the guards (2), (3).



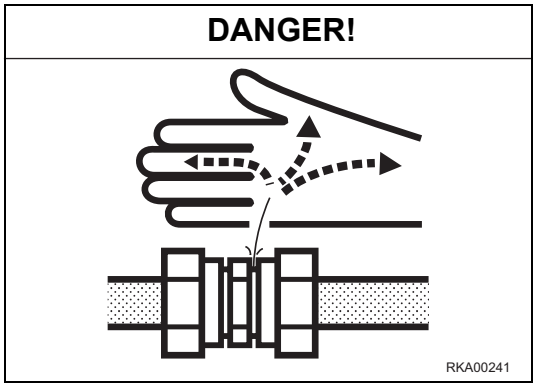



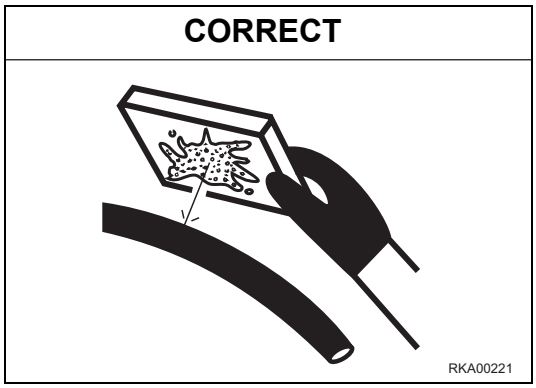
## 2.8.15 PRECAUTIONS CONCERNING HIGH-PRESSURE HOSES AND FUEL PIPES

- Do not bend high-pressure hoses or rub them with sharp or abrasive objects.
  Do not use bent or cracked pipes or hoses that were previously rejected because of leaks or fastening defects, since they may burst during use.
- Always repair or replace any loose or faulty fuel or oil pipe. Any leakage of fuel or oil may cause fires.

## 2.8.16 PRECAUTIONS TO BE TAKEN WHEN WORKING ON HIGH- PRESSURE SYSTEMS

- Do not forget that the work equipment circuits are always under pressure; for this reason, when it is necessary to add or drain hydraulic oil, or to service or inspect the hydraulic circuit, it is advisable to lower the equipment to the ground and completely release the pressures and the residual pressure present in the tank.
  Small leakages from pipes under pressure and the resulting jets are extremely dangerous, since they can perforate the skin and penetrate in the blood circulation or injure the eyes.
  For this reason, always wear goggles and thick gloves during the inspections and use a piece of cardboard or a sheet of plywood to check for oil leakages.
  If you are struck by a jet of high-pressure oil or are injured, even if slightly, consult a doctor without delay.



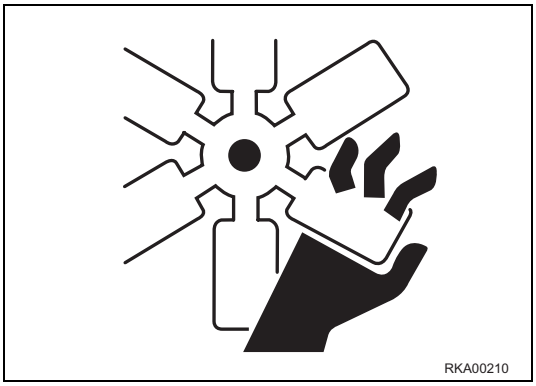




## 2.8.17 PRECAUTIONS FOR MAINTENANCE WORK INVOLVING HIGH TEMPERATURES AND PRESSURES

- When the machine is stopped at the end of operations, the engine coolant, the oil and all the components are hot and the hydralic circuits are under pressure.
  In these conditions, if the coolant, the hydraulic oil and the engine oil are to be drained in order to change them or the filters, there are serious risks of damage and burns.
  Wait for the temperature to lower within the normal operating range (42°C) before carrying out the maintenance operations in accordance with the procedures indicated in the relevant sections of this manual.

## 2.8.18 COOLING FAN AND FAN BELT

- Be careful to the revolving parts and do not allow anyone to get too close to these parts, since clothes or parts of the body may get caught into them.
- If hands, clothes, or tools become entangled in the fan blades or the fan belt, they may be cut, torn or seriously injured/damaged; for this reason, avoid touching any revolving parts.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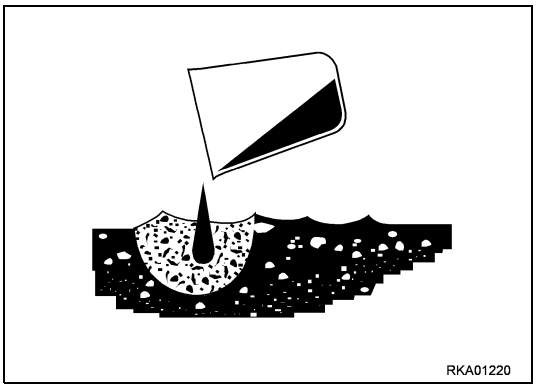
## 2.8.19 WASTE MATERIALS

- Do not dispose of exhausted oil into sewage systems, gutters, rivers, etc.
- Always put any exhausted oil into suitable containers. Do not drain exhausted oil directly on the ground.
- Always keep to the standards and regulations in force regarding the disposal of polluting and/or dangerous substances like oil, fuel, solvents, used filters, batteries, gaskets, electric cables, etc.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## 2.8.20 PRECAUTIONS CONCERNING TECHNOPOLYMERS AND ELASTOMERS

**⚠ DANGER**

- **Some components of the machine contain polymers and elastomers (Viton sealing rings, Teflon rings, piston seals made of fluoroelastomers, electric cable insulating materials, etc.).**
  **At room temperature and up to approximately 200°C these materials can be handled without taking any precautions, since they are completely inert.**
  **However, if these materials are burnt, they release highly toxic gases.**
  **Once they have cooled down, these materials must be collected into airtight bags using heavy impermeable gloves; the gloves and the materials used must be disposed of according to the regulations in force.**
  **The contaminated part of the machine must be washed with highly alkaline detergents and then with a solution made of detergent and water.**

- Avoid burning seals, electric cables, sealing rings.
- Dispose of elastomeric and polymeric waste according to the regulations in force.
- Do not touch any burnt elastomeric or polymeric waste and in case of accidental burning avoid inhaling the toxic gases produced.
- In case of contact with the skin, immediately rinse with a solution made of water and an alkaline detergent for about 30 minutes and then contact a poisoning treatment center without delay.


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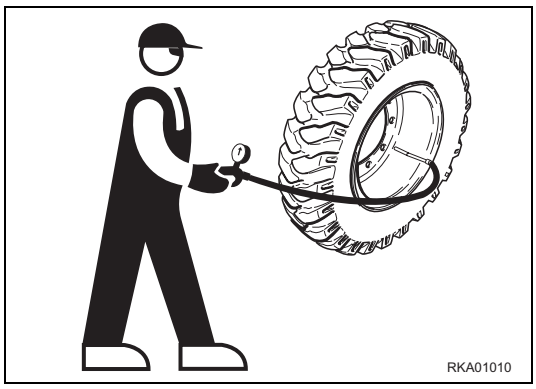
## 2.8.21 PRECAUTIONS TO BE TAKEN WHEN INFLATING TYRES




- Always bear in mind that tyres can burst while being inflated, causing serious accidents.
- Before inflating tyres, always check the wheel rims and the tyre walls and tread for dents, cuts, broken plies, or other defects.
- Have tyres checked and serviced by specialized personnel.
- When inflating tyres, use a compressed air gun with extension hose and pressure gauge.
- Make sure that there is nobody in the vicinity before starting to inflate a tyre. Stand at the tread side of the tyre to inflate it.
- Never exceed the inflation pressures specified for each type of tyre. Always check that the tyre pressures are identical on both sides of the machine.

## 2.8.22 PRECAUTIONS TO BE TAKEN WHEN USING SYNTHETIC BIODEGRADABLE OIL TYPE «HEES»

- It is not possible to mix the synthetic biodegradable oil type HEES with ordinary hydraulic oils, since when the temperature increases insoluble compounds are generated, which are deposited on the filters and clog them (the maximum concentration of ordinary oil must not exceed 1% of the total quantity of oil).
- Biodegradable oil can be used only in the hydraulic system; it cannot be used for the endothermic engine, the transmissions, the braking system, etc.
- Before introducing synthetic biodegradable oil in the hydraulic system, empty the system completely, disconnecting the cylinders and all the parts that may contain ordinary oil, and replace the drain filter with a new one.
  Start the engine and let it idle without using the work equipment, wait until the oil reaches a temperature of at least 40°C, then start moving the equipment, so that all the parts of the system are filled with oil.
  Stop the engine and check the oil level (see «4.7.8.c CHECKING THE HYDRAULIC OIL LEVEL»).

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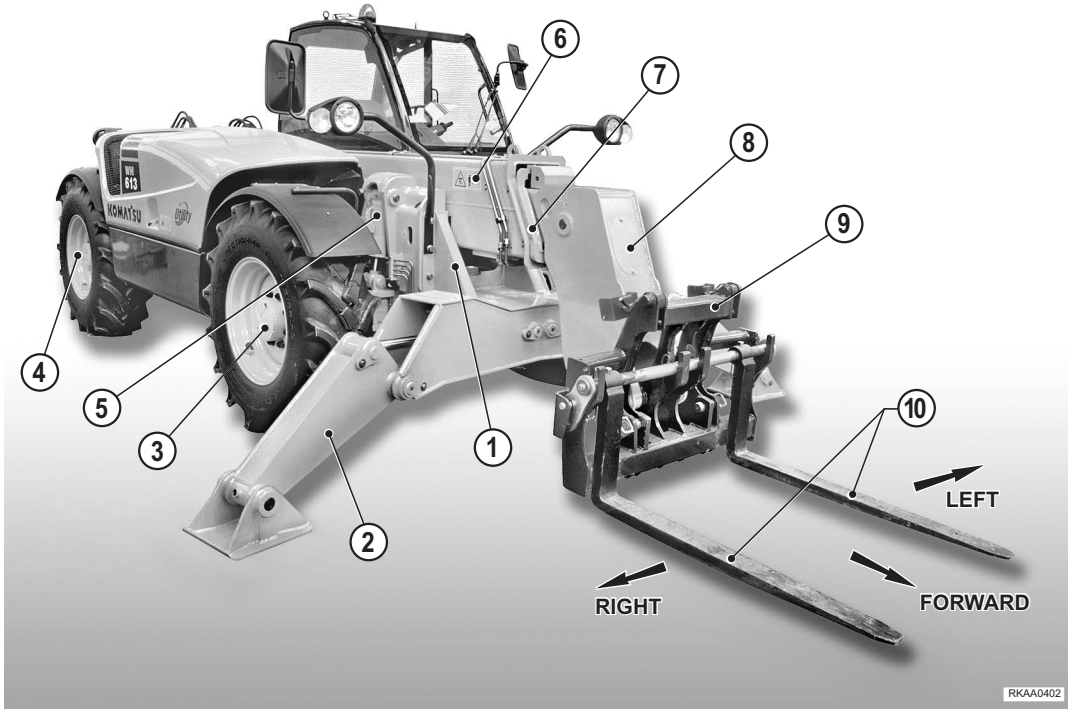
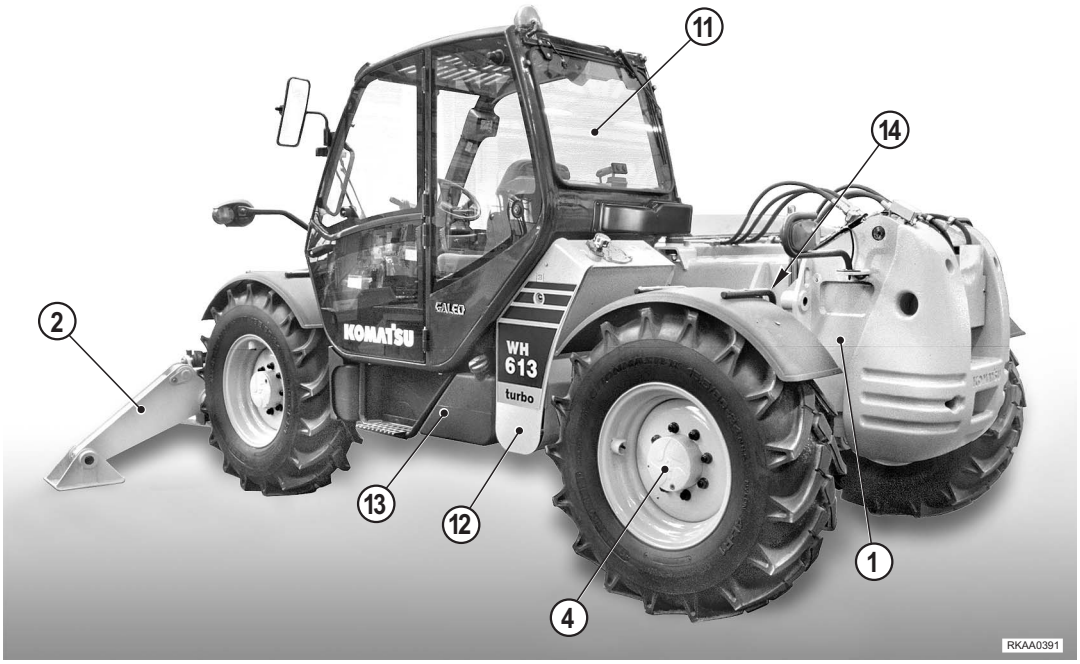
# DESCRIPTION AND OPERATION OF THE MACHINE

# 3.1 GENERAL VIEWS

## 3.1.1 RIGHT SIDE VIEW




## 3.1.2 LEFT SIDE VIEW




1 - Frame
2 - Stabilizers
3 - Front axle
4 - Rear axle
5 - Frame levelling cylinder (optional)
6 - Boom
7 - Intermediate boom section
(only for the 3-section boom version)
8 - Final boom section
9 - Equipment-carrier
10 - Forks
11 - Cab
12 - Hydraulic oil tank
13 - Fuel tank
14 - Rear axle locking cylinder (optional)

## 3.1.3 CAB INSIDE GENERAL VIEW




1 - Gearshift-reverse lever
2 - Operating mode selection unit
3 - Steering mode selection unit
4 - Frame levelling push button (optional)
5 - Stabilizers push buttons (optional)
6 - Boom control lever
7 - SLI-Safe Load Indicator
8 - Parking brake
9 - Service brake pedal
10 - Accelerator
11 - Steering wheel
12 - Steering wheel position lock lever
13 - Dashboard
14 - Direction indicators – dimmer switch – horn – front windshield washer
15 - Water level (spirit level)

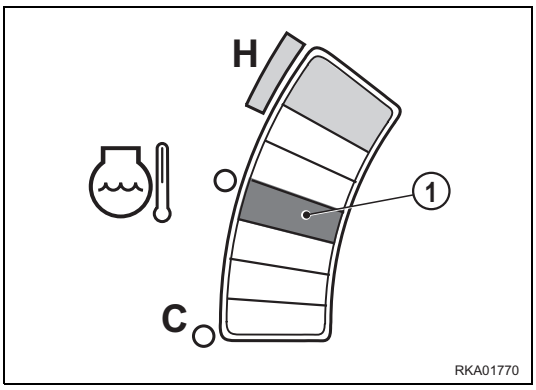
# 3.2 INSTRUMENTS AND CONTROLS

## 3.2.1 INSTRUMENTS

The following instruments are positioned on the upper part of the dashboard:

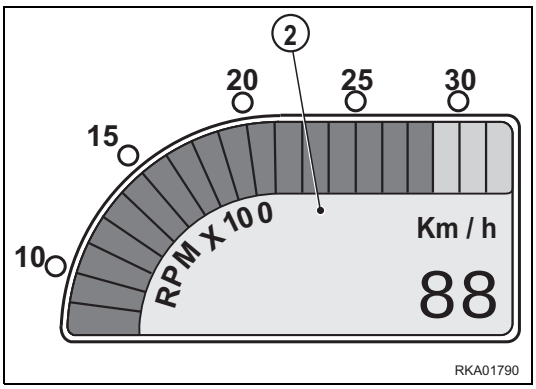

### 1 - ENGINE COOLANT TEMPERATURE INDICATOR

- Indicates the temperature of the engine coolant.
- The relevant indications are given by the shifting of the bar in succession from bottom to top.
- The high temperature is indicated when the bar reaches the red area. In this case the bar flashes intermittently.
  If the bar enters in the red area the alarm buzzes continuosly and the general alarm warning light flashes intermittently (see «3.2.2 WARNING LIGHTS». pos. 15 - GENERAL ALARM WARNING LIGHT (Red)).

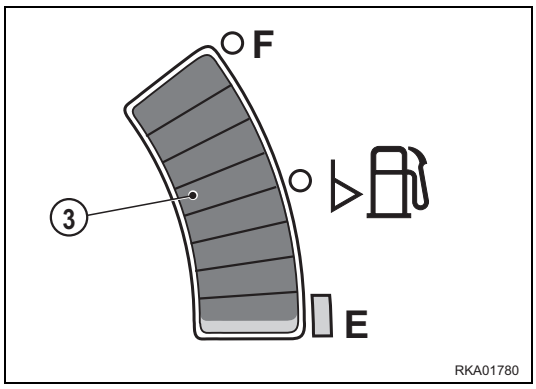



### 2 - SPEEDOMETER AND REVOLUTION COUNTER

- The speedometer indicates the travel speed of the machine.
- The revolution counter indicates the number of engine revolutions.
- When the speed exceeds 50 km/h the alarm buzzes and the general alarm warning light flashes intermittently (see «3.2.2 WARNING LIGHTS». pos. 15 - GENERAL ALARM WARNING LIGHT (Red)).
- When the engine rpm exceeds 3250 the alarm buzzes and the general alarm warning light flashes intermittently (see «3.2.2 WARNING LIGHTS». pos. 15 - GENERAL ALARM WARNING LIGHT (Red)).



## 3 - FUEL LEVEL INDICATOR




- Indicates the fuel level in the tank and is divided into two-colour led bars:

  a - flashing red = low fuel (first bar).

  b - green = all the other bars.

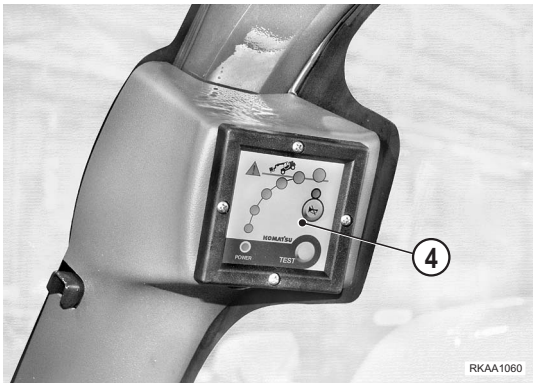
**NOTE**

- **Rated capacity of the tank: 130 l.**

**IMPORTANT**

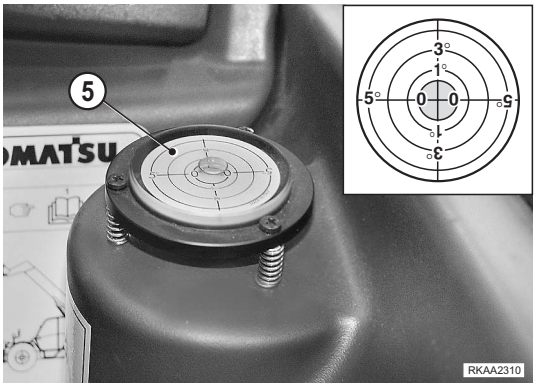
- **If the indicator reaches the low fuel area during work, stop the machine as soon as possible and provide for refuelling.**
- **When working on slopes, refuel as soon as the indicator starts flashing; the engine may stop suddenly, making it difficult to control the machine and leading to serious risks.**

## 4 - SLI-SAFE LOAD INDICATOR



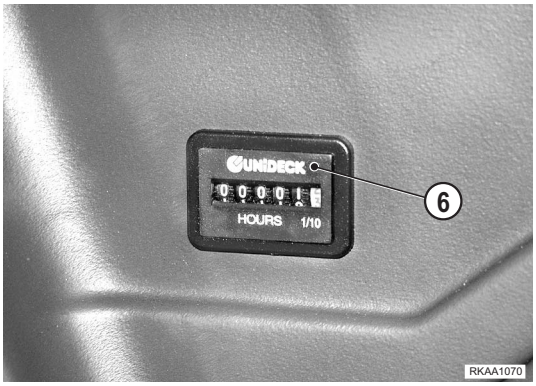

- This instrument provides visual and acoustic signals regarding the longitudinal stability of the machine during the load lifting phase.
  When the stability limit is going to be reached, an acoustic alarm is emitted.
  For further details on the use and functions of this device, see «3.2.5 MACHINE CONTROLS» pos. 7 - SLI-SAFE LOAD INDICATOR.

## 5 - WATER LEVEL (SPIRIT LEVEL)




This instrument makes it possible to check the levelling of the machine during the frame stabilization phase and during work.
For a correct levelling operation, the water level must be centered transversally in the central circle that represents the optimal centering zone.
The circles outside the central one represent the inclination levels divided 2° by 2° up to a maximum of ±5°.
The maximum longitudinal inclination during work is 2°, corresponding to the tangential position of the water level with respect to the second circle.

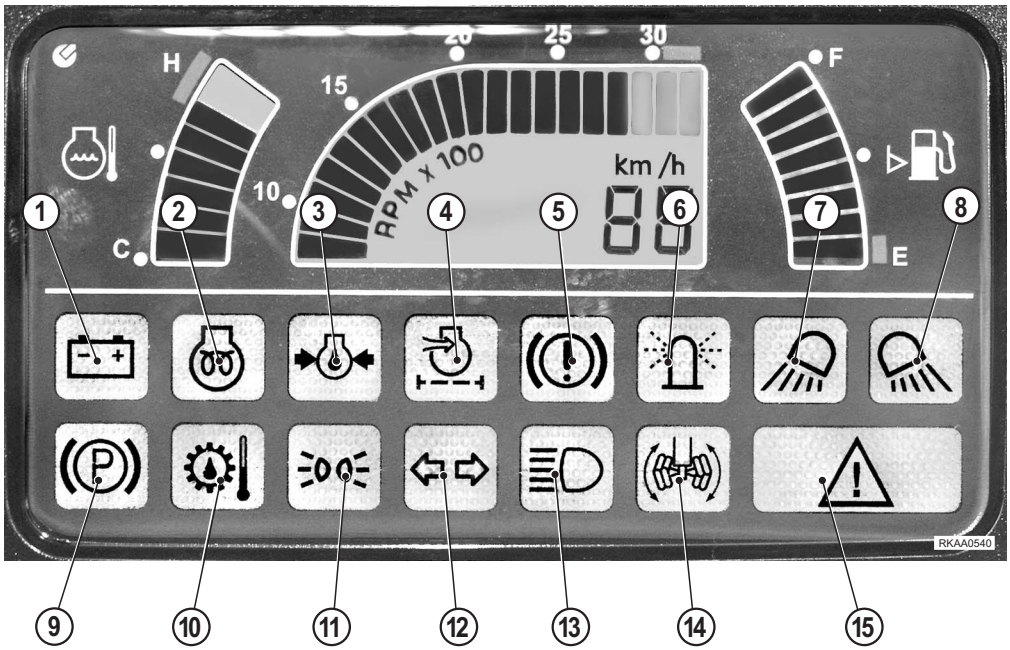
## 6 - HOUR METER




This instrument is positioned on the left side of the dashboard and indicates the operating hours.
The reading must be considered valid for the calculation of the time intervals indicated for routine maintenance operations.

## 3.2.2 WARNING LIGHTS

The following warning lights are positioned on the lower part of the dashboard:

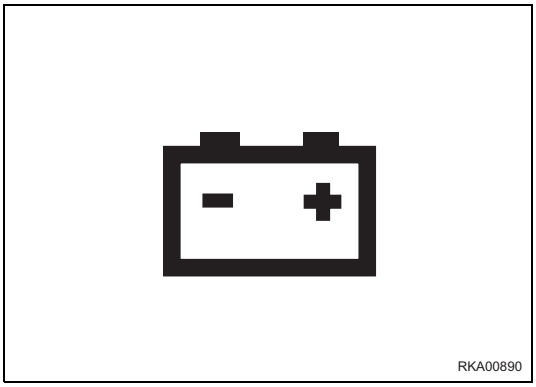



### 1 - GENERATOR WARNING LIGHT (Red)

This warning light comes on and activates the acoustic alarm when the starting circuit is energized and goes out when the engine reachs the idling speed; if this warning light remains on even when the engine is running at the normal operating speed, this means that the alternator does not work and the battery is not charged correctly.

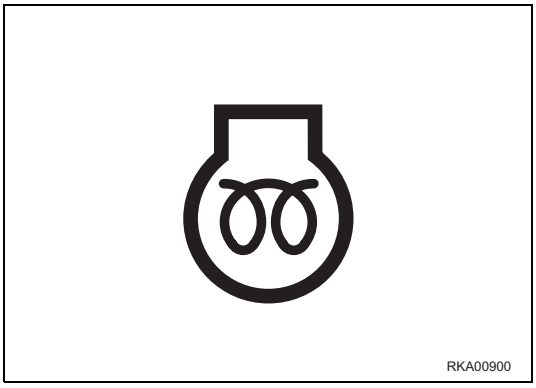
**IMPORTANT**

- **If the warning light remains off when the ignition key is turned to position «I», this means that the alternator is faulty or broken.**



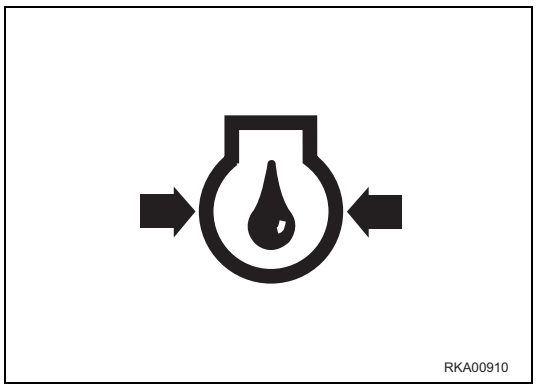

### 2 - PREHEATING WARNING LIGHT (Yellow)

This warning light comes on when the ignition key is turned to position " " to start the engine at low temperatures.
(See «3.6.2.2 STARTING WITH COLD ENGINE OR IN COLD CLIMATES»).



## 3 - ENGINE OIL PRESSURE WARNING LIGHT (Red)

This warning light comes on and activates the acoustic alarm with engine at rest when the starting circuit is energized and goes out as soon as the engine lubrication circuit is pressurized.
If this warning light remains on or comes on with the engine running, stop the machine immediately and try to locate the trouble.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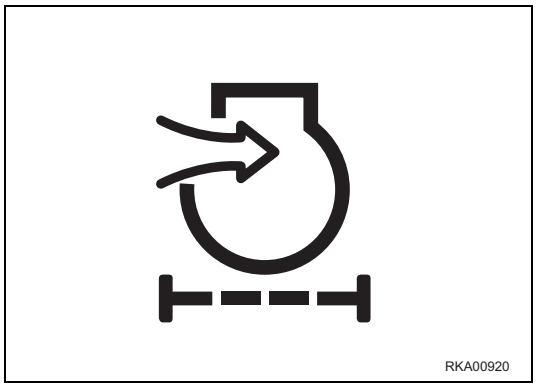
## 4 - AIR CLEANER CLOGGING WARNING LIGHT (Red)

This warning light comes on when the engine air filter needs cleaning.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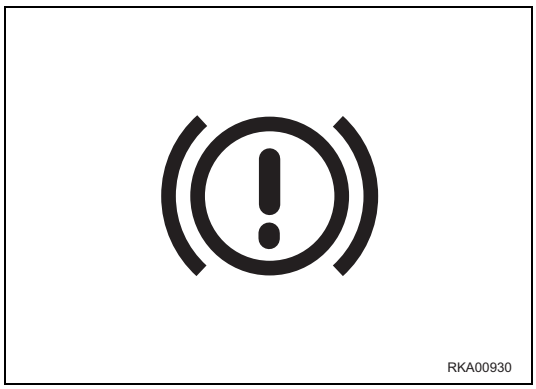
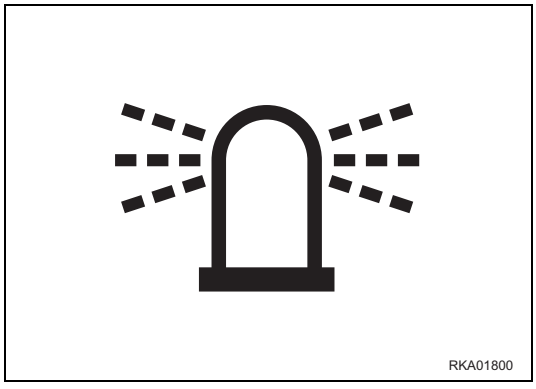
## 5 - LOW OIL PRESSURE OR BRAKING SYSTEM FAILURE WARNING LIGHT (Red)

This warning light comes on to indicate that the brake oil pressure is low or that there is no oil in the reservoir due to leakages.
If it comes on repeatedly, check the braking system and eliminate any leakage.


RKA00930

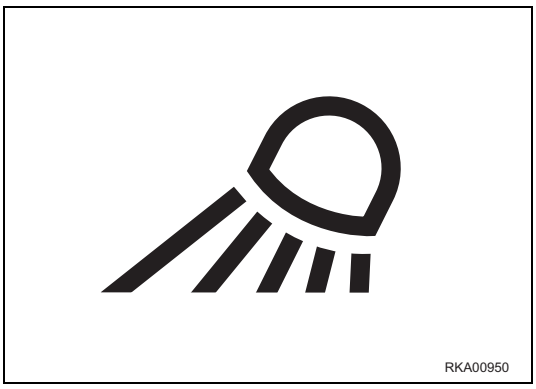
## 6 - REVOLVING LIGHT (Yellow) (optional)

This warning light comes on when the revolving light is operated.


RKA01800

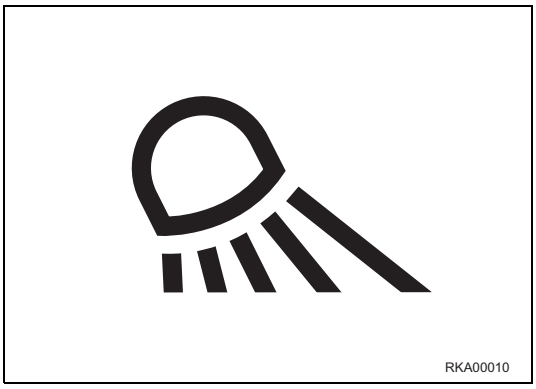
## 7 - FRONT WORK LIGHT (Yellow) (optional)

This warning light comes on when the work light on the telescopic boom is operated.



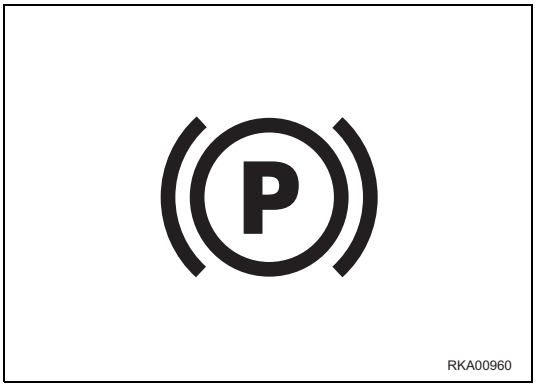

## 8 - REAR WORK LIGHT (Yellow) (optional)

This warning light comes on when the rear work light is operated.



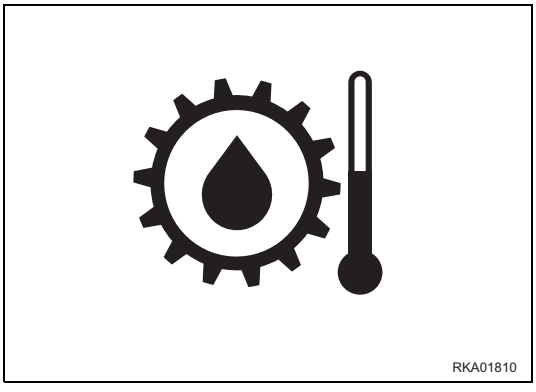

## 9 - PARKING BRAKE WARNING LIGHT (Red)

This warning light comes on when the parking brake is applied.



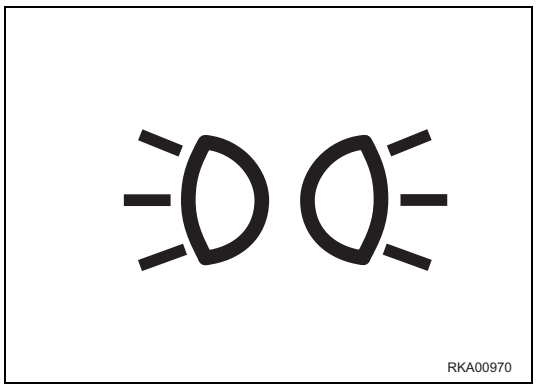

## 10 - TRANSMISSION OIL TEMPERATURE WARNING LIGHT (Red)

This warning light comes on and activates the acoustic alarm when the transmission oil exceeds the maximum temperature allowed; when it comes on, immediately stop the machine, put it in neutral and let it cool down with the engine idling at approximately 1200 rpm until the warning light goes out.
If this inconvenience occurs repeatedly, have the machine inspected and if necessary repaired by an authorized repair shop.



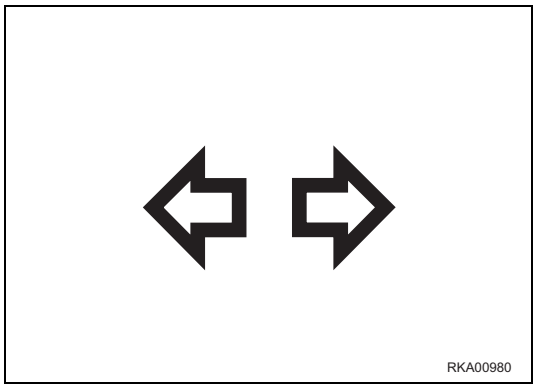
## 11 - PARKING LIGHTS AND LOW BEAM WARNING LIGHT (Green)

This warning light comes on when the parking lights and the low beam are operated with the corresponding switch «3.2.3 SWITCHES AND PUSH BUTTONS» pos. 1 - PARKING LIGHTS AND LOW BEAM SWITCH).



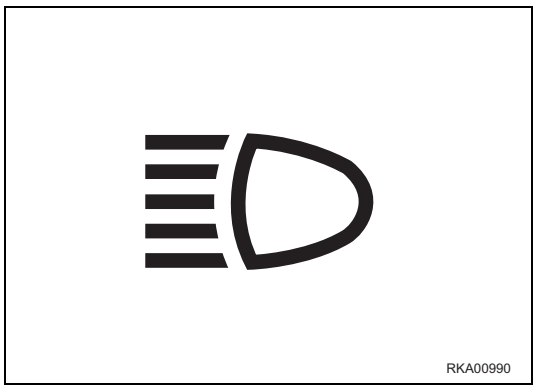

## 12 - DIRECTION INDICATORS WARNING LIGHT (Green)

This warning light comes on intermittently when the direction indicator lever is operated (see «3.2.3 SWITCHES AND PUSH BUTTONS» pos. 11 - EMERGENCY INDICATORS SWITCH).




## 13 - HIGH BEAM WARNING LIGHT (Blue)

This warning light comes on when the high beam is turned on with the dimmer switch (see «3.2.3 SWITCHES AND PUSH BUTTONS» pos. 21 - DIRECTION INDICATORS - DIMMER SWITCH - HORN - FRONT WINDSHIELD WIPER/WASHER).

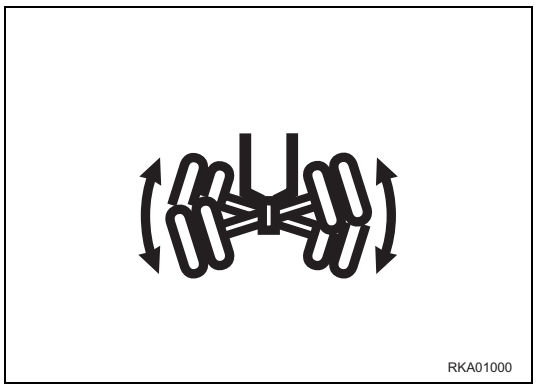



## 14 - REAR AXLE SWING LOCK WARNING LIGHT (optional)

This warning light comes on when the rear axle is locked, that is, when the inclination of the telescopic boom exceeds approximately 30°or when WORK mode is selected. WORK (see «3.2.5 MACHINE CONTROLS» pos. 3 - OPERATING MODE SELECTION UNIT.

**NOTE**

- **The 30° inclination of the telescopic boom indicates the value obtained by adding the inclination angle of the telescopic boom to the inclination of the machine and therefore of the ground. That's why the 30° value may not correspond to the value displayed by the inclinometer.**




The locking of the axle inhibits the frame levelling function.

## 15 - GENERAL ALARM WARNING LIGHT (Red)


This warning light comes on:

a - for about 3 seconds, during the general warning light check every time the machine is started;

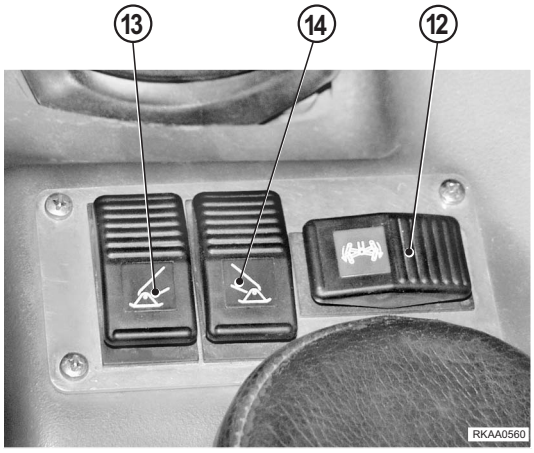
b - when the maximum temperature allowed for the engine coolant is exceeded.

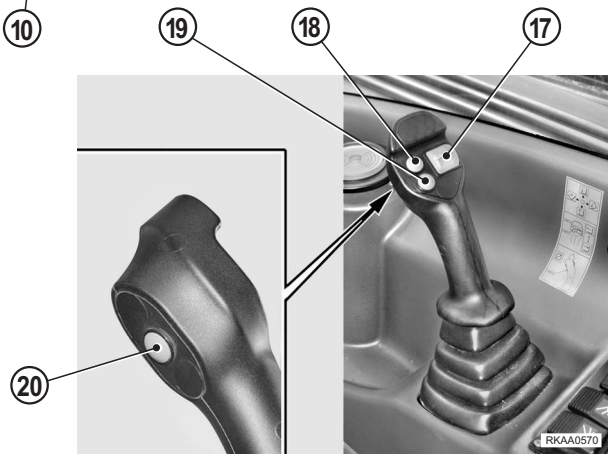
c - when the travel speed exceeds 50 km/h.

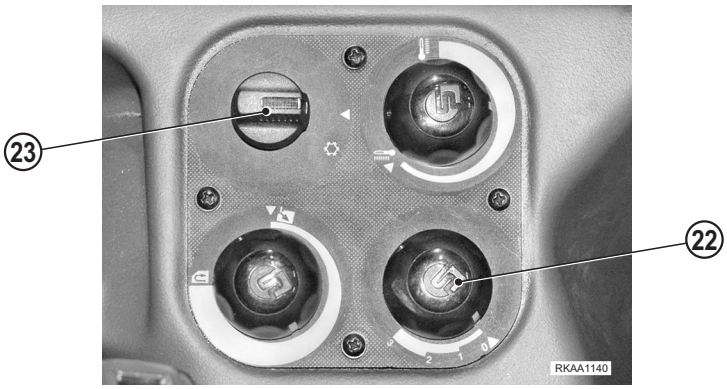
d - when the engine rpm exceeds 3250.

e - when the engine oil pressure is low.

## 3.2.3 SWITCHES AND PUSH BUTTONS

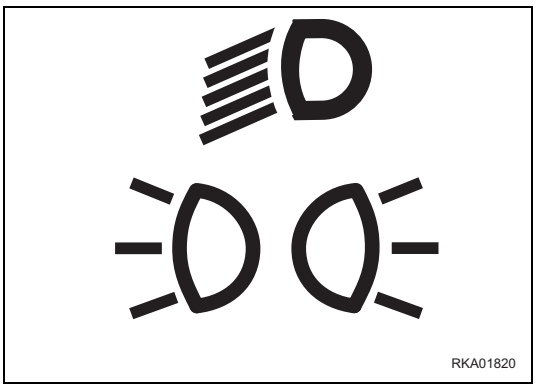




RKAA0580

## 1 - PARKING LIGHTS AND LOW BEAM SWITCH

This is a two-position switch; with one click it switches on the parking lights and instruments, with two clicks it switches on the low beam.

The parking lights can be switched on even with the machine at rest.

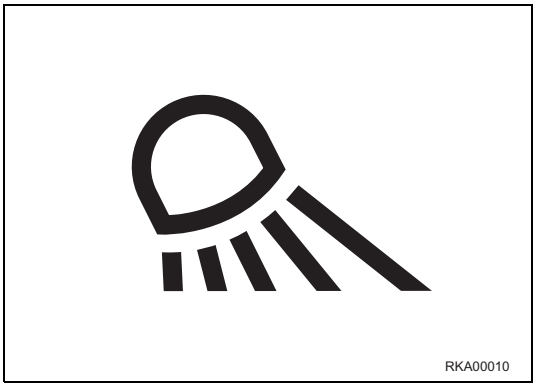



## 2 - WORK LIGHTS SWITCH

This is a two-position switch.

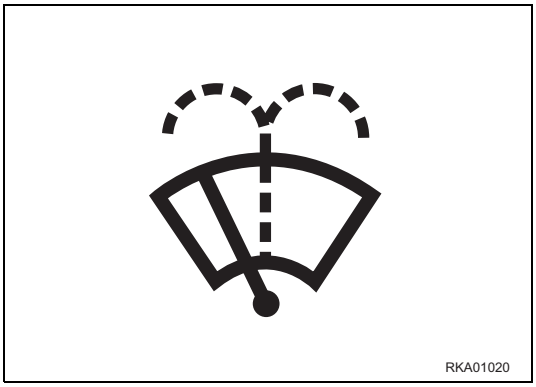
With the first click it switches on the front work light positioned on the boom (warning light (7) on the dashboard).
With the second clicks it switches on also the rear work lights (warning light (8) on the dashboard).
See «3.2.2 WARNING LIGHTS».

**NOTE**
- **When the machine travels on roads, the work lights must be off or covered by a screen.**



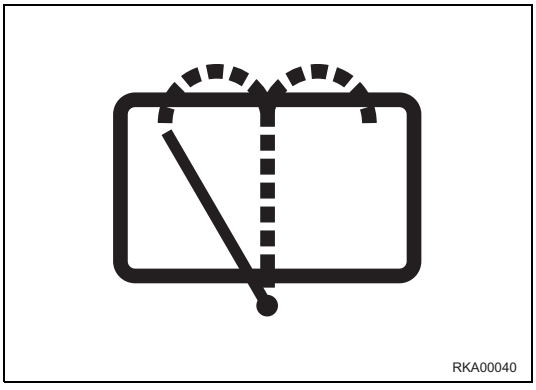

## 3 - UPPER WINDSHIELD WIPER/WASHER SWITCH (optional)

With the first click it operates the windshield wiper, while with two clicks (with automatic return to the first click position) it operates the rear and upper windshield washer.




## 4 - REAR WINDSHIELD WIPER/WASHER SWITCH

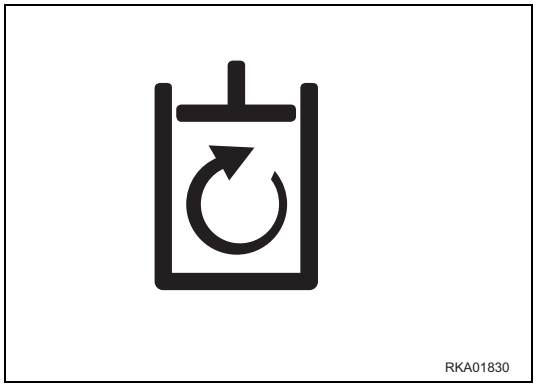
With the first click it operates the windshield wiper, while with two clicks (with automatic return to the first click position) it operates the upper and rear windshield washer.



## 5 - 6 AVAILABLE

## 7 - OPTIONAL EQUIPMENT HYDRAULIC CIRCUIT SWITCH

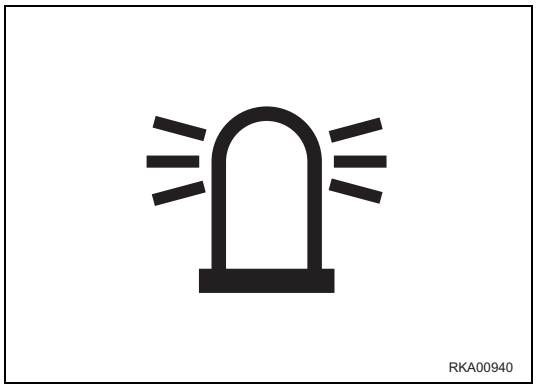
This switch is complete with safety lock.
When pressed to activate the circuit, it must be locked with a cursor to be held in this position; to deactivate the circuit, move the cursor to its original position (up), or press the switch again.


RKA01830

## 8 - REVOLVING LIGHT SWITCH (optional)

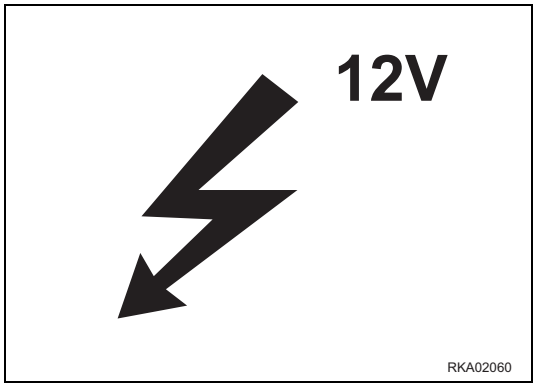
It switches on the revolving light.

**IMPORTANT**
- **When the machine travels on roads, the revolving light can be used only if this is required/allowed by the local traffic regulations.**


RKA00940

## 9 - 12V OUTLET

This is 12V outlet than can be used also to charge mobile phones, to supply power to radios for service communications, cigarette lighter, etc.

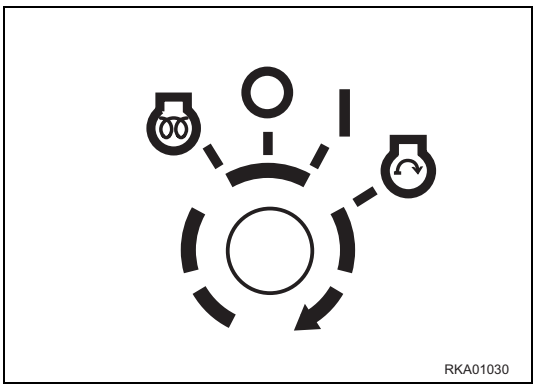


RKA02060

## 10 - IGNITION SWITCH

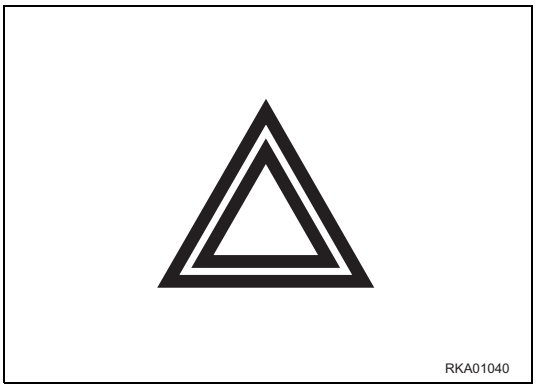
This is a rotary key switch with four positions marked by the following symbols: « » - **O** (OFF) - **I** - « » (START).

For further details on the use of this switch, see «3.6.2 STARTING THE ENGINE»).



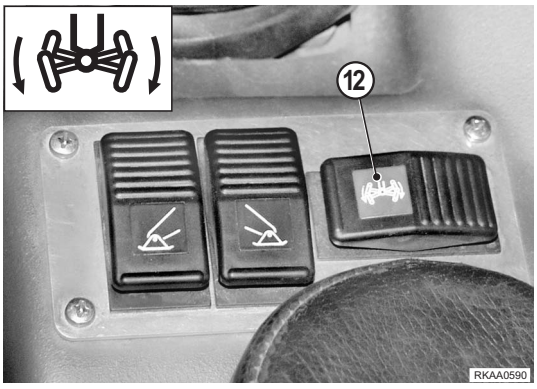

## 11 - EMERGENCY INDICATORS SWITCH

This switch operates all the direction indicators at the same time and must be used whenever, while travelling on roads, the machine is temporarily parked/stopped on the roadway or in any case in anomalous position.



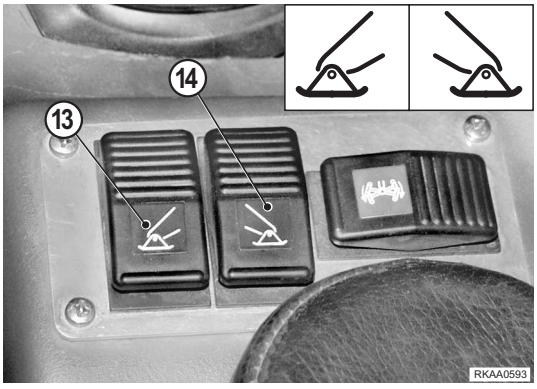

## 12 - FRAME LEVELLING PUSH BUTTON (optional)

This is a rocker button that returns to the center whenever released.
It must be used to level the frame when it is necessary to work on uneven ground or in any case on a slope that is transversal with respect to the axis of the machine.
For details on how to use this button, see «3.2.5 MACHINE CONTROLS».



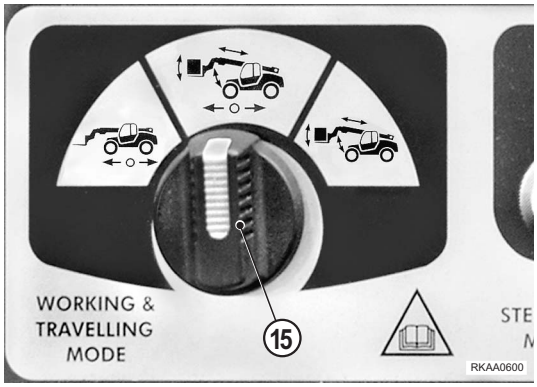

## 13 - 14 STABILIZERS PUSH BUTTONS (optional)

These are two two-position rocker buttons that return to the center whenever released.
They serve to operate the right and left stabilizer, respectively.
For details on how to use this button, see «3.2.5 MACHINE CONTROLS».



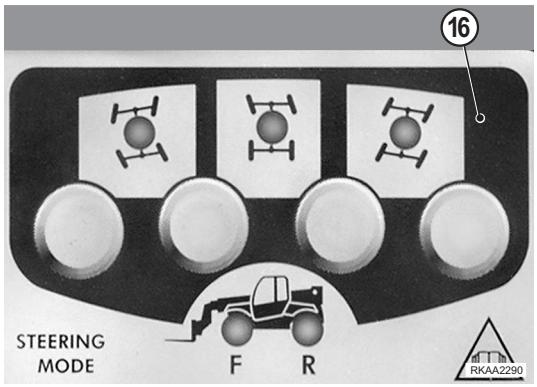
## 15 - MACHINE OPERATING MODE SELECTOR

This is a three-position selector that must be operated exclusively with the machine at rest.
With this selector it is possible to choose among three operating modes: TRAVEL, TRAVEL-WORK and WORK.
For details on how to select and use the three operating modes, see «3.2.5 MACHINE CONTROLS».



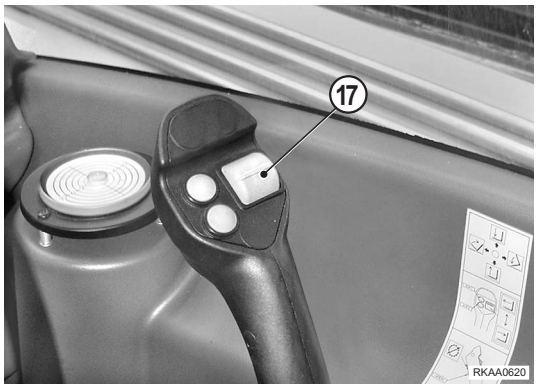

## 16 - STEERING MODE SELECTION PUSH BUTTONS

These are four buttons and must always be pressed in pairs; they make it possible to choose between two or four-wheel steering.
In particular, they make it possible to steer with the front wheels only (compulsory for circulation on roads) or with four wheels for either round or crab steering.
For more details on the steering mode selection procedure, see «3.2.5 MACHINE CONTROLS».



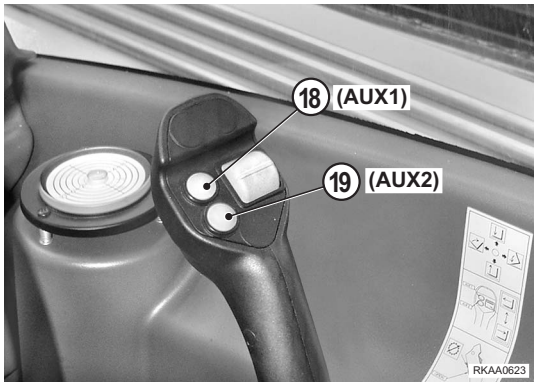

## 17 - BOOM EXTENSION AND RETRACTION POTENTIOMETER

This is a proportional potentiometer rotating in two directions that returns to the center whenever released.
Turn it forward to extend the boom and turn it backward to retract the boom.
For further details on how to use this potentiometer, see «3.2.5 MACHINE CONTROLS».




## 18 - 19 PUSH BUTTONS FOR HYDRAULICALLY-CONTROLLED EQUIPMENT

These buttons are used only when the quick coupling or hydraulically-controlled equipment are installed.

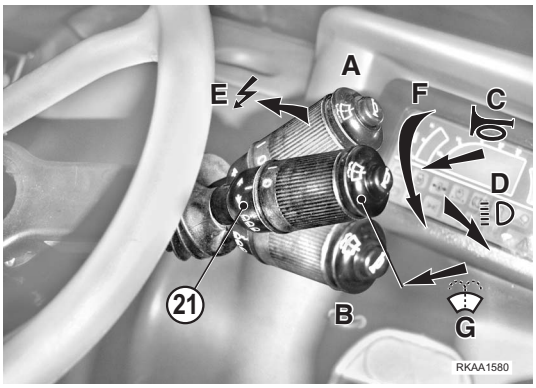


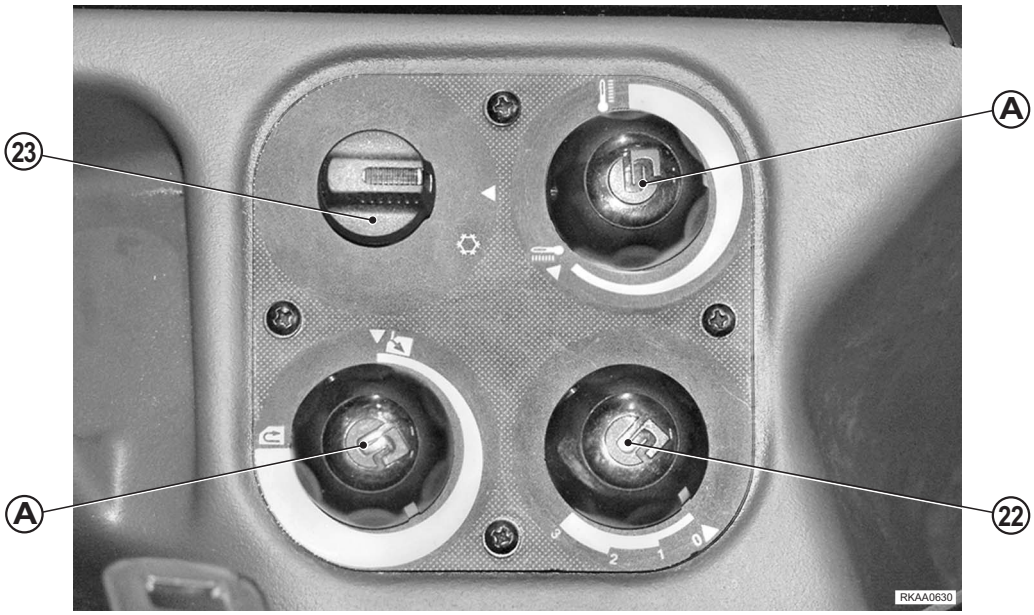
## 20 - TRANSMISSION DECLUTCH PUSH BUTTON

This button makes it possible to disconnect the transmission in order to use all the power developed by the engine for the hydraulic system.
It can be used when the TRAVEL-WORK or TRAVEL operating modes are selected.


## 21 - DIRECTION INDICATORS - DIMMER SWITCH - HORN - FRONT WINDSHIELD WIPER/ WASHER

A - Left direction indicator
B - Right direction indicator
C - Horn
D - Low beam-high beam switch
E - High beam signaller
F - Windshield wiper
G - Windshield washer



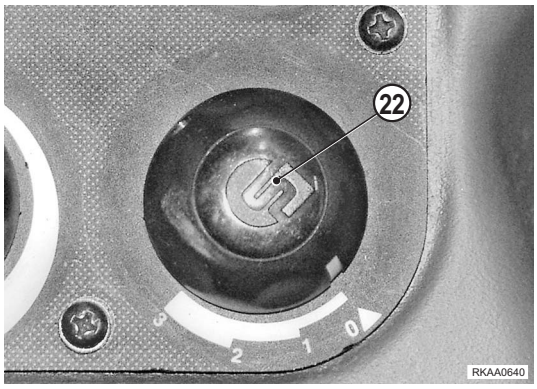



22 - Fan switch

23 - Air conditioner switch (optional)

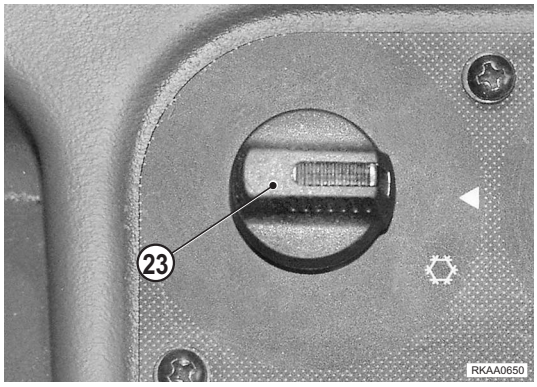
A - See «3.5.2 CAB»

## 22 - FAN SWITCH




This is a three-speed switch that operates the fan motor. Turn the switch clockwise to increase ventilation.
If operated after the tap installed on the heater has been opened, this switch ensures the circulation of warm air and serves as heating switch (see «3.5.4 VENTILATION AND HEATING»).
On machines provided with air conditioning system, the fan ensures the circulation of cool air (see «3.5.5 AIR CONDITIONER (optional)»).

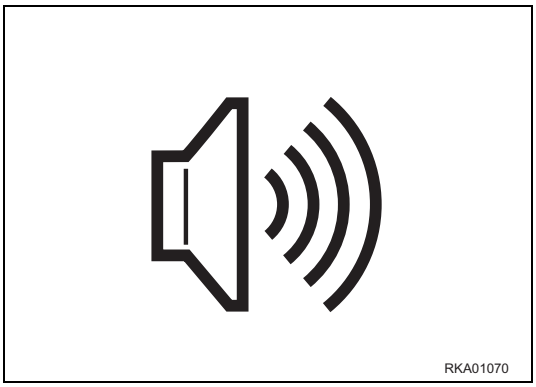
## 23 - AIR CONDITIONER SWITCH (optional)




This is a two-position switch and if rotated clockwise (led on) it operates the air conditioner.
For further details on how to use this switch, see «3.5.5 AIR CONDITIONER (optional)»).
To stop the air conditioner, turn the switch anticlockwise (led off).

# 3.2.4 ELECTRIC ACCESSORIES

## 1 - ACOUSTIC ALARM



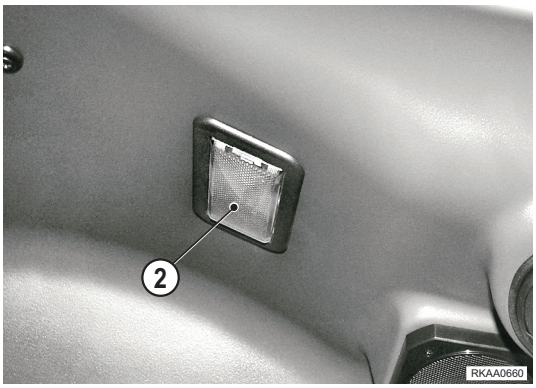

The acoustic alarm starts when the circuits are energized with the ignition key (rotation to position «**I**») and stops automatically after the automatic check on the warning lights.
The continuous sound during the use of the machine signals:

- insufficient engine oil pressure;
- overheating of the engine cooling circuit;
- aulty alternator or worn belt.

The intermittent sound during the use of the machine signals:

- misalignment of the rear wheels;
- interval between selection and actual operation of the selected steering mode.

## 2 - ROOF LIGHT




This lamp is used to check the instruments and the inside of the cab and to consult the load charts when visibility is poor.

The roof light can be switched on by pressing one of its short sides.

## 3 - POWER OUTLET


A power outlet is positioned on the rear part of the machine for the connection of a lighting device for routine and maintenance operations.

It is a two-pole outlet and is in compliance with the ISO 4165-1979 standard.

Power supply 12 V.

## 3.2.5 MACHINE CONTROLS





RKAA0780

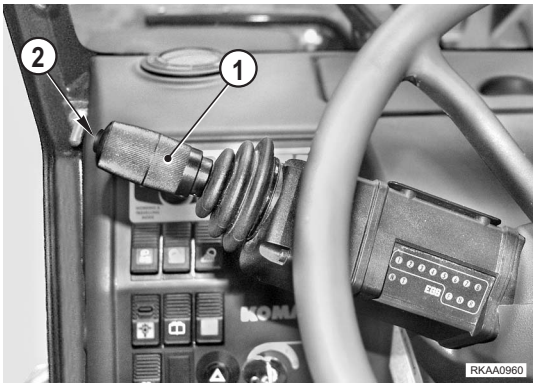
1 - Gearshift-reverse lever
2 - Steering mode selection unit
3 - Operating mode selection unit
4 - Frame levelling (optional)
5 - Stabilizers control (optional)
6 - Boom control lever
7 - SLI-Safe Load Indicator
8 - Parking brakes
9 - Service brake pedal
10 - Accelerator pedal

## 1 - GEARSHIFT-REVERSE LEVER

**⚠ DANGER**

- **Between the gearbox and the engine there is no mechanical connection; if the machine is parked on a slope, it can move freely even if the gears are engaged. For this reason, always apply the parking brake, in order to avoid serious damage.**
- **Before performing electric welding operations on the machine, remove the guard and disconnect the connector of the gearshift-reverse lever (See «2.8.14 PRECAUTIONS CONCERNING THE GEAR LEVER»).**
  **Non-compliance with this rule may lead to serious damage, injury and even death, since the microcircuits of the selection and storage of gears and of the travel direction may be irreversibly damaged.**

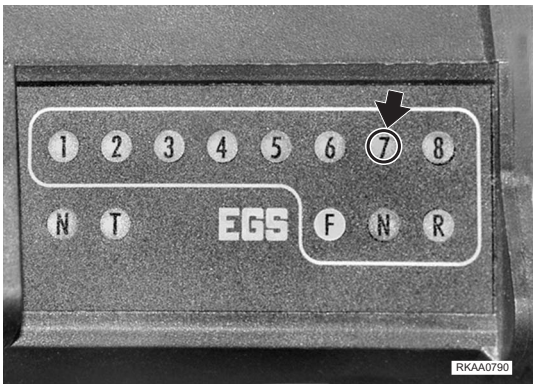
It is a combined electronic control (1) that makes it possible to select the machine travel direction, the gear and consequently also the travel speed.



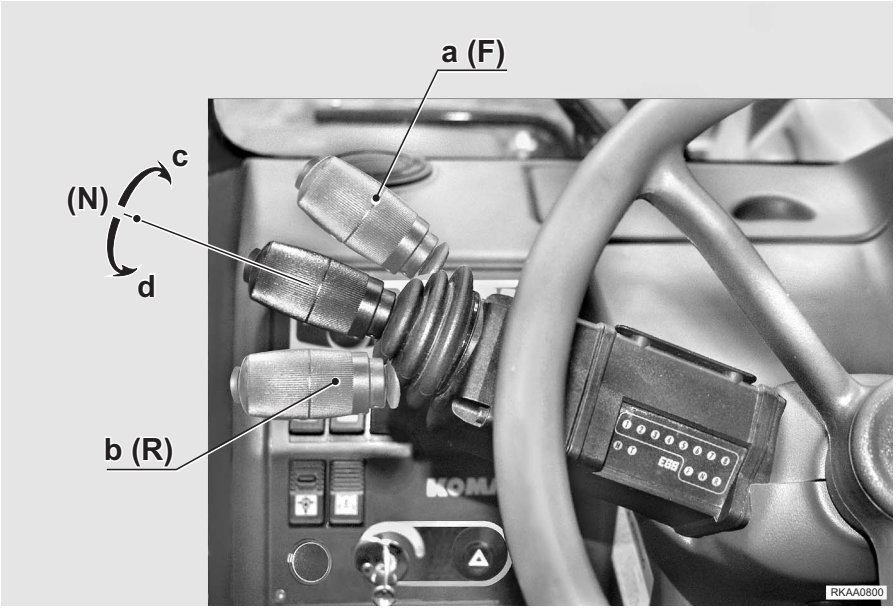

The gearshift-reverse lever unit is available in two versions:

- **STANDARD**: manual shift of all gears.
- **SEMI-AUTOMATIC**: manual engagement of the first three gears and automatic management of 4th and 5th gear.
  The visual signals emitted by the led are the same and the only difference lies in the push button (2) (provided only for the semi-automatic version), which when pressed makes it possible to select the completely manual mode indicated by the coming on of the yellow led 7.

It is possible to select among 5 FORWARD gears and 3 REVERSE gears.
It is possible to choose among all the available gears only in TRAVEL operating mode.
In TRAVEL - WORK operating mode only the 1st and 2nd forward and reverse (F - R) gears can be selected.
In WORK operating mode the gearshift cannot be used.




The start normally takes place in 2nd gear, both forward and reverse; it is possible to start in 1st gear only by selecting it manually.




**a - When shifted FORWARD (F) and rotated on its axis**, the forward movement of the machine is enable.

**b - When shifted BACKWARD (R) and rotated on its axis**, the reverse movement of the machine is enable.

**NOTE**

- **If the machine travels in 1st forward (F) gear at a speed exceeding 4 km/h and a reversal is carried out (1st reverse gear (R)), the gears automatically shift to NEUTRAL (N).**

---

**IMPORTANT**

- **Damage to the transmission may occur if the machine is allowed to coast with the engine off.**
  **Damage to the transmission may also occur if the machine travel direction is reversed at an excessive speed.**
  **Do not allow the machine to coast.**
  **Reverse the machine travel direction only with the machine in 1st gear and moving at less than 4 km/h.**

---

The lever in position (N), rotated on its horizontal axis selects:

**c - When rotated FORWARD,** the upshift of the 5 gears available.

**d - When rotated BACKWARD,** the downshift of the 3 gears available.

All the functions are indicated by leds that come on or take on different colours:

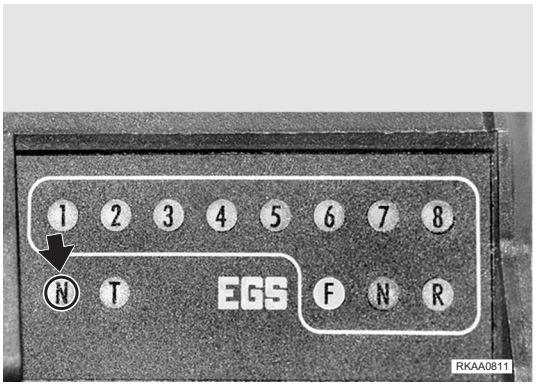

| LED | CONDITION |
|---|---|
| **N** | Comes on when the machine is in NEUTRAL |
| **T** | Used only with a diagnostic function, comes on only in case of failure |
| **1 - 5** | Indicate what gear is engaged (N°) and the direction according to their colours.<br>**RED:** with machine in NEUTRAL<br>**GREEN:** with machine in FORWARD gear<br>**YELLOW:** with machine in REVERSE gear<br>**NOTE**<br>**If the enable of movement is selected but the gear lever is not shifted, the corresponding led flashes passing from GREEN to YELLOW and vice versa.** |
| **6** | Not used. |
| **7** | Used only for the SEMI-AUTOMATIC gearshift. |
| **8** | No indication during the use of the machine. |

Example:

- If the 2nd forward gear (F) is engaged, the led (2) is green.
- If the 2nd reverse gear (R) is engaged, the led (2) is yellow.
- If the 2nd gear is selected with machine in neutral (N), the led (2) is red.

The other rules governing the use of the gearshift-reverse lever unit are the following:

1 - Every time the engine is stopped, the gears automatically shift to neutral (N) and any gear engaged is released.
When the engine is restarted, the gearshift passes to the safety position (LED N RED); to start moving, shift the lever to the NEUTRAL position (N), select the travel direction and engage a gear (the 2nd gear is automatically engaged).



2 - The engagement of a gear can take place only after the selection of the travel direction and within maximum 5 seconds; if the gears are not engaged, the gearshift returns to the safety postion (NEUTRAL).

3 - The gears are engaged by rotating the lever on its axis and releasing it after each engagement.

4 - It is not possible to upshift from the 2nd to the 3rd FORWARD gear and from the 2nd to the 3rd REVERSE gear if the minimum number of revolutions necessary for upshifting hasn't been reached.
This doesn't apply for the first two gears.

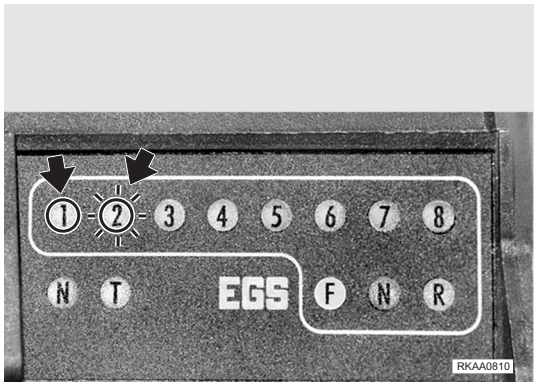
5 - The gearbox includes a device against quick shifting or reversal manoeuvres that involve the risk of overspeed for the transmission; in this case the shifting control is stored, but the shifting isn't carried out immediately; several gear shifts are carried out in 1.5 seconds, until the selected gear is engaged.

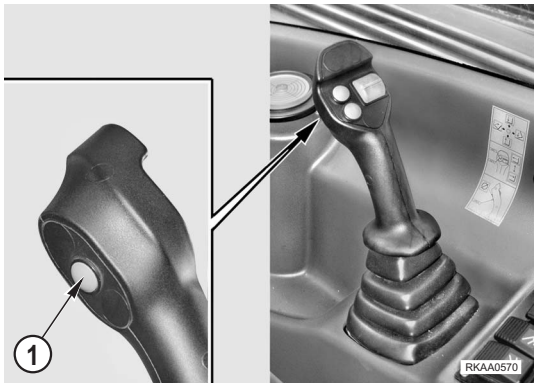
Example

If the machine travels in 2nd forward gear at high speed and the 1st gear is engaged, the leds are in the following condition: led (1) is green and led (2) is green, but flashing: the flashing of the led signals to the operator that the speed must be reduced to allow the 1st gear to be engaged.

The led of the upper gear flashes to signal that to shift down it is necessary to reduce the speed, while the led of the engaged gear remains steadily on.
When the led stops flashing, this means that the selected gear has been engaged.

6 - The gears can temporarily be set to NEUTRAL (N) by using the transmission declutch button (1) positioned on the grip of the boom control lever, only in TRAVEL-WORK or TRAVEL operating mode.



## 2 - STEERING MODE SELECTION UNIT

**⚠ DANGER**

- **When the engine is started the two-wheel steering is always enabled.**
  **The acoustic alarm when the machine starts moving means that the rear wheels aren't aligned.**
  **Turn the steering wheel clockwise or anticlockwise until the rear wheels are aligned, which is confirmed by the coming on of the green warning light (9) and by the interruption of the acoustic alarm.**
  **Once the rear wheels are aligned, the warning lights (8), (9) remain on and the warning light (6) of the two-wheel steering comes on.**
- **The selection of the four-wheel steering mode can be made only after selecting the TRAVEL-WORK or WORK operating mode (for further details, see« 3 - OPERATING MODE SELECTION UNIT»).**
  **The TRAVEL mode automatically inhibits the four-wheel steering.**
- **The selection of the crab steering can be carried out only and exclusively with the machine at rest, while the round or two-wheel steering can be selected also when the machine is moving, with 1st or 2nd gear engaged or with TRAVEL-WORK operating mode selected.**

---

The steering mode is selected according to the type of ground and to the type of operation to be carried out.
Three steering modes are available:

a - **Two-wheel steering (2WS)** (warning light 6 on): this is the compulsory steering mode for circulation on roads (TRAVEL).

b - **Round steering (4WS)** (warning light 5 on).

c - **Crab steering (4WS)** (warning light 7 on).

**NOTE**

- **The flashing of one of these warning lights indicates that the corresponding steering mode has been selected, but not that it is actually in function, since this occurs only after the alignment of the wheels.**

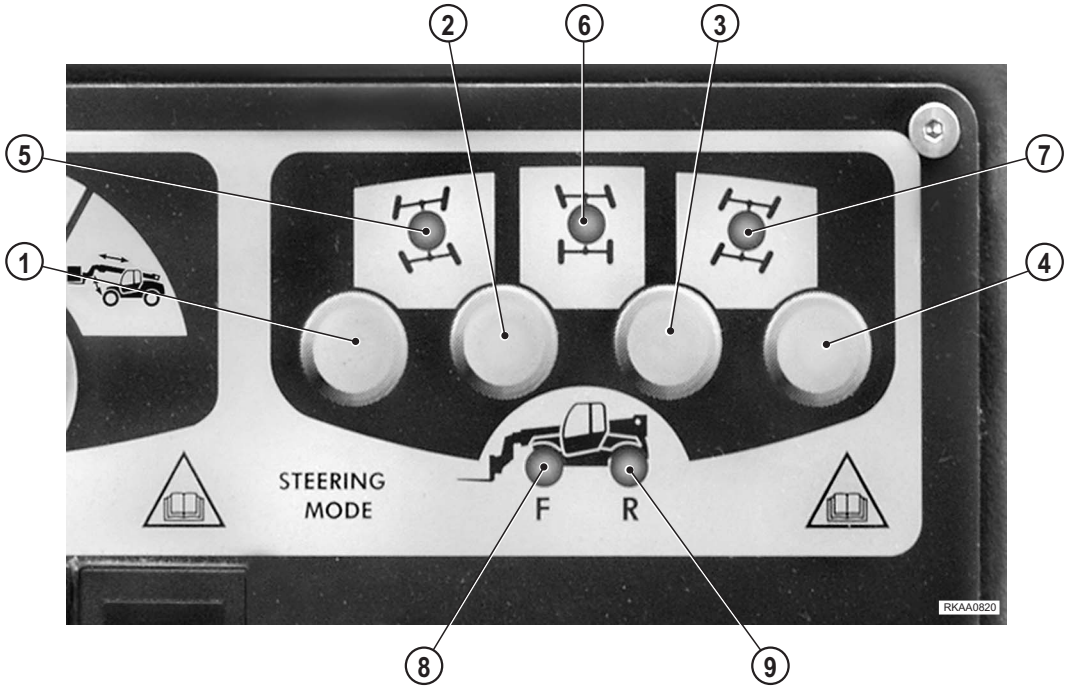
---

The selection of the steering mode can be made only after selecting the TRAVEL-WORK and WORK operating mode and it is achieved by simultaneously pressing:

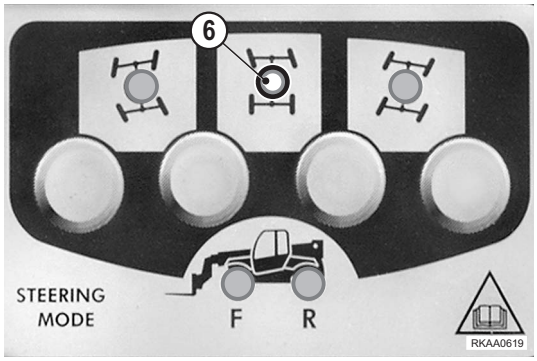
a - buttons (2), (3) for two-wheel steering (2WS and warning light 6 on)

b - buttons (1), (2) for round steering (4WS and warning light 5 on)

c - buttons (3), (4) for crab steering (4WS and warning light 7 on).



The operating functions of this unit are the following:




**2-1 START**

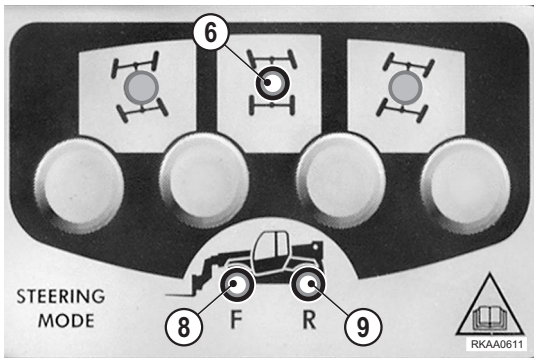
When the machine is started, the two-wheel steering is always selected and therefore the led (6) is on.
If the rear wheels are misaligned:

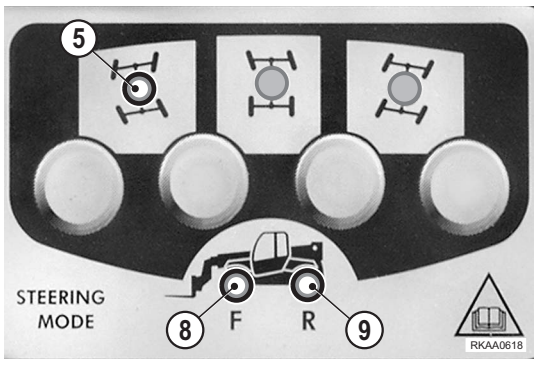
a - the intermittent acoustic alarm starts;

b - the transmission is locked and therefore travel is inhibited;

c - the last steering mode previously selected is automatically engaged.

In these conditions, the rear wheels are realigned (leds 8 and 9 on) by turning the steering wheel, the two-wheel steering is automatically selected, the acoustic alarm stops and the transmission lock is released.



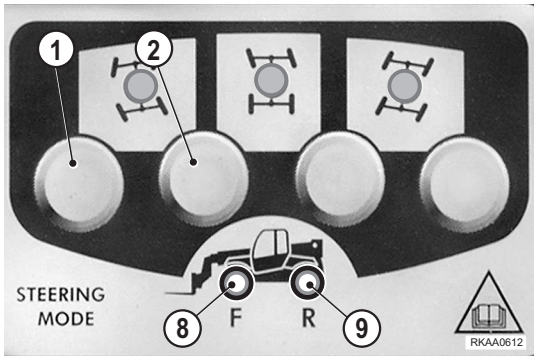

**2-2 REAR WHEEL ALIGNMENT**

When the two-wheel steering is selected, the misalignment of the rear wheels can take place with speed under or over 13 km/h; in both cases the acoustic alarm starts sounding, intermittently if the speed is **under** 13 km/h, continuously if the speed **exceeds** 13 km/h.
The realignment procedure with speed under 13 km/h is the following:

a - turn the steering wheel until the front wheels are aligned (led 8 on);

b - select the round steering with push buttons (1) and (2);

c - realign the rear wheels by turning the steering wheel until the leds (8) and (9) are on.




**NOTA**

- **The alignment involves the automatic selection of the two-wheel steering.**

When the speed **exceeds** 13 km/h, the starting of the continuous acoustic alarm requires the operator to reduce the speed under 13 km/h; once this speed has been reached, the procedure described above can be carried out.

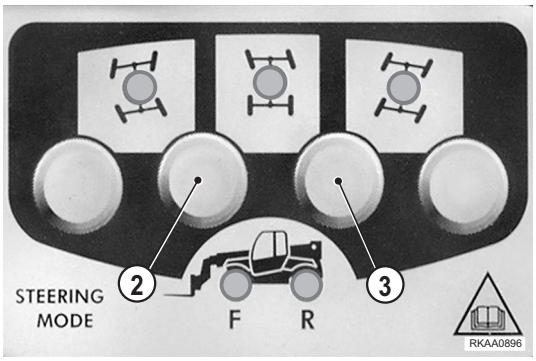
## 2-3 TWO-WHEEL STEERING (2WS)

If the four-wheel round or crab steering (4WS) is being used and the two-wheel steering (2WS) is selected with buttons (2) and (3) while the rear axle isn't aligned:

a - the intermittent acoustic alarm starts;

b - the round or crab steering is maintained until the rear wheels are realigned;

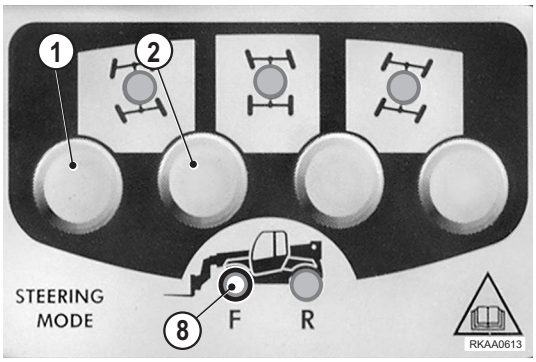
c - once the rear wheels have been realigned, the two-wheel steering (2WS) is automatically selected.



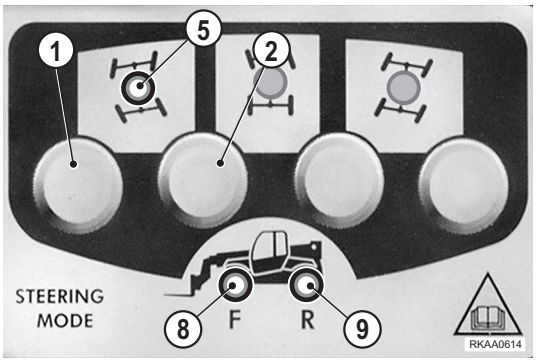

## 2-4 4WS ROUND STEERING MODE

- If the 4WS round steering is selected with push buttons (1) and (2) when the machine is in WORK or TRAVEL-WORK operating mode with two-wheel steering (2WS) engaged and front wheels misaligned:

a - the 2WS selection is maintained until the front wheels are aligned (led 8 on);

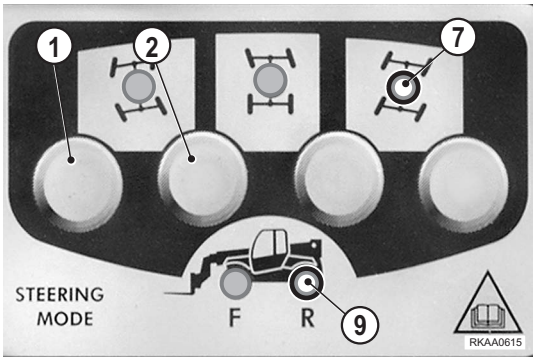



b - the 4WS round steering is selected (led 5 on).

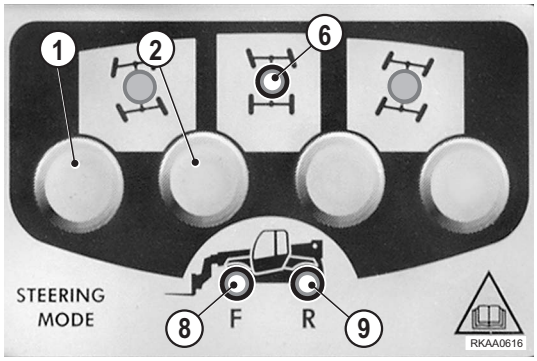



- If the 4WS round steering is selected with push buttons (1) and (2) when the machine is in WORK or TRAVEL-WORK operating mode with 4WS crab steering and front and/or rear wheels misaligned:

a - the crab steering is maintained until the rear wheels are aligned (led 7 and 9 on);



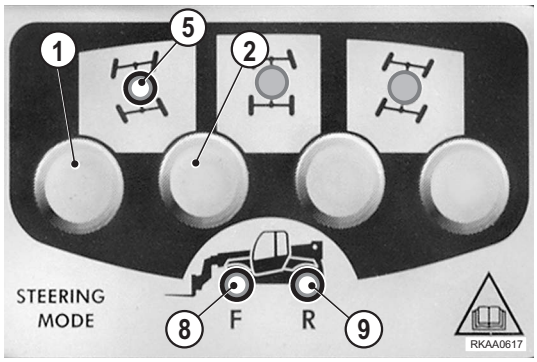
b - the two-wheel steering (2WS) is selected until the front wheels are aligned (led 6 and 8 on);




c - the 4WS round steering is selected (led 5 on).

**NOTE**

- **If the 4WS ROUND steering is selected with the machine in TRAVEL operating mode, the control is neither accepted, nor stored.**

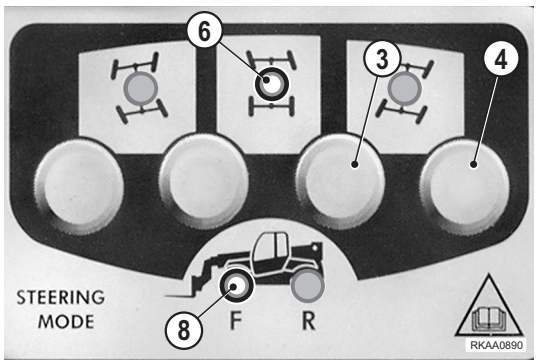



## 2-5 4WS CRAB STEERING MODE

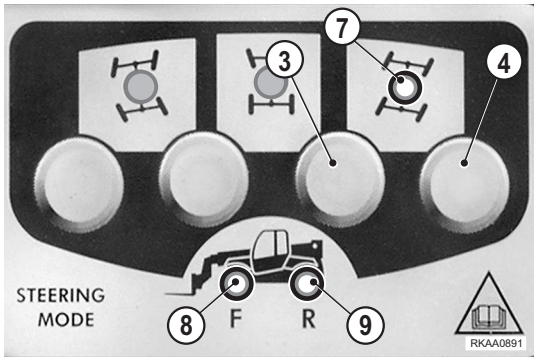
- If the 4WS CRAB steering is selected with push buttons (3) and (4) when the machine is in WORK or TRAVEL-WORK operating mode with two-wheel steering (2WS) engaged and front wheels misaligned:

**1st CASE (machine at rest)**

a - the 2WS selection is maintained until the front wheels are aligned (led 8 on);



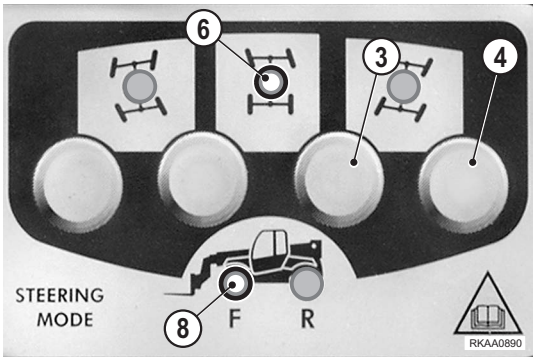

b - the 4WS crab steering is selected.



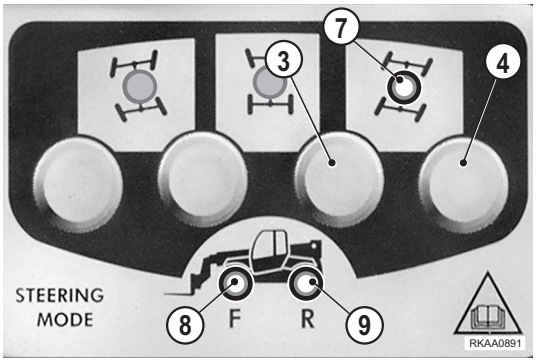
**2nd CASE (machine moving)**

a - the intermittent acoustic alarm starts and continues until the machine stops;

b - the 2WS selection is maintained until the front wheels are aligned (led 8 on);



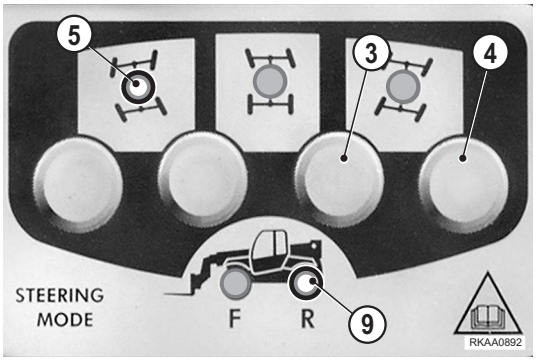

c - the 4WS crab steering is selected.



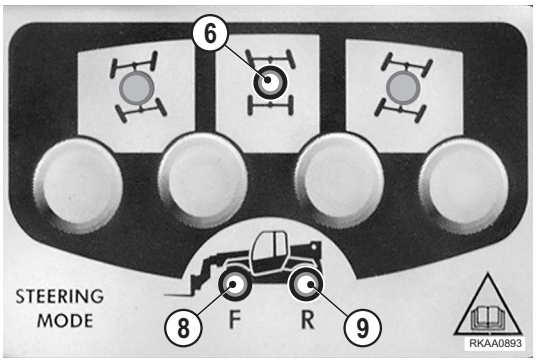

- If the 4WS CRAB steering is selected with push buttons (3) and (4) when the machine is in WORK or TRAV-EL-WORK operating mode with 4WS round steering engaged and front and/or rear wheels misaligned:

**1st CASE (machine at rest)**

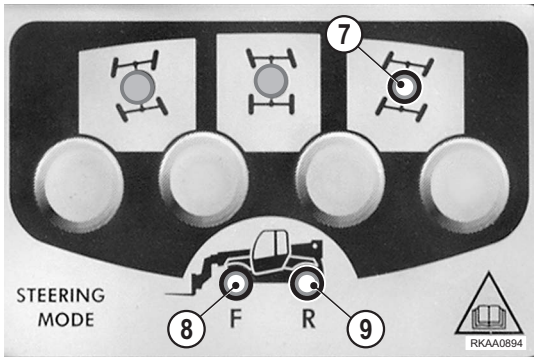
a - the 4WS round steering selection is maintained until the rear wheels are aligned (led 9 on);




b - the two-wheel steering (2WS) is selected until the front wheels are aligned (led 8 on);



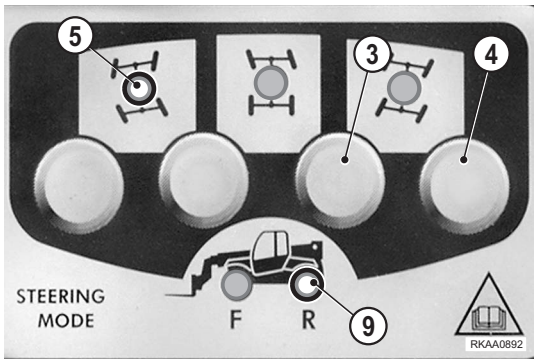
c - the 4WS crab steering is selected (led 7 on).



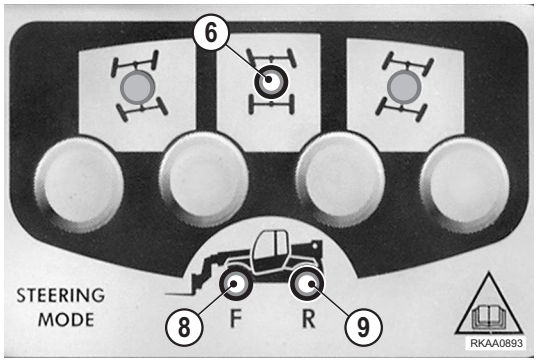

**2nd CASE (machine moving)**

a - the intermittent acoustic alarm starts and continues until the machine stops;

b - the 4WS round steering selection is maintained until the rear wheels are aligned (led 9 on);



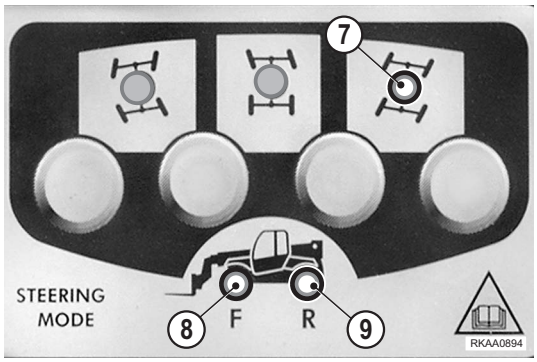

c - the two-wheel steering (2WS) is selected until the front wheels are aligned (led 8 on);




d - the 4WS crab steering is selected (led 7 on).

**NOTE**

- **If the 4WS CRAB steering is selected with the machine in TRAVEL operating mode, the control is neither accepted, nor stored.**



## 3 - OPERATING MODE SELECTION UNIT

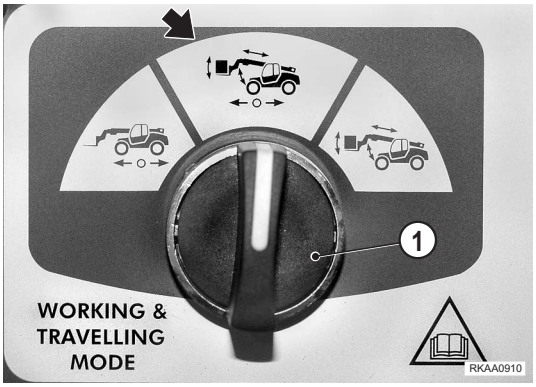
The selector (1) is used to choose among three different operating modes:

**a - TRAVEL**

This operating mode allows the machine to travel only; therefore, it inhibits all movements regarding boom, work equipment, stabilizers and frame levelling.
When this mode is selected, all the available gears can be used (5 forward + 3 reverse).


**b - TRAVEL-WORK**

Besides travel, this operating mode also enables the frame levelling function and the use of boom, work equipment, stabilizers.
It is the operating mode that must be used to prepare the machine for lifting operations, to carry out (if necessary) the load balance tests before lifting the load and before moving to reach the unloading point.
In this mode only the 1st and 2nd gear, both forward and reverse, are available.
This operating mode can be selected with the machine at rest and also in TRAVEL condition; in the latter case, the gears will be shifted down until engaging the 2nd gear.




**c - WORK**

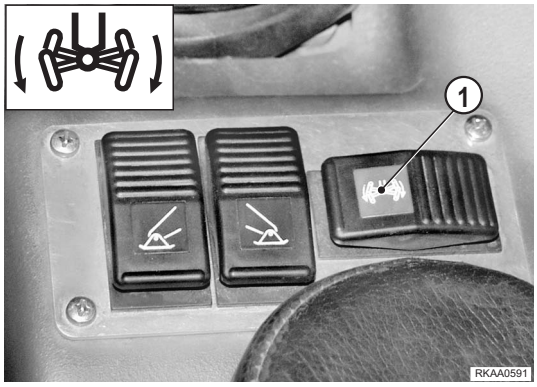
This operating mode allows only the movement of the boom and of the work equipment, inhibiting all other functions; it is the mode to be selected for the loading and unloading of the material and must be selected **only with the machine at rest** and with parking brake applied.

## 4 - FRAME LEVELLING (optional)

**⚠ DANGER**

- **The levelling of the frame must be carried out only with the machine at rest, in TRAVEL-WORK operating mode and before lowering the stabilizers.**
- **Always level the machine frame before lifing the load to be handled.**
- **Avoid using the levelling control when the boom is lifted or extended, even if partially, with or without load.**
- **The frame must be levelled even when the machine travels on slopes that are transversal to the travel direction and even if the machine isn't loaded.**

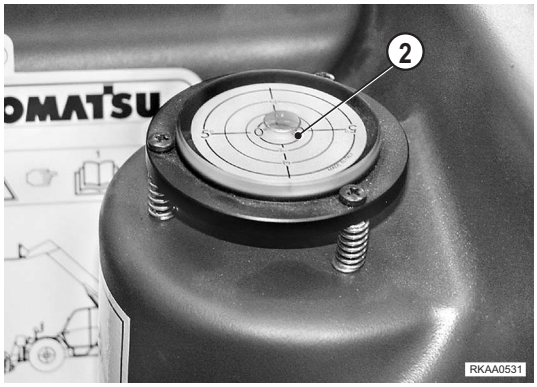
The transversal levelling of the frame is achieved by pressing the rocker button (1) that, when released, stops the movement of the frame; the maximum inclination possible is ± 10°.




The frame must be checked using the water level (2) (see «3.2.1 INSTRUMENTS»); the level must be centered laterally.

If during travel the transversal gradient should exceed 2°, stop the machine and level the frame.

The frame levelling will be inhibited when boom inclination referred to the frame exceeds approximately 30°.



## 5 - STABILIZERS CONTROL (optional)

**⚠ DANGER**

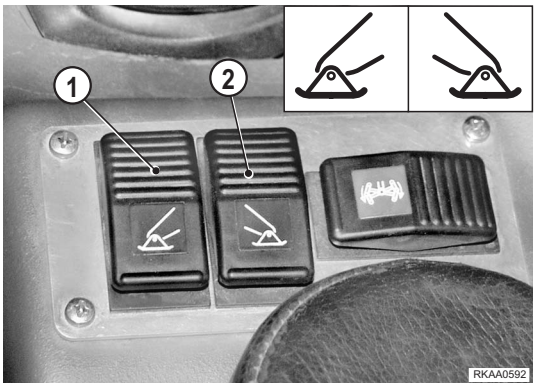
- **The stabilizers can be operated only in TRAVEL-WORK operating mode.**
- **Before lowering or raising the stabilizers, make sure that no person or obstacle is within their operating range.**
- **Before selecting a gear or the travel direction, make sure that the stabilizers have been completely raised.**
- **In case of operation with the front tyres touching the ground, consult the load chart corresponding to this condition.**

The stabilizers are lowered by pressing the push buttons (1) and (2), which control the right and left stabilizer, respectively, towards the front of the machine.

When the buttons are released the movement is interrupted and when the buttons are pressed in the opposite direction the stabilizers are raised.

The stabilizers must be forced until the tyres are raised approx. 3-5 cm from the ground, always paying attention to the levelling of the frame (for further details, see paragraph « 4 - FRAME LEVELLING (optional)»).

The use of the stabilizers is inhibited when boom inclination referred to the frame exceeds approximately 30°.

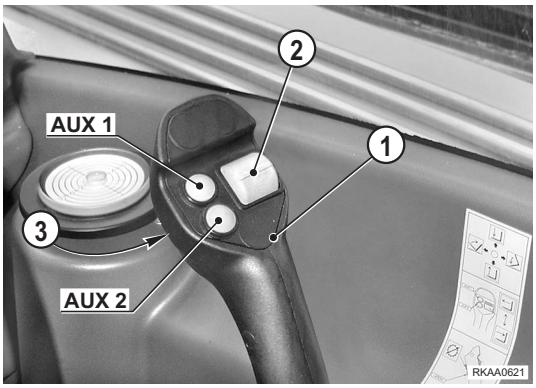



## 6 - BOOM CONTROL LEVER

**⚠ DANGER**

- **Before carrying out any manoeuvre with this lever, the operator must be seated in driving position, with fastened safety belt.**
- **Before using the machine, the operator must get acquainted with the functions and use of all the controls grouped on the boom control lever.**
- **The lifting and extension of the boom must be carried out respecting the safety limits prescribed by the load chart corresponding to the configuration of the machine (with or without stabilizers and with the equipment installed), depending on the inclination and on how much the boom is extended.**
  **Information regarding safety is supplied by the warning lights and by the acoustic alarm of the SLI-Safe Load Indicator.**
  **For further details, see pos. « 7 - SLI-SAFE LOAD INDICATOR» and «3.3.1 READING THE LOAD CHARTS».**

The boom control lever (1) is a multifunction lever, since it is equipped with other controls: boom extension and retraction potentiometer (2), solenoid valves (AUX1 - AUX2) for optional hydraulic equipment and transmission declutch button (3).



## 6-1 LEVER

The boom control lever is positioned on the operator's right and controls the boom lifting and lowering and the folding and dumping of the equipment according to the orthogonal movements listed below.

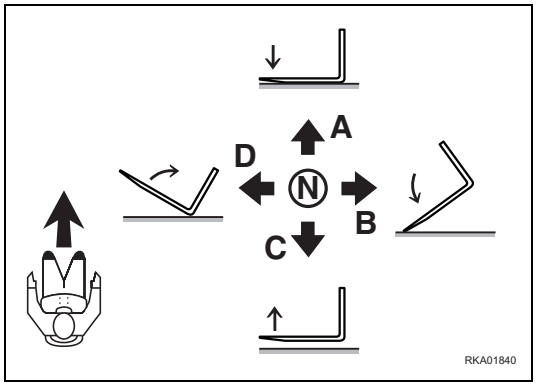
**N** - Neutral

**A** - Boom lowering

**B** - Equipment dumping

**C** - Boom lifting

**D** - Equipment folding




If the lever is operated following an inclined direction with respect to the machine axes, simultaneous movements, proportional to the inclination angle, are obtained, since the two hydraulic distributors responsible for the single functions are working at the same time.

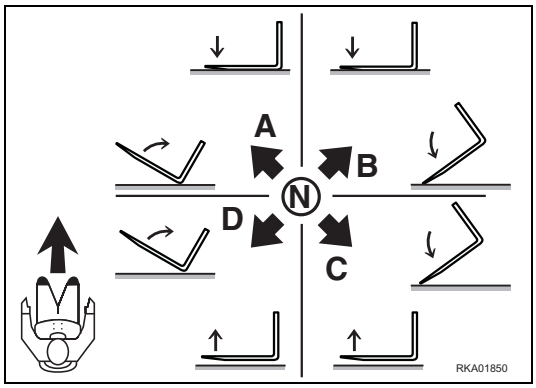
**N** - Neutral

**A** - Boom lowering – Equipment folding

**B** - Boom lowering – Equipment dumping

**C** - Boom lifting – Equipment dumping

**D** - Boom lifting – Equipment folding



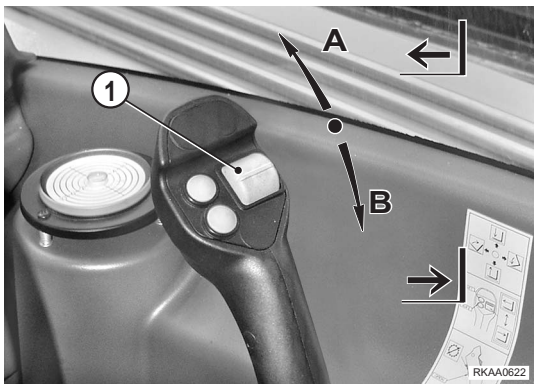

**IMPORTANT**

- **In the TRAVEL–WORK operating mode, independently of the boom extension and in order to increase the transversal stability of the machine, if the boom inclination exceeds approximately 30° (which can be checked on the goniometer applied to the left side of the first section of the boom), the movement of the frame with respect to the axles is automatically locked (if the rear axle lock cylinder is installed). Normal conditions are automatically restored when the boom inclination is again below 30°.**

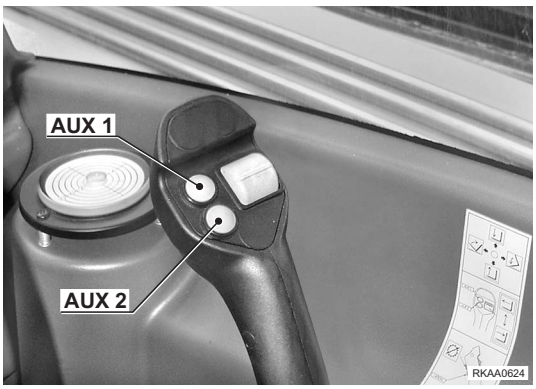
## 6-2 BOOM EXTENSION-RETRACTION POTENTIOMETER

This is a roller potentiometer (1) with proportional directional signals that automatically returns to the center when released.

When turned towards the front of the machine (A), it controls the extension of the boom; turned in the opposite direction (B), it controls the retraction of the boom.



### 6-3 HYDRAULIC EQUIPMENT CONTROL PUSH BUTTONS




**DANGER**

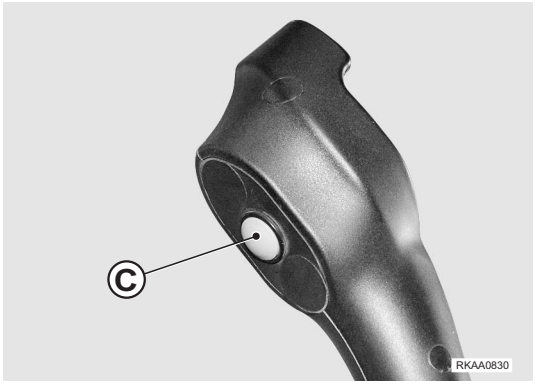
- **After using the auxiliary line for the equipment, disconnect the circuit.**
  **Failure to disconnect the line after use may cause serious accidents and even death.**

In order to be able to use the auxiliary line for the hydraulic equipment, it is necessary to connect the circuit by pressing button on the dashboard (see «3.2.3 SWITCHES AND PUSH BUTTONS»). The buttons that control the hydraulic equipment are identified by AUX1 - AUX2, as shown in the illustration.

**IMPORTANT**

- **After connecting the pipes to the equipment, the operator must try the AUX1 - AUX2 buttons to verify the directions of rotation or the movements produced by each individual push of the buttons.**
- **Before starting work, the operator must check the correspondence between the AUX buttons and the directions of movement of the equipment, since the person who connected the pipes may have inverted the connections.**

### 6-4 TRANSMISSION DECLUTCH PUSH BUTTON




**DANGER**

- **Avoid using this button when the machine works or travels on slopes.**

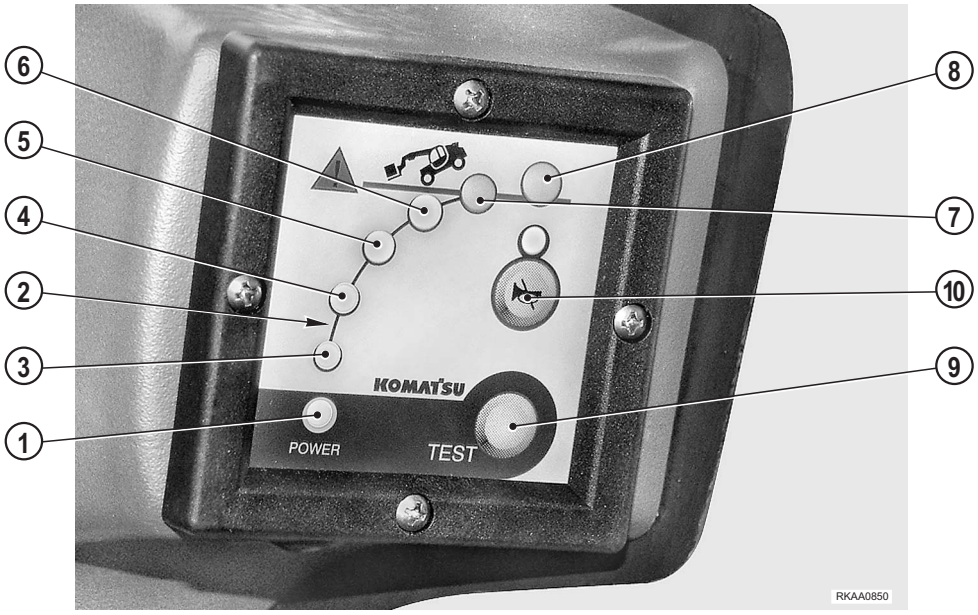
This button is used in TRAVEL-WORK and TRAVEL operating modes when heavy loads must be lifted and therefore all the hydraulic power developed by the machine must be available.
The transmission is disconnected by keeping this button (**C**) pressed; in this way, all the power developed by the engine can be used by the hydraulic system.
The transmission remains disconnected as long as the button is kept pressed.
This function can be used with any gear engaged.

## 7 - SLI-SAFE LOAD INDICATOR

**⚠ DANGER**

- **While lifting or handling a load, check the stability of the machine frequently; if the yellow warning lights come on, maximum attention must be paid while performing manouevres with the equipment control lever and travel speed must be reduced if the machine travels on uneven or wavy surfaces. Do not change direction abruptly.**
- **Even if the first operational TEST is carried out automatically as soon as the engine is started, check the functionality of the warning lights and of the acoustic alarm every day, by pressing the TEST button on the apposite panel.**
- **The reading of the SLI-Safe Load Indicator refers only to the longitudinal stability of the machine.**
- **When the machine is steering or with axle oscillation, the reading of the indicator may be affected by these conditions. Refer to the load charts.**
- **If the instrument is faulty or in case of doubts on its functionality, immediately contact your Komatsu Utility Dealer.**

The SLI-Safe Load Indicator is positioned on the right post of the cab and is clearly visible to the operator.




This instrument comprises warning lights and push buttons having the following functions:

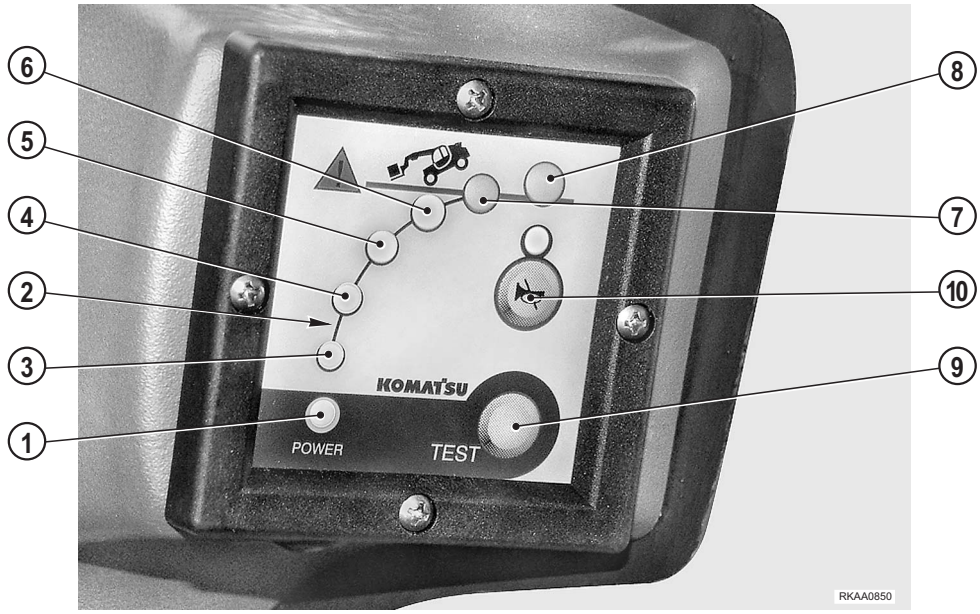
a - **POWER warning light (1)**: when on, indicates that the instrument is correctly powered.
**NOTE. This warning light goes out in TRAVEL mode.**

b - **Load curve (2)**: constituted by 6 leds (2 green (3-4), 2 yellow (5-6) and 2 red (7-8)) that indicate the risk percentage variation until reaching the pre-overturning condition (red warning lights).

c - **TEST button (9)**: is used periodically to check the correct functioning of the instrument; when it is pressed, all the warning lights come on and the acoustic alarm sounds for 2 seconds.

d - **MUTE button (10):** allows to deactivate or reactivate the acoustic alarm.

## 7-1 INTERPRETING VISUAL MESSAGES AND ACOUSTIC ALARMS



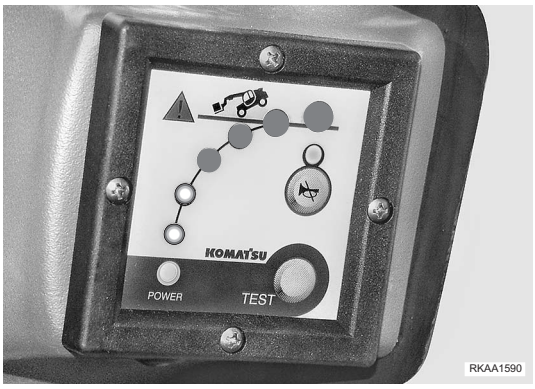

The LED scale (2) goes from bottom to top, with the green LED coming on first and the others following up to the maximum level of risk corresponding to the red LED (8).

**NOTE**

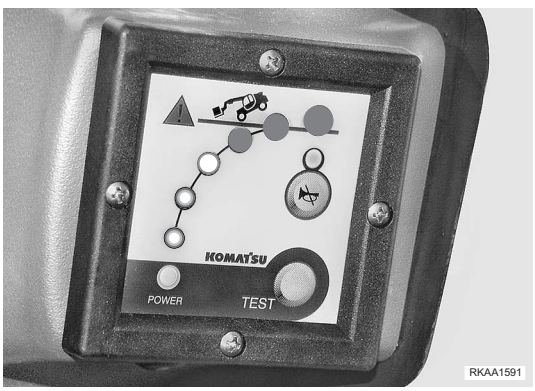
- **The reading of the SLI-Safe Load Indicator refers only to the longitudinal stability of the machine.**

---

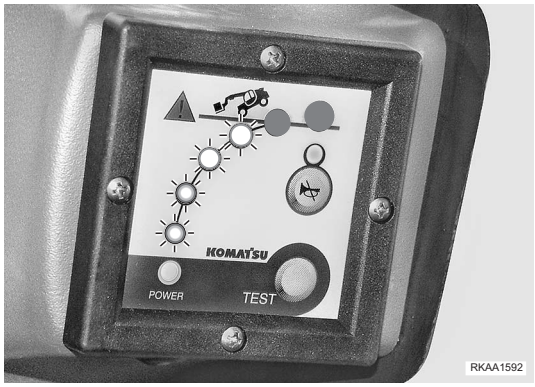
- Acoustic alarm: OFF
- Led 3 or Led 3 and 4: ON
- The instrument indicates that the machine is stable. Proceed with care.



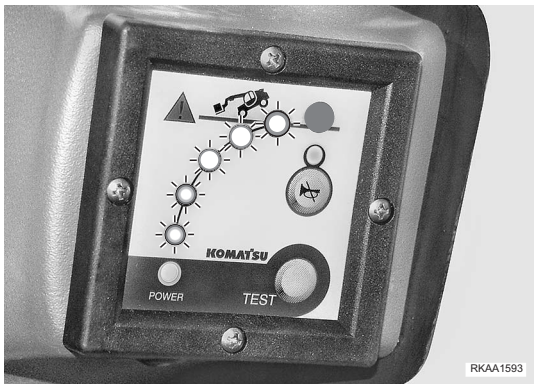

- Acoustic alarm: OFF
- Led 3, 4 and 5: ON
- The instrument indicates that the machine is near the place where it will be necessary to operate with slow boom lifting and extension movements and with reduced engine speed.



- Acoustic alarm: slow intermittence
- Led 3, 4, 5 and 6: slow blinking
- The instrument indicates that it is necessary to proceed at low speed, without using the accelerator and operating the controls slowly.



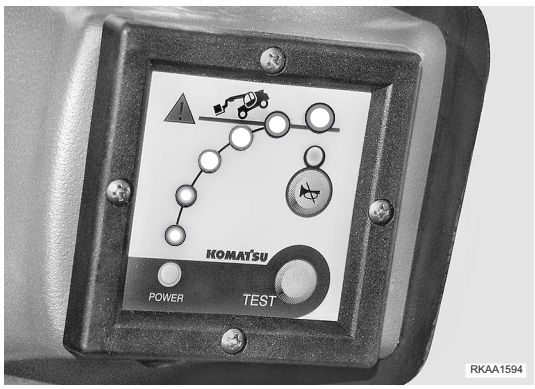

- Acoustic alarm: fast intermittence
- Led 3, 4, 5, 6 and 7: fast blinking
- The instrument indicates the pre-overturning condition, thus signalling that it is prohibited to lower and extend the boom; it is only allowed to retract the boom to restore safety conditions by operating the controls carefully and reducing the engine rpm.

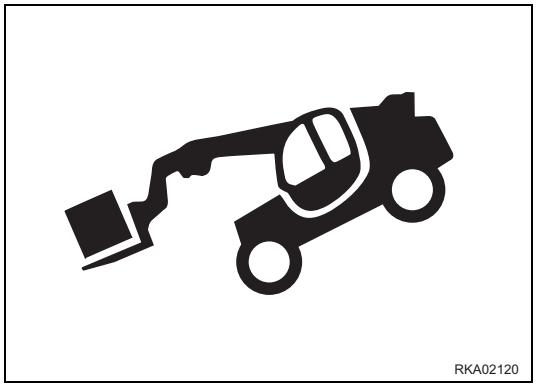



- Acoustic alarm: ON (continuous alarm)
- Led 3, 4, 5, 6, 7 and 8: ON
- The instrument indicates that the conditions of the machine are such that it runs the risk of overturning.

**⚠ DANGER**

- **The machine may overturn at any moment; even if the machine seems to be stable, there is no certainty that it won't overturn.**



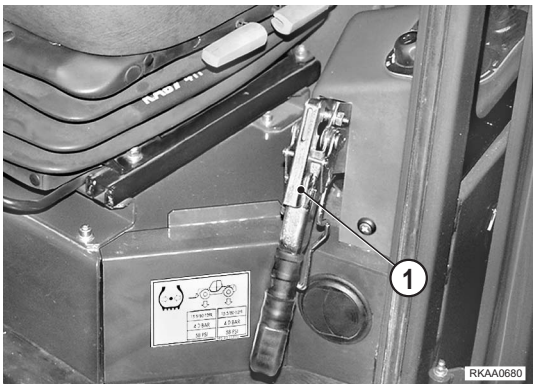



## 8 - PARKING BRAKE

**⚠ DANGER**

- **The parking brake must be applied whenever the opeator leaves the cab, even if for a short time and even if the machine rests on firm and level ground.**
- **In dangerous conditions the parking brake can be used also as emergency brake if the service brakes cannot stop the machine.**
- **AVOID USING the parking brake as service brake if this is not required by an emergency situation; after stopping the machine in case of emergency, have the braking system inspected by an Authorized Repair Shop.**

The parking brake acts only on the front axle and is operated through a lever positioned on the operator's left. The brake is applied by pulling the lever (1) upwards until the safety coupling snaps; the brake is disconnected by pulling the lower lever (2) and accompanying the lever (1) that automatically returns to its neutral position. The engagement of the parking brake is indicated by the coming on of the warning light on the dashboard.
(For further details, see «3.2.2 WARNING LIGHTS»).




The application of the parking brake has different functions, according to the operating mode selected:

**TRAVEL**

With brake applied:

- gearshift-reverse lever: operation inhibited.

With brake disengaged:

- gearshift-reverse lever: active

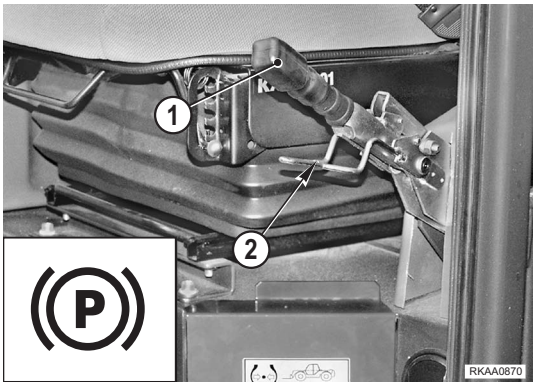
**TRAVEL-WORK**

With brake applied:

- gearshift-reverse lever: operation inhibited.

With brake disengaged:

- gearshift-reverse lever: active




**IMPORTANT**

- **If the parking brake lever (1) is operated with one gear and one travel direction selected, when the lever is released both the gear and the travel function are immediately active.**

**WORK**

With brake applied:

- gearshift-reverse lever: operation inhibited.

With brake disengaged:

- gearshift-reverse lever: operation inhibited.

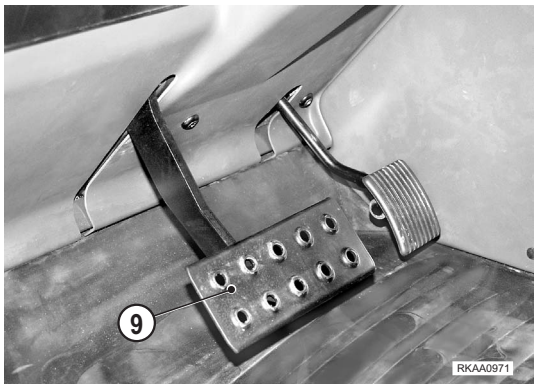
## 9 - SERVICE BRAKE PEDAL

**⚠ DANGER**

- **The service brakes are power-assisted; if the engine stops, the effort required to press the pedal and brake increases considerably. This will delay the braking response and make stopping distances longer, which increases the chances of causing accidents that may even be very serious.**
- **Do not stop the engine during travel.**

The brake pedal is positioned on the left with respect to the steering wheel and is suspended.

The braking action obtained by means of this pedal is proportional to the force applied and is distributed on both axles.




**⚠ ATTENTION**

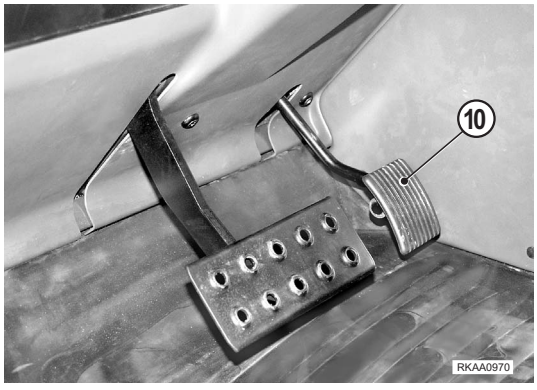
- **If the machine doesn't decelerate gradually, or the pedal reaches its end of stroke, stop the machine immediately (using also the parking brake, if necessary), apply the parking brake and have the braking system inspected by an Authorized Repair Shop.**

## 10 - ACCELERATOR PEDAL

This pedal is positioned on the right with respect to the steering wheel and is suspended.

It is used to vary the engine revolution number according to the machine's travel or operating needs.

Avoiding sudden or abrupt accelerations means reducing consumption and extending the service life of both the engine and the machine.



# 11 - REAR AXLE SWING LOCK (Optional)

## 11-1 TRAVEL AND TRAVEL-WORK OPERATING MODE

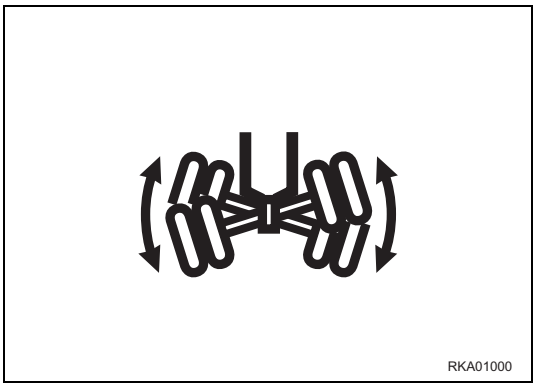
1 - The swing of the rear axle will be locked automatically when the inclination of the telescopic boom referred to the frame exceeds approximately 30°.

**⚠ ATTENTION**

- **30° inclination may not correspond to the value displayed by the inclinometer, since the limit inclination angle includes the inclination of the ground; the values indicated by the inclinometer are only valid with the machine positioned on level ground.**

2 - The coming on of the warning light indicates that the axle is locked. (See «3.2.2 WARNING LIGHTS»).
Backward or forward travel can only be resumed once the boom has been moved to an overall inclination of less than 30° and after the axle lock warning light has gone out.

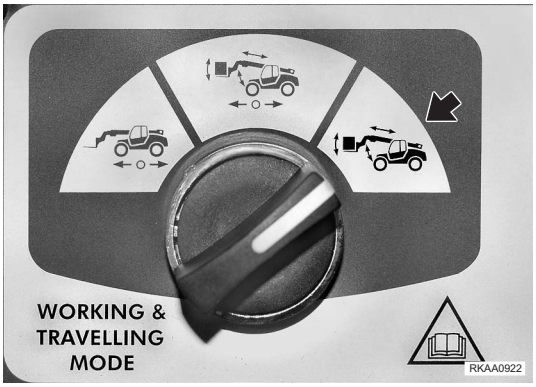
3 - Sometimes it may be necessary to lock the axle even if the inclination of the boom is less than 30°; the operator can engage the lock manually, by rotating the operating mode selector (see «3.2.5 MACHINE CONTROLS») to the WORK position.




## 11-2 WORK MODE

1 - In this condition, the axle is locked with any inclination of the boom; when the axle is locked, the warning light (see «3.2.2 WARNING LIGHTS») comes on.

2 - Before starting any load lifting operations, the operator must check the condition of the warning light (see «3.2.2 WARNING LIGHTS»); if the machine is malfunctioning and fails to lock the axle, or the warning light remains off, the operator must immediately stop working and contact the Komatsu Utility Dealer.




**⚠ DANGER**

- **If the axle locking system is faulty, this may affect the lifting performance of the machine, which may no longer correspond to the load charts. This increases the risk of overturning.**
- **DO NOT resume work until your Komatsu Utility Dealer has repaired the malfunction.**
- **When changing the operating mode from WORK to TRAVEL-WORK or TRAVEL on laterally inclined ground with boom inclination below approximately 30°, pay attention to the lateral stability of the machine by releasing the rear axle swing lock.**

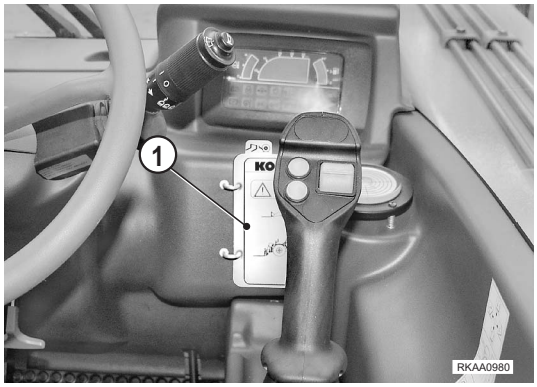
# 3.3 LIFTING LOADS

## 3.3.1 READING THE LOAD CHARTS

**⚠ DANGER**

- **Load charts are specific for each equipment installed and refer to the machine at rest on the wheels or the stabilizers, if provided, in any case always with levelled frame (if the frame levelling function is included) and in WORK operating mode.**
- **Only the load chart corresponding to the specific configuration of the machine must be used.**
- **For lifting operations with the machine resting on the wheels, make sure that the inflation pressures are those indicated for the type of tyres used (see «5.1 TECHNICAL DATA»).**
- **Change any damaged chart and introduce those specific for the optional equipment added after the purchase of the machine.**

1 - The load charts (1) are located on the dashboard and to use them it is necessary to know the mass or weight to be lifted.




### 3.3.1.1 DESCRIPTION OF THE LOAD CHARTS

The charts are of the type with concentric angular sectors marked by letters (A –> G), inserted in a guide network for the quick identification of the values expressed in meters for the boom length covered by each sector; all the sectors are divided in 10° angle lines.

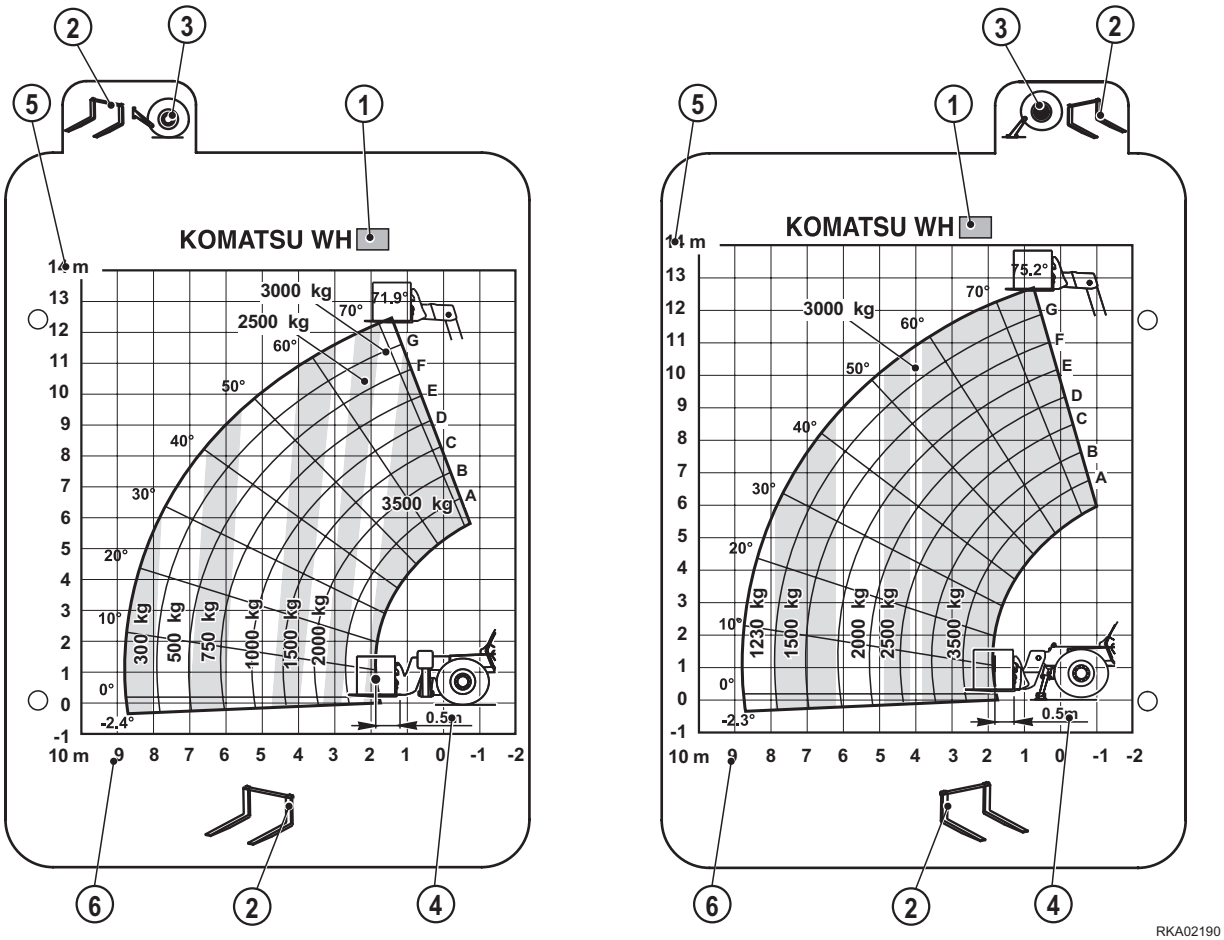
**⚠ DANGER**

- **Machine instability can result in injury or death.**
  **To ensure stability during operation the following conditions must be observed:**
  **a - Tires must be correctly inflated (see «5.1.2 TECHNICAL CHARACTERISTICS»).**
  **b - The machine frame must be level (if the machine is equipped with frame levelling or stabilizer).**
  **c - The frame level switch must never be operated when the boom is raised.**
  **d - The frame level switch must never be operated when stabilizers are lowered.**
  **e - Stabilizer swicthes must never be operated when the boom is raised.**
  **f - The correct load chart for the machine as equipped must be referenced and the weights and load centers specified must never exceeded.**
  **g - The machine must never be moved when the boom is raised.**
- **If the parameters indicated above exceed the left limit of the area, avoid lifting the load even if the green (3-4) and yellow (5-6) warning lights of the SLI-Safe Load Indicator are on (see «3.2.5 MACHINE CONTROLS» - pos. 7 - SLI-SAFE LOAD INDICATOR).**

**NOTE**

- **The SLI-Safe Load Indicator indicates only the front stability and not the lateral stability or the maximum structural stress limit**

The charts are reproduced on the two sides of rigid boards and indicate the data that are useful to choose the chart to be consulted according to the operating mode and the equipment installed on the machine.




1 - Model of the machine for which the chart is destined
2 - Specific equipment to which the chart refers
3 - Operating condition (on wheels or stabilizers)
4 - Position of the center of gravity of the load
5 - Lifting height
6 - Lifting radius

### 3.3.1.2 USING THE CHARTS

1 - Find the area in which the load is included on the table corresponding to the machine configuration.

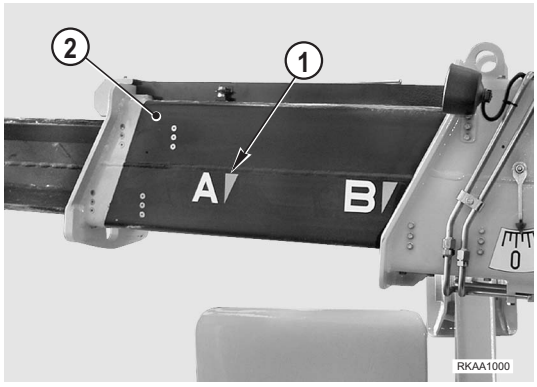
**NOTE**

- **If the load corresponds to the right delimiting line of the area, choose the successive area suitable for a heavier load.**
- **The left line of the load area and the upper line represent the stability limits of the machine according to the weight to be lifted.**

2 - Following the left profile of the load area, it is possible to obtain the maximum length and inclination of the boom acceptable to ensure the longitudinal stability of the machine.

3 - Compare these two values with the data (1) indicated on the boom (2) and on the boom angle indicator (3), in order to decide whether or not the manoeuvre can be carried out.

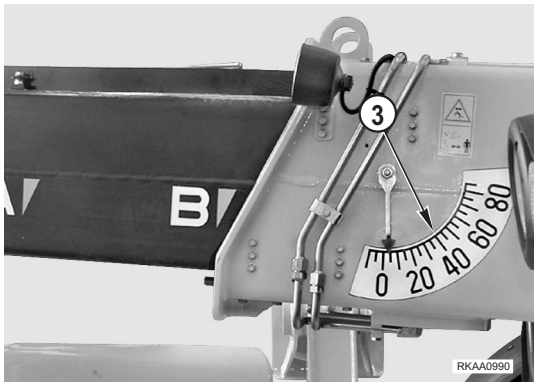
4 - The machine boom has two scale which must used for reference with the load chart in order to assess the lift operation.
The boom extension reference scale (1) gives an indication of the boom lenght.
The letters "**A**" to "**G**" correspond to the same letters on the load chart.
The concentric scale under the letter "**A**" corresponds to the fully retracted position of the boom.
The concentric scale over letter "**G**" corresponds to the fully extended position of the boom.




5 - The boom angle reference scale (3) gives an indication of the angle of the boom. For the instructions below in order to assess the intended load:

a - Position the machine near the load as possible. For detail see «3.12.6 OPERATING THE MACHINE FITTED WITH FORKS».

b - Raise and extend the boom in order to move the work tool into position for the operation.




**ATTENTION**

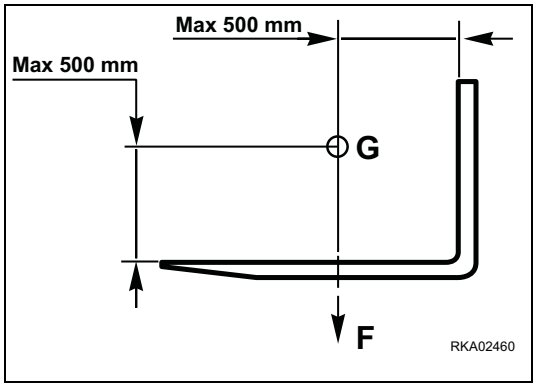
- **Do not make the lift operation.**

c - Look at the boom extension reference scale and the boom angle reference scale and note the readings.

d - Refer to the load chart and use these two values in order to locate the equivalent load zone.

e - If the intended load is equal to the value in the equivalent load zone the lift operation can be attempted with caution. Also, if the intended load is less than the value in the equivalent load zone the lift operation can be attempted with caution.

f - If the intended load is heavier than the value in the equivalent load zone the lift operation can not be made.




**ATTENTION**

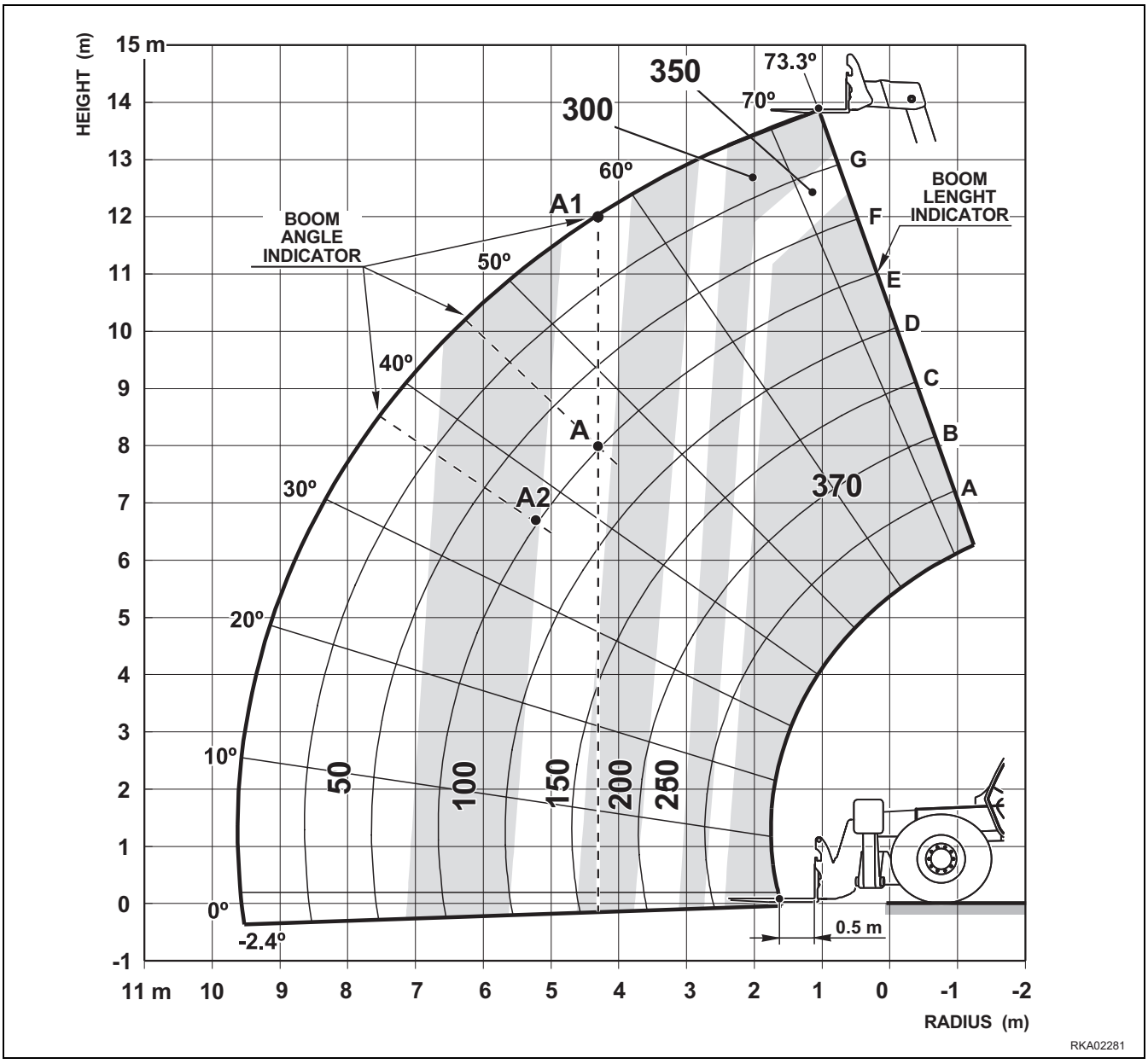
- **The areas are defined on the basis of the center of gravity (G) of the load positioned at a distance of 500 mm from the fork shoulders and 500 mm above the upper level of the forks.**
- **If the boom length is included between two letters, the data to be taken in consideration is the legible letter.**

6 - Following the chart guide network, draw two lines corresponding to the boom lenght indicator and to the boom angle indicator.

- If the two lines cross at point “**A**”, that is, within the area or on its right, the load is within the stability limits.
- If the two lines cross on the upper (point “**A1**”) or left line (point “**A2**”) delimiting the area, it is still possible to lift the load, but several precautions must be taken.
- If the lines cross in one area, **but the load exceeds** the weight value relevant to that area, **do not lift the load.**

## ⚠ DANGER

- **Before releasing the load, make sure that the machine is within the maximum distance allowed by the chart.**
- **Always retract the boom first and then lower the load.**
- **Do not invert this operation sequence.**



- **EXAMPLES**

## ⚠ ATTENTION

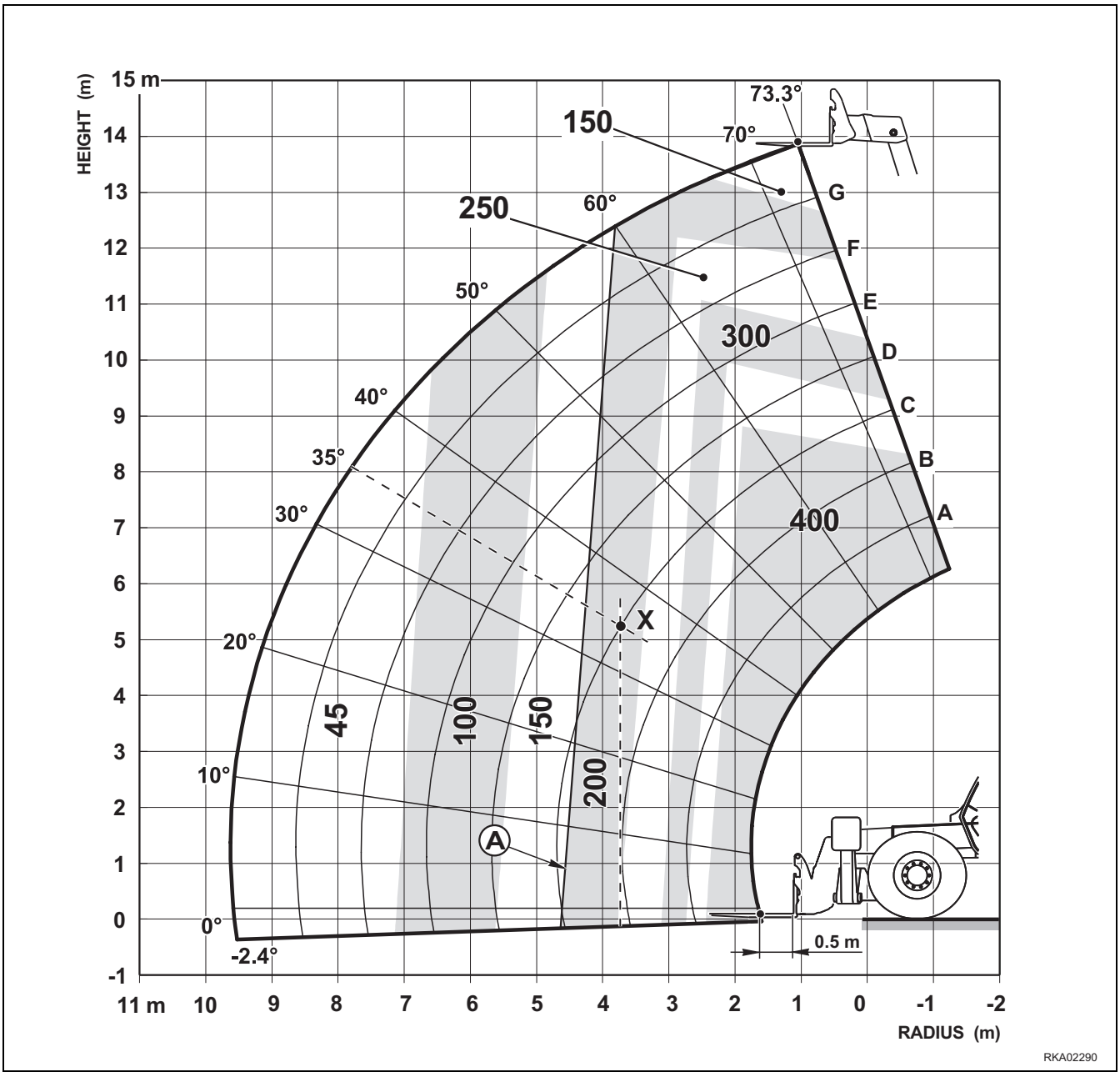
- **The examples are not referred to specific machines and load values are expressed in units.**

**1st Example**

Given a 180-unit load, to be lifted starting from a height corresponding to an angle of 35° and with boom lenght indicator matching **C**, point **X** must be found, i.e. the point where the angle line (35°) and the boom extension line cross.

Point **X** is in the area corresponding to 200 units (more than 180) and therefore is within the lifting capacity of the machine, up to the maximum angle allowed by the machine, since the center of gravity of the load is always on the right of line "**A**".

The load can be lowered to the ground and released as long as the boom is retracted enough to keep the center of gravity of the load within the area delimited by line "**A**".



**2nd Example**

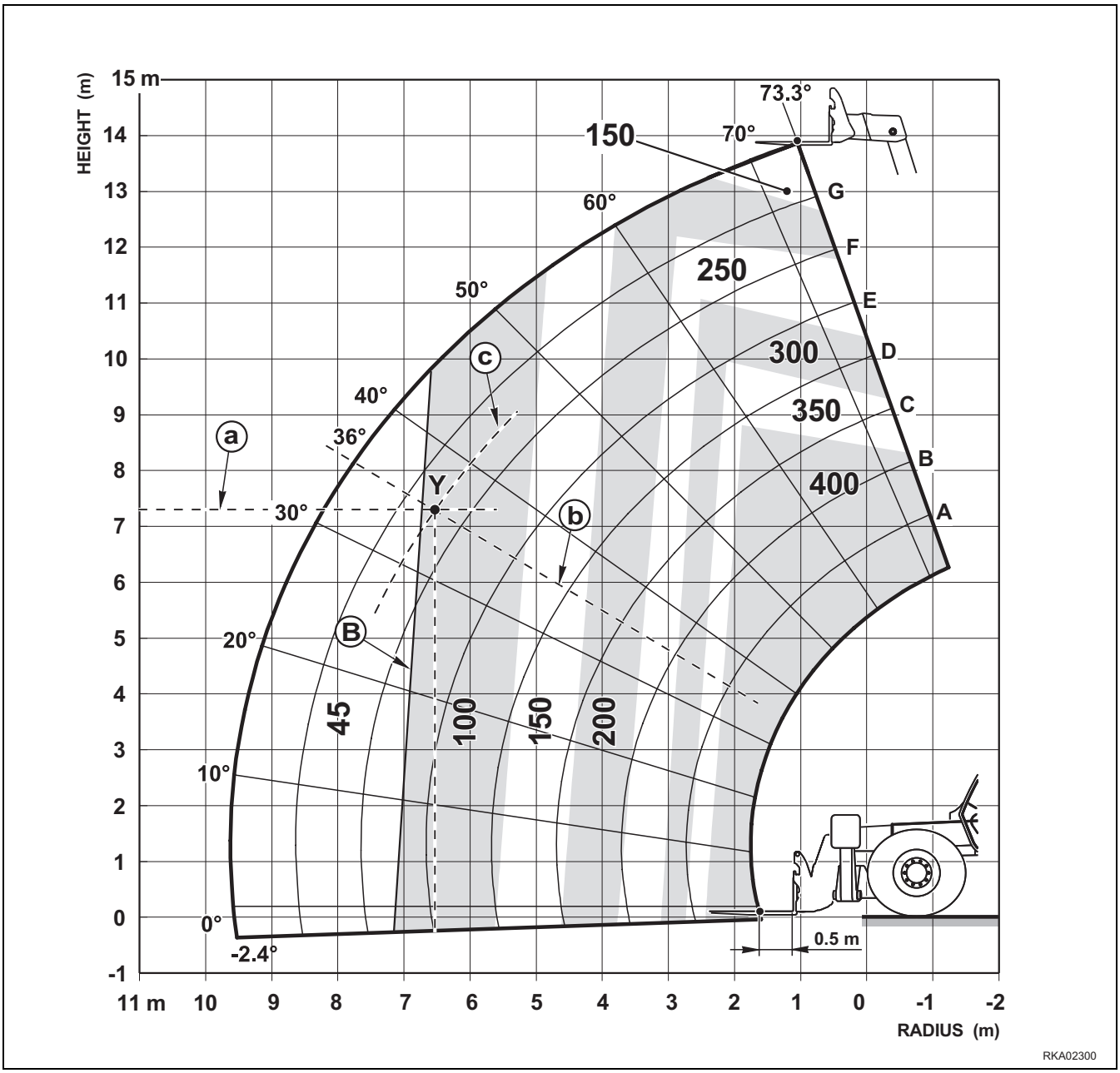
Given a 55-unit load to be lifted to the height of 7.3 m:

1 - Draw line **a** corresponding to the height of 7.3 m.

2 - Draw line **b** passing through the point corresponding to a 100 unit (more than 55) load; the data obtained is the inclination of the boom.

3 - From the crossing point, draw line **c** that indicates the extension of the boom.

It is possible to deposit the load on the ground, provided that the boom is retracted and therefore the load doesn't pass beyond the left line **B**.



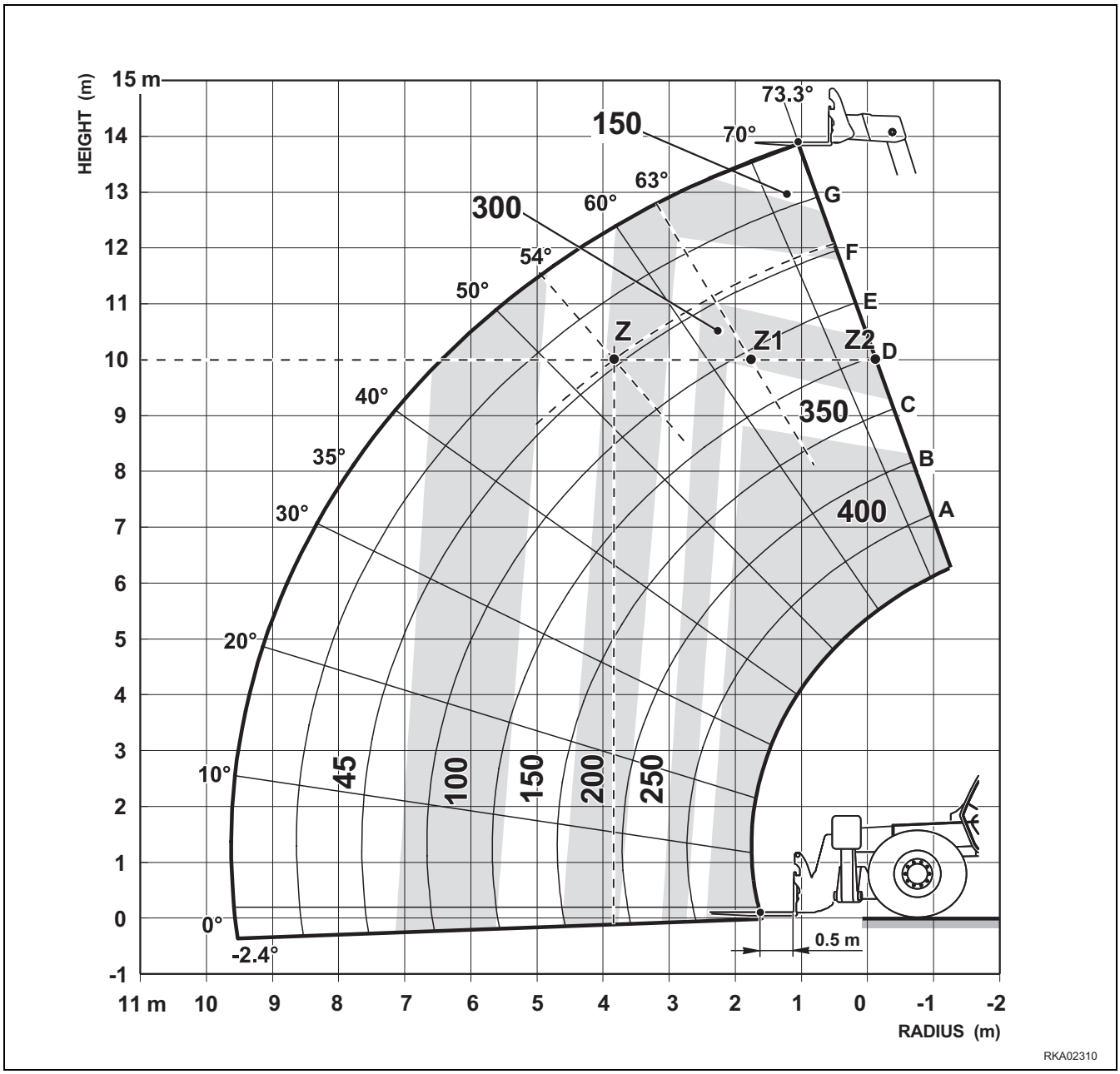
**3rd Example**

Given a 180-unit load to be lifted to the height of 10 m, find point **Z** (inside the 200-unit area) given by the inclination of the boom equal to 54° and the extension included between **F** and **G**.

The 10 m height can be reached more quickly and with more precision if operating with well defined boom extensions and inclinations; in fact, this height can be reached even with boom extension corresponding to letters **E** and **D**, provided that the inclination (respectively 63° and 73.3°) corresponding to points **Z1** and **Z2** be varied.

**NOTE**

- **The choice of the possible extension to be used depends exclusively on the position of the front part of the machine with respect to fixed obstacles (walls, gutters, etc.) and on the load deposit distance with respect to the point that can be reached by the machine.**



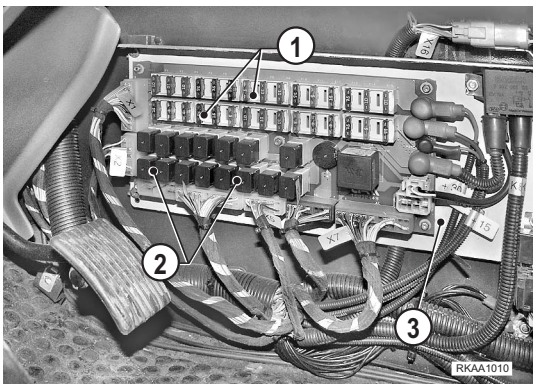
# 3.4 FUSES AND RELAYS

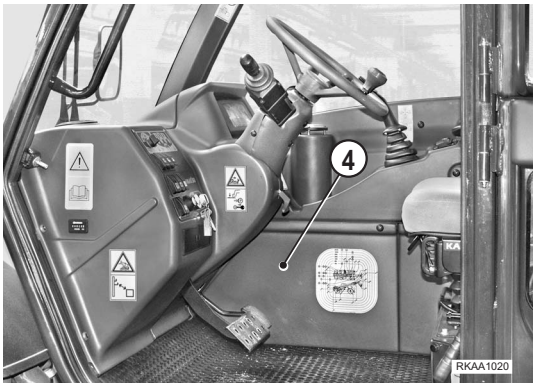
**IMPORTANT**

- **Before changing a fuse, make sure that the ignition key is in position «O».**
- **If the fuses are oxidized, corroded or do not fit perfectly in their seat, replace them only with new fuses having the same capacity.**
- **If the engine does not run when the ignition switch is turned to position «» START, check the main fuse and if necessary change it.**

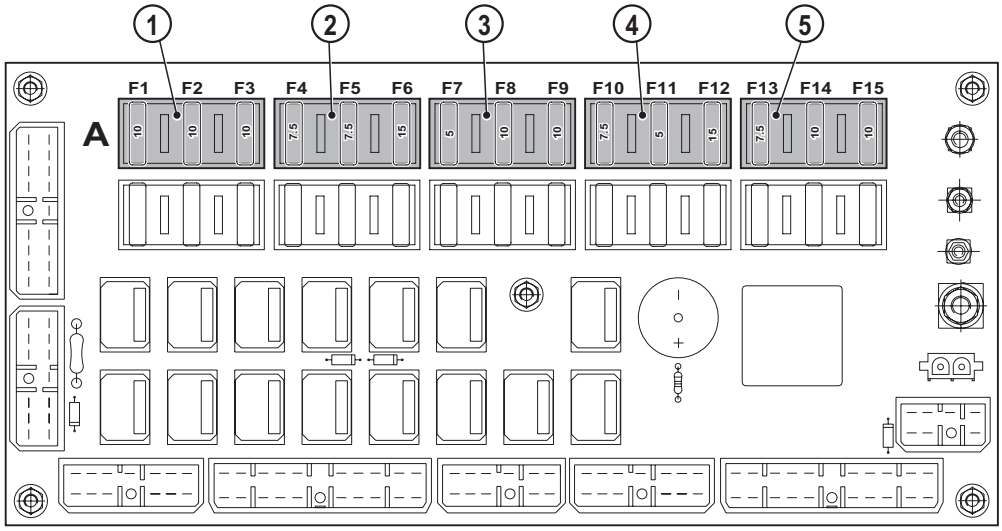
## 3.4.1 CENTRAL UNIT FUSES AND RELAYS

The fuses (1) and relays (2) are grouped on a single base (3) positioned in the right body side of the cab.
The central unit can be reached by removing the panel (4).

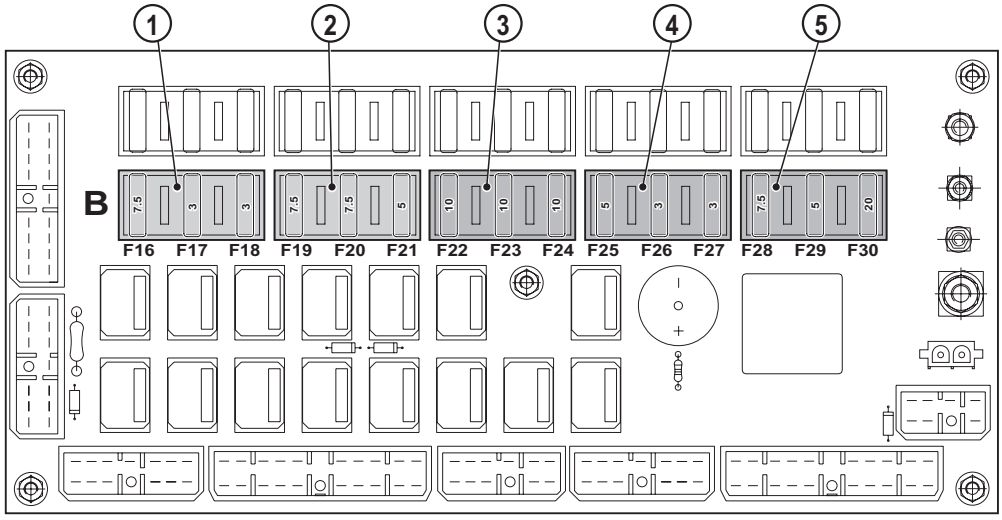


### 3.4.1.1 CENTRAL UNIT FUSES

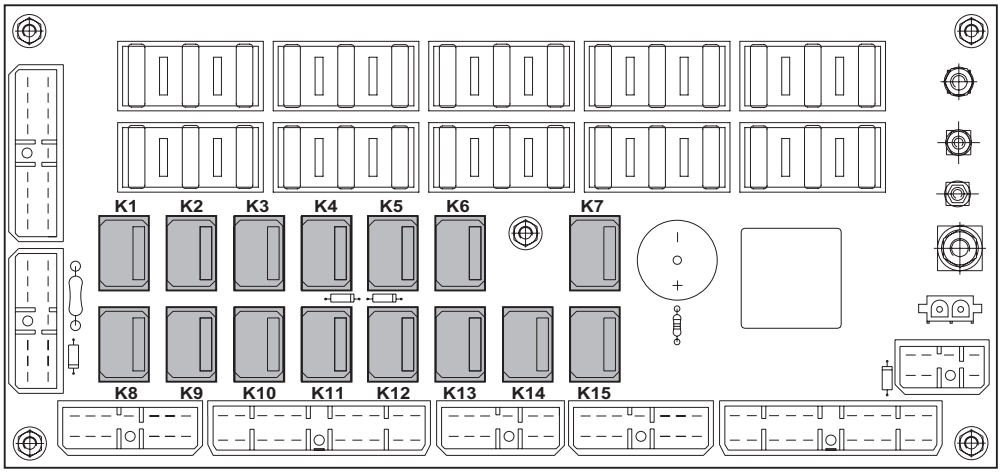



| POS. | | COLOUR | CAPACITY | CIRCUIT INVOLVED |
|---|---|---|---|---|
| A1 | F1 | Red | 10A | General alarm warning light |
| | F2 | Red | 10A | Cigarette lighter |
| | F3 | Red | 10A | Revolving light |
| A2 | F4 | Brown | 7.5A | Radio - Roof light |
| | F5 | Brown | 7.5A | Acoustic alarm |
| | F6 | Light blue | 15A | High beam |
| A3 | F7 | Orange | 5A | Stop lights |
| | F8 | Red | 10A | Rear axle swing lock solenoid valve |
| | F9 | Red | 10A | Steering control unit |
| A4 | F10 | Brown | 7.5A | EGS |
| | F11 | Orange | 5A | Free |
| | F12 | Light blue | 15A | Front work lights (optional) |
| A5 | F13 | Brown | 7.5A | Front windshield wiper/washer |
| | F14 | Red | 10A | Dimmer switch - direction indicators |
| | F15 | Red | 10A | Rear windshield wiper - Upper windshield wiper (optional) |




| POS. | | COLOUR | CAPACITY | CIRCUIT INVOLVED |
|---|---|---|---|---|
| B1 | F16 | Brown | 7.5A | Engine stop |
| | F17 | Violet | 3A | Parking lights (L.H. rear - R.H. front) - Number plate |
| | F18 | Violet | 3A | Parking lights (R.H. rear - L.H. front) - Dashboard light |
| B2 | F19 | Brown | 7.5A | Slow motion solenoid valve |
| | F20 | Light blue | 15A | Low beam |
| | F21 | Orange | 5A | Reverse alarm |
| B3 | F22 | Red | 10A | Relay for auxiliary functions disconnection upon starting |
| | F23 | Red | 10A | Boom equipment solenoid valve |
| | F24 | Red | 10A | Direction indicators unit |
| B4 | F25 | Orange | 5A | Pre-heating unit |
| | F26 | Violet | 3A | Dashboard |
| | F27 | Violet | 3A | SLI-Safe Load Indicator display |
| B5 | F28 | Brown | 7.5A | Parking lights |
| | F29 | Orange | 5A | Rear work lights (optional) |
| | F30 | Yellow | 20A | Air conditioner condenser fans (optional) |

### 3.4.1.2 CENTRAL UNIT RELAYS

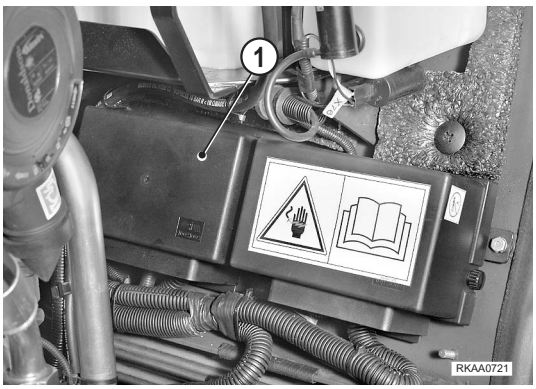


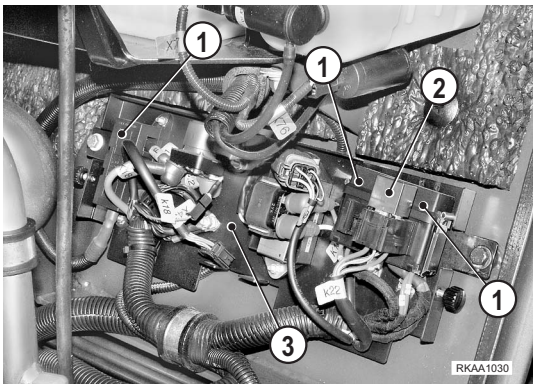

RKA01890

| POS. | DESCRIPTION |
|---|---|
| **K1** | Horn |
| **K2** | High beam |
| **K3** | Low beam |
| **K4** | Reverse alarm |
| **K5** | Gear engaged |
| **K6** | Auxiliary functions disconnection upon starting |
| **K7** | Optional solenoid valve enablement |
| **K8** | Slow motion |
| **K9** | Front work lights (optional) |
| **K10** | Stop lights |
| **K11** | Stabilizer lock - frame levelling (optional) |
| **K12** | Axle swing lock |
| **K13** | Optional equipment |
| **K14** | Optional equipment |
| **K15** | Proportional solenoid valve enablement |

## 3.4.2 ENGINE LINE FUSES AND RELAYS

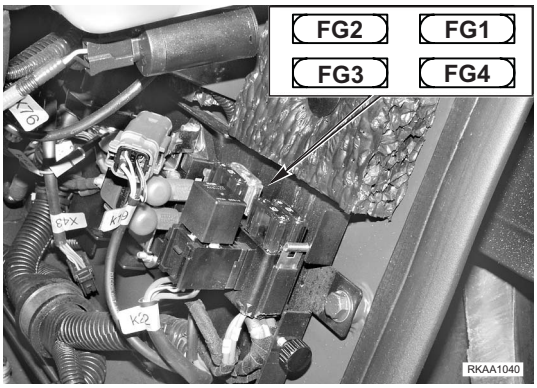
The fuses (1) and relays (2) are grouped on a single base (3) positioned inside the engine compartment and can be reached by removing the cover (4).

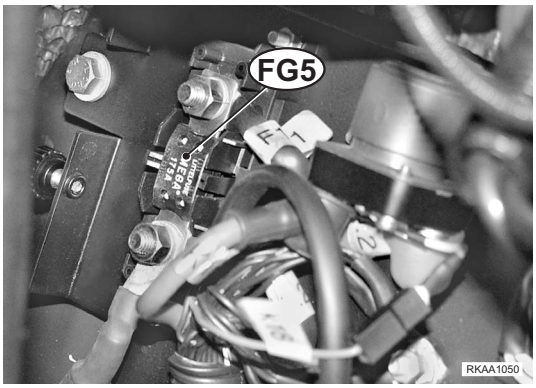


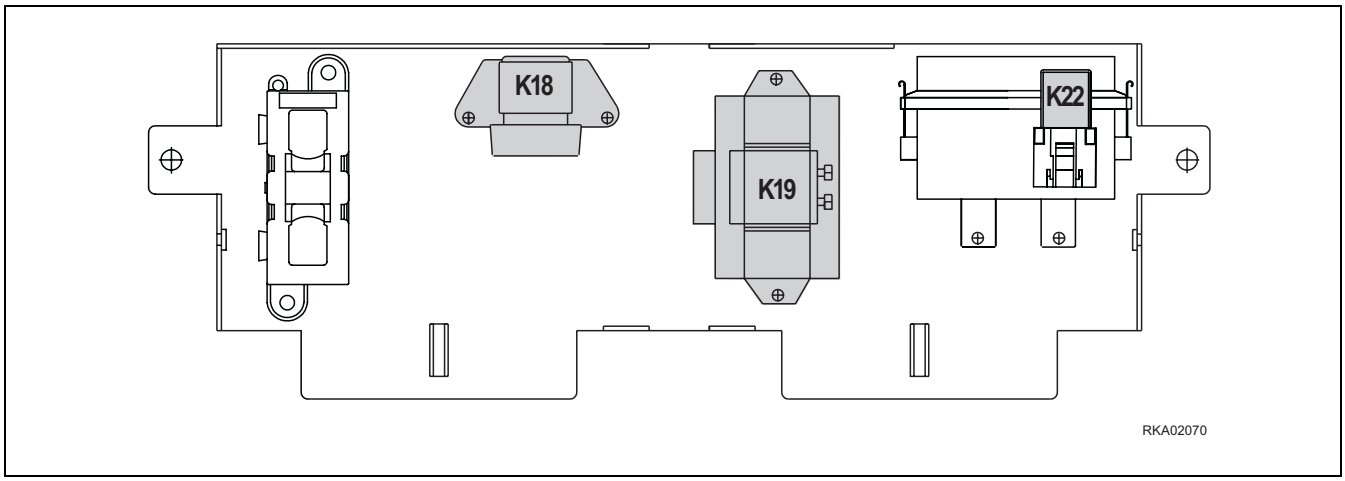

### 3.4.2.1 ENGINE LINE FUSES

| POS. | COLOUR | CAPACITY | CIRCUIT INVOLVED |
|---|---|---|---|
| **FG1** | Red | 50A | Aux. functions relay general power supply |
| **FG2** | Yellow | 30A | Cab ventilation motor relay |
| **FG3** | Red | 50A | Starter unit power supply |
| **FG4** | Red | 50A | Fuse central unit and diesel oil preheating relay power supply |
| **FG5** | Brown | 175A | Air preheating relay power supply |



### 3.4.2.2 ENGINE LINE RELAYS




| POS. | DESCRIPTION |
|---|---|
| **K18** | Air preheating |
| **K19** | Start |
| **K22** | Diesel oil preheating |

# 3.5 GUARDS, CAB AND DRIVER'S SEAT

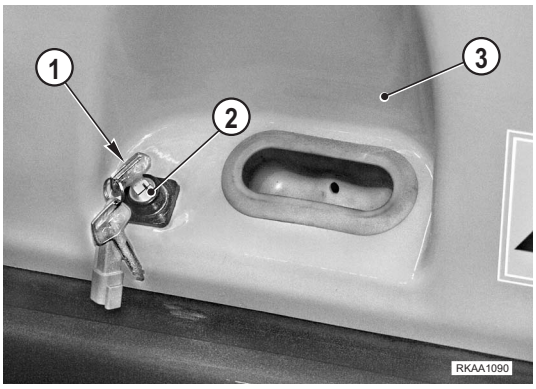
## 3.5.1 ENGINE HOOD

**DANGER**

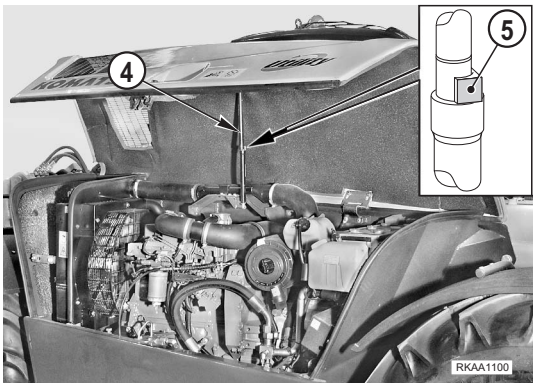
- **Before opening the hood, lower and retract the boom completely, then apply the parking brake.**
- **Do not open the engine hood when the engine is running.**
- **Do not use the machine without engine hood and do not start the engine when the hood is open, unless this is expressly prescribed for certain maintenance operations.**
- **Non-compliance with these rules may lead to serious accidents.**

After releasing the lock (1), press the push button (2), raise the hood (3) and open it completely, reaching the position defined by the gas spring (4) and by the relevant safety retainer (5).

To close the hood, press the safety retainer (5) of the gas spring (4) and lower the hood until the lock snaps.
Lock the hood.







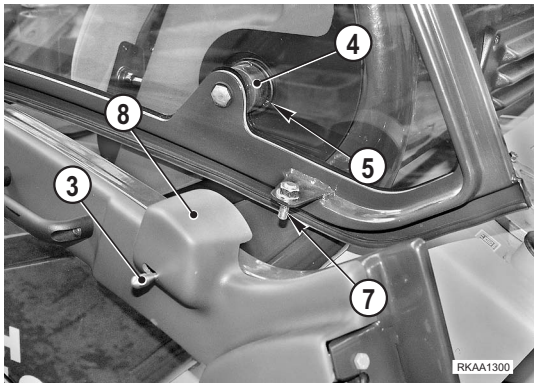
## 3.5.2 CAB

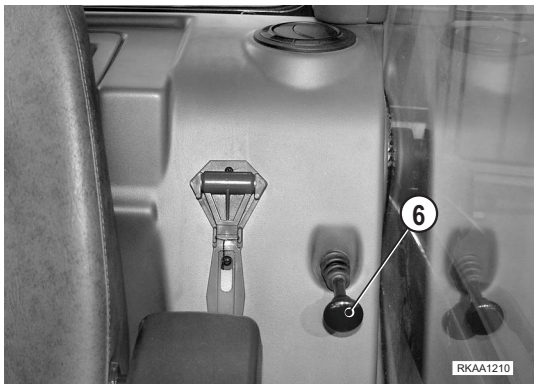
**⚠ DANGER**

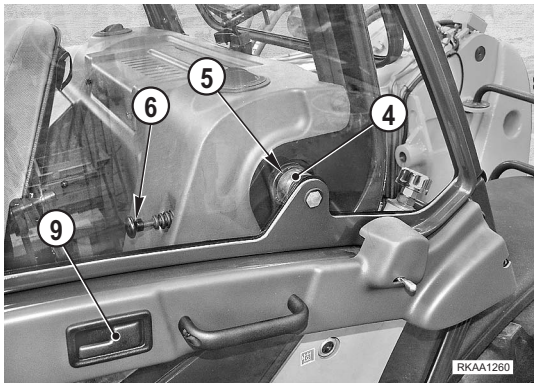
- **If, for any reason, the cab is subjected to an impact, or if the machine overturns, immediately contact your Komatsu Utility Dealer, which will verify the stiffness of the cab and make sure that the operator's safety is guaranteed.**
- **When working or travelling at low speed, keep the lower part of the door closed, in order to be protected from foreign materials that may get into the cab.**
- **When travelling at high speed, it is necessary to close the door and also the upper window.**
- **When opening or closing the door, pay attention not to hit persons staying around the door.**
- **When leaving the machine or moving so far that it cannot be seen any more, lock the door.**

The cab is provided with a single door (1) that is used by the operator to get on and off the machine.
The door comprises two parts that can be opened independently of each other and that can be opened completely and secured in this position.

- The upper part (2) of the door is used to ensure the circulation of fresh air.
  To open and fix it, pull the handle (3) and open the upper part (2) completely, until engaging the pin (4) in the safety retainer (5).
  To close it, pull the knob (6) to release the pin (4) from the retainer (5), then close the window until engaging the pin (7) in the lock (8).
- To open the entire door completely and lock it, the upper part must be closed; then pull the handle (9) and open the door until the pin (4) engages in the retainer (5).
  To close the door, release the pin by pushing or pulling the knob (6).

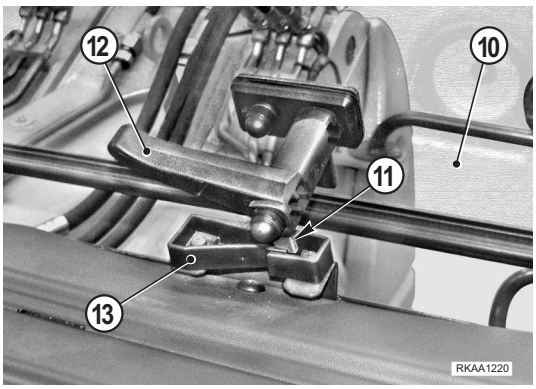



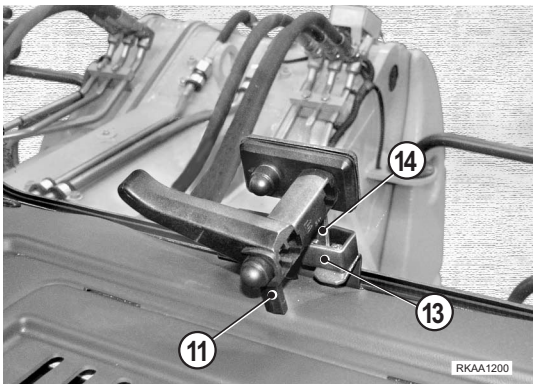



Besides the fixed front, side and upper windows, the cab is fitted with a rear window (10) with compass opening in two fixed positions; the opening and fixing in the open position can be obtained by engaging the pin (11) of the handle (12) in the slot provided in the block (13).
The window can be closed completely by engaging the external pin (14) in the block (13).

**IMPORTANT**

- **The door, the upper part of the door and the rear window must always be secured with the relevant retainers, both when closed and when open.**




## 3.5.3 EMERGENCY EXIT

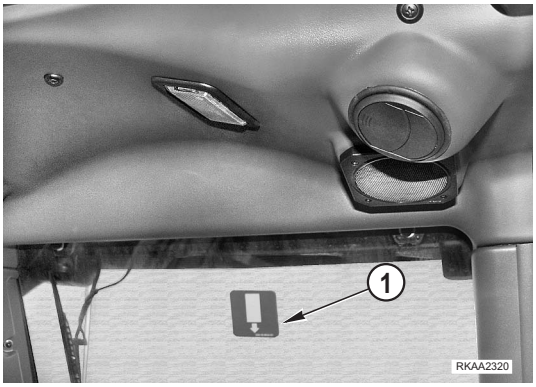
The cab's emergency exit is through the rear window and is signalled by an emergency exit label (1) on the window itself.

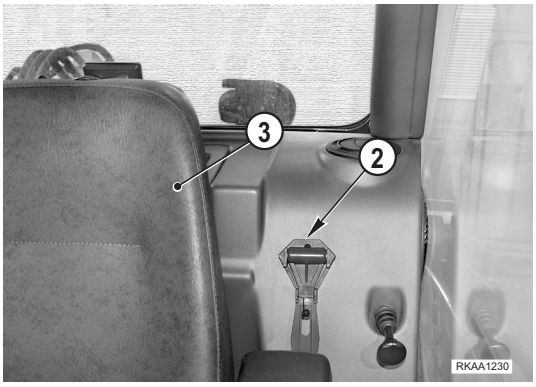
There are two different ways to abandon the cab through the rear window:

- **Machines without air conditioning:** open the window completely by rotating the handle and pushing the glass outwards.
- **Machines with air conditioning**: smash the rear window with the glass hammer (2) that is fixed to the vertical panel behind the seat (3).

**IMPORTANT**

- **Make sure that the glass hammer (2) is always available inside the cab, fixed and sealed in the prescribed position.**



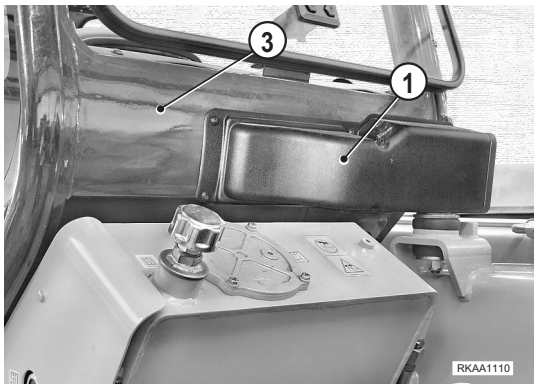



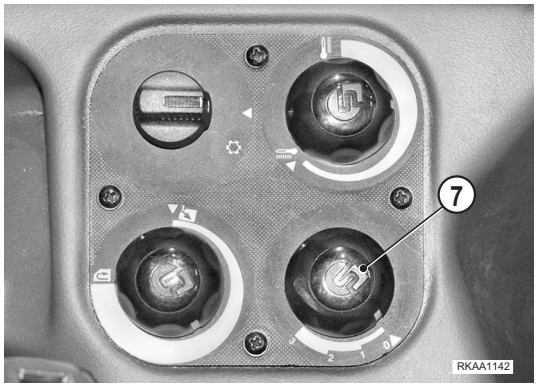
## 3.5.4 VENTILATION AND HEATING

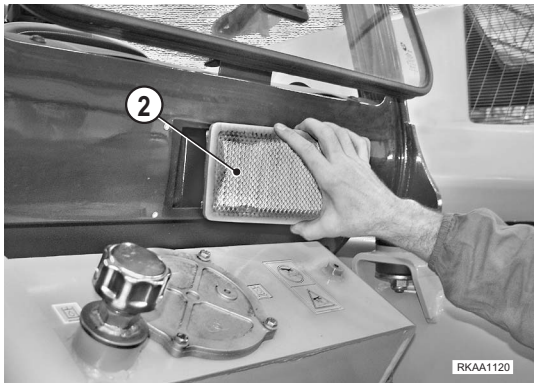
The ventilation and heating of the cab serve to reduce the operator's stress both in summer and in winter; these functions also serve to eliminate condensate from the front window, thus ensuring visibility during both work and travel.

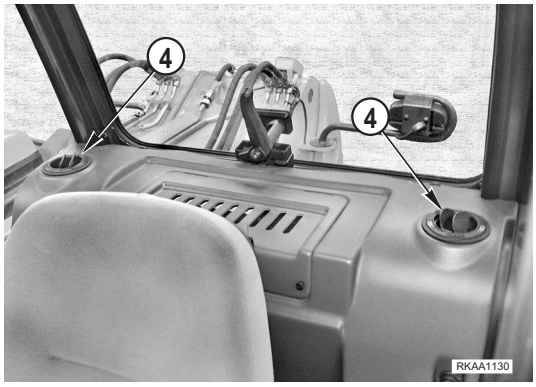
Ventilation and air change are achieved by means of a 3-speed fan installed in the cab, protected by a panel (1) and operated by means of the selector (7).

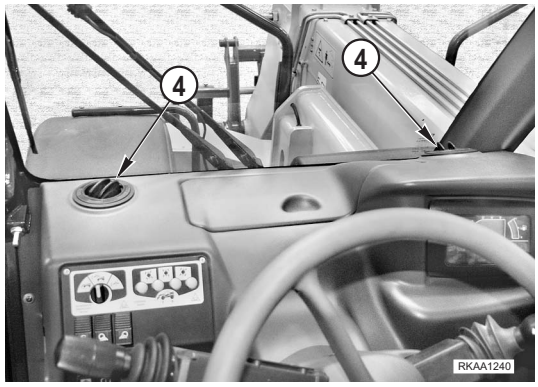
The outside air intake inlet is protected by a filter (2) positioned on the back of the cab (3) and extractable from the outside, while air distribution is obtained through a series of adjustable vents with variable flow rate (4), both for the side flows and for the flows that serve to defrost and defog the front and rear window.



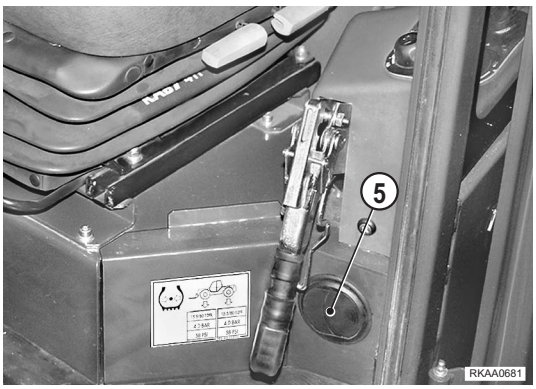



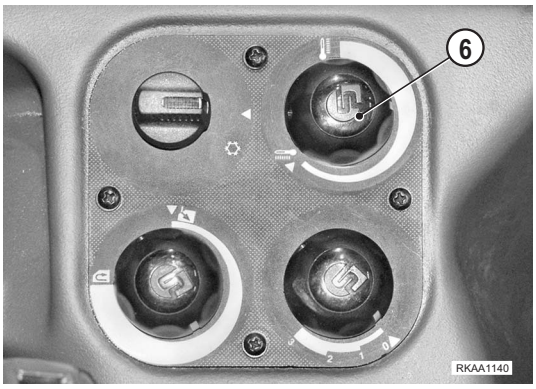



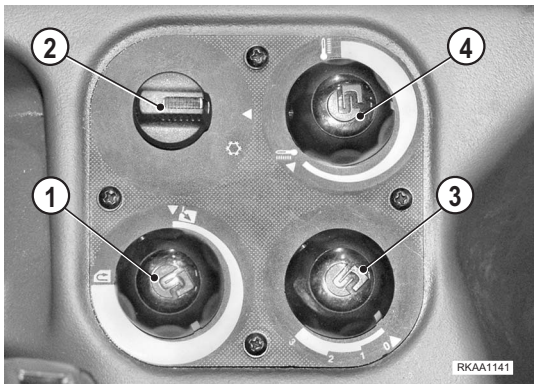
A further adjustable vent (5) is positioned in the lower part of the cab to heat the floor area.
Two additional adjustable vents to defrost the upper window (positioned on the cab ceiling) can be supplied for the machine versions equipped with air conditioning system.
A radiator having the function to heat the air conveyed into the cab is installed beside the fan; this is used in the cold season and receives the hot water necessary for the heat exchange directly from the engine cooling circuit.




The water supply flow is partialized or excluded by means of a cock operated by the knob (6).
The intensity of the hot water flow can be increased by rotating the knob clockwise.



## 3.5.5 AIR CONDITIONER (optional)




The air conditioner can be used in different ways, according to the weather conditions and to the environment in which the machine is working.
It serves to cool and dehumidify the air present inside the cab when the air recirculation function is selected, or to dehumidify the air taken in from the outside before it reaches the inside of the cab.
To dehumidify air in a cold and humid environment the air conditioner can be used at the same time as the cab heating, thus obtaining a dry, warm and comfortable environment without fogging of the windows.
The ventilation and heating system includes also the internal air recirculation function, which is operated by turning the knob (1) clockwise until it stops; the intermediate positions make it possible to mix external and internal air.

This function ensures quicker heating of the cab and is very useful when working in particularly polluted environments (tunnels, dusty or evil-smelling places, etc.).

**⚠ ATTENTION**

- **Do not use the air recirculation function too long in rainy or cold days, since this would increase the fogging of the inside of the windows.**
- **Avoid smoking when the air recirculation function is on, since smoke would recirculate together with air, leaving an unpleasant smell, rather difficult to eliminate, inside the cab.**

---

- To operate the air conditioner, turn the knob (2) to position ⎔.
- The ventilation intensity can be selected with the knob (3).
- Total or partial air recirculation is achieved by means of the knob (1).
- Temperature can be adjusted by means of the knob (4).

**IMPORTANT**

- **Do not tamper with the air conditioner; in case of doubts regarding the use or maintenance of this system, contact your Komatsu Utility Dealer.**

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# 3.5.6 SEAT

## 3.5.6.1 STANDARD SEAT


The seat offers four adjustment options:

a - longitudinal position;

b - back inclination;

c - degree of suspension, in order to dampen the inevitable vibrations and jumps as much as possible;

d - height and cushion inclination;

The operator can choose the driving position that is most suitable for his physical structure and according to the angular adjustment of the steering wheel.

The longitudinal adjustment of the seat (1) is obtained by operating the lever (2) and making the seat slide on the guides; once the desired position has been found, release the lever and carry out slight movements, in order to make sure that the lock pin is properly fitted in its seat.

The adjustment of the back is obtained by operating the levers (3) and at the same time exerting pressure with the back; the back will automatically adapt to the physical structure of the operator.

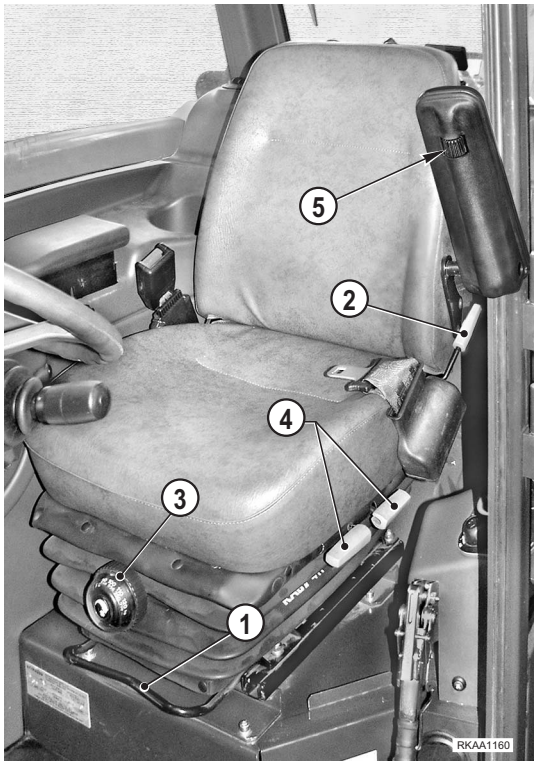
The adjustment of the suspension is carried out with the lever (4) and can be controlled by observing the position of the indicator (5).

The operator must carry out this adjustment while seated; the right suspension degree is reached when the indicator is positioned in correspondence with the seat frame.

If the indicator protrudes from the frame, it is necessary to operate the lever (4) with the (+) mark on the grip towards the operator; if the indicator is positioned inward with respect to the frame, the lever (4) must be operated with the (–) mark on the grip towards the operator.

The seat cushion inclination and height can be adjusted by means of the lever (6); three height positions and five different inclination positions are available.

### 3.5.6.2 OPTIONAL SEAT




The seat features five different adjustment options:

a - longitudinal position;

b - back inclination;

c - degree of suspension, in order to dampen the inevitable vibrations and jumps as much as possible;

d - height and cushion inclination;

e - armrest position.

The operator can choose the driving position that is most suitable for his physical structure and according to the angular adjustment of the steering wheel.

The longitudinal adjustment of the seat can be carried out by means of the lever (1), making the seat slide on the apposite guides; once the desired position has been found, release the lever and make small movements with the seat to make sure that the retainer pin is correctly engaged in its seat.

The position of the back can be adjusted by operating the levers (2) and at the same time exerting pressure with the back; the back will automatically adapt to the physical structure of the operator.

The degree of suspension can be adjusted by rotating the knob (3) and checking the graduated scale on the knob itself.

The ideal position is reached when the weight indicated on the scale corresponds to the operator's weight. In any case, the operator can choose the degree of suspension at his sole discretion.

Turn the knob (3) clockwise ( ) to obtain a more rigid suspension, or anticlockwise to obtain a softer suspension.

The inclination and the height of the cushion can be adjusted by means of the levers (4).

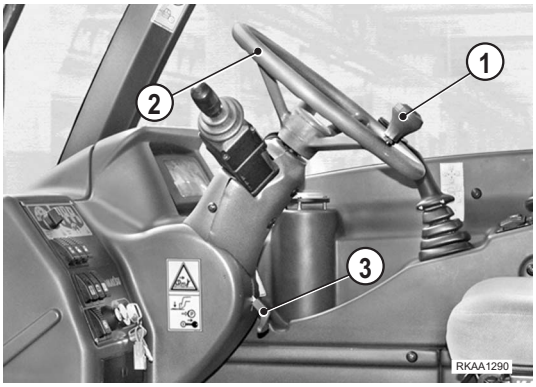
To facilitate access to the seat, the armrest can be rotated and positioned vertically.

The inclination of the armrest can be adjusted with the knob (5).

## 3.5.7 STEERING WHEEL

**DANGER**

- **The steering wheel is power-assisted; if the engine stops, steering requires considerable effort and becomes imprecise, with serious consequences for the safety of the machine.**
  **If this occurs, stop the machine using the parking brake and contact your Komatsu Utility Dealer immediately.**

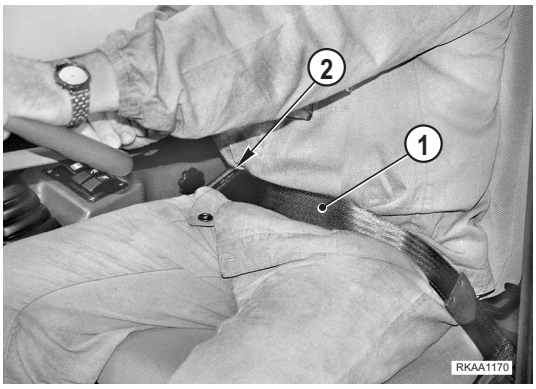



This is a three-spoke steering wheel with ball grip (1) to enable the operator to swiftly get the appropriate steering angle in case of movements with restricted radiuses.
As well as adjusting the seat, the Operator can adapt the inclination of the steering wheel (2) to his physique.
Angular movements can be obtained after lifting the lever (3); once the desired position has been reached, release the lever.

## 3.5.8 SAFETY BELT

**DANGER**

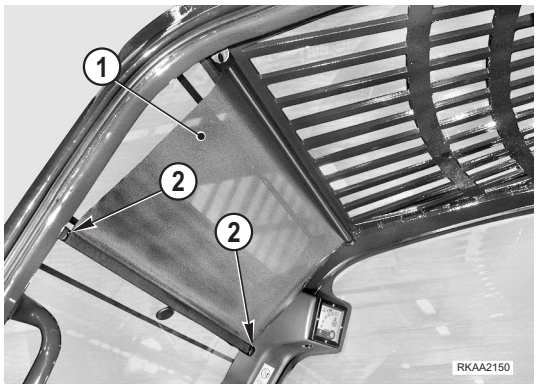
- **Fasten the safety belt before starting the engine.**
- **The safety belt must be changed when it is frayed, damaged or worn, and in any case every 3 years.**

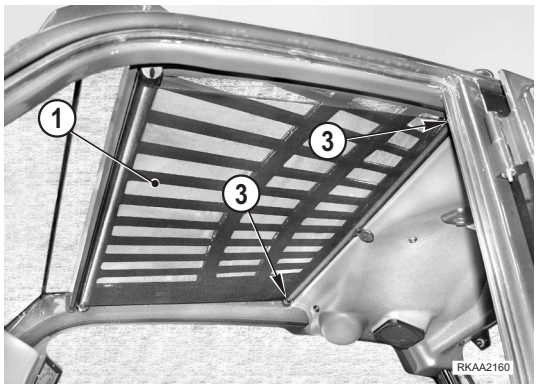



The safety belt (1) is of the type with two coupling points and adjustment of the length (2); it must be well tightened and hold the operator's hips, while leaving the upper part of his body completely free.

## 3.5.9 WINDOW SHADE

The window shade (1) allows to reduce light reflection into the cab when the machine is operating under the sun or in places where light is excessive.
It is a roller blind and can be used to cover either the windshield or the upper window; in any case it is important to secure it correctly to the lateral retainers (2), (3) when it is unrolled.



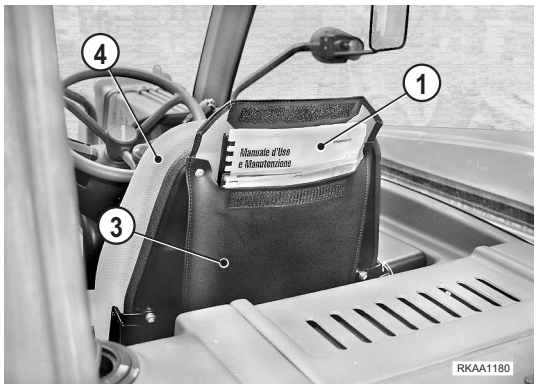



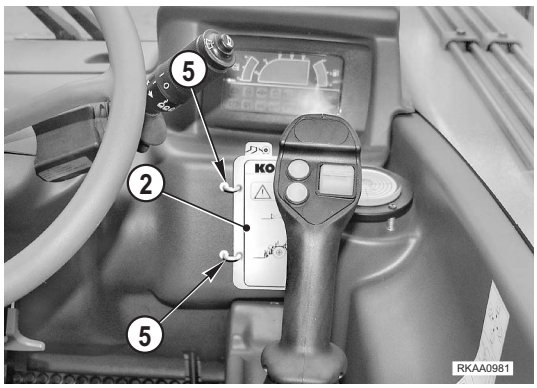

## 3.5.10 TECHNICAL DOCUMENTATION

**⚠ ATTENTION**

- **The use and maintenance manual and the spare parts catalogue are integral parts of the machine and must always accompany it, even in case of resale.**

The manual (1) and the load charts (2) must be handled with care and always kept on the machine, so that they can be quickly consulted when necessary; keep the manual in the rear compartment (3) of the seat (4), where the owner's and registration documents and the load charts attached to the rings (5) are usually kept.



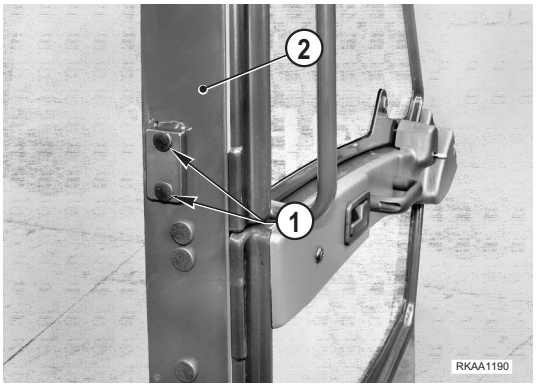



## 3.5.11 FIRE EXTINGUISHER

**⚠ ATTENTION**

- **The owner of the machine is responsible for installing and fixing the fire extinguisher where prescribed.**
- **Periodically make sure that the fire extinguisher is full.**

If the operator deems it necessary to have the fire extinguisher on board, he must fix it to a bracket on the left pillar of the cab. The bracket can be screwed using the holes (1) provided on the pillar (2).



# 3.6 USE OF THE MACHINE

## 3.6.1 CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE

### 3.6.1.1 VISUAL CHECKS

**⚠ DANGER**

- **Dirt, oil and fuel in the engine compartment near hot parts may damage the machine and even cause fires.**
  **Check frequently and eliminate any leakage; if leakages occur repeatedly, contact your Komatsu Utility Dealer.**

Before starting the engine, check around and under the machine to verify:

1 - if there are loose screws or nuts;
2 - if there are oil, fuel or coolant leakages;
3 - the wear of the work equipment;
4 - the fastening of the electrical connections;
5 - the fastening of the engine exhaust pipe and manifold;
6 - the conditions of the rims and the wear of the tyres;
7 - if the safety and warning plates are legible;
8 - if the ladders and handles to be used to reach the operator's seat are clean.

Any leak or anomaly must immediately be repaired/eliminated and any trace of oil or grease must be removed.
Further visual checks concern:

9 - the condition of the safety belt;
10 - the efficiency of the instruments and of the dashboard;
11 - the condition of the cab windows and the efficiency of lights, work lights and direction indicators.

### 3.6.1.2 DAILY CHECKS

**⚠ DANGER**

- **Do not smoke while refuelling and adding oil and avoid using naked flames or non-homologated lighting means to check the fuel and oil level, in order not to cause fires.**
- **If some fuel, oil, or lubricant is spilled while filling the tanks, clean the dirty areas immediately.**

Before starting work, check the level of the engine coolant, of the engine oil and of the oil in the hydraulic circuit.
At the end of work, provide for refuelling, in order to avoid the formation of condensate, always checking the fuel level on the indicator provided on the dashboard.

**IMPORTANT**

- **Avoid filling the tank completely, in order to leave room for the diesel oil to expand.**
- **After filling the tank, put back the filler cap, making sure that the bleed hole is completely open.**
- **Check the engine oil level with the machine resting on level ground and the hydraulic circuit oil level with the boom completely retracted and lowered and the equipment parallel to the ground.**

### 3.6.1.3 OPERATIONAL CHECKS

**DANGER**

- **All the checks must be carried out by the operator while seated, with fastened safety belt.**

The checks are intended to verify:

1 - that the parking brake is applied;

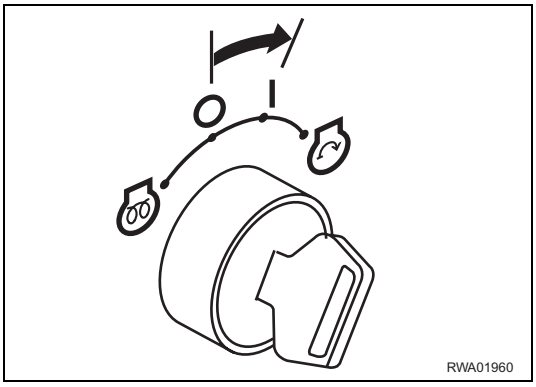
2 - that the forward-reverse selector is in neutral;

3 - the position of the boom, which must be completely retracted with the equipment resting on the ground.

The successive check is carried out by turning the ignition key to position «**I**» to supply voltage to the control panel and check the functionality of the acoustic alarm, the warning lights positioned on the dashboard and of the SLI-Safe Load Indicator and if the push button of the auxiliary circuit for the hydraulic equipment is in position off (warning light off).

**NOTE**

- **The acoustic alarm sounds and the warning lights remain on for approximately 3 seconds.**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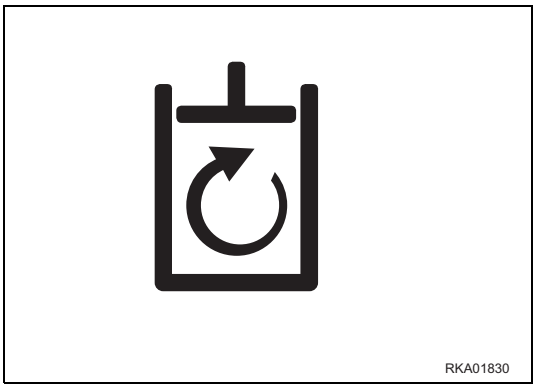
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## 3.6.2 STARTING THE ENGINE

**⚠ DANGER**

- **Before starting the engine, carefully read the instructions and information regarding safety given in this manual and make sure that you know the controls.**
  **From the moment in which the engine is started, the operator is directly responsible for any damage that may be caused by wrong manoeuvres and non-compliance with the safety regulations and the rule of the road.**
- **Before starting the engine, make sure that there is no one within the operating radius of the machine and sound the horn.**
- **Before starting the engine, make sure that the gearshift-reverse lever is in neutral position..**
  **A safety device does not allow the machine to be started with engaged gears or selected travel direction.**

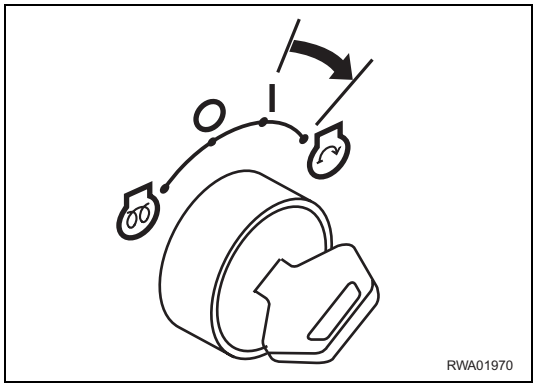
### 3.6.2.1 STARTING WITH WARM ENGINE OR IN TEMPERATE CLIMATES

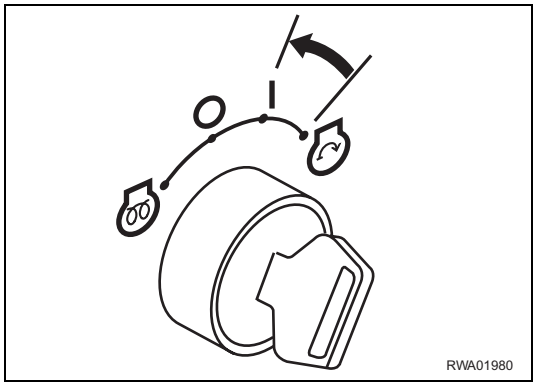
1 - Turn the ignition key to position «⏻» (START).

2 - As soon as the engine starts, release the ignition key, which will automatically return to position «**I**».

**IMPORTANT**

- **If the engine does not start within 15 seconds, release the key, which will automatically return to position «I», and wait 30 seconds before trying again.**



### 3.6.2.2 STARTING WITH COLD ENGINE OR IN COLD CLIMATES

**⚠ DANGER**

- **If the battery electrolyte is frozen, neither charge the battery, nor attempt to start the engine with a different power source, since the battery may explode.**
  **Before charging the battery or starting the engine with a different power source, wait for the electrolyte to melt and make sure that there are no leaks in the battery.**
- **For specific applications in cold climates, ask your Komatsu Utility Dealer for the "COLD ARRANGEMENT" configuration.**
- **Do not use any fluid or product that facilitate the cold starting of the engine, since these are ether-based and may cause explosions.**

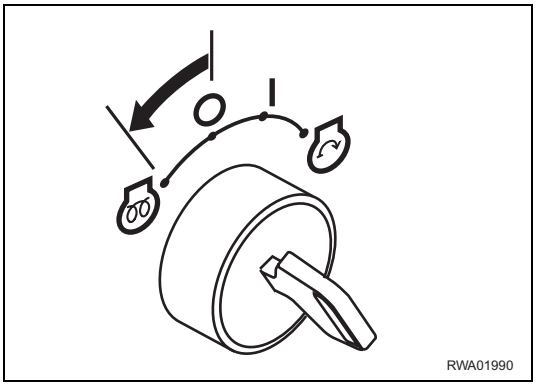
Turn the ignition key to the preheating position and make sure that the warning light «» comes on; when the warning light goes out, proceed as follows:

1 - Slightly press the accelerator pedal and turn the ignition key to position «» (START) for maximum 15 seconds.

2 - As soon as the engine starts, release the ignition key, which will automatically return to position «**I**», and let the engine run at a minimum speed of approximately 950-1050 rpm, in order to warm the engine up gradually.

**⚠ ATTENTION**

- **If the engine does not start at the first attempt, repeat operations 1 and 2 after waiting at least 30 seconds, so that the starter cools down.**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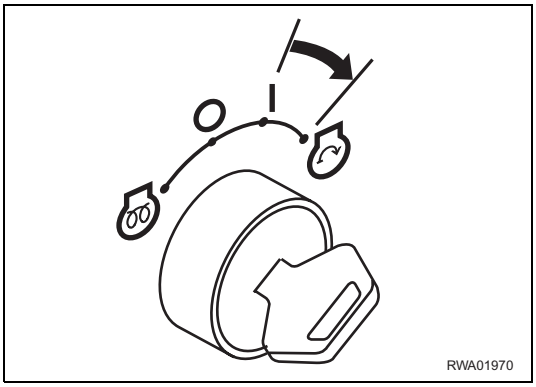
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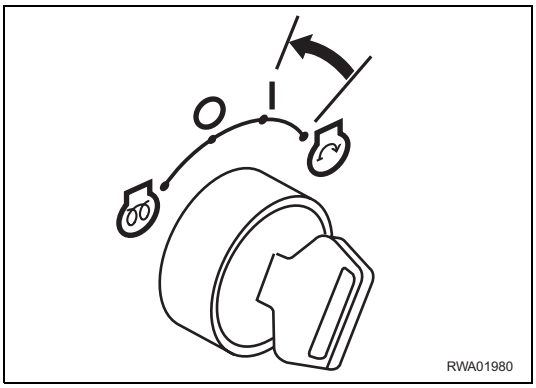
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## 3.6.3 WARMING THE ENGINE

1 - After starting the engine, let it warm up before starting work.

2 - The ideal warming up of the engine is achieved with a constant speed of approximately 1000 rpm and can be checked on the digital scale provided on the dashboard, which indicates the overheating with red bars.

3 - To reduce the time necessary to warm up the engine, accelerate now and then, up to maximum 1800 rpm.

4 - While warming up the engine, check the colour of the exhaust gas and be careful to anomalous noises or vibrations; any abnormal situation must be examined thoroughly and its cause must be immediately eliminated.

## 3.6.4 HEATING THE HYDRAULIC OIL

When warming up the engine, especially in the cold season, it is advisable to heat also the hydraulic system oil.

For this purpose, when the coolant temperature has reached approximately 60°C, proceed as follows:

1 - Lift the boom slowly and completely for several times.

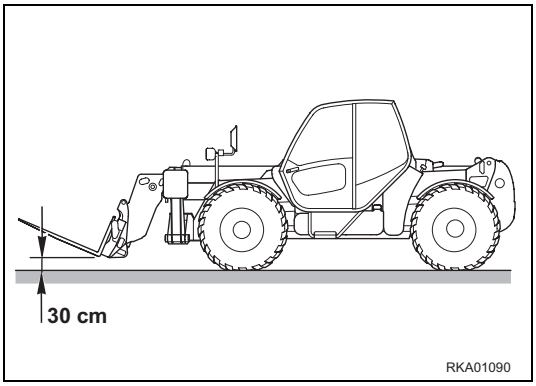
2 - Extend and retract the boom completely for several times.

3 - Fold and dump the equipment completely for several times.

**⚠ ATTENTION**

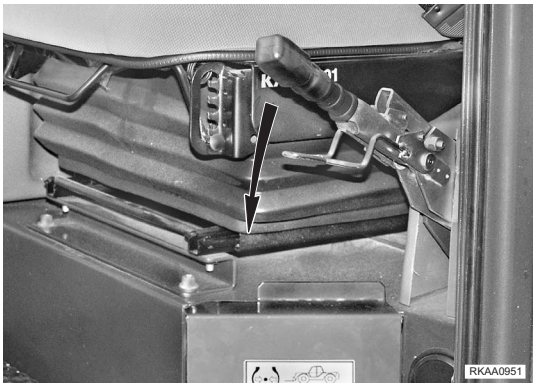
- **The hydraulic oil must be heated gradually and carefully; if the machine isn't warmed up properly before using the control lever, the response of the hydraulic components may be slow and cause unexpected accidents.**

## 3.6.5 HOW TO MOVE THE MACHINE




**⚠ DANGER**

- **Before moving the machine, make sure that you know the control functions and all the relevant safety regulations perfectly.**
- **The operator must be sitting in the driving position with fastened safety belt and must have checked the position of the rear-view mirrors.**
- **Before selecting the travel direction and engaging the gears, make sure that the equipment is lifted at about 30 cm from the ground.**
- **Before moving the machine, make sure that there is no one within the operating radius of the machine and that there are no obstacles in the surrounding area.**
- **Be extremely careful when engaging the reverse and make sure that there are no persons, working means or obstacles in the way.**




Before moving the machine, check the instruments, warm up the engine and the hydraulic oil and then make sure that the stabilizers are completely raised.
At this point, release the parking brake.

Proceed as follows:

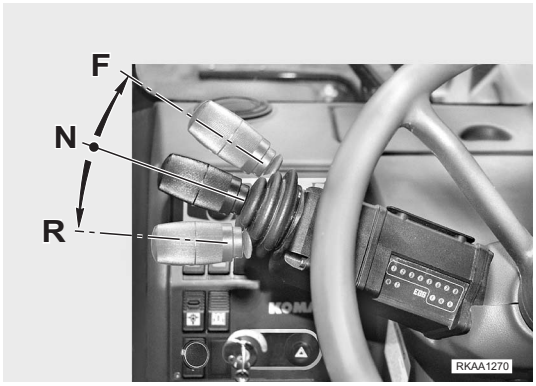
1 - Select the operating mode (TRAVEL or TRAVEL-WORK).

2 - Select the steering mode (see «3.2.5 MACHINE CONTROLS»).

3 - Select the travel direction, by shifting the control lever forward (F) or backward (R).

4 - Engage the gears within 5 seconds from the selection of the travel direction.

5 - Accelerate gradually using the accelerator pedal.




**IMPORTANT**

- **The gears must be engaged with the engine at low rpm, in order to avoid an abrupt acceleration.**
- **For the operation of the gearshift and its functions, see «3.2.5 MACHINE CONTROLS»).**
- **The gearshift is completely synchronized, therefore it is not necessary to decelerate to shift gears when the machine has to keep travelling in the same direction.**
- **If it is necessary to shift down, first reduce the engine rpm and then shift down.**
- **If it is necessary to reverse, slow down by putting on the brakes before operating the reverse lever.**

### 3.6.5.1 MOVING ON SLOPES

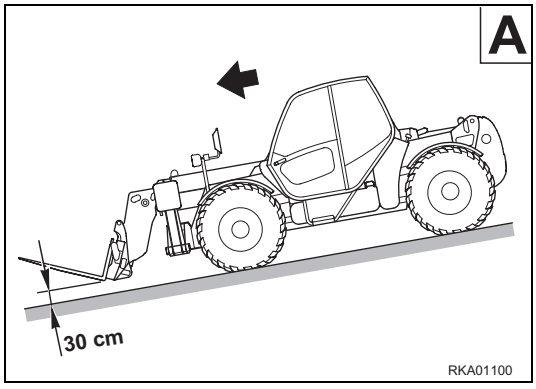
**⚠ DANGER**

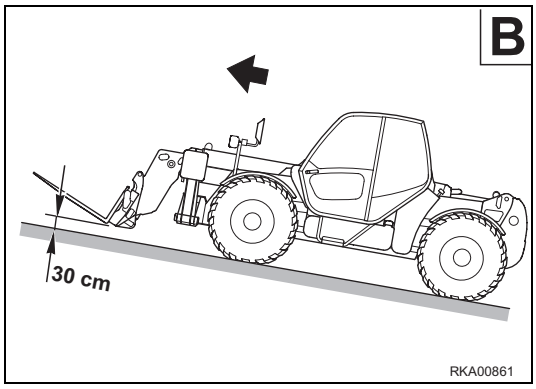
- **Before starting work on slopes, always check the functionality of the brakes and of the parking brake.**
- **Avoid engaging the high gears.**
- **Do not move downhill with the gearshift in neutral, but keep always the low gears engaged. NON-COMPLIANCE WITH THESE RULES MAY CAUSE THE OPERATOR TO LOSE CONTROL OF THE MACHINE.**
- **Avoid using the declutch push button.**

When working on slopes some precautions should be taken to avoid risks for the operator and anyone in the vicinity; the checks and operations to be carried out are the following:

1 - Always check the work area for snow, landslips, gravel, loose ground and anything that may suddenly modify the work conditions and the stability of the machine.

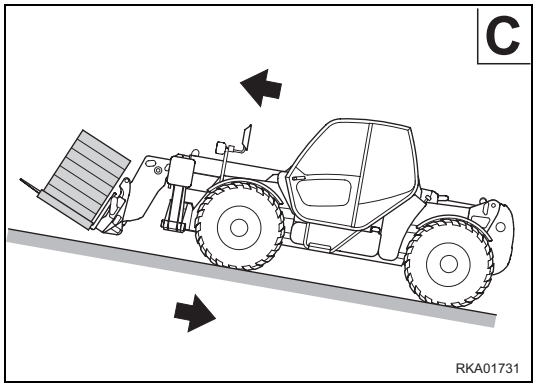
2 - When travelling downhill or uphill without load, engage the forward gear and travel with boom lifted, in transport position (Figures A - B).




3 - When travelling downhill or uphill carrying a load, always keep the boom directed upwards (travelling forward uphill and backward downhill) (Fig. C).

4 - Carry out any lateral movement on a flat surface at the beginning or at the end of the slope; if this is not possible, move obliquely, keeping the machine axis as parallel to the slope directrix as possible.
Do not move too obliquely, or, even worse, with the machine axis rotated by 90° with respect to the slope directrix.

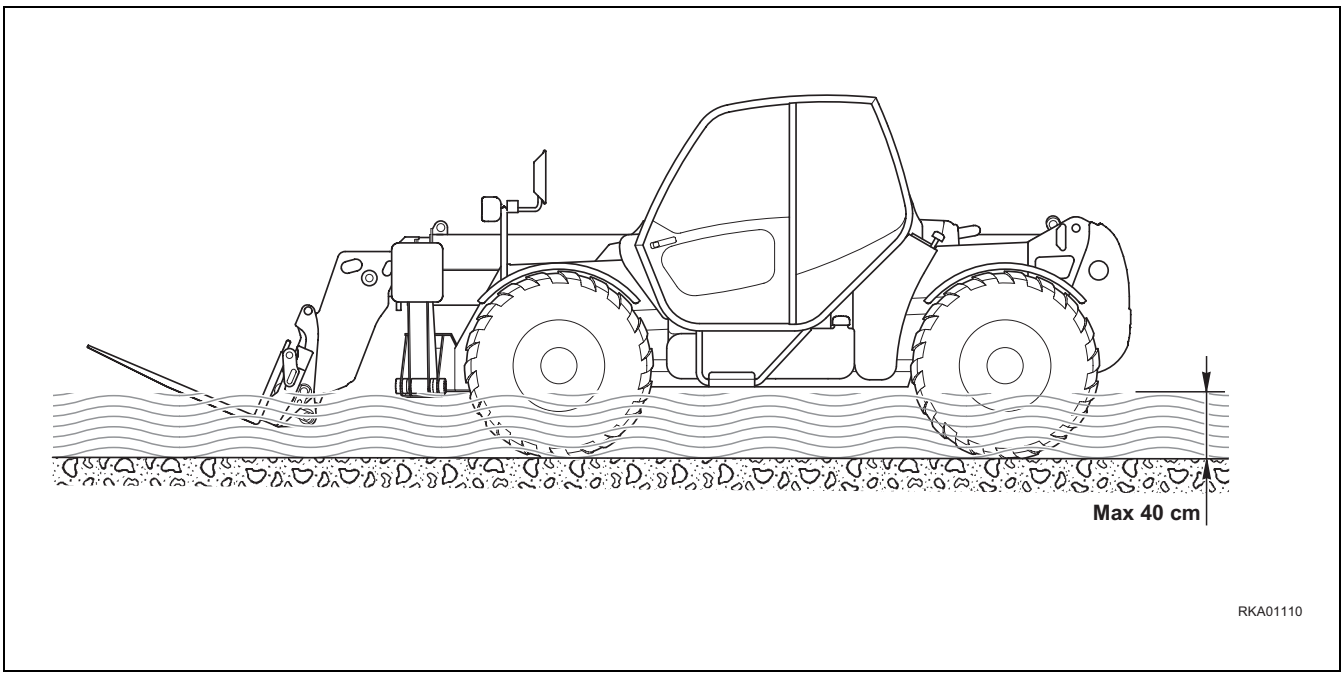


### 3.6.5.2 MAXIMUM IMMERSION DEPTH

## ⚠ DANGER

- **If it is necessary to work with the machine immersed in water or on river banks or sea shores, always check the water depth and the current flow.**
- **Make sure that the surface on which you are working is sufficently firm.**

If it is necessary to work with the machine immersed in water, make sure that the maximum depth does not exceed 40 cm; working in deeper water may cause serious damage.

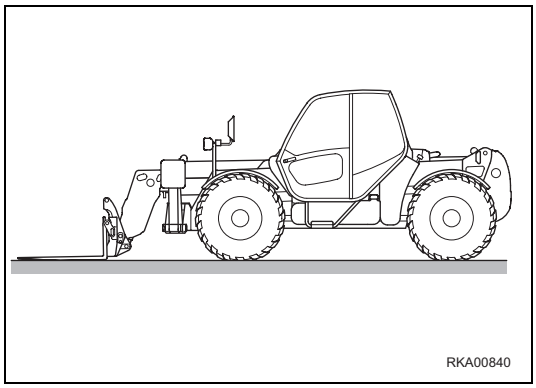



## ⚠ ATTENTION

- **After moving or working with the machine immersed in water, on the seashore, or on river banks, always remove any mud or sand from the fulcrum pins of the stabilizers and the equipment that have been immersed and provide for additional lubrication.**

# 3.7 PARKING THE MACHINE

## 3.7.1 PARKING ON LEVEL GROUND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**DANGER**

- **Park the machine on firm and level ground, in a sufficiently wide space, so that the checks, daily lubrication and refuelling can be carried out without problems.**
- **Retract and lower the boom until the equipment rests on the ground; apply the parking brake.**
- **Keep to all the safety rules, in order to avoid any movement of the machine when the operator is absent.**
- **When leaving the machine, remove the ignition key, use the ladders and handles, lock the cab.**
- **The operator is directly responsible for any damage caused by improper parking operations.**

1 - Park the machine on firm and level ground, in a sufficiently wide space.

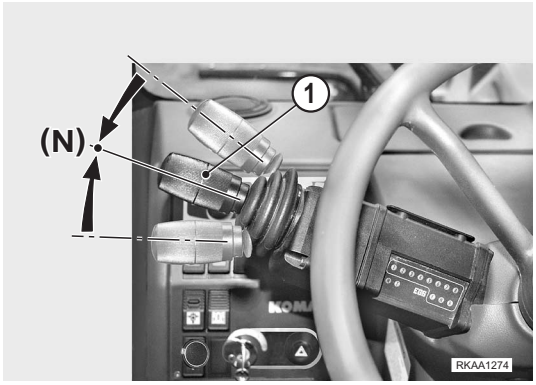
2 - Move the gearshift-reverse lever (1) to position (N) and apply the parking brake (2).

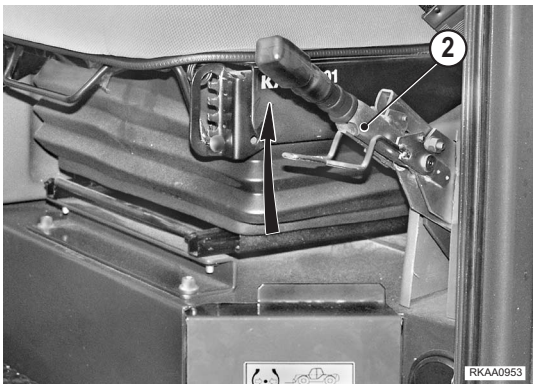
3 - Stop the engine following the procedure indicated in paragraph «3.8 STOPPING THE ENGINE».

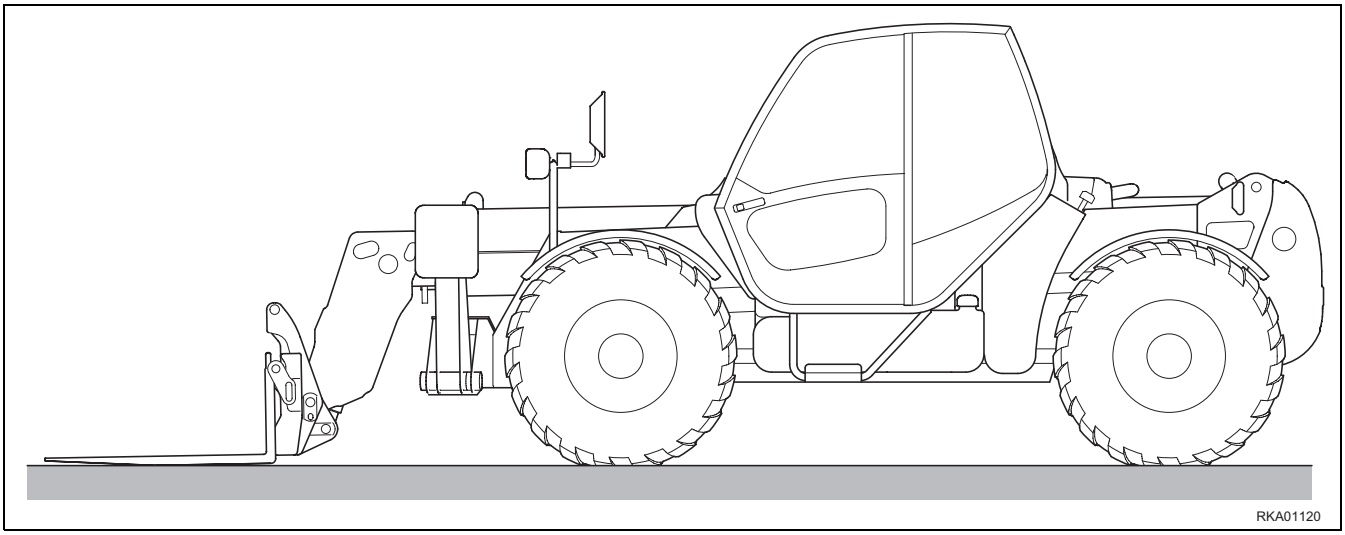
4 - Leave the driving position using the ladders and handles provided for this purpose.

5 - Refuel, taking the necessary precautions.

6 - Remove the ignition key and lock the cab.

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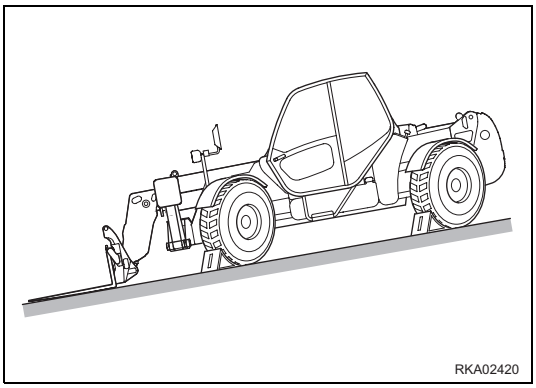
## 3.7.2 PARKING ON SLOPES




**DANGER**

- **Any movement of the machine when the operator is not on board may cause serious accidents and even death; to prevent this, carry out the operations described below.**
- **Park on slopes only when it is absolutely necessary.**
- **Park only with the boom directed downwards.**

1 - Park the machine with the boom directed downwards and resting against an obstacle.

2 - Select the round steering mode with the push-buttons (1) and (2) and steer the wheels completely directing them uphill.

3 - Shift the reverse lever (3) into neutral.

4 - Apply the parking brake (4).

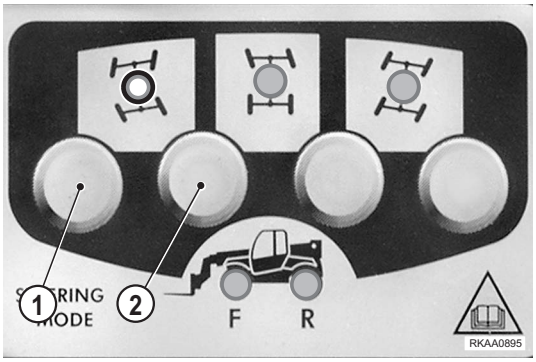
5 - Stop the engine following the procedure indicated in paragraph «3.8 STOPPING THE ENGINE».

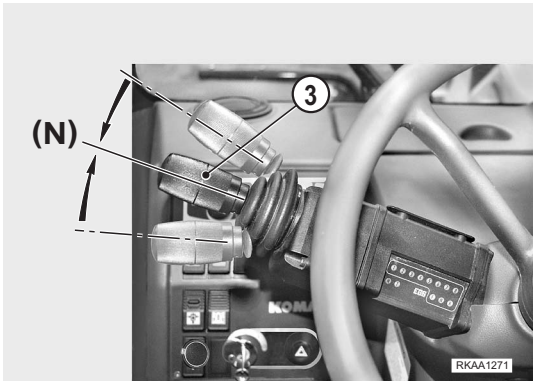
6 - Leave the driving position using the ladders and handles provided for this purpose.

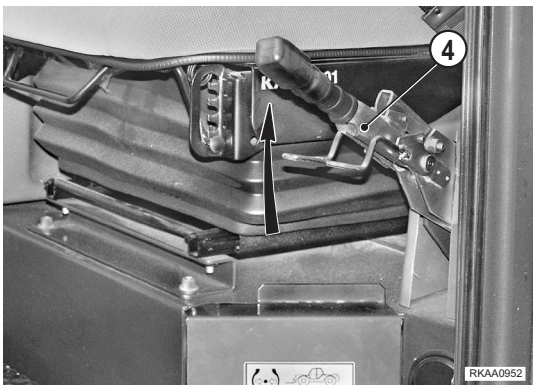
7 - Put wedges under the wheels.

8 - Refuel, taking the necessary precautions.

9 - Remove the ignition key and lock the cab.



# 3.8 STOPPING THE ENGINE

**IMPORTANT**

- **Do not stop the engine suddenly, except in case of emergency. The sudden stop of the engine while it is running shortens its life.**
- **It is likewise recommended not to stop the engine suddenly if it has been running for a long period and is still hot; in this case, let the engine idle at minimum 1200–1300 rpm for about 5 minutes, in order to allow it to cool down gradually before stopping it.**

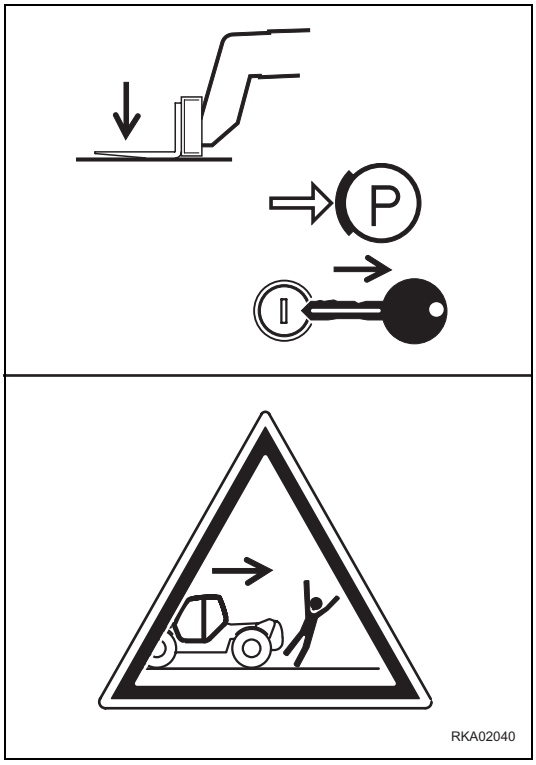
Before stopping the engine, proceed as follows:

1 - Retract the boom completely and rest the equipment onto the ground.

2 - Shift the gearshift-reverse lever to neutral and apply the parking brake.

3 - Stop the engine.

The engine can be stopped by turning the ignition key to position «**O**» (OFF).

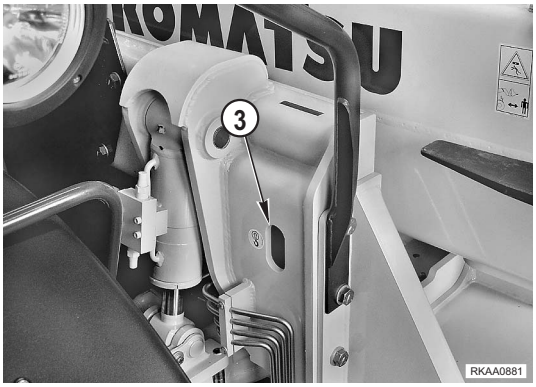


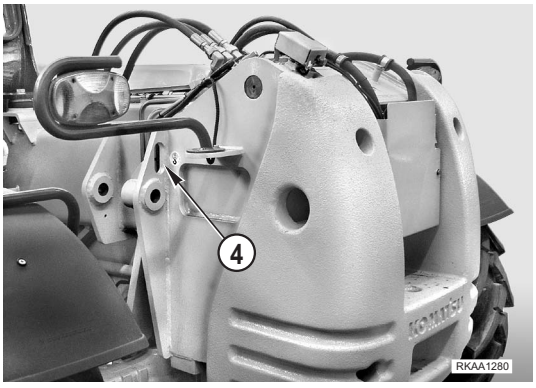
# 3.9 TRANSPORTING THE MACHINE ON OTHER VEHICLES

## 3.9.1 LOADING AND UNLOADING THE MACHINE

**⚠ DANGER**

- **The loading and unloading of the machine on-off the means of transport must be carried out on a flat surface and at a safety distance from the edges of ditches or from the road side.**
- **Block the means of transport by positioning wedges before and behind each wheel.**
- **Make sure that the ramps are sufficiently strong; if necessary, reinforce them with blocks, in order to prevent any dangerous bending.**
- **Make sure that the ramps have the same length, are firmly anchored to the vehicle, are parallel to each other and perpendicular to the loading board; the distance between the ramps must be suitable for the machine gauge.**
- **Position the ramps with a maximum inclination of 15°.**
- **Remove any trace of oil, grease or ice from the ramps and the loading board.**
- **Do not change direction when the machine is already on the ramps; if necessary, go down and find the correct direction.**




1 - Remove the equipment from the boom.

2 - The machine must get on the ramps with the boom directed forward with respect to the travel direction.

3 - Once the machine has been loaded, apply the parking brake.

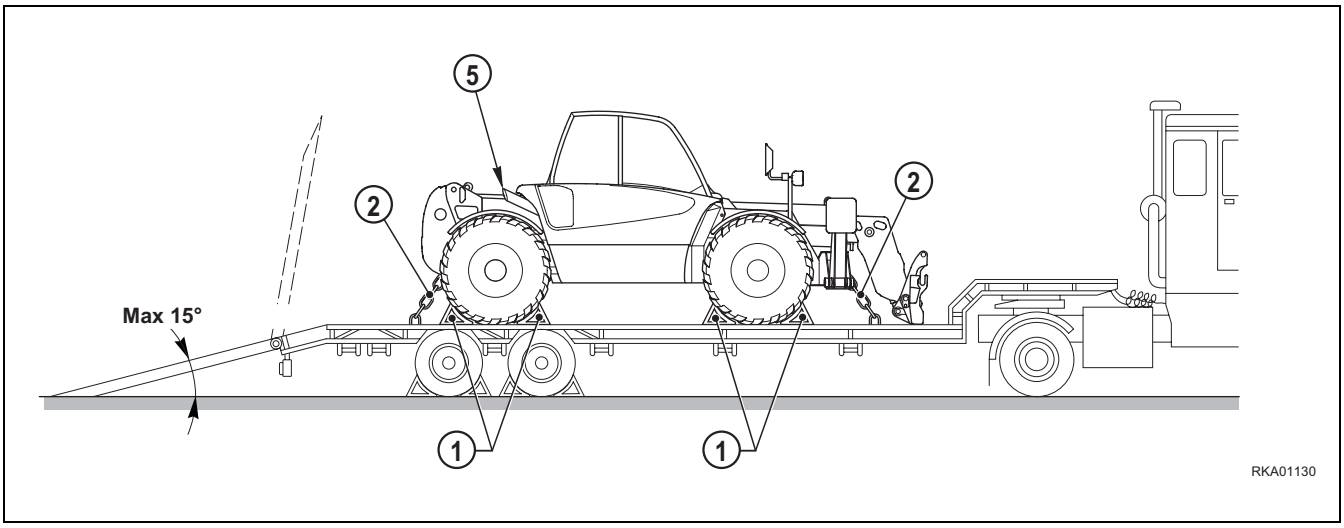
4 - Stop the engine and remove the ignition key.

5 - Close the rear window and the cab door.

6 - Keep the machine in the correct position by putting wedges (1) before and behind each wheel.

7- Secure the machine with tie-downs or chains (2) using the anchorage points (3) and (4) provided at the sides of the frame and indicated by the pictograms.

8 - Protect the end of the exhaust pipe (5).



## 3.9.2 TRANSPORT

1 - Check the overall dimensions of the means of transport; the height, width and weight of the means of transport - machine included - must be compatible with the road and any tunnel, underpass, bridge, electric or telephone line that may be found on the way.

2 - Keep to the regulations in force regarding signals, speed limits, road traffic, authorizations, etc.

## 3.9.3 LIFTING THE MACHINE

**⚠ DANGER**

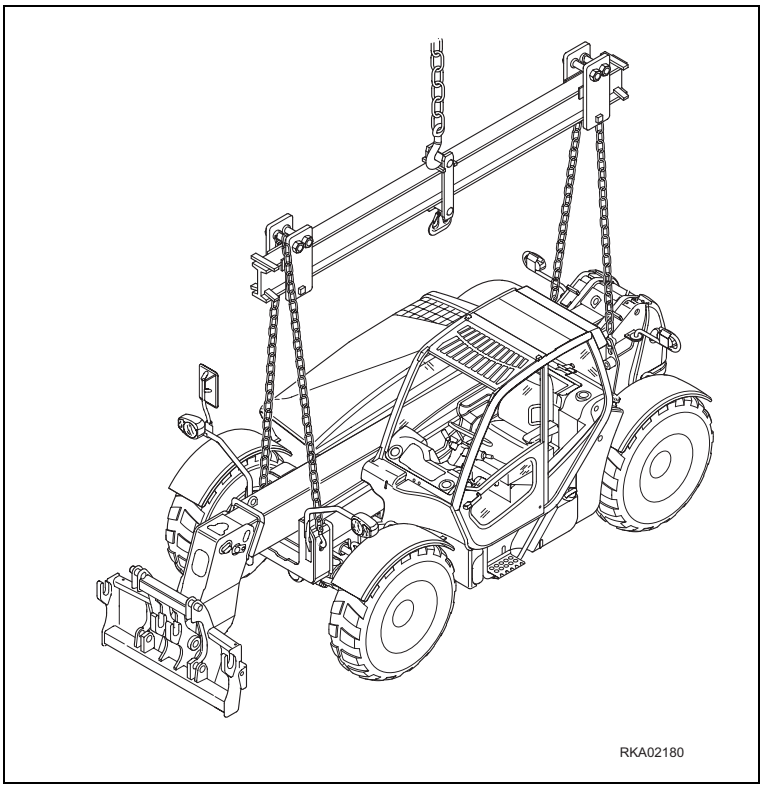
- **To lift the machine, use exclusively equipment with suitable capacity.**
- **The mass of the machine is indicated on the CE identification plate.**
- **Always keep at a safety distance while the machine is being lifted.**
- **The manoeuvres must be carried out only by the person responsible for these operations, who must follow the correct procedure and take all the necessary measures.**
- **To lift the machine, use the points indicated, which are symmetrical and indicated by apposite pictograms.**

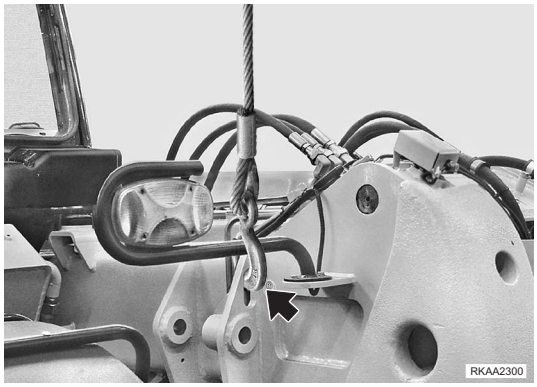
1 - Remove the equipment, retract the boom and lower it completely.

2 - Connect the lifting means and make sure that no cable or chain interferes with the cab.

**NOTE**
- **The lifting points are symmetrical.**

3 - Slowly lift the machine a few centimetres from the ground, then check its stability and balance before lifting it completely.

# 3.10 PRECAUTIONS TO BE TAKEN IN THE COLD SEASON AND IN COLD PLACES

During the cold season or in areas where temperatures are particularly low, especially during the night, it is necessary to take some countermeasures meant to limit any damage deriving from low temperatures.

## 3.10.1 FUEL AND LUBRICANTS

1 - Change the fuel and use winter fuel type ASTM D975 N. 1.

2 - Change the engine oil with an oil with suitable viscosity.
For the relevant specifications, see «4.3 FUEL, COOLANT AND LUBRICANTS».

## 3.10.2 ENGINE COOLANT

- Use only permanent, ethylene glycol-based coolant, with corrosion inhibitor for protection up to -36°C.
The coolant density must be checked every year before the cold season and the coolant must be changed every 2 years.

## 3.10.3 BATTERY

**⚠ DANGER**

- **To avoid explosions due to the presence of gas, do not provoke sparks and do not use naked flames near the battery.**
- **The battery electrolyte is dangerous. If it comes in contact with the eyes or the skin, immediately rinse with plenty of water and consult a doctor without delay.**
- **To prevent the fluid from freezing, add distilled water in the morning, before starting work.**

1 - When the ambient temperature decreases, the battery capacity decreases accordingly and, if the battery charge is low, the electrolyte may freeze.
Keep the battery completely charged and insulate it to protect it from low temperatures, so that the machine can be started without problems in the morning.

2 - Measure the specific weight of the electrolyte and check the battery charge percentage, using the following table:

| CHARGE PERCENTAGE | ELECTROLYTE DENSITY | | | |
|---|---|---|---|---|
| | 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 |

## 3.10.4 OTHER PRECAUTIONS

1 - Before using the machine in normal operating conditions, carry out some slow movements both forward and in reverse.
With the machine in WORK mode, operate the boom slowly, performing some complete movements, and if possible operate also the equipment-carrier.
These operations serve to warm up and fluidize the oil in the hydraulic circuit, the transmission, the axles and the brakes.

## 3.10.5 PRECAUTIONS TO BE TAKEN AT THE END OF WORK

1 - Remove mud and water completely from the machine body.
Park the machine on firm ground; if the machine must be parked near banks or ditches, park it on wooden boards in order to distribute the weight of the machine on a larger surface.

2 - Be careful to water drops forming on the hydraulic cylinder rods: these drops must be completely removed, since if they freeze the cylinder gaskets may be damaged.
After removing the water drops, protect the rods with oil.

3 - Drain the condensate that may have formed in the tank and in the water separator, to prevent the water from freezing during the night.

4 - Since the battery capacity may decrease considerably at low temperatures, after work cover the battery or remove it and store it at a suitable temperature.

# 3.11 PRECAUTIONS TO BE TAKEN IN THE WARM SEASON

1 - At the end of the cold season, change the lubricants and the fuel.

**IMPORTANT**

- **The coolant must be changed only if it is not permanent.**
  **For the relevant specifications, see «4.3 FUEL, COOLANT AND LUBRICANTS»**

2 - Make sure that the cooling fan belt is in good conditions.

3 - Make sure that the fins of the radiator and of the heat exchanger are clean.

4 - Check the radiator cap gasket and spring; in case of doubt regarding tightness and setting, change the cap.

# 3.12 EQUIPMENT

## ⚠ DANGER

- **Avoid installing non-approved equipment or equipment that is not provided with specific load charts issued or approved by Komatsu Utility.**
- **Always make sure that the equipment is installed properly and that the retaining pins are completely engaged, and, for the manual type, that the pins are held in place by safety cotter pins.**
  **Vibrations and jumps may cause the equipment to fall, with the risk of causing serious injury and even death.**

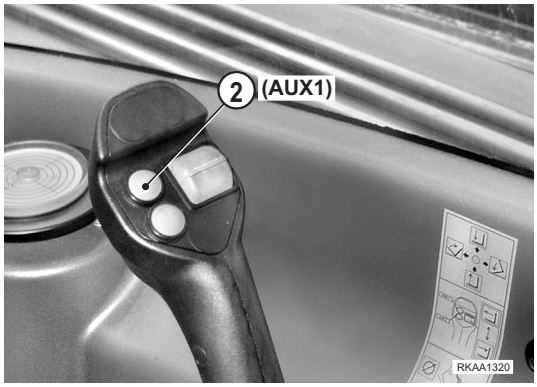
## ⚠ ATTENTION

- **This section of the manual illustrates the procedure for attaching and disconnecting the lifting forks and the bucket. However, the same procedure applies to all pieces of equipment that can be used with equipment-carriers with hydraulic or manual coupling.**
- **Any equipment with non-standard coupling requires specific equipment-carriers and must be approved by Komatsu Utility.**
- **Approved standard equipment includes: lifting forks, loader (for general purpose or for light materials), and 4x1 bucket.**
- **Two types of equipment-carriers can be supplied:**
  **a - with hydraulic quick coupling**
  **b - with manual quick coupling.**

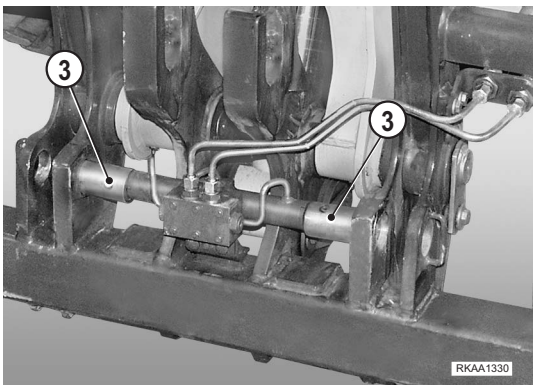
## 3.12.1 INSTALLING EQUIPMENT WITH HYDRAULIC QUICK COUPLING

1 - Press and lock the switch (1) that enables the hydraulic circuit for optional equipment (see «3.2.3 SWITCHES AND PUSH BUTTONS»).


2 - Press the AUX1 button (2).



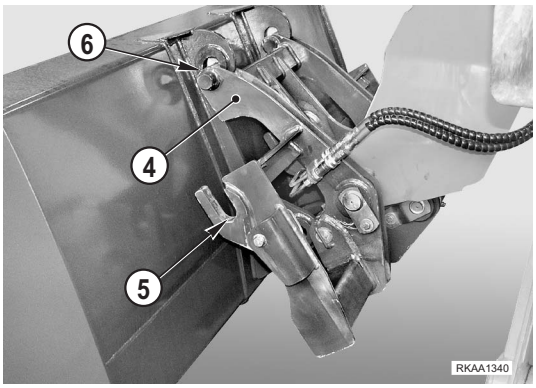
3 - Hold the button until the lower coupling pins (3) are fully open.




4 - Partially extend the telescopic boom until the quick coupling (4) becomes visible.

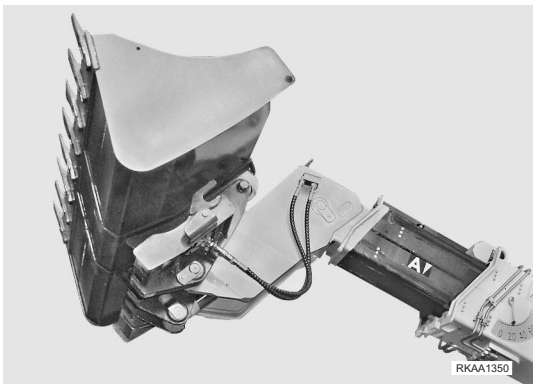
5 - Operate the machine until aligning the quick coupling with the equipment to be attached.

6 - Using the control lever, tilt the quick coupling forward in order to:
a - lower the coupling holes (5) for the fork assembly
b - lower the central coupling pins (6) for the loader.




7 - Slowly extend the telescopic boom and when the quick coupling comes in contact with the equipment to be installed, lift slowly and centre the connections and the equipment.

8 - Using the control lever, draw back the quick coupling until it rests on the lower part of the equipment.




9 - Press and hold the AUX2 (7) button until the lower coupling pins (3) are fully engaged.

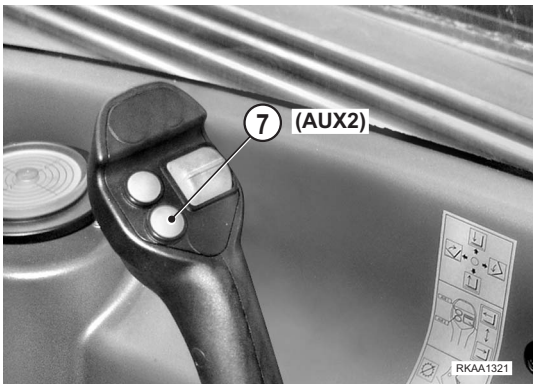
10 - Disconnect the auxiliary circuits enablement switch (1).

**IMPORTANT**

- **Before using the equipment, make sure that the lower coupling pins are completely engaged by proceeding as follows:**

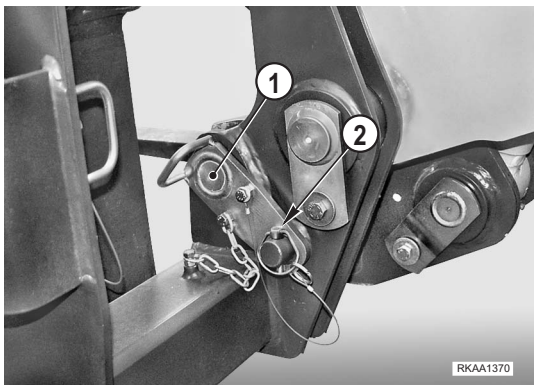
**1 - Lower the equipment to the ground, exerting a certain pressure.**

**2 - Reverse slowly and make sure that the equipment doesn't move with respect to the equipment-carrier. If the equipment moves, this means that the pins are not correctly engaged.**



## 3.12.2 INSTALLING EQUIPMENT WITH MANUAL COUPLING

The procedure for installing equipment with manual coupling is similar to the procedure for installing equipment with hydraulic coupling. The only difference regards the lower coupling pins (1), which must be extracted and inserted by hand and secured with the safety cotter pins (2).




## 3.12.3 INSTALLING EQUIPMENT REQUIRING HYDRAULIC POWER (4X1 BUCKET - FORKS – ROUND BALE GRIPPERS, ETC.)

Once the equipment has been connected as described in paragraph «3.12.1 INSTALLING EQUIPMENT WITH HYDRAULIC QUICK COUPLING» and once having verified that both lock pins are fully engaged, stop the engine.

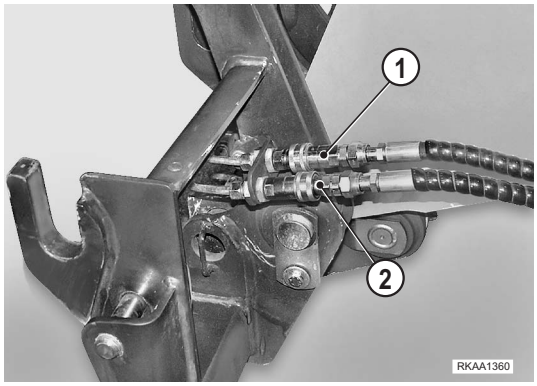
1 - Disconnect the delivery and drain pipes (1) and (2) from the quick couplings of the pin control cylinders.

2 - Remove the protection elements of the equipment quick couplings and install them on the couplings of the lock pin cylinders.

3 - Connect the equipment to the pipes (1) and (2).

4 - Start the engine and lift the equipment so that it is completely visible.

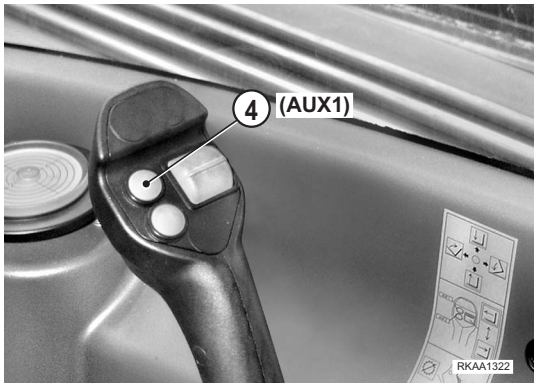
5 - Press and lock the optional equipment hydraulic circuit enablement switch (3).



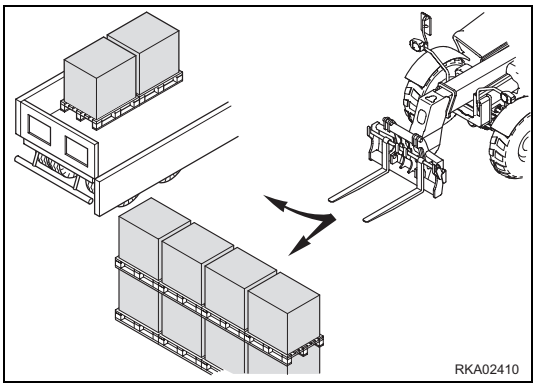


6 - Operate the AUX1 button (4) and make sure that the movement performed by the equipment corresponds to that specified on the adhesive plate supplied with the equipment.

7 - If the movement doesn't correspond to the indications given, lower the equipment to the ground, stop the engine and invert the connection of the delivery and drain pipes.



## 3.12.4 ORGANIZING THE WORK AREA




If after a first inspection the area results to be uneven, encumbered with big obstacles or made up of areas with considerable differences in height, it is advisable to level the ground as much as possible before starting work.
These preliminary operations will reduce the time necessary to carry out the job and will ensure better results, in terms of both operator's stress and machine service life.
Reduce to the minimum the movements of the machine that are necessary to carry out the job.

## 3.12.5 OPERATING THE EQUIPMENT

**⚠ DANGER**

- **Always fasten the safety belt.**
- **Always warn the authorised persons present on the work site, by sounding the horn.**

**IMPORTANT**

- **The illustrations shown are the basic ones that are necessary for a correct use and exploitation of the machine; the operator must get familiar with the controls and the operation method described and learn to organize work in a free area, using the low gears and remaining seated in driving position.**

The methods described are the traditional and safest methods for operation with machine fitted with forks and bucket.

The operating methods to be adopted with other equipment are described in the section that deals with optional equipment.

# 3.12.6 OPERATING THE MACHINE FITTED WITH FORKS

## 3.12.6.1 FORKING A LOAD

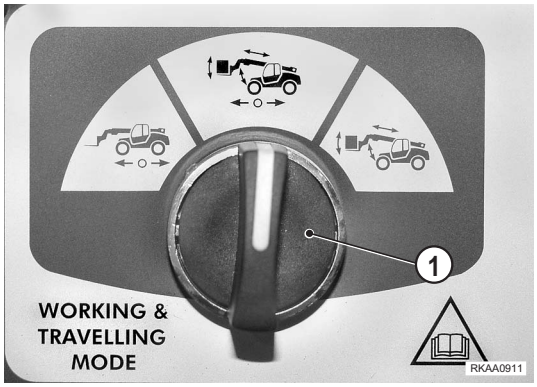
**⚠ ATTENTION**

- **The machine must move in TRAVEL-WORK operating mode, with boom lowered and completely retracted.**
- **The other forking operations must be carried out in WORK operating mode.**

Before starting work, it is important to know the mass of the load to be handled and to consult the load chart corresponding to the machine configuration (with or without stabilizers) (see «3.3 LIFTING LOADS»).

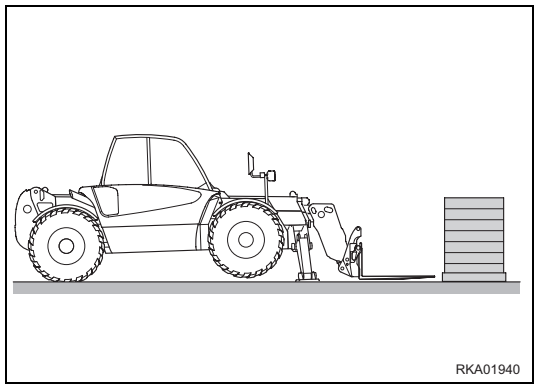
If the mass of the load isn't known, proceed as indicated below.

1 - Get as near the load as possible, perpendicularly, and select the TRAVEL-WORK operating mode with the selector (1).

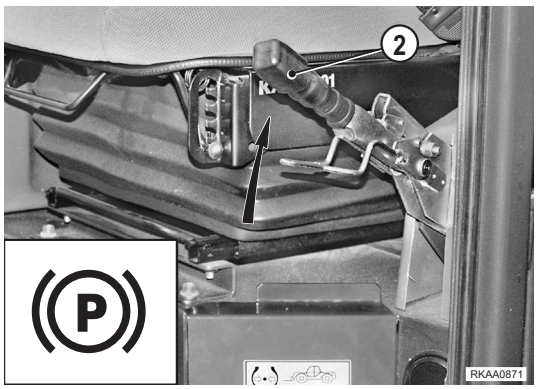



2 - Use the water level to check if the frame needs levelling; if necessary, and if the frame levelling device is provided, level the frame.

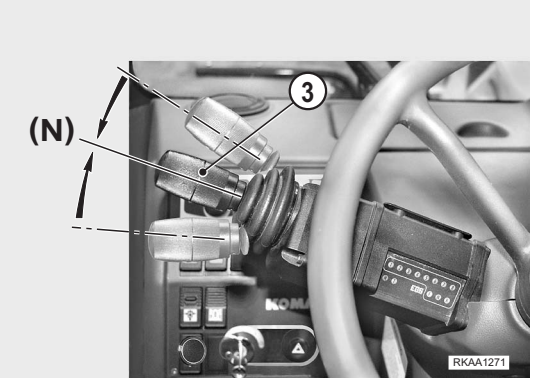
3 - If the machine is equipped with stabilizers, lower them until raising the front tyres a few centimeters from the ground, always maintaining the level condition achieved in step 2.




4 - Apply the parking brake (2).

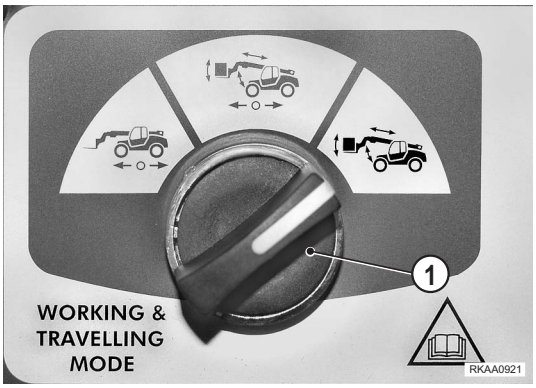


5 - Shift the reverse lever (3) into neutral.

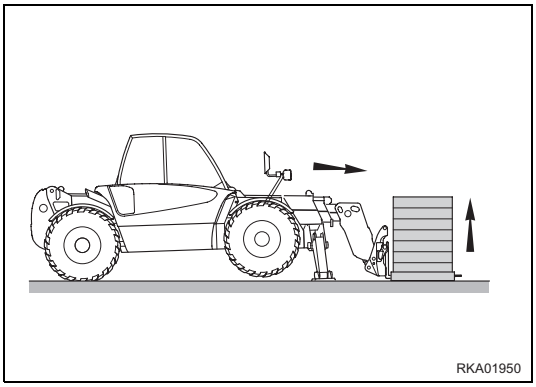



6 - Select the WORK operating mode and make sure that the forks are as wide as possible and centered with respect to the equipment-carrier plate; if necessary, widen the forks, making sure that there are side retainers to prevent the load from slipping.

7 - Swing the quick coupling until the forks are in horizontal position.



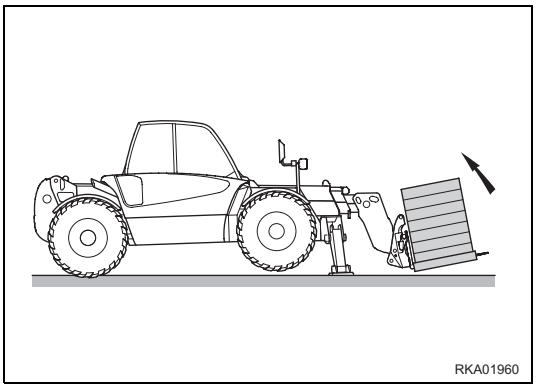

8 - Extend and lower the boom until the forks held the load firmly.




9 - Lift the load slowly a few centimeters by folding the equipment, to check the stability of the machine on the SLI-Safe Load Indicator (see «3.2.5 MACHINE CONTROLS» 7 - SLI-SAFE LOAD INDICATOR).

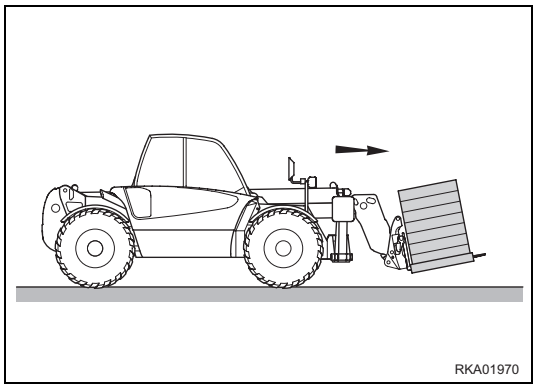
**NOTE**

- **If the machine has reached or exceeds the stability limit, lower and release the load and if possible move the machine nearer, in order to reduce the boom length and the operating angle.**
- **If the stability limit is reached notwithstanding this manoeuvre, the operation CANNOT be performed.**



10 - Once the stability of the machine has been ascertained, fold the equipment further and, using the control lever, retract the boom to release the load and continue the manoeuvres until the boom is retracted and lowered at 30 cm from the ground.

11 - Disengage the parking brake, select the TRAVEL-WORK operating mode and if the machine is equipped with stabilizers raise them completely.




### 3.12.6.2 TRANSPORTING THE LOAD

1 - Engage the reverse gear and move the machine away from the loading area, making sure that there are no people or obstacles in the area.

2 - If necessary, level the frame (if the frame levelling device is provided) before starting to move towards the unloading area.

3 - If necessary, select the steering mode (two-wheel, round or crab steering) (see «3.2.5 MACHINE CONTROLS») and start travelling slowly in order to get as near the unloading area as possible, always in perpendicular position.

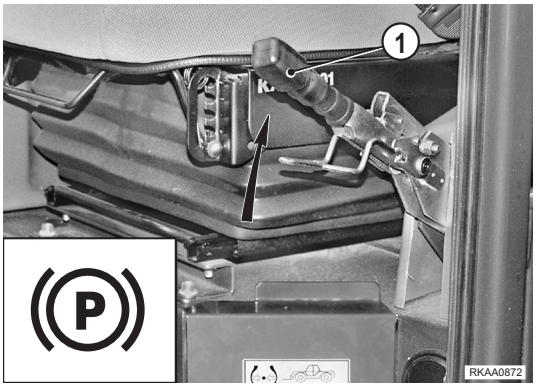
### 3.12.6.3 STACKING THE LOAD

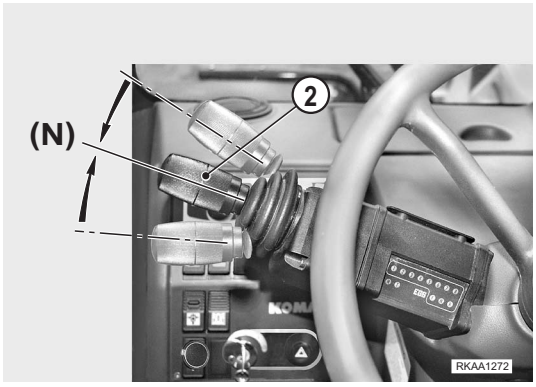
1 - With the machine in TRAVEL-WORK operating mode, move perpendicularly and get as near the unloading area as possible.

2 - Use the water level to check if the frame needs levelling; if necessary and if the frame levelling device is provided, level the frame.

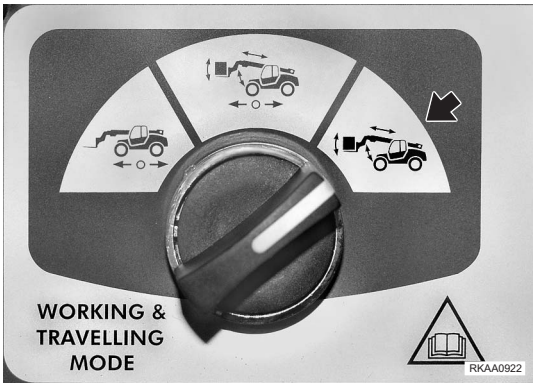
3 - If the machine is equipped with stabilizers, lower them until raising the front tyres a few centimeters from the ground, always maintaining the level condition achieved in step 2.

4 - Apply the parking brake (1) and move the gearshift-reverse lever (2) to NEUTRAL (N).



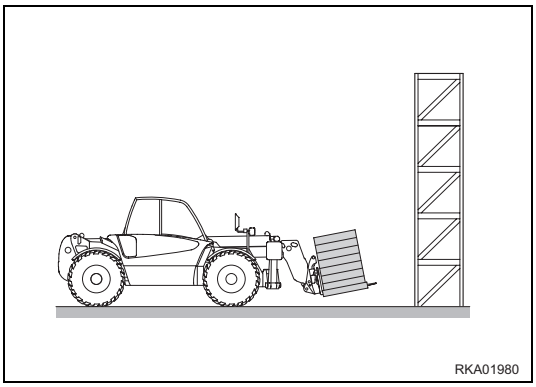
5 - Select the WORK operating mode.

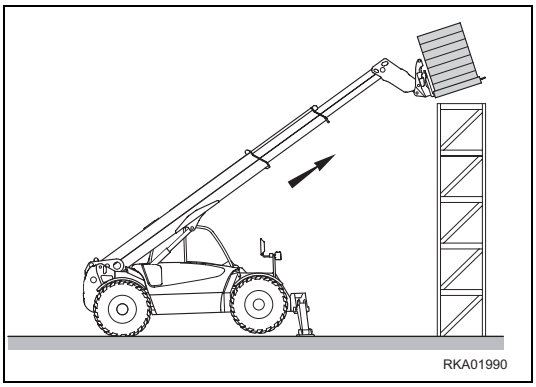



6 - Lift and extend the boom until reaching the unloading area.

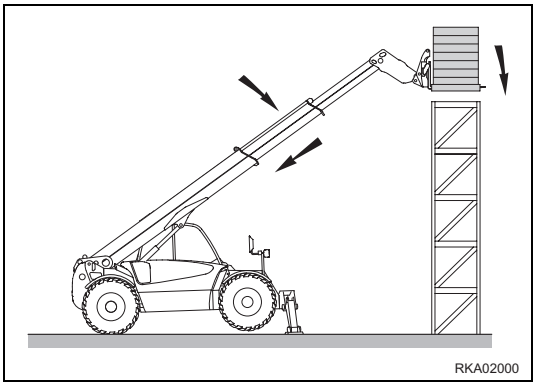
## ⚠ ATTENTION

- **During these manoeuvres, pay attention to the SLI-Safe Load Indicator; the coming on of the warning lights (blinking fast or lighting up steadily, together with the sounding of the acoustic alarm, intermittent or continuous), indicates that the machine runs the risk of overturning.**
  **Retract the boom completely and give up stacking the load, since the capacity of the machine isn't sufficient for this operation.**
  **(See «3.2.5 MACHINE CONTROLS» 7 - SLI-SAFE LOAD INDICATOR).**

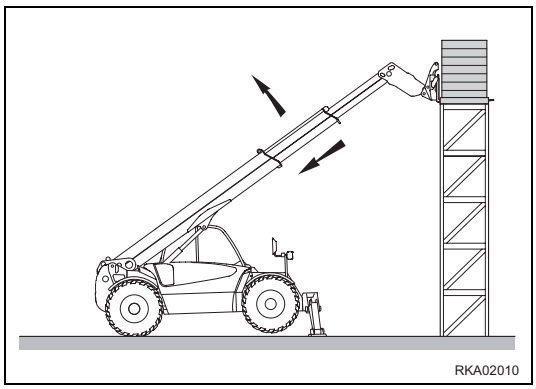



7 - Incline the equipment-carrier forward until the forks are in level position.



8 - Lower the load until resting it where it must be unloaded and, after making sure that it is stable, release it by lifting and retracting the boom and therefore disengaging the forks.




**⚠ DANGER**

- **Do not move the machine to disengage the forks.**

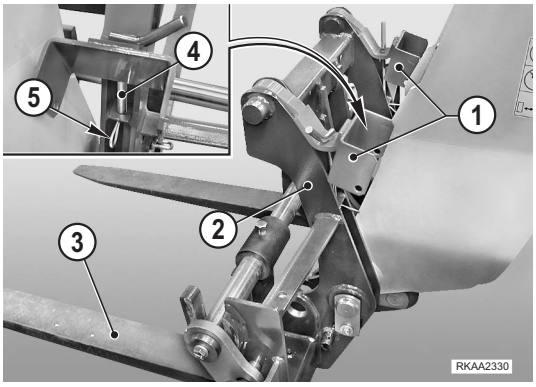
9 - Retract and lower the boom completely before raising the stabilizers, if provided; release the parking brake before selecting the operating mode (TRAVEL or TRAVEL-WORK).

## 3.12.7 PREPARING THE MACHINE FOR TRAVELLING ON ROADS

**⚠ DANGER**

- **When tipping the forks in order to position them correctly for a transfer or for the normal use of the machine, the necessary operations must be carried out by two persons; carefully check the holding points, since there is the risk of crushing and cutting the upper and lower limbs.**

The machine equipped with forks has two safety locks (1); these are constructed and positioned in such a way as to be always integral with the equipment holder (2), even when the forks (3) are operating. Fastening is achieved with two pins (4) that engage in the safety retainers (1) and in the equipment holder (2); the two pins are held in position by safety pins (5).




For travelling on roads, proceed as follows:

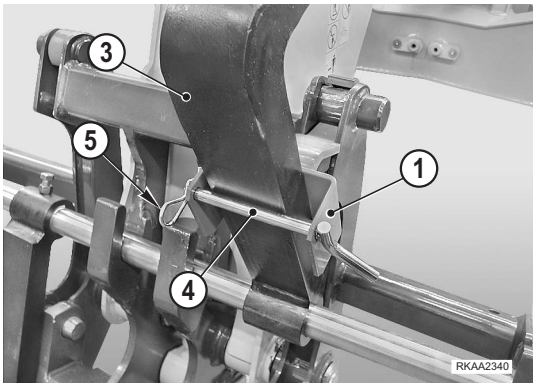
1 - Remove the safety pins (5).

2 - Extract the pins (4) and tip the retainers (1) towards the front.

3 - Tip the forks (3) and engage them in the retainers (1).

**NOTE**

- **When tipping the forks, check their width and adjust it, if necessary.**




4 - When the back of the forks (3) is positioned against the seats of the retainers (1), insert the pins (4) and secure them with the safety pins (5).

**⚠ DANGER**

- **The safety retainers must be installed as indicated in the figures; overturning the retainers may lead to serious danger for the operator and for anyone in the vicinity.**

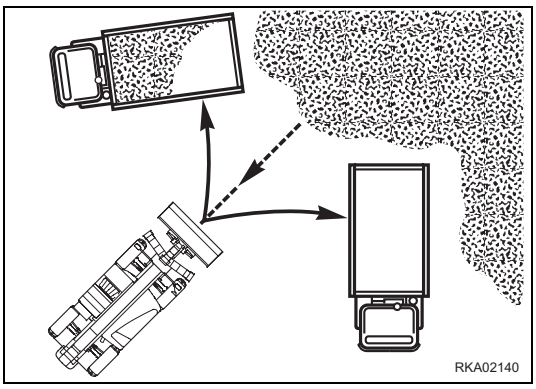
## 3.12.8 USING THE MACHINE AS A LOADER

**⚠ ATTENTION**

- **Fit the machine with an approved bucket, that is, one that is suitable for the job on hand and, above all, for the product to be handled or loaded.**
- **When the bucket is used to organise the work area, keep the bucket bottom parallel to the ground and work at low speed to avoid excessive strain on the bucket front edge.**
- **Stacking operations must be carried out with the boom fully retracted and the bottom of the bucket parallel to the ground.**
- **Load the bucket evenly and avoid positioning all the load to one side or with unbalanced weight, as these conditions may adversely affect the stability of the machine during travel and unloading.**

### 3.12.8.1 ORGANIZING THE WORK AREA

If after a first inspection the area results to be uneven, encumbered with big obstacles or characterized by considerable height differences, before starting work it is advisable to level the ground as much as possible, both for the machine and for the vehicles to be loaded.
This preliminary operations will make work quicker, ensure better results and at the same time reduce the operator's stress and the straining of the machine components; furthermore, this will considerably reduce the time necessary to load the trucks.
To clear the area of any obstacles, the equipment must be positioned as shown in the picture.



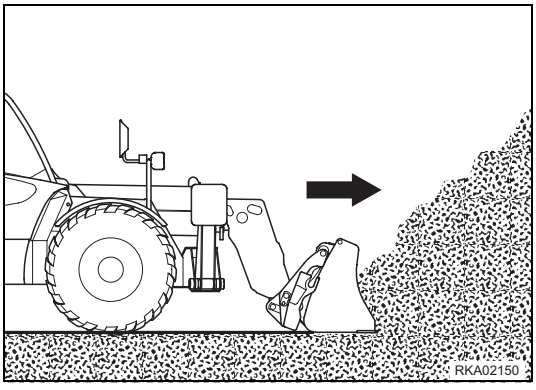

**IMPORTANT**
- **When using the loader, keep the boom as low as possible.**

In all other situations the movements of the machine must be reduced to the minimum, exploiting the steering capacity of the machine as much as possible.

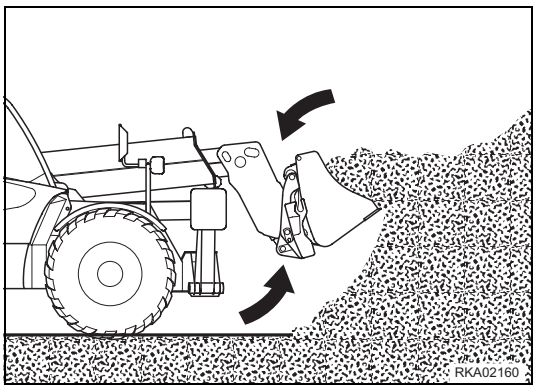
### 3.12.8.2 LOADING HEAPED AND LEVEL MATERIAL

The efficiency of the bucket depends on how the operator starts loading; proceed as follows:

1 - Start moving and direct the bucket towards the heap base.



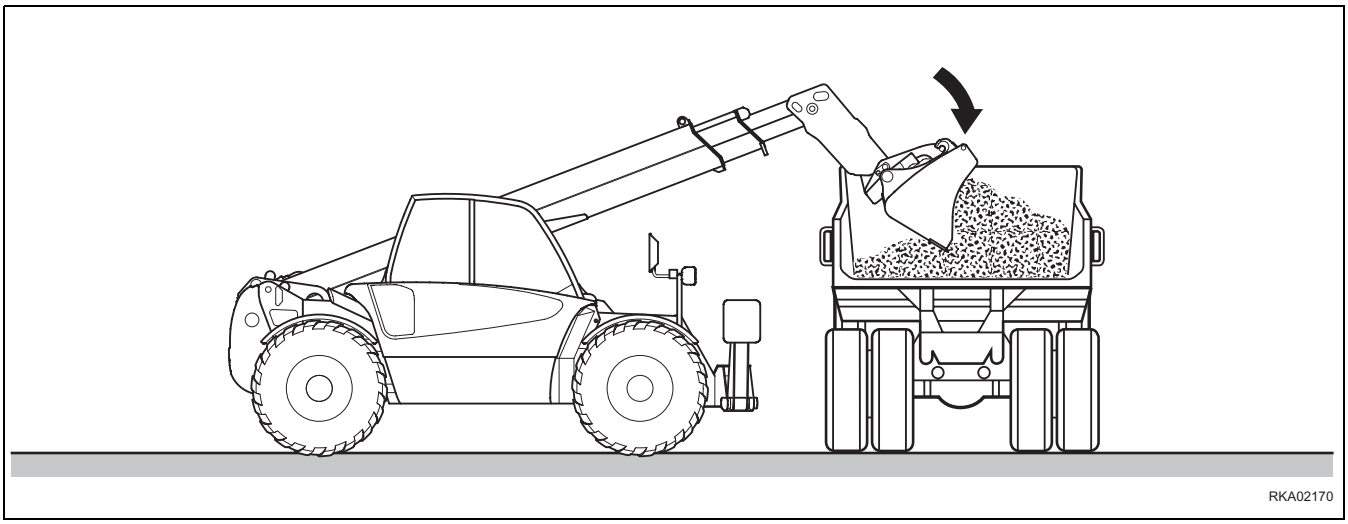
2 - While the upper material falls down filling the bucket, raise the boom gradually and at the same time retract the bucket completely.




3 - Reverse the motion of the machine and dump the bucket onto the truck.

**IMPORTANT**

- **Start loading the truck from the cab side and, if the material is sufficiently homogeneous, dump the material from the maximum height, in order to increase its compaction and its distribution on the loading platform.**



# 3.13 LONG PERIODS OF INACTIVITY

## 3.13.1 PREPARING THE MACHINE FOR A LONG PERIOD OF INACTIVITY

**⚠ DANGER**

- **When draining the fuel, do not smoke, nor use naked flames near the machine.**
  **Position a container under the machine to collect the fuel and avoid spilling it or pouring it on the tyres.**
  **If some fuel should be spilled, clean the dirty area immediately.**

**NOTE**

- **These operations are to be carried out if the machine is going to remain unused for 1 month; if the period of inactivity should be longer, perform also the operations indicated in «3.13.2 PREPARING THE ENGINE FOR A LONG PERIOD OF INACTIVITY».**

If the machine is going to remain unused for a long period, to keep its components in good conditions it is advisable to store it in a sheltered place and to take the following measures:

1 - Clean the inside and the outside of the machine completely and very carefully, retouching any scratch on the paintwork in order to avoid oxidation.

2 - Drain and change all the fluids of the hydraulic circuits and the lubricants (axles, reduction gears, converter), following the indications given in the maintenance instructions.

3 - Change all the filtering elements (air filter, engine oil filter, hydraulic circuit filters, fuel filter).

4 - To prevent the deformation of the tyre sidewalls, insert supports or blocks under the axles, to nullify the weight of the machine.

5 - Grease the exposed rods of the hydraulic cylinders and the equipment and boom joints.

6 - Shift the machine controls to neutral and apply the parking brake.

7 - Seal the end of the exhaust pipe, the intake filter and the breather outlets of engine and hydraulic oil tank.

8 - Refuel completely.

9 - Remove the battery, check the electrolyte level and make sure that the battery is charged.
Place the battery in a room with suitable temperature and recharge it periodically.

10 - Lock the cab door, the filler cap and the engine hood.

11 - Seal the filler cap.

## 3.13.2 PREPARING THE ENGINE FOR A LONG PERIOD OF INACTIVITY

**NOTE**

- **These operations must be carried out only if the engine is going to remain unused for more than 1 month.**
- **The first two operations must be carried out only on engines that have already run for more than 200 hours.**

1 - Drain the oil from the oil pan and fill it with washing oil FIAT L35.

2 - Start the engine and let it run at low idle for 15 minutes.
Stop the engine and drain the oil.

3 - Fill the oil pan to the MIN. level with SAE 30 oil or with oil corresponding to the MIL - 2160B – type 2 specifications.

4 - Empty the fuel filters, disconnect the fuel pump intake pipe and connect it to an outside tank filled with CBF (ISO 4113) oil.

5 - Start the engine and let it run at 800–1000 rpm for 15 minutes.
At this point, use a syringe to inject 40 g of SAE30 oil or of an oil corresponding to the MIL - 2160B - type 2 specifications in approximately 10 seconds.

6 - Stop the engine and drain the oil from the oil pan.

**NOTE**

- **Recovered oil can be used again, for other two or three times, when preparing the engine for a long period of inactivity.**

7 - Loosen the alternator, fan and coolant pump belt.

8 - Reconnect the pump intake pipe to the tank.

9 - Seal the exhaust pipe and all the intake and breather openings with adhesive tape and vynil bags.

10 - Position a sign with the clear writing “NO ENGINE OIL” on the steering wheel and on the engine.

**IMPORTANT**

- **These operations must be repeated every 6 months.**

## 3.13.3 MAINTENANCE DURING A PERIOD OF INACTIVITY

**NOTE**

- **These operations must be carried out once a month.**

1 - Recharge the battery and install it on the machine.

2 - Remove the seals from tank, air filter, exhaust pipe and breather outlets.

3 - Check the tyre pressure and remove the support blocks from the machine.

4 - Start the engine and let it run at low idle for 15 minutes.

5 - While warming the engine, remove the protection grease from the rods of the exposed hydraulic cylinders.

6 - Before moving the machine, make sure that the instruments, warning lights, lights, direction indicators, windshield wipers and stoplights function correctly.

7 - As soon as possible, warm the hydraulic cylinders by lifting and extending the boom and the equipment-carrier slowly more than once.

8 - Release the parking brake and travel for short distances at low speed, applying the brakes every now and then to allow the braking surfaces to settle down.

## 3.13.4 RESTARTING THE ENGINE

**NOTE**

- **These operations must be carried out if the machine has been prepared for a period of inactivity of more than 1 month.**

1 - Remove the seals from the exhaust pipe and the filler cap.

2 - Open the engine hood and the cab.

3 - Remove the seals from the intake and breather openings.

4 - Drain the oil contained in the injection pump.

5 - Fill the engine with the oil prescribed, suitable for the ambient temperature.

6 - Tighten the alternator, fan and coolant pump belt.

7 - Check all the fluid levels (coolant, windshield detergent, fuel, oil in the gearbox and axle hydraulic circuits).

8 - Check the battery charge and install it.

9 - Start the engine by proceeding as indicated in paragraph «3.6.2 STARTING THE ENGINE» and make sure that the engine oil pressure warning light goes out when the starter has run for approx. 5 seconds.

10 - After starting the engine, let it run at low idle for 15 minutes.

11 - Warm the hydraulic cylinders by lifting and extending the boom and the equipment-carrier slowly more than once.

## 3.13.5 AFTER A LONG PERIOD OF INACTIVITY

Considering that different periods of inactivity can have different durations, the functions of the machine can be restored according to two different procedures:

1 - If the period of inactivity lasted for more than one months, follow the instructions given in paragraphs «3.13.4 RESTARTING THE ENGINE» and «3.13.3 MAINTENANCE DURING A PERIOD OF INACTIVITY».

2 - If the period of inactivity lasted for less than one months, follow the instructions given in paragraph «3.13.3 MAINTENANCE DURING A PERIOD OF INACTIVITY».

# 3.14 OPERATIONS IN CASE OF FAILURE

## 3.14.1 IF THE ENGINE BREAKS DOWN WITH BOOM LOADED, LIFTED AND EXTENDED

**⚠ DANGER**

- **This is an extreme condition. If it occurs, it is necessary to resort to external means and report the accident to the Komatsu Utility Dealer immediately.**
  **While waiting for the Dealer to arrive, remove the ignition key, mark off the area around the machine and keep it under close surveillance to ensure that nobody approaches. This area is very dangerous, in particular if the weather is windy.**

## 3.14.2 REMOVING THE MACHINE IN CASE OF FAILURE

**⚠ DANGER**

- **The removal of a machine in case of failure always involves risks that may cause injuries to the persons responsible for this type of operation.**
- **The machine can be moved only with the boom completely retracted and lowered.**
- **Before attempting to remove the machine, decide the travel direction or the coupling points of the towing cable or bar.**
- **To remove the machine, use metal cables or a rigid bar with resistance suitable for towing weights equal to or more than 1.5 times the weight of the machine as specified on the identification plate.**
  **If the machine to be towed is positioned downhill, use only a strong rigid bar, in such a way as to be able to control the brakes in total safety.**
- **The vehicle that will remove the machine must have at least the same dimensions as the machine to be towed and its power, weight and braking capacity must be sufficient to stop both vehicles.**
- **Before coupling the towing vehicle and before releasing the parking brake, block the machine with wedges.**
- **Install metal guards on the two vehicles (towing vehicle and problem machine), in order to protect their drivers from the impacts due to any breakage of the bar or towing cables.**
- **If you are not sure about the manoeuvres to be carried out or if the problems to which the failure is due cannot be solved with routine maintenance, contact your Komatsu Utility Dealer.**

1 - Only the operator can get on the problem machine, and only if the service brakes are functioning and steering is possible.

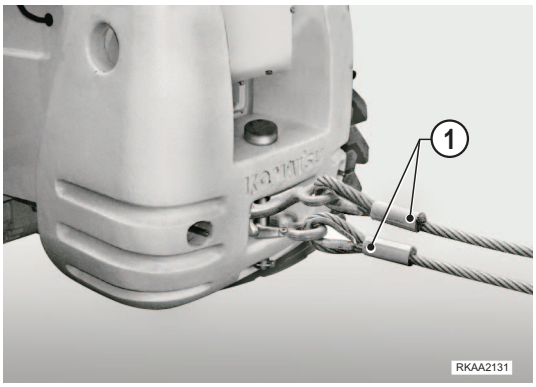
**⚠ ATTENTION**

- **If the failure involves the engine, there is no hydraulic pressure for the power-assisted braking and steering pumps; this makes the operations very hard. The amount of effort required to operate the brakes and the steering wheel will be much greater than in normal conditions and this will slow down response time considerably.**

2 - Couple the cable or the bar only to the points indicated and ask an Assistant to supervise the various manoeuvres; the Assistant must be the only reference person for the interruption of the recovery operations in case of danger.

3 - Tow the machine only with slow movements and parallel traction, or with a maximum inclination of 20° with respect to the axis of the machine.

4 - Disengage the parking brake and remove the wedges from the wheels only when the cable or bar are tensioned.




## 3.14.3 IF THE FUEL HAS RUN OUT

If the engine stops because the fuel has run out, proceed as follows:

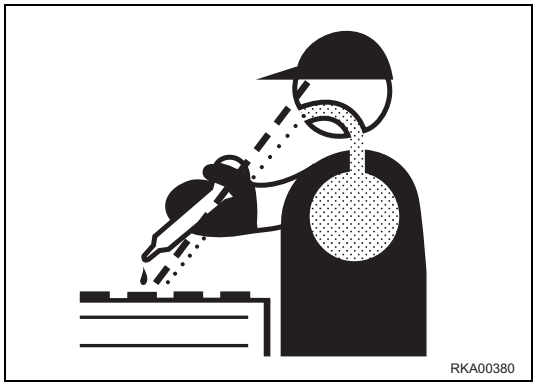
1 - Refuel.

2 - Bleed the fuel supply circuit.
For further details, see paragraph «4.7.8 MAINTENANCE EVERY 500 HOURS OF OPERATION OR EVERY 6 MONTHS» in the maintenance section.

## 3.14.4 IF THE ENGINE FAILS TO START BECAUSE THE BATTERY HAS RUN DOWN

**⚠ DANGER**

- **When checking or carrying out any operation on the battery, stop the engine and make sure that the ignition switch is in position «O».**
- **The battery produces hydrogen, which may explode. Do not use naked flames and do not smoke near the battery, and avoid producing sparks.**
- **The battery electrolyte is made of diluted sulphuric acid that may corrode clothes and even the skin; in case of contact with this fluid, immediately rinse the involved part with plenty of water. If the acid gets into the eyes, immediately rinse with plenty of water and consult a doctor without delay.**
- **When working on the battery, always wear goggles and gloves.**
- **When removing the battery, disconnect first the earth cable (–); when installing the battery, connect first the positive cable (+).**
- **If a tool makes contact with the positive terminal and the machine structure at the same time, this may generate sparks with consequent risk of explosion.**
- **Carefully tighten the connection terminals, since false contacts may generate sparks with consequent risk of explosion.**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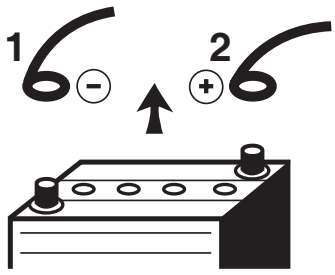
**REMOVAL**



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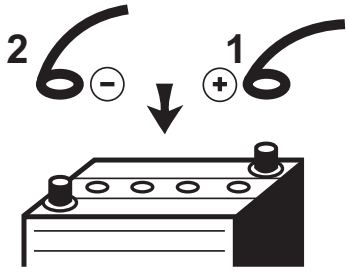
**INSTALLATION**



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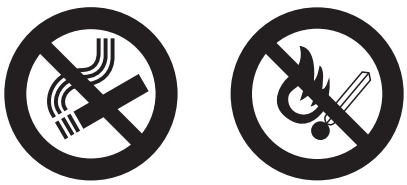
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### 3.14.4.1 STARTING WITH BOOSTER CABLES

## ⚠ DANGER

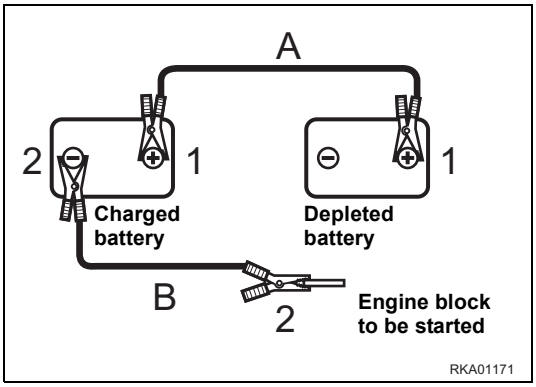
- **When using the machine in cold climates, before starting it with a different power source (and therefore with booster cables), make sure that the electrolyte isn't frozen, as the battery may catch fire. Before starting the machine or recharging the battery, let the electrolyte melt down and make sure that there are no leakages in the battery.**
- **It is absolutely forbidden to start the engine by shorting together the terminals of the starter; the connections of the booster cables must be carried out as indicated below.**
- **When starting the engine with the aid of another machine, connect the batteries in parallel.**
- **When connecting the cables, avoid any contact between the positive cable (+) and the negative cable(–).**
- **When starting the engine with booster cables, always wear safety goggles.**
- **Take care to avoid any contact between the machine to be started and the machine used as starting aid, in order to avoid sparks and therefore the explosion of the hydrogen produced by the batteries. The explosion of the battery causes serious damage and injury.**
- **Take care not to switch the ignition cables. Connect the ground cable (–) last to the main ground block of either the engine or the machine to be started.**
- **Remove the cables with great care; prevent the cables disconnected from the battery from touching other parts of the machine, in order to avoid the explosion of the hydrogen.**

**IMPORTANT**

- **Cables and pliers must be suitable for the current load that must be transferred.**
- **The battery to be used for the starting must have greater capacity or at least the same capacity as the battery of the machine to be started.**
- **Make sure that the cables and pliers are neither corroded, nor damaged.**
- **Make sure that the pliers hold the terminals firmly.**

CONNECTING THE CABLES AND STARTING THE ENGINE

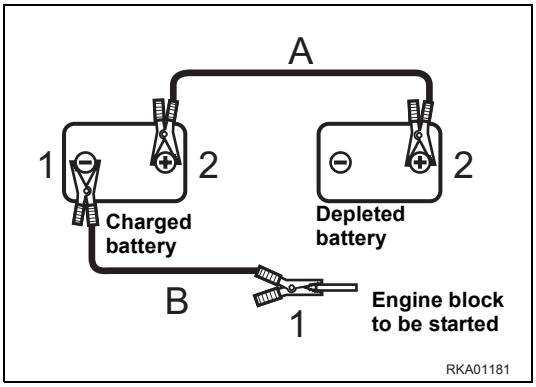
1 - Make sure that the ignition key is in position «**O**».
2 - Connect the positive poles (+) of the two batteries with each other (A).
3 - Connect the cable of the negative terminal (-) of the charged battery to the ground block of the machine to be started (B).
4 - Start the engine of the machine that supplies current and increase its speed.
5 - Start the engine of the failed machine. (See «3.6.2 STARTING THE ENGINE»).




REMOVING THE CABLES

When the engine has started, remove the cables in the reverse order with respect to their connection.

1 - Disconnect the negative cable (-) from the ground block of the engine that has been started and then from the battery (B).
2 - Disconnect the positive cable (+) first from the battery used for the starting and then from the exhausted battery (A).



## 3.14.5 OTHER TROUBLES

(•) Always contact your Komatsu Utility Dealer when you have to carry out this operation.

• If the anomaly or its cause are not included in the table below, contact your Komatsu Utility Dealer for the necessary repair.

### 3.14.5.1 ELECTRIC CIRCUIT

| TROUBLE | CAUSE | REMEDY |
|---|---|---|
| Lights do not work satisfactorily even with engine running at high speed: | • Faulty cables. | (•) Check and repair any loose terminals and connections. |
| Lights come on intermittently with engine running: | • Faulty fan belt tension | • Adjust fan tension (see “EVERY 250 HOURS”) |
| Alternator charge warning light does not go out with engine running and increasing speed | • Faulty alternator.<br>• Faulty cables. | (•) Change.<br>(•) Check and repair. |
| Alternator emits an abnormal noise: | • Faulty alternator. | (•) Change. |
| Starter does not turn with key in START position: | • Faulty cables.<br>• Battery charge insufficient<br>• Faulty main fuse. | (•) Check and repair.<br>• Charge battery.<br>• Change. |
| Starter pinion engages and then disengages: | • Battery charge insufficient | • Charge battery. |
| Starter makes engine run slowly: | • Battery charge insufficient<br>• Faulty starter. | • Charge battery.<br>(•) Change. |
| Starter disengages before engine has started: | • Faulty cables.<br>• Battery charge insufficient | (•) Check and repair.<br>• Charge battery. |
| Engine oil pressure warning light does not come on when engine is stopped (ignition key in position «**I**»): | • Faulty bulb.<br>• Faulty pressure sensor. | (•) Change.<br>(•) Change. |
| Alternator charge warning light does not come on when engine is stopped (ignition key in position «**I**»): | • Faulty bulb.<br>• Faulty cables. | (•) Change.<br>(•) Check and repair. |

### 3.14.5.2 HYDRAULIC SYSTEM

| TROUBLE | CAUSE | REMEDY |
|---|---|---|
| Pump emits an abnormal noise: | • No oil in the tank.<br>• Faulty pump.<br>• Hydraulic oil unsuitable for the temperature. | • Top up.<br>(•) Repair or change.<br>• Change. |
| Equipment control lever doesn’t return automatically to neutral: | • Broken return spring or seized element. | (•) Change spring or distributor element. |
| Equipment moves only at low speed: | • Faulty pump.<br>• Max. pressure valves out of rating, or not closed due to impurities.<br>• Dirty drain filter. | (•) Repair or change.<br>(•) Set or change.<br>• Change. |

### 3.14.5.3 BRAKING SYSTEM

| TROUBLE | CAUSE | REMEDY |
|---|---|---|
| Braking not regular on one axle only: | • Brake discs worn.<br>• No oil in brake pump.<br>• Air in braking circuit. | (•) Change.<br>(•) Top up and bleed circuit.<br>(•) Bleed circuit. |
| Braking not regular on one side only: | • Air in braking circuit.<br>• Brake discs worn. | (•) Bleed circuit.<br>(•) Change. |

### 3.14.5.4 CONVERTER

| TROUBLE | CAUSE | REMEDY |
|---|---|---|
| Low pressure in the clutch: | • Oil level too low.<br>• Clutch pressure adjusting valve locked open.<br>• Faulty delivery pump.<br>• Clutch shaft or piston rings damaged.<br>• Leakages due to clutch piston pump locked open. | • Top up.<br>(•) Clean element and seat.<br>(•) Change.<br>(•) Change rings.<br>(•) Clean valve carefully. |
| Pump delivery insufficient | • Oil level too low.<br>• Intake filter clogged.<br>• Faulty pump. | • Top up.<br>• Clean filter.<br>(•) Change. |
| Overheating: | • Damaged rings.<br>• Faulty pump.<br>• Oil level too low.<br>• Dirty heat exchanger.<br>• Damaged heat exchanger. | (•) Remove, disassemble and reassemble the unit.<br>(•) Change.<br>• Top up.<br>• Clean.<br>• Change. |
| Noisy converter | • Faulty pump.<br>• Damaged bearings. | (•) Change.<br>(•) Remove and change. |
| Lack of power: | • Low engine rpm cause stall speed.<br>• Defects as if due to overheating. | (•) Check and set up engine governor.<br>• See remedies in case of overheating. |

### 3.14.5.5 ENGINE

| TROUBLE | CAUSE | REMEDY |
|---|---|---|
| Oil pressure warning light remains on even with engine at high speed: | • Oil level in oil pan too low.<br>• Oil filter clogged.<br>• Oil unsuitable for the season. | • Top up.<br>• Change filter.<br>• Change. |
| Steam comes out of radiator breather pipe: | • Fluid level low, fluid leakages.<br>• Fan belt slack.<br>• Radiator fins damaged or closed.<br>• Faulty thermostat.<br>• Radiator cap loose or broken. Working at considerable altitude. | • Top up, repair.<br>• Check belt tension.<br>• Repair or clean.<br>(•) Change.<br>• Tighten cap or change unit. |
| Temperature indicator always on the right end of the scale: | • Faulty temperature indicator. | (•) Change |
| Temperature indicator pointer always on the left end of the scale: | • Faulty thermostat.<br>• Faulty indicator. | (•) Change.<br>(•) Change. |
| Engine does not start: | • Battery down.<br>• Battery terminals loose or corroded.<br>• No fuel.<br>• Type of fuel unsuitable for climate.<br>• Air in fuel supply circuit.<br>• Other causes. | (•) Charge or replace.<br>(•) Tighten nuts or change terminals.<br>• Refuel.<br>(•) Change filter.<br>Refuel with winter type.<br>(•) Check pipes, connections, fuel and injection pumps.<br>Bleed the circuit.<br>(•) Contact Dealer. |
| Engine stops: | • Fuel filters clogged.<br>• Air in fuel supply circuit.<br>• Other causes. | (•) Change.<br>(•) Check pipes, connections, fuel and injection pumps.<br>Bleed the circuit.<br>(•) Contact Dealer. |
| Engine overheats: | • Radiator clogged.<br>• Insufficient tension of water pump and fan belt.<br>• Low coolant.<br>• Air filters clogged. | • Clean fins.<br>(•) Check and adjust belt tension.<br>• Top up.<br>(•) Clean or change filters. |
| Engine power insufficient: | • Impurities or water in fuel supply circuit.<br>• Fuel filter clogged.<br>• Air filter clogged. | (•) Clean and refuel with new fuel.<br>(•) Change.<br>(•) Clean or change filters. |
| Exhaust gases white or light blue: | • Too much oil in oil pan.<br>• Unsuitable fuel.<br>• Other causes. | • Restore correct level.<br>• Change with fuel in compliance with standards.<br>(•) Contact Dealer. |
| Exhaust gases occasionally tend to be black: | • Air filter clogged.<br>• Faulty injectors. | • Clean or change.<br>(•) Change. |
| Combustion noise occasionally resembles a blow: | • Faulty injectors. | (•) Change. |
| Abnormal noises (during combustion or in mechanical parts): | • Fuel with low cetane rating.<br>• Overheating.<br>• Exhaust silencer inside damaged.<br>• Excessive valve clearance. | • Change with fuel in compliance with standards.<br>• See “defects of temperature indicator”.<br>(•) Change.<br>(•) Adjust valve clearance. |

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# MAINTENANCE

# 4.1 GUIDE TO MAINTENANCE

- Before opening the engine hood and if it is necessary to check the hydraulic oil level in the tank, position the machine as if it were going to be parked (boom completely retracted and lowered).
- Carry out any operation on firm and level ground, after applying the parking brake.
- Use Komatsu Utility genuine oils and greases; choose oils suitable for the ambient temperature.
- Use clean oils and greases. Keep the oil and grease containers clean and prevent any foreign matter from getting into them.
- Always keep the machine clean: this makes it easier to locate any failed part.
  In particular, keep the grease nipples, the breathers and the areas near the openings for the level checks clean and prevent any impurities from getting into/on them.
- Draining hot oil or coolant immediately after stopping the engine is hazardous; let the engine cool down until reaching a safe temperature of 40–45°C.
- After changing the oil or the filters, check if there are metal particles. If you find large quantities of metal particles, contact your Komatsu Utility Dealer.
- Check and change the oil in a clean place and prevent any impurities from getting into the tank.
- Before carrying out any maintenance operation, hang a warning plate on the ignition switch, the control levers and the cab doors, to prevent anyone from starting the engine.
- When performing maintenance operations, always take the precautions indicated on the safety plates applied to the machine.
- Instructions for arc welding:
  1 - Turn the ignition key to position «**O**».
  2 - Disconnect the battery (first the negative pole and then the positive pole).
  3 - Disconnect the alternator.
  4 - Disconnect the gearshift-reverse unit connector positioned under the steering wheel.
  5 - Do not apply more than 200V continuously.
  6 - Connect the earth cable within 1 m from the point where the welding operation must be carried out.
  7 - Avoid placing gaskets and bearings between the welding area and the earth cable.
- Do not use flammable fluids to clean any parts of the machine. Keep naked flames away from these fluids and avoid smoking.
- When O-rings and gaskets are removed, clean the sealing surfaces thoroughly and replace the O-rings and gaskets with new ones. Fit the O-rings and gaskets correctly when reassembling.
- Avoid keeping loose objects or tools in your pockets: they may fall out and drop into the machine, especially when you open covers and work on the machine while bending over it.
- When washing the machine, do not direct the high-pressure water jet onto the radiator and the heat exchanger.
- When washing the machine, protect the electric system connectors and avoid wetting the ignition switch and engine central unit.
- Before starting work in mud, under the rain, on seashores or river banks, provide for lubrication where required.
  Wash the machine immediately after work in order to protect its components from oxidation.
  Lubricate the equipment joints more frequently than usual.
- When the worksite is particularly dusty, proceed as follows:
  1 - Check the engine air cleaner and the cab air filter for any clogging and clean them more frequently than prescribed.
  2 - Clean the radiator and the heat exchanger frequently, to avoid any clogging of the fins.
  3 - Change the diesel oil filter more frequently than usual.
  4 - Clean the electrical components, especially the starter and the alternator, to avoid any accumulation of dust.
- Never mix oils of different brands.
  Do not top up with any oil different from that used in the machine. If necessary, drain the tanks and fill them with the oil of the new brand.

## ⚠ DANGER

- **Oils, filters, seals, electric cables, coolant and batteries are considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**
- **The combustible material of some components may become extremely dangerous if it burns. For this reason, avoid any contact of burnt material with your skin or eyes and do not inhale the fumes (see «2.8 PRECAUTIONS TO BE TAKEN DURING MAINTENANCE»).**

# 4.2 MAINTENANCE NOTES

- Use only Komatsu Utility genuine spare parts.
- Do not mix different types of oil.
- Unless specified otherwise, the oils and the coolant used by Komatsu Utility to fill the tanks before the delivery of the machine are the following:

| FLUID | SPECIFICATIONS |
|---|---|
| Engine oil | SAE 15W-40<br>Spec. API CI |
| Hydraulic system oil | SAE 10W-30<br>Spec. API CI |
| Hydraulic system biodegradable oil<br>(Only for machines in which synthetic biodegradable oil type HEES not of plant origin is used) | PAKELO GEOLUBE HYDRAULIC EP-46 |
| Hydraulic transmission oil | ANDROS FLUID II D TRASMISSIONE<br>Spec. GM DEXRON® II D |
| Front and rear axle oil | 918 SPECIAL TRANSMISSION FLUID 68/F-100<br>Spec. UTTO FLUID |
| Braking system oil | 921 ANDROS FLUID II D<br>Spec. GM DEXRON® II D |
| Fuel | With ambient temperature over -10°C:<br>ASTM D975 no. 2 diesel oil |
| | With ambient temperature under -10°C:<br>ASTM D975 no. 1 diesel oil |
| Radiator | 932 - Permanent, ethylene glycol-based antifreeze, with corrosion inhibitor for protection up to -36°C |

GM DEXRON® II D (DEXRON® II D is a registered trademark of General Motors Corporation)

## 4.2.1 NOTES REGARDING THE ENGINE

### 4.2.1.1 ENGINE OIL

- The engine oil must be selected very carefully, since it lubricates the engine, which is the machine's heart; the main maintenance operations required for the engine oil are the following:
  1 - daily check of the oil level;
  2 - check of the degree of pollution of the oil;
  3 - periodical change.

### 4.2.1.2 COOLANT

- The coolant serves to keep the engine at the correct temperature and therefore to ensure optimal operating conditions; check the coolant level in the expansion tank daily and top up when necessary.

#### 4.2.1.3 FUEL

- Always use fuel suitable for the engine. Other fuels with different specifications may damage the engine or reduce its power.
- Always refuel at the end of the workday.
- When refuelling, make sure that there is no water on the fuel drum cover and take care not to draw condensate from the drum bottom.
- If fuel runs out, or if the fuel filter has been replaced, it is necessary to bleed the circuit.

## 4.2.2 NOTES REGARDING THE HYDRAULIC SYSTEM

- Be extremely careful when performing maintenance operations on the hydraulic system, since soon after work the oil is very hot.
  The circuit is pressurized not only during work, but also at the end of work.
- The maintenance operations required for the hydraulic system are the following:
  1 - daily check of the oil level in the tank;
  2 - periodical change of the oil filter;
  3 - periodical change of the oil and cleaning of the intake filter.
- Always bleed the circuit after changing the oil filter or the oil.
- When a component is removed from the circuit, check the gaskets and O-rings and change them if they are damaged.
- When a cylinder or a component of the hydraulic circuit is removed, after reassembly bleed the circuit by proceeding as follows:
  1 - start the engine and let it idle;
  2 - extend all the cylinders 4-5 times, stopping them at approx. 100mm from the end of stroke;
  3 - With the machine in WORK mode, lift the boom to the maximum height and slowly extend and retract it completely.
  4 - Once the boom is completely retracted, slowly extend all the cylinders completely 3 or 4 times.

## 4.2.3 NOTES REGARDING THE ELECTRIC SYSTEM

- If the cables are wet or their insulating material is damaged, the electric system leaks and this may result in malfunctions of the machine.
- The maintenance operations required for the electric system are the following:
  1 - Check of the alternator belt for damage or breakages.
  2 - Check of the battery electrolyte level.
- Do not remove or eliminate any electric component installed on the machine and do not install any electric component with characteristics different from those specified and approved by Komatsu Utility.
- Keep the electric system dry.
- When working long in damp places with high levels of condensation, i.e. on seashores and on river or lake banks, protect the equipment connection pins with anticorrosion products.
- Do not connect any optional device to the fuses, ignition switch, battery, relays, etc.; for the installation of any optional equipment, contact your Komatsu Utility Dealer.
- If any electric welding operation has to be carried out, disconnect the battery, the alternator and the gearshift-reverse unit connector.

## 4.2.4 NOTES REGARDING LUBRICATION

- Lubrication makes the operations carried out with the machine and work equipment smoother, while preventing wear and the noise that may be produced if the articulated joints are dry.
  Lubrication is to be carried out with grease or oil.
- The maintenance operations required for the components that need lubricating are the following:
  1 - Check of the levels.
  2 - Oil change.
  3 - Injection of grease through the grease nipples.
  4 - Grease lubrication with a brush.
  5 - Lubrication of the chains with a low pressure oil spray.
- Use only the specified lubricants, according to the ambient temperature.
- Always clean the grease nipples before injecting grease and remove any excess grease after lubrication; this cleaning operation must be performed with extreme care on the revolving parts.
- Keep the lubricant levels as prescribed, avoiding excessive or insufficient quantities.

## 4.2.5 PARTS SUBJECT TO WEAR THAT PERIODICALLY NEED CHANGING

The parts subject to wear such as filters must be replaced when performing routine maintenance.
The timely change of these parts ensures an economic use of the machine.
Use only Komatsu Utility genuine parts, which alone can guarantee excellent quality and interchangeability..

| ITEM | CODE | DESCRIPTION | Q.ty | CHANGE INTERVAL |
|---|---|---|---|---|
| Hydraulic oil drain filter | 848101178 | Cartridge | 1 | Every 500 hours |
| Engine oil filter | EA2992242 | Cartridge | 1 | |
| Fuel filter | EA504073234 | Cartridge | 1 | |
| Converter oil filter | DG4209211 | Cartridge | 1 | Every 1000 hours |
| Air cleaner | 848101189<br>848101190 | Main cartridge<br>Safety cartridge | 1<br>1 | When required<br>When required |

# 4.3 FUEL, COOLANT AND LUBRICANTS

**CORRECT SELECTION ACCORDING TO THE AMBIENT TEMPERATURE**

| TANK/ RESERVOIR | FLUID | AMBIENT TEMPERATURE | CAPACITY (l) | |
|---|---|---|---|---|
| | | -30 -20 -10 0 10 20 30 40 50 °C | 1st filling | Change |
| Engine oil pan | OIL API CI | SAE 5W-30 / SAE 10W / SAE 20W-20 / SAE 30 / SAE 40 / SAE 15W-40 | 12.8 | 12.8 |
| Chains lubrication | | SAE 15W-40 | as required | as required |
| Hydraulic system | | SAE 10W-30 | 117 | 95 |
| Hydraulic system with biodegradable oil | see «4.3.1» | | 117 | 95 |
| Front axle: Differential | OIL UTTO FLUID SPECIAL TRANSMISSION FLUID 68/F - 100 | | 7.1 | 7.1 |
| Final reduction gear (ea.) | | | 0.7 | 0.7 |
| Rear axle: Differential | | | 7.1 | 7.1 |
| Final reduction gear (ea.) | | | 0.7 | 0.7 |
| Hydraulic transmission | OLIO ATF GM DEXRON® II D (DEXRON® is a registered trademark of General Motors Corporation) | | 13.5 | 11.7 |
| Transmission reduction gear | | | 0.25 | 0.25 |
| Braking system | | | 0.65 | 0.65 |
| Fuel tank | DIESEL OIL | * / ASTM D975 N. 2 | 130 | 130 |
| Engine cooling system | PERMANENT COOLANT | | 20 | – |

## LUBRICATION WITH GREASE

| LUBRICATION POINTS | CONSISTENCY | TYPE |
|---|---|---|
| Articulated joints, transmissions, fork guides, door hinges, engine hood | NLGI 2EP | Litio EP + $MoS_2$ |
| Sliding pads, block guides, inner boom hoses | NLGI 2EP | EP LC-23 TEF |

**IMPORTANT**

- **When the diesel oil sulphur content is less than 0.5%, change the engine oil according to the routine maintenance intervals indicated in the operation and maintenance manual. If the diesel oil sulphur content exceeds 0.5%, change the engine oil according to the following table:**

| Sulphur content | Engine oil change interval |
|---|---|
| from 0.5 to 1.0% | 1/2 of regular interval |
| over 1.0% | 1/4 of regular interval |

- When starting the engine at temperatures below 0°C, use engine oil SAE 10W, 20W-20, even if during the day the temperature increases by 10°C.
- It is advisable to use only engine oil with CI classification in order to ensure the correct operation and constant reliability of the engine.
- Use Komatsu Utility genuine products whose characteristics have been specifically formulated and approved for use in the engine, in the work equipment hydraulic circuit, in the transmission, in the axles and in the brakes.

**First filling quantity:** total quantity of oil, including the oil for the components and pipes.

**Oil change quantity:** quantity of oil necessary to fill the system or unit during the normal inspection and maintenance operations.

ASTM: American Society of Testing and Materials
SAE: Society of Automotive Engineers
API: American Petroleum Institute
UTTO: Universal Tractor Transmission Oil

## 4.3.1 HOMOLOGATED SYNTHETIC BIODEGRADABLE LUBRICANTS “HEES”

Our machines can be filled with synthetic biodegradable hydraulic oil type HEES not of plant origin and therefore the use of the oils indicated in the following table is authorized and recommended:

| SUPPLIER | SYNTHETIC BIODEGRADABLE OIL “HEES” |
|---|---|
| KOMATSU | – |
| AGIP | ARNICA S 46 |
| ARAL | HEF 46 vitam |
| AVIA | SYNTOFLUID N 46 |
| BP | BIOHYD SE-S 46 |
| CONDAT | CONDAT D 46 K |
| ELF | HYDRELF BIO 46 |
| ESSO | HYDRAULIKOIL HE 46 |
| FINA | BIOYIDRAN TMP 46 SE 46 |
| FUCHS | PLANTOHYD S 46 |
| KENDALL | SYNTH NATURA 46 HV |
| KUWAIT PETROLEUM Q8 | HOLBEIN 46 |
| MOBIL | EAL SYNDRAULIC |
| MOBIL (USA) | ENVIROSYN 46 H |
| PAKELO | GEOLUBE HYDRAULIC EP-46 |
| PANOLIN | HLP SYNTH 46 |
| SHELL | NATURELLE HFE-46 |
| TAMOIL | GREEN HYDRO SAFETY 46 |
| TEXACO | HYDRA 46 |
| TOTAL | EQUIVIS BIO 46 |
| VALVOLINE | UNISYN HLP 32/68 |

**⚠ ATTENTION**

- **It is not possible to mix the synthetic biodegradable oil type HEES with conventional hydraulic oils, since when the temperature increases insoluble compounds are generated, which are deposited on the filters and clog them (the maximum concentration of conventional oil cannot exceed 1% of the total quantity of oil).**
- **Synthetic biodegradable oil can be used only in the hydraulic system; it cannot be used for the engine, the transmissions, the braking system, etc.**
- **Before introducing biodegradable oil in the hydraulic system, empty the system completely, disconnecting the cylinders and all the parts that may contain conventional oil, and replace the drain filter with a new one.**
  **Start the engine and let it idle without using the work equipment , wait until the oil reaches a temperature of at least 40°C, then start moving the equipment, so that all the parts of the system are filled with oil.**
  **Stop the engine and check the oil level (see «4.7.8.c CHECKING THE HYDRAULIC OIL LEVEL»).**

# 4.4 DRIVING TORQUES FOR SCREWS AND NUTS

## 4.4.1 STANDARD DRIVING TORQUES

**★ Nm (Newton metre): 1 Nm = 0.102 kgm**

| Thread diameter (mm) | Pitch (mm) | Wrench size (mm) | 8.8 | | 10.9 | |
|---|---|---|---|---|---|---|
| | | | kgm | Nm | kgm | Nm |
| 6 | 1 | 10 | 0.96 ± 0.1 | 9.5 ± 1 | 1.3 ± 0.15 | 13.5 ± 1.5 |
| 8 | 1.25 | 13 | 2.3 ± 0.2 | 23 ± 2 | 3.2 ± 0.3 | 32.2 ± 3.5 |
| 10 | 1.5 | 17 | 4.6 ± 0.5 | 45 ± 4.9 | 6.5 ± 0.6 | 63 ± 6.5 |
| 12 | 1.75 | 19 | 7.8 ± 0.8 | 77 ± 8 | 11 ± 1 | 108 ± 11 |
| 14 | 2 | 22 | 12.5 ± 1 | 122 ± 13 | 17.5 ± 2 | 172 ± 18 |
| 16 | 2 | 24 | 19.5 ± 2 | 191 ± 21 | 27 ± 3 | 268 ± 29 |
| 18 | 2.5 | 27 | 27 ± 3 | 262 ± 28 | 37 ± 4 | 366 ± 36 |
| 20 | 2.5 | 30 | 38 ± 4 | 372 ± 40 | 53 ± 6 | 524 ± 57 |
| 22 | 2.5 | 32 | 52 ± 6 | 511 ± 57 | 73 ± 8 | 719 ± 80 |
| 24 | 3 | 36 | 66 ± 7 | 644 ± 70 | 92 ± 10 | 905 ± 98 |
| 27 | 3 | 41 | 96 ± 10 | 945 ± 100 | 135 ± 15 | 1329 ± 140 |
| 30 | 3.5 | 46 | 131 ± 14 | 1287 ± 140 | 184 ± 20 | 1810 ± 190 |

**IMPORTANT**
- **This driving torque table is not valid for screws or nuts that must lock nylon parts or similar parts onto washers or components made of nylon or nonferrous materials.**

## 4.4.2 SPECIFIC DRIVING TORQUES

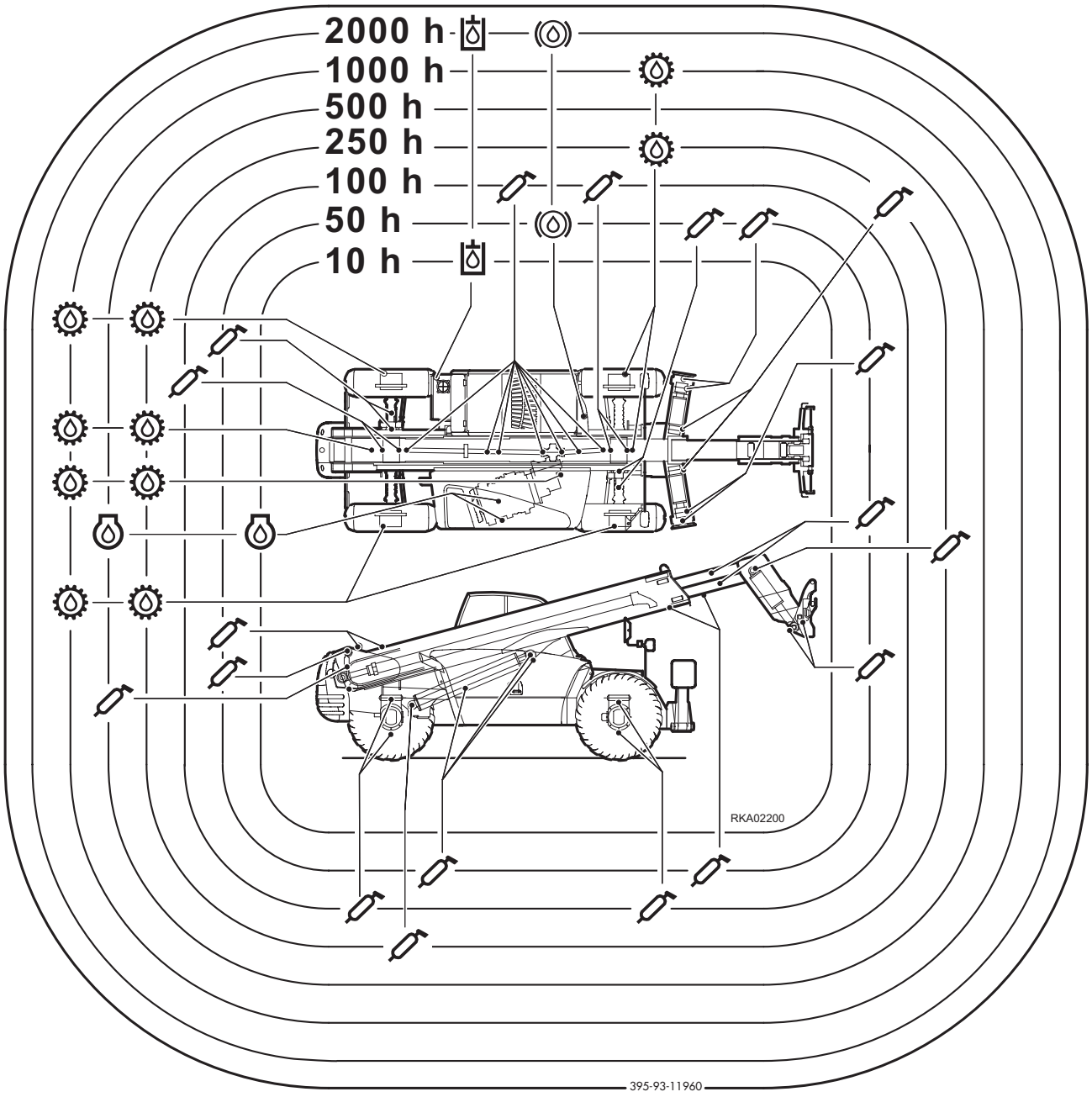
| ITEM | DESCRIPTION | kgm | Nm |
|---|---|---|---|
| Cab | Front support screws | 20 | 196 |
| | Rear support screws | 20 | 196 |
| Wheels | Front | 56±2 | 550±20 |
| | Rear | 56±2 | 550±20 |
| Engine and transmission | Front upper central screw (fan left side) | 25–31.5 | 245–309 |
| | Front upper central screw (fan right side) | 25–31.5 | 245–309 |
| | Rear upper central screw (fan left side) | 25–31.5 | 245–309 |
| | Rear upper central screw (fan right side) | 14.5–17.5 | 142–172 |

# 4.5 LUBRICATION

## 4.5.1 LUBRICATION DIAGRAM (2-SECTION BOOM)

**IMPORTANT**

- **For the lubrication procedures for single points, see «4.7 MAINTENANCE PLAN».**




**Engine oil**

**Transmission oil**

**Brake oil**

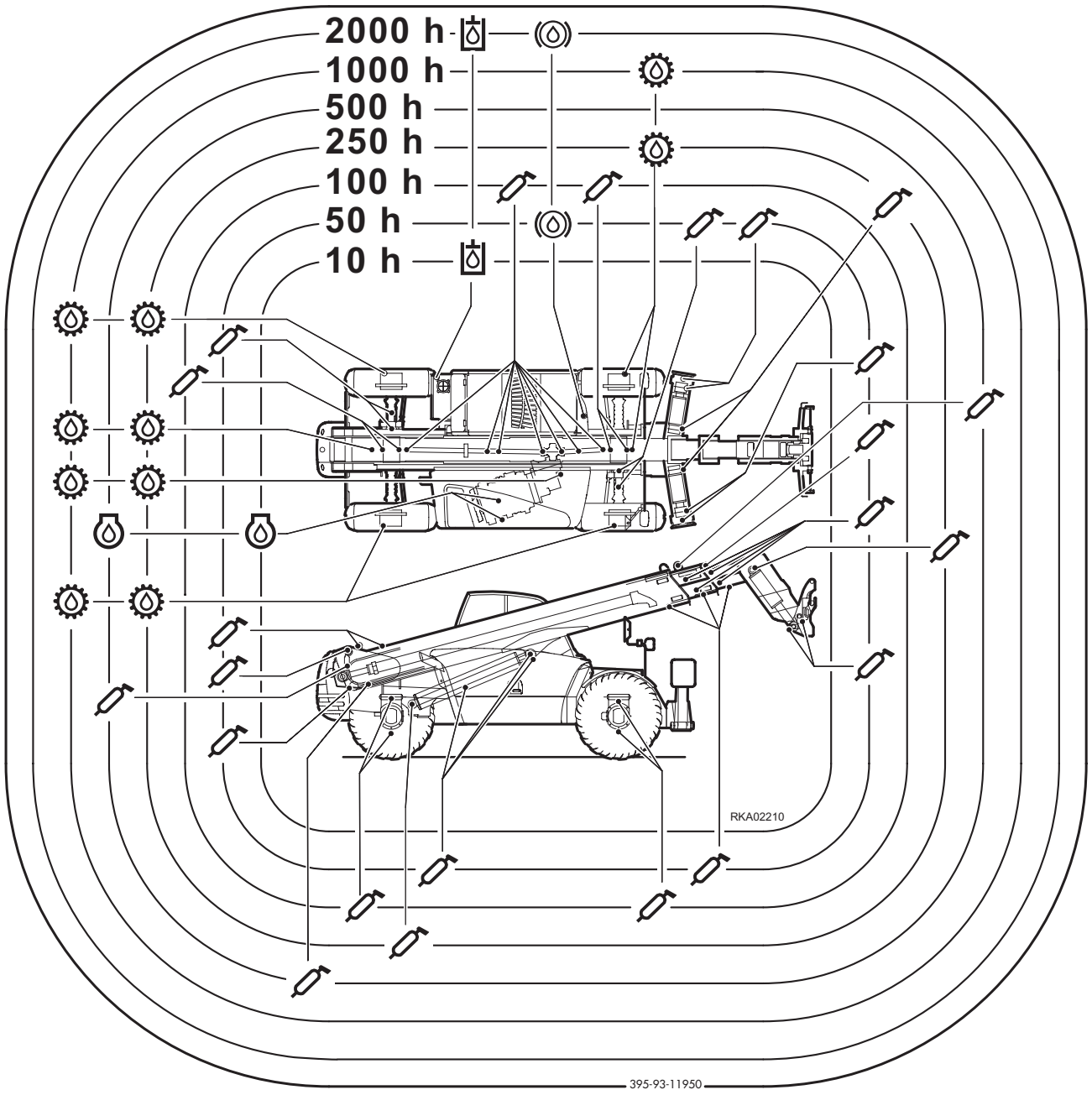
**Hydraulic oil**

**Grease**

## 4.5.2 LUBRICATION DIAGRAM (3-SECTION BOOM)

**IMPORTANT**

- **For the lubrication procedures for single points, see «4.7 MAINTENANCE PLAN».**




**Engine oil**

**Transmission oil**

**Brake oil**

**Hydraulic oil**

**Grease**

# 4.6 PERIODICAL CHANGE OF THE SAFETY-RELATED COMPONENTS

**NOTE**

- **It is advisable to consult the Komatsu Utility Dealer to define the periodical replacement of the specified components, which should be performed on the fourth maintenance service to be carried out every 1000 hours of operation or before the first maintenance service to be carried out «EVERY 2 YEARS».**

To ensure safety at any moment while driving and using the machine, the operator must carry out all the routine maintenance operations prescribed.
Moreover, to increase safety even further, the operator must provide for the periodical change of the components indicated in the tables on the following pages, which are especially related to safety and fire-prevention rules.
These components are subject to wear and tend to deteriorate over time. Since it is particularly difficult to evaluate their conditions through simple routine maintenance, after a certain period it is advisable to change them independently of their state, in order to keep the machine efficient over time.
Repair or replace these components immediately in case of failures or anomalies, even if the time interval prescribed for their change has not elapsed yet.

If the pipe clamps show signs of deterioration, like deformations or cracks, provide for changing them together with the pipes.

**In addition to the periodical change of the components listed on the following pages, it is necessary to inspect the hydraulic pipes by proceeding as described here below. In case of anomalies, carry out all the necessary repairs and changes, or adopt any other measure required.**

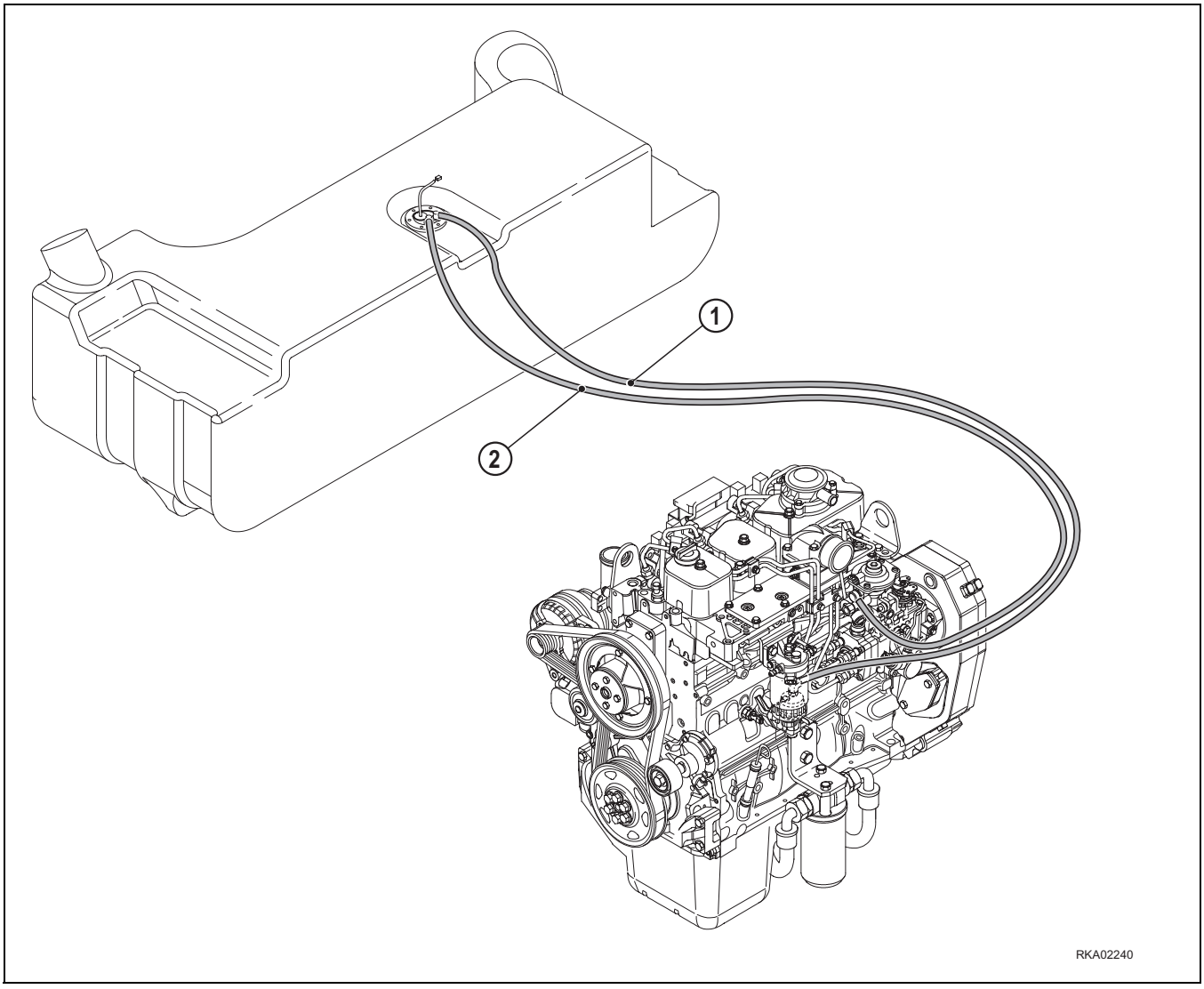
| Type of check | Items to be checked |
|---|---|
| Before starting the engine | Leakages from joints, hydraulic pipes or fuel pipes. |
| Periodically (monthly) | Leakages from joints, hydraulic pipes or fuel pipes. Damaged hydraulic or fuel pipes (cracks, wear and tear). |
| Periodically (yearly) | Leakages from joints, hydraulic pipes or fuel pipes.<br>Deteriorated, twisted, damaged hydraulic or fuel pipes (cracks, wear and tear) or pipes in contact with other parts of the machine. |

## 4.6.1 CRITICAL PARTS FOR SAFETY

**NOTE**

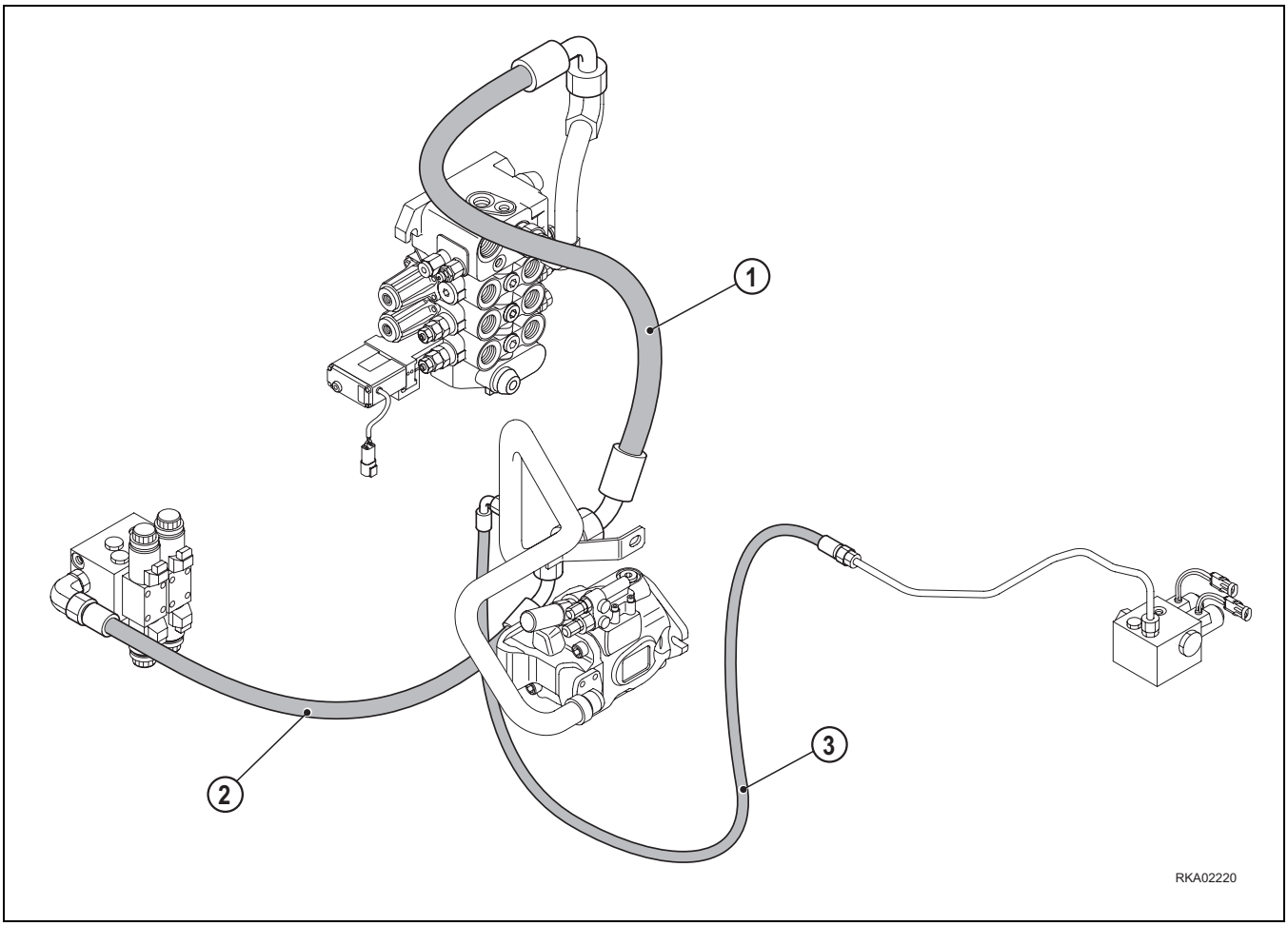
- **For the serial numbers and the quantity of the components that periodically need changing, consult the spare parts catalogue section regarding the components connected with safety and the components that must be periodically changed.**
- **When changing pipes, always change O-rings, gaskets and analogous components.**

### 4.6.1.1 FUEL SUPPLY SYSTEM



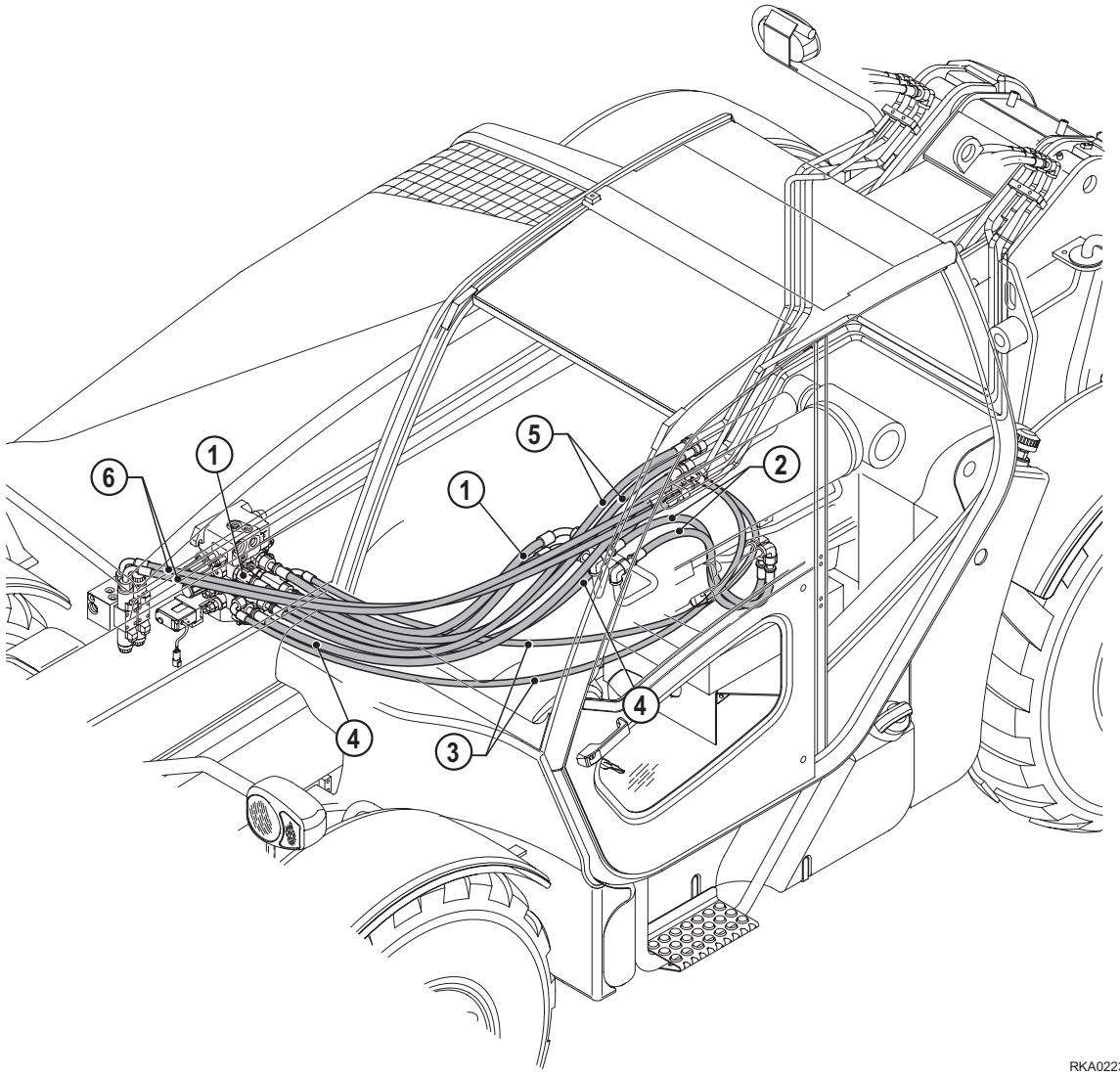

| No. | Components related to safety that periodically need changing | Q.ty | Change interval |
|---|---|---|---|
| 1 | Fuel pipe (Fuel tank - fuel pump) | 1 | Every 2 years or 1000 hours, whichever occurs first |
| 2 | Fuel pipe<br>(Injection pump - fuel tank) | 1 | |

## 4.6.1.2 DELIVERY HYDRAULIC SYSTEM



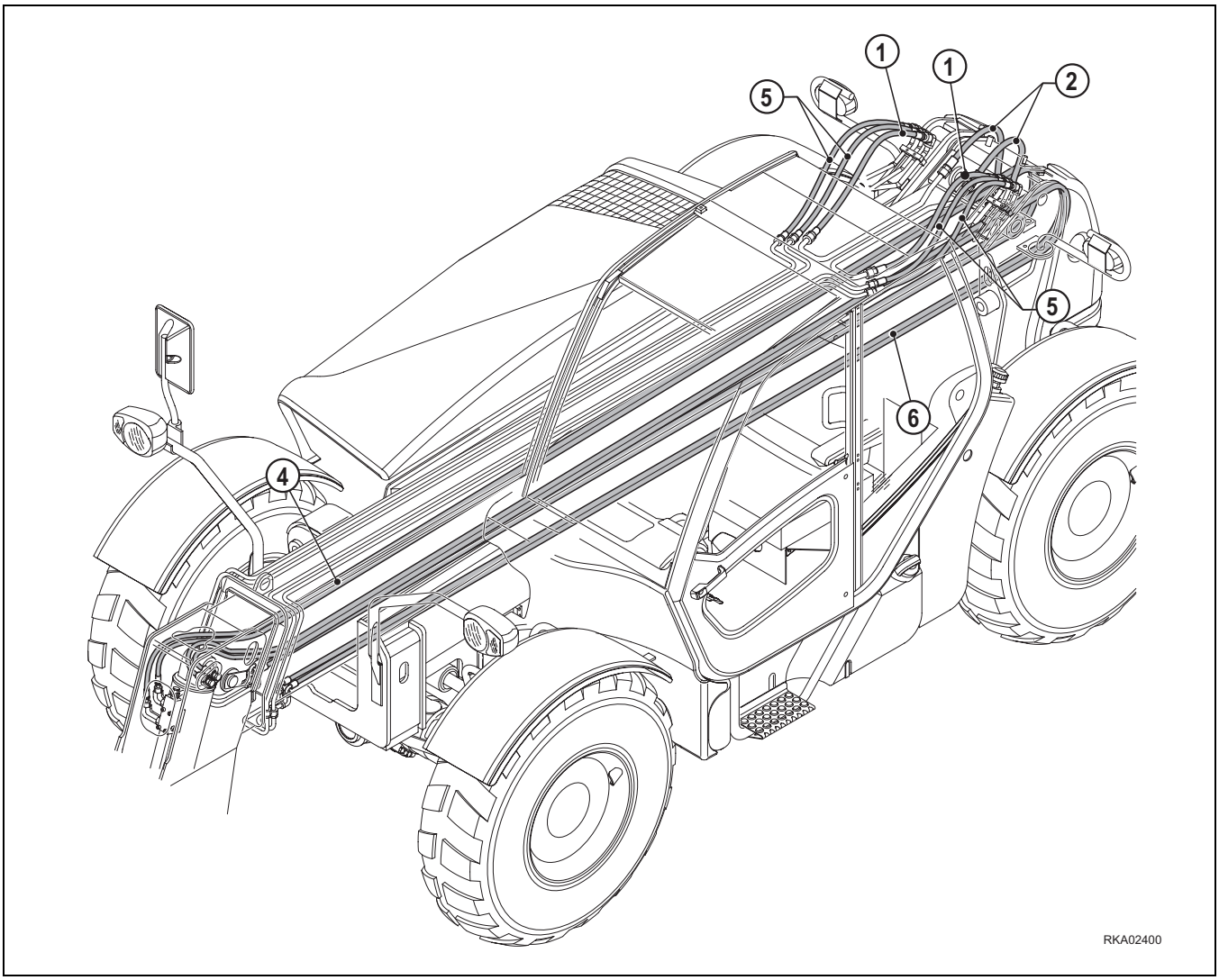

| No. | Components related to safety that periodically need changing | Q.ty | Change interval |
|---|---|---|---|
| 1 | Hydraulic pipe<br>(Hydraulic pump - control valve) | 1 | Every 2 years or 1000 hours, whichever occurs first |
| 2 | Hydraulic pipe<br>(Hydraulic pump - auxiliary control valve) | 1 | |
| 3 | Hydraulic pipe<br>(Hydraulic pump - solenoid valve) | 1 | |

## 4.6.1.3 CONTROL VALVE HYDRAULIC SYSTEM




| No. | Components related to safety that periodically need changing | Q.ty | Change interval |
|---|---|---|---|
| 1 | Hydraulic pipe<br>(control valve - lifting boom iron pipe) | 2 | Every 2 years or 1000 hours, whichever occurs first |
| 2 | Hydraulic pipe<br>(tubi in ferro - lifting cylinder) | 2 | |
| 3 | Hydraulic pipe<br>(control valve - compensating cylinder) | 2 | |
| 4 | Hydraulic pipe<br>(control valve - extension boom iron pipe) | 2 | |
| 5 | Hydraulic pipe<br>(control valve - equipment carrier iron pipe) | 2 | |
| 6 | Hydraulic pipe<br>(auxiliary control valve - auxiliary system iron pipe) | 2 | |

## 4.6.1.4 BOOM HYDRAULIC SYSTEM




| No. | Components related to safety that periodically need changing | Q.ty | Change interval |
|---|---|---|---|
| 1 | Hydraulic pipe<br>(iron pipe - extension boom iron pipe) | 2 | Every 2 years or 1000 hours, whichever occurs first |
| 2 | Hydraulic pipe<br>(iron pipe - extension cylinder) | 2 | |
| 3 | Hydraulic pipe<br>(iron pipe - equipment carrier iron pipe) | 2 | |
| 4 | Hydraulic pipe<br>(iron pipe - equipment carrier cylinder) | 1 | |
| 5 | Hydraulic pipe<br>(iron pipe - auxiliary system iron pipe) | 2 | |
| 6 | Hydraulic pipe<br>(pipe - optional equipment) | 1 | |

# 4.7 MAINTENANCE PLAN

## 4.7.1 WHEN REQUIRED

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Battery | Check electrolyte level<br>Inspect terminals and cables | 189 |
| b | Engine air cleaners | Check, clean or change | 190 |
| c | Cab air filter | Check and clean | 192 |
| d | Fuses and relays | Check and replace | 193 |
| e | Windshield washer reservoir | Check level | 193 |
| f | Windshield washer blades | Check | 194 |
| g | Cab door and engine hood hinges | Lubricate | 194 |
| h | Fork support rod | Lubricate | 194 |
| i | Fuel tank | Check fuel level | 194 |
| j | Brake oil reservoir | Top up brake oil | 195 |

## 4.7.2 MAINTENANCE EVERY 10 HOURS OF OPERATION OR EVERY DAY

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Various checks | – | 196 |
| b | Acoustic alarms, warning lights and instruments | Check operation | 196 |
| c | Engine coolant | Check level | 197 |
| d | Radiator fluid | Check level | 197 |
| e | Engine oil | Check level | 198 |
| f | Tyres | Check pressure | 198 |
| g | Service brakes | Check | 199 |
| h | Parking brake | Check and adjust | 199 |

## 4.7.3 MAINTENANCE EVERY 50 HOURS OF OPERATION OR EVERY 2 WEEKS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Articulated joints and sliding pads | Lubricate | 200 |
| b | Chain gear shafts<br>(for 3-section boom version only) | Lubricate | 202 |
| c | Water separator | Drain | 202 |
| d | Boom sections | Lubricate | 203 |

## 4.7.4 MAINTENANCE EVERY 100 HOURS OF OPERATION

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Drive shafts | Lubricate | 204 |
| b | Front and rear axle oscillation joint | Lubricate | 205 |
| c | Wheel hub joints | Lubricate | 205 |

## 4.7.5 MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION

• Carry out the following maintenance operations after the first 250 hours, together with those to be performed “EVERY 250 HOURS”.

a - CHANGE THE HYDRAULIC OIL DRAIN FILTER

b - CHANGE THE AXLE OIL (DIFFERENTIAL UNIT AND FINAL REDUCTION GEAR)

c - CHANGE THE TRANSMISSION FILTER

## 4.7.6 MAINTENANCE EVERY 250 HOURS OF OPERATION OR EVERY 3 MONTHS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Articulated joints | Lubricate | 206 |
| b | Boom inner hoses, rollers and guard | Lubricate | 207 |
| c | Front and rear axles | Check oil level | 208 |
| d | Transmission | Check oil level | 209 |
| e | Radiator and heat exchanger | Clean outside | 210 |
| f | Alternator / fan belt | Check | 210 |
| g | Air conditioner compressor belt (optional) | Check and tighten | 211 |
| h | Parking brake | Check adjustment | 212 |
| i | Electrolyte | Check level | 212 |

## 4.7.7 MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION (Only for machines in which synthetic biodegradable oil “HEES” is used)

• Carry out the following operations after the first 500 hours of operation, together with those to be performed «EVERY 500 HOURS».

a - CHANGE THE HYDRAULIC OIL AND CLEAN THE INTAKE FILTER

## 4.7.8 MAINTENANCE EVERY 500 HOURS OF OPERATION OR EVERY 6 MONTHS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Fuel filter | Change | 214 |
| b | Fuel tank | Drain | 215 |
| c | Hydraulic oil | Check level | 215 |
| d | Hydraulic oil drain filter | Change | 216 |
| e | Oil tank<br>(Only for machines in which synthetic biodegradable oil HEES is used) | Drain condensate | 217 |
| f | Engine oil | Change | 218 |
| g | Engine oil filter | Change | 219 |
| h | Chains (Only for 3-section boom version) | Check for oxidation | 220 |
| i | Boom chains (Only for 3-section boom version) | Check and tighten | 221 |
| j | Extension boom chains<br>(Only for 3-section boom version) | Check length | 226 |
| k | Chains (Only for 3-section boom version) | Lubricate | 227 |
| l | Chain drive gear bushings<br>(Only for 3-section boom version) | Check clearance | 228 |
| m | Sliding pads | Check clearance | 228 |
| n | Wheels | Check nut driving torque | 228 |

## 4.7.9 MAINTENANCE EVERY 1000 HOURS OF OPERATION OR EVERY YEAR

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Front and rear axles | Change oil | 229 |
| b | Hydraulic transmission | Change oil | 230 |
| c | Hydraulic transmission | Change filter | 231 |
| d | Engine coolant | Check and top up | 231 |

## 4.7.10 MAINTENANCE EVERY 2000 HOURS OF OPERATION OR EVERY 2 YEARS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Alternator and starter | Check | 232 |
| b | Alternator | Change belt | 232 |
| c | Coolant | Change | 232 |
| d | Braking system | Change oil | 233 |
| e | Intake filter | Change oil and clean filter | 235 |

## 4.7.11 MAINTENANCE EVERY 3 YEARS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Safety belt | Change | 236 |

## 4.7.12 MAINTENANCE EVERY 3000 HOURS OF OPERATION OR EVERY 3 YEARS

| No. | PART | OPERATION | PAGE |
|---|---|---|---|
| a | Engine thermostatic valve | Change | 236 |
| b | Engine antivibration and retaining screws | Check | 236 |
| c | Engine valve clearance and injection timing advance | Check and adjust | 236 |

# 4.7.1 WHEN REQUIRED

## 4.7.1.a CHECKING THE BATTERY ELECTROLYTE LEVEL – INSPECTING TERMINALS AND CABLES

**⚠ DANGER**

- **Carry out this check with the machine parked on level ground.**
- **Check the level only after stopping the engine and if necessary add distilled water only before starting work.**
- **Always wear safety goggles and waterproof gloves.**
- **To prevent gas explosions, do not use naked flames, do not smoke and avoid producing sparks due to short circuits.**
- **The battery electrolyte is dangerous; in case of contact with the eyes or skin, rinse with plenty of water and consult a doctor without delay.**


The battery (1) can be reached after opening the engine hood.
The electrolyte level in each cell must be about 6 mm above the plate edge; if necessary, remove the cell plugs and top up using exclusively distilled water.
If, on the contrary, the level is low because some fluid has been spilled, add electrolyte with concentration suitable for the ambient temperature. (See «3.10.3 BATTERY»).


**NOTE**

- **When adding distilled water or electrolyte, do not exceed the level indicated. This would shorten the service life of the battery and may cause the electrolyte to overflow.**

**IMPORTANT**

- **It is advisable to add distilled water before starting work, in order to prevent it from freezing.**
- **Before putting back the cell plugs, make sure that the breather holes are not clogged.**
- **Make sure that the connection terminals and cables are not oxidized; if necessary, clean them and cover them with anti-oxidation grease.**

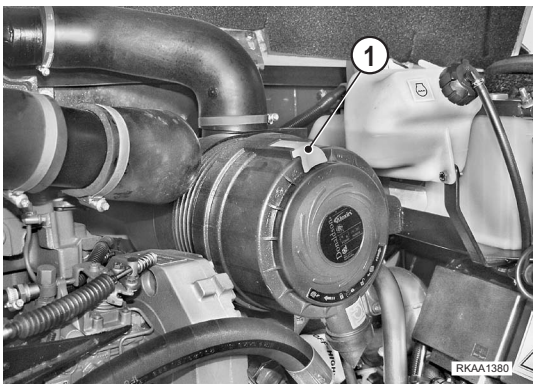
## 4.7.1.b CHECKING, CLEANING OR CHANGING THE ENGINE AIR CLEANERS

**⚠ DANGER**

- **Remove the air cleaner only after stopping the engine and do not start the engine if the air cleaner is open.**
- **Wear safety goggles during the cleaning operations.**

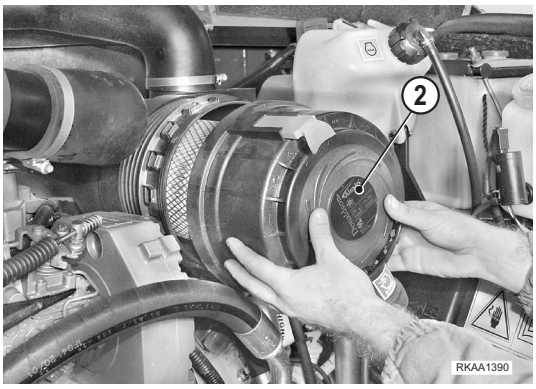
**IMPORTANT**

- **The air filtering system consists of a primary filtering element with considerable capacity and of a secondary cartridge that ensures additional safety.**
  **The primary element can be cleaned with compressed air, while the safety cartridge must be changed.**
- **The filter must be cleaned when the clogging warning light (A) on the dashboard comes on.**
  **(For further details, see «3.2.2 WARNING LIGHTS» 4 - AIR CLEANER CLOGGING WARNING LIGHT (Red)).**




The filter can be reached after opening the engine hood (see «3.5.1 ENGINE HOOD»).
To clean the primary element, proceed as follows:

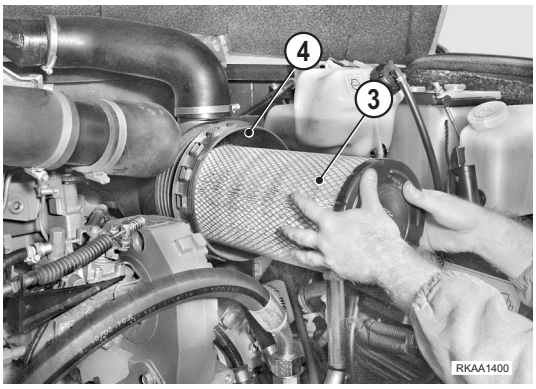
1 - Release the safety retainer (1), moving it toward the outside.




2 - Rotate the cover (2) anticlockwise by approximately 12.5° and then remove it.

3 - Extract the filtering element (3).

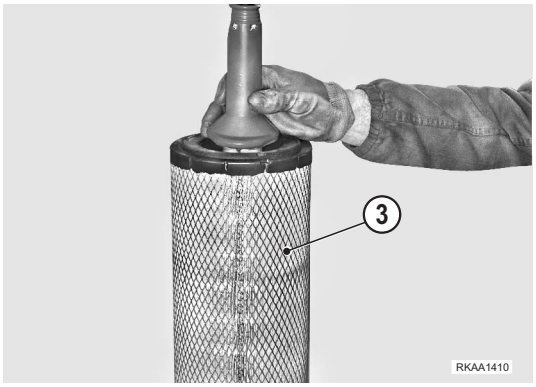
4 - Slightly strike the filtering element (3) on the palm of your hand, in such a way as to remove the dust it contains, and blow compressed air on its inner surface, keeping the air jet at a distance of approximately 15 cm and taking care to prevent the pressure from exceeding 2 bars.




5 - After the cleaning operations, inspect the filtering surface for damage by introducing a lamp into the cartridge and carefully check the gaskets of the front seals. If the cartridge is damaged, replace it.

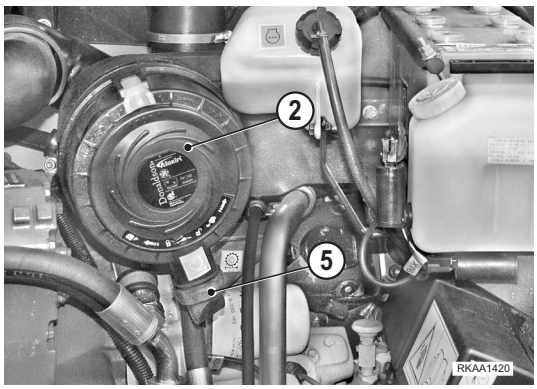
6 - Carefully clean the inside of the filter case (4), taking care to prevent foreign bodies from getting into the suction duct.

7 - Put back the filtering element (3), making sure that it fits perfectly in its seat.



8 - Put back the cover (2), rotating it clockwise. Make sure that the cover (2) is perfectly locked and make sure that the ejector (5) is positioned on the lower part.

9 - Once the whole has been assembled, push the safety retainer (1) toward the inside.




**IMPORTANT**

- **If the clogging warning light or the relevant alarm signal should come on after the start of the engine, it is necessary to change the primary filtering element and the safety cartridge.**
- **Change the primary filtering element after 6 cleaning operations or after one year. Every time the primary filtering element is replaced, the safety cartridge must be replaced, too.**

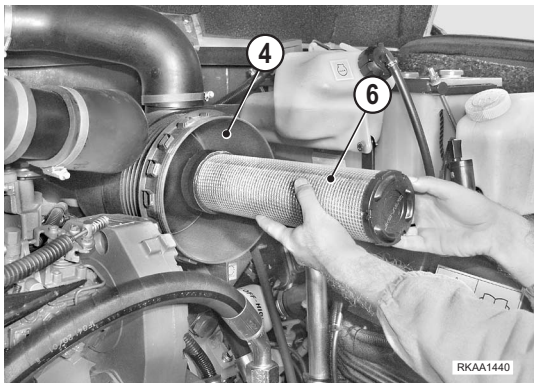
---

To change the safety cartridge (6), after removing the primary element (3), proceed as follows:

1 - Remove the safety cartridge (6) and replace it with a new one.

2 - Once the safety cartridge (6) has been installed inside the filter case (4), make sure that it fits perfectly in its seat.

3 - Reassemble the whole as described above, making sure that all the filter components are perfectly secured.



## 4.7.1.c CHECKING AND CLEANING THE CAB AIR FILTER

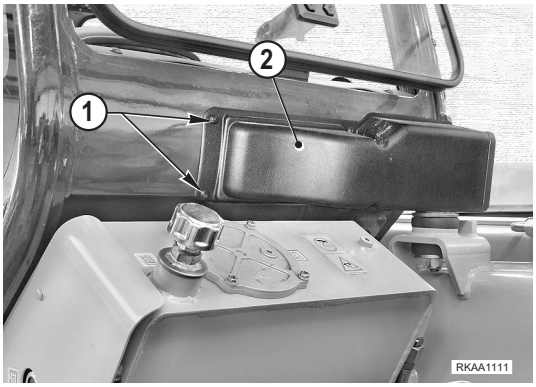
**⚠ DANGER**

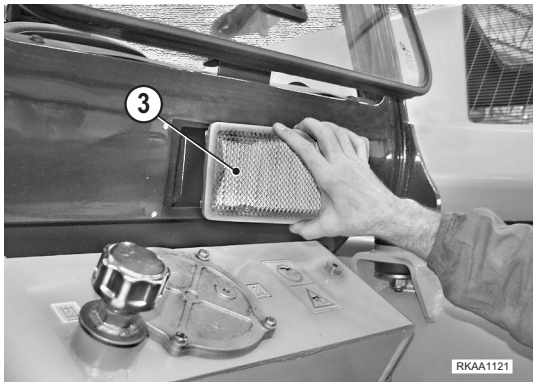
- **Wear safety goggles during the cleaning operations.**

The air suction for the ventilation of the cab is protected by a filter positioned on the rear outer side of the cab.
This filter blocks all the impurities contained in the air and must be cleaned whenever a decrease in air circulation is observed.
To clean the filtering element, proceed as follows:

1 - Remove the screws (1), remove the outer guard (2) and extract the filtering element (3).

2 - Strike the element slightly on the palm of your hand to eliminate the dust it contains and blow compressed air on its surfaces, keeping the jet at a distance of about 15 cm and making sure that pressure does not exceed 2 bars.



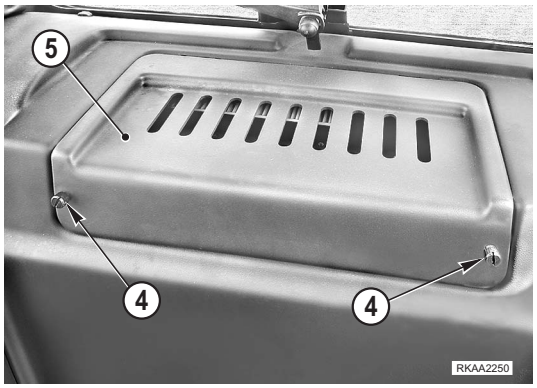




If the machine is provided with air conditioning system, besides the external filter (3) there is also an additional internal filter (6) for air recirculation.
This is a filter that holds the impurities contained in the air and it must be cleaned whenever a decrease in air circulation is perceived.
The filter can be reached from the inside of the cab and to clean the filtering element it is necessary to proceed as follows:

1 - Remove the screws (4), remove the outer guard (5) and extract the filtering element (6).

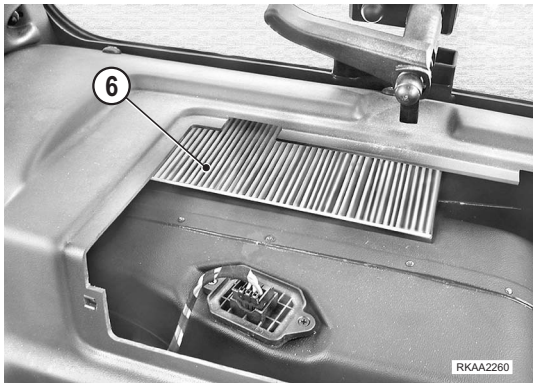
2 - Strike the element slightly on the palm of your hand to eliminate the dust it contains and blow compressed air on its surfaces, keeping the air jet at a distance of about 15 cm and making sure that pressure does not exceed 2–3 bars.

3 - Put back the filtering element (6) and the guard (5).




**IMPORTANT**

- **If the filtering element is excessively clogged or damaged, change it with a new one.**



## 4.7.1.d FUSES AND RELAYS – CHECK AND CHANGE

**IMPORTANT**

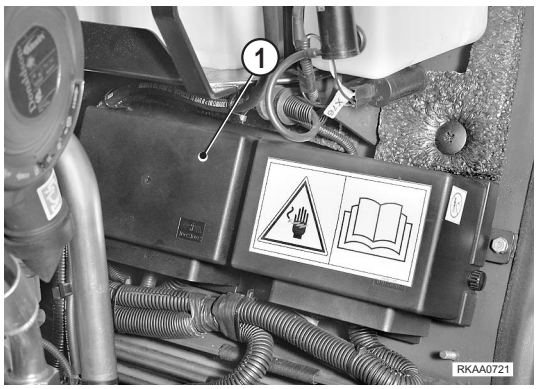
- **Before changing a fuse, make sure that the ignition key is in position «O».**
- **If the fuses are oxidized, corroded or do not fit perfectly in their seat, replace them only with new fuses having the same capacity.**
- **If the engine does not run when the ignition switch is turned to position «» START, check the main fuse and replace it if necessary.**

### CENTRAL UNIT FUSES AND RELAYS

Fuses and relays are grouped on a single base that is positioned on the inside of the cab's right wall.
The central unit can be reached by removing the panel (1).
For information on the capacity of the fuses and relays to be replaced, see «3.4.1 CENTRAL UNIT FUSES AND RELAYS».


### ENGINE LINE FUSES AND RELAYS

The fuses and relays are grouped on a single base positioned inside the engine compartment and can be reached by removing the cover (1).
For information on the capacity of the fuses and relays to be replaced, see «3.4.2 ENGINE LINE FUSES AND RELAYS».




## 4.7.1.e CHECKING THE WINDSHIELD WASHER FLUID LEVEL

If there is air in the windshield washer fluid, check the washer fluid level in the reservoir (1). If necessary, add detergent of the type used for cars.
While topping up, be careful to prevent dust from getting into the reservoir.


**Quantity of detergent to be mixed with water**

Proportions vary according to ambient temperature. Before topping up, it is advisable to dilute the detergent with water according to the quantities indicated in the following table.

| Area, season | Proportions | Freezing temperature |
|---|---|---|
| Normal | Detergent 1/3 Water 2/3 | -10 °C |
| Cold area - winter | Detergent 1/2 Water 1/2 | -20 °C |
| Very cold area - winter | Undiluted detergent | -30 °C |

### 4.7.1.f CHECKING THE WINDSHIELD WIPER BLADES

The windshield wiper blades should be checked once the windshield wipers have stopped working, by verifying the conditions of the windshield.
If any lines are left on the windshield after washing and wiping it, this means that the scraping wire has deteriorated and it is therefore necessary to change the blades.

### 4.7.1.g LUBRICATING THE CAB DOOR AND ENGINE HOOD HINGES

Cab door and engine hood hinges should be lubricated when a squealing noise is heard on opening or closing the cab door or engine hood or when signs of oxidation are found on the shoulder washers or on the pivots.
The lubrication procedure consists in injecting grease into the nipples provided on the hinge axes.
For further information on the appropriate grease to use, see «4.3 FUEL, COOLANT AND LUBRICANTS».

**⚠ ATTENTION**

- **Inject grease until all the residual old grease has come out.**
- **After lubrication, remove all the grease that has come out and clean the area.**

### 4.7.1.h LUBRICATING THE FORK SUPPORT ROD

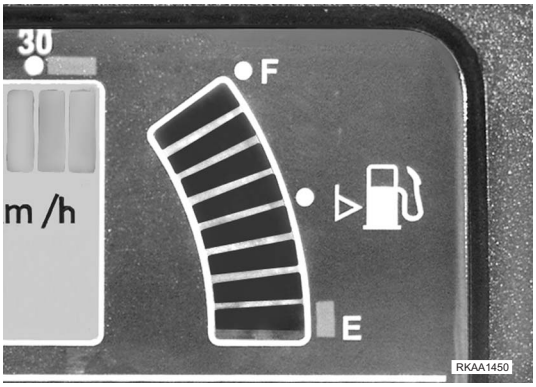
The fork support rod should be lubricated when the widthwise movement of the forks is difficult.
Use a brush to lubricate the support rod.
For further information on the appropriate grease to use, see «4.3 FUEL, COOLANT AND LUBRICANTS».

### 4.7.1.i CHECKING THE FUEL LEVEL

**⚠ DANGER**

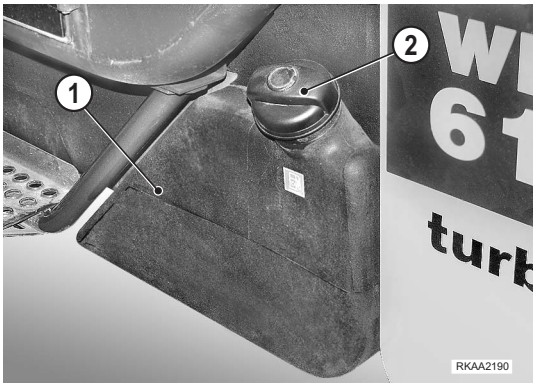
- **When refuelling the machine, avoid spilling fuel, since this may cause a fire hazard. If fuel is spilled, wipe it immediately.**
- **Fuel is flammable; do not use naked flames and do not smoke when refuelling.**
- **Hold the fuel gun constantly in contact with the filler.**

To check the fuel level, use the fuel gauge positioned on the dashboard. Do not fill the tank (1) completely, but leave enough room for the fuel to expand.



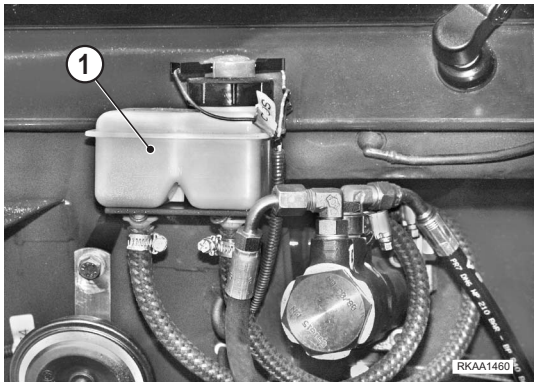

**IMPORTANT**

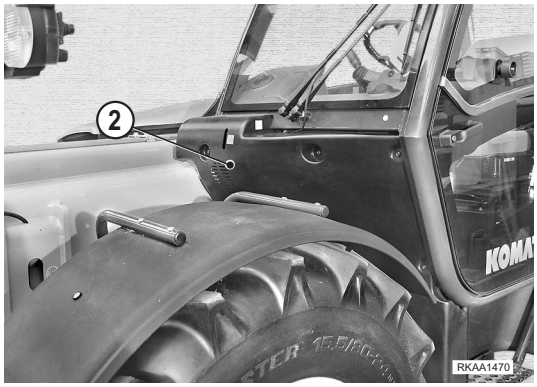
- **It is advisable to refuel after work, in order to avoid the formation of condensate.**
- **After refuelling, screw the filler cap (2) thoroughly and lock it.**



## 4.7.1.j TOPPING UP THE BRAKING SYSTEM OIL RESERVOIR

This operation must be carried out when the warning light on the dashboard comes on (see «3.2.2 WARNING LIGHTS» pos. 5 - LOW OIL PRESSURE OR BRAKING SYSTEM FAILURE WARNING LIGHT (Red)).
The brake oil reservoir (1) can be reached after removing the front guard (2).
This is a visual check and, if necessary, the reservoir must be topped up with the prescribed oil until reaching the MAX. mark. (See «4.3 FUEL, COOLANT AND LUBRICANTS»).




**IMPORTANT**

- **Use only new oil.**
- **If constant and considerable leakages are observed, it is advisable to contact a Komatsu Utility Dealer to have the braking system checked and the necessary repairs carried out.**

## 4.7.2 MAINTENANCE EVERY 10 HOURS OF OPERATION OR EVERY DAY

### 4.7.2.a VARIOUS CHECKS

**⚠ DANGER**

- **Dirt, oil and fuel in the engine compartment near hot parts may damage the machine and even cause fires.**
  **Check frequently and eliminate any leakage; if leakages occur repeatedly, contact your Komatsu Utility Dealer.**

Before starting the engine, proceed as follows:

1. Verify that the boom inclination indicator pendulum is free to rotate and reach the end of the scale and that it returns to its original position, performing the necessary adjustment swings, once it has been released.
2. Check for loose screws or nuts.
3. Check for oil, fuel or coolant leakages.
4. Check for unusual wear, deformation or cracks.
5. Check the condition of the rims and the condition and wear of the tyres.
6. Make sure that lights, work lights and direction indicators work correctly.

The other general checks concern the safety of the operator and he is required to:

7. Check the soundness of the safety belt.
8. Check the soundness and legibility of the warning plates.
9. Make sure that the ladders and handles used to reach the driver's seat are clean, as well as the inside of the cab.

### 4.7.2.b CHECKING THE ACOUSTIC ALARMS, WARNING LIGHTS AND INSTRUMENTS

This checking procedure concerns three units:

1 - **Acoustic alarm and warning lights on the dashboard:** this check is performed by turning the ignition key to position "**I**". In this condition, the red warning lights on the dashboard should come on and the acoustic alarm should start sounding.
If a red warning light remains off, this means that the corresponding function is not active; before using the machine, check the circuit concerned and eliminate the fault.

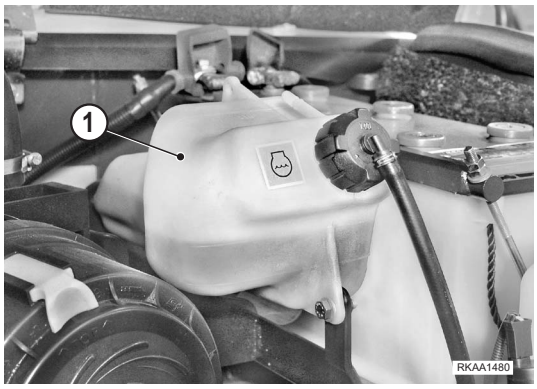
2 - **SIi-Safe Load Indicator:** the procedure consists in checking that all the LEDs of the device come on when the ignition key is turned to position "**I**". Furthermore, an additional test is necessary and should be carried out halfway through the work shift.
The additional test consists in pressing the TEST button (see «3.2.5 MACHINE CONTROLS» 7 - SLI-SAFE LOAD INDICATOR) and checking that the LEDs come on and that the acoustic alarm sounds.

3 - **Instruments:** the instruments should be checked during the warming up of the machine and the first travel movements.
More specifically, the following checks can be performed during warming up: coolant thermometer, engine revolution counter and fuel level indicator.
The correct operation of the speedometer can be checked during travel.

## 4.7.2.c CHECKING THE ENGINE COOLANT LEVEL

**⚠ DANGER**

- **Do not remove the radiator cap; the coolant level must be checked with cold engine, through the expansion tank.**




The coolant level must be checked on the expansion tank (1), which can be reached after opening the engine hood. The check must be carried out with cold engine and the coolant level must be above the lower MIN. mark.
If the level is near the MIN. mark, fill the tank with coolant, and if the level decreases considerably and constantly, check the radiator-engine seals and the radiator body for leaks and check the fluid level in the radiator.
(See «4.7.2.d CHECKING THE RADIATOR FLUID LEVEL»).

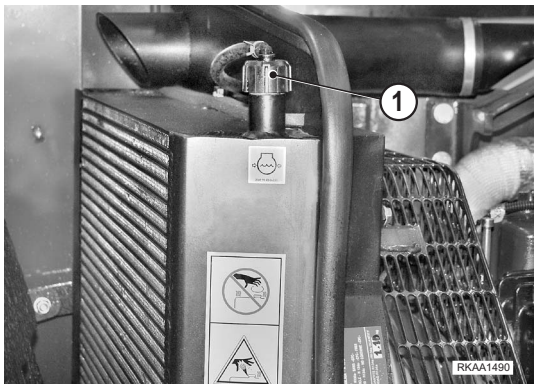
**IMPORTANT**

- **The upper MIN. and MAX. marks indicate the level reached by the coolant after expansion, at operating temperature.**

## 4.7.2.d CHECKING THE RADIATOR FLUID LEVEL

**⚠ DANGER**

- **Carry out this check with the machine parked on level ground.**
- **Do not remove the radiator cap when the fluid is hot, since the fluid may be sprayed out of the radiator and cause burns.**
- **Loosen the cap slowly to release any residual pressure.**




The radiator cap can be reached after opening the engine hood. Remove the cap (1) and make sure that the fluid level is very near the filling hole.

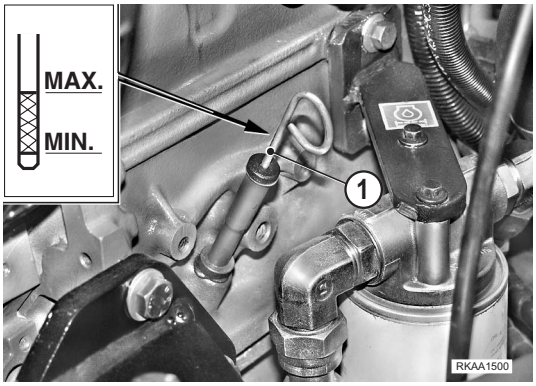
**IMPORTANT**

- **If the level of fluid in the radiator is low and the expansion tank is filled with coolant, check for tightness and make sure that there are no air leakages from the pipe that connects the radiator to the expansion tank.**
  **If the problem persists, contact your Komatsu Utility Dealer.**

## 4.7.2.e CHECKING THE ENGINE OIL LEVEL

**⚠ DANGER**

- **Soon after the machine has been stopped, the engine is very hot and may cause burns; let the engine cool down before carrying out any check.**




The dipstick (1) can be reached after opening the engine hood.
The oil level must be checked with cold engine and the machine parked on level ground. The oil level must be checked on the graduated dipstick (1) and it must be included between the MIN. and MAX. marks; if the level is near the MIN. mark, top up with oil of the type specified in the lubricant table for the ambient temperature.
(See «4.3 FUEL, COOLANT AND LUBRICANTS»).

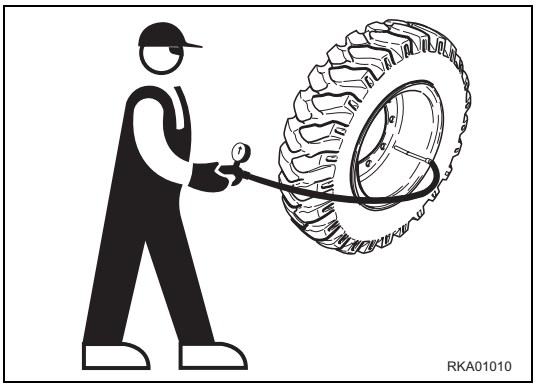
**IMPORTANT**

- **If it is necessary to check the oil level during or soon after work, stop the engine and wait 15 minutes before carrying out the check.**

## 4.7.2.f CHECKING THE TYRE PRESSURE

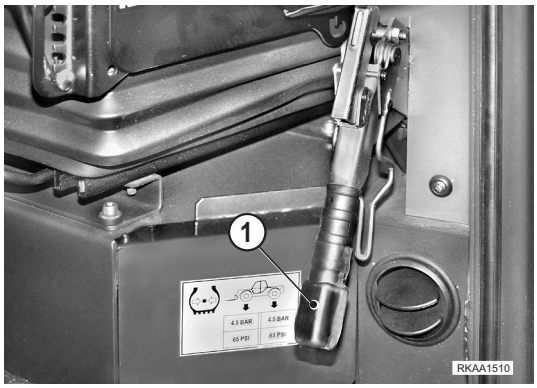
**⚠ DANGER**

- **When inflating a tyre, the operator must stand in front of the tread.**
- **Do not exceed the pressure values indicated in the TECHNICAL DATA.**




This check is indispensable to preserve the tyres, keep them efficient over time and make them last longer and is also very important to ensure safety.
Pressure must be as prescribed in the specifications. (See «5.1 TECHNICAL DATA»).
While checking the tyre pressure, check also the conditions of the tread and sidewalls.

## 4.7.2.g CHECKING THE SERVICE BRAKES




**IMPORTANT**

- **Perform this check on firm, level ground, with no people or obstacles around.**

This checking procedure should be carried out with the machine in TRAVEL operating mode, i.e. the compulsory mode for circulation on roads.

1 - Release the parking brake (1) and start the engine. (See «3.6.2 STARTING THE ENGINE»).

2 - Engage the 2nd (a) gear and select the FORWARD travel direction (b).

3 - Press the brake pedal thoroughly and accelerate until reaching the maximum engine speed.
In this condition, the machine must not move.

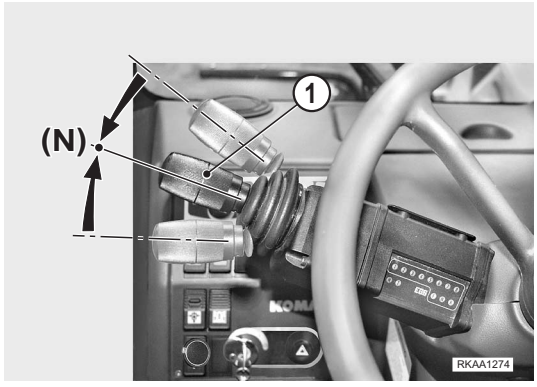

**⚠ DANGER**

- **The machine may cause accidents if it moves during the test. In this case, release the accelerator immediately and apply the parking brake.**

## 4.7.2.h CHECKING AND ADJUSTING THE PARKING BRAKE

**IMPORTANT**

- **During running-in, check the efficiency of the parking brake after the first 100 hours of operation.**




CHECK

Check conditions:

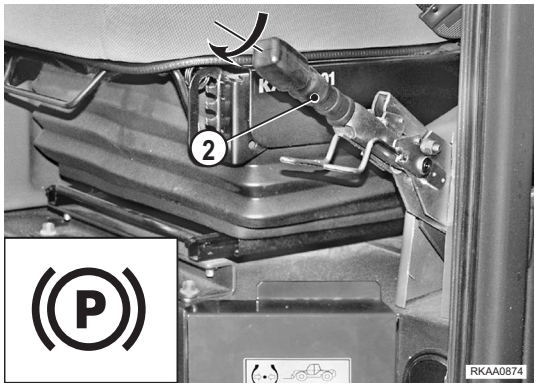
- Tyre pressure in accordance with the prescribed values.
- Road surface dry, compact, with a gradient of approx. 20%.
- Machine in operating conditions without load.

1 - Start the engine, (see «3.6.2 STARTING THE ENGINE»).

2 - Align the machine in travel position on a straight road section and proceed up the slope with 20% gradient.

3 - Stop the machine with the service brakes and shift the reverse lever (1) to neutral (N).

4 - Apply the parking brake (2) (lock position), release the service brakes slowly and make sure that the machine does not move.




ADJUSTMENT

1 - Press the service brake pedal, release the brake lever and rotate the lever end (2) by giving it 2 or 3 anticlockwise turns.

2 - Apply the parking brake and check again.

## 4.7.3 MAINTENANCE EVERY 50 HOURS OF OPERATION OR EVERY 2 WEEKS

- **These maintenance operations should be carried out together with those to be performed every 10 HOURS.**

### 4.7.3.a LUBRICATING THE ARTICULATED JOINTS AND THE PADS

**⚠ DANGER**

- **The compensating cylinder must be lubricated on the head side from under the machine; always apply the parking brake and remove the ignition key.**
- **The lifting cylinder must be lubricated on the base side with partially lifted boom and grease nipple positioned beside the safety valve.**

**IMPORTANT**

- **Clean the grease nipples thoroughly before applying the greasing pump.**
- **After lubrication, remove all the contaminated grease that may have spread out and clean the area.**
- **If the machine is used in difficult conditions, carry out these operations more frequently than usual.**

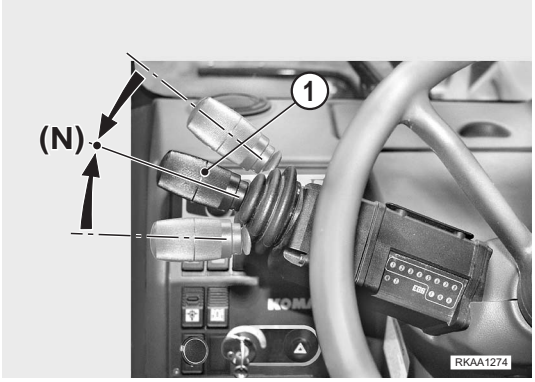
1 - Park the machine on firm and level ground, as described in «3.7.1 PARKING ON LEVEL GROUND».

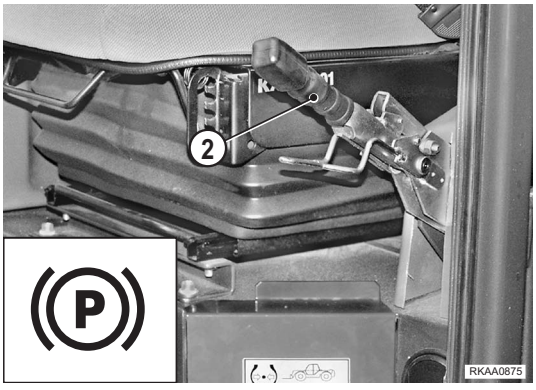
2 - Make sure that the gearshift-reverse lever (1) is in neutral position (N) and apply the parking brake (2).

3 - Stop the engine, proceeding as described in «3.8 STOPPING THE ENGINE».

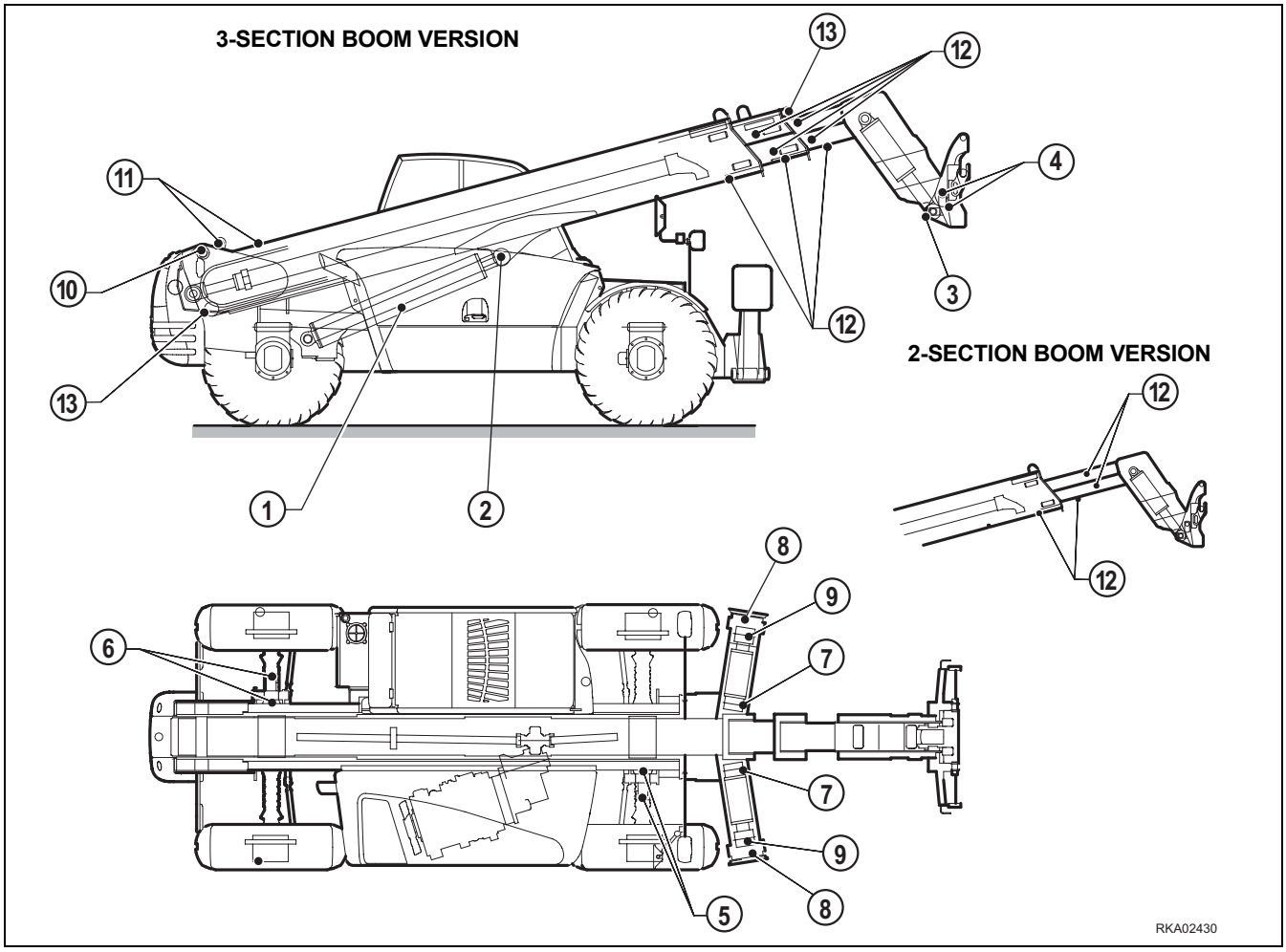
4 - Remove the ignition key. The ignition key must be kept by the person in charge of maintenance until the end of work.

5 - Lubricate using a syringe filled with the prescribed grease. (See «4.3 FUEL, COOLANT AND LUBRICANTS» and the maintenance chart).



**PARTS TO BE LUBRICATED**




| No. | Part | Operation |
|---|---|---|
| 1 | Lifting cylinder | Head side (1 point) |
| | | Base side (1 point) [note[1]] |
| 2 | Compensating cylinder | Head side (1 point) |
| 3 | Tilting cylinder | Head side (1 point) |
| 4 | Equipment carrier fulcrum pins | (2 points) |
| 5 | Frame levelling cylinder (if provided) | Head side (1 point) |
| | | Base side (1 point) |
| 6 | Rear axle swing lock cylinder (if provided) | Head side (1 point) |
| | | Base side (1 point) |
| 7 | Stabilizers fulcrum pin (if provided) | (2 points) |
| 8 | Stabilizers suppport fulcrum pin (if provided) | (2 points) |
| 9 | Stabilizer cylinders (if provided) | Head side (2 points) |
| 10 | Boom fulcrum pin | (1 point) |
| 11 | Telescopic boom sliding pads<br>(with completely retracted and lowered boom sections) | 2-section boom (2 points)<br>3-section boom (4 points) |
| 12 | Telescopic boom sliding pads<br>(with completely extended and lowered boom sections) | 2-section boom (8 points)<br>3-section boom (16 points) |
| 13 | Chain gear shafts (Only for 3-section boom version) | See paragraph «4.7.3.b» |

note [1]: The grease nipple is positioned beside the safety valve.

### 4.7.3.b LUBRICATING THE CHAIN GEAR SHAFTS (Only for 3-section boom version)


**IMPORTANT**
- **Clean the grease nipples thoroughly before applying the greasing pump.**
- **After lubrication, remove all the grease that may have spread out.**

1 - Using a syringe with hose (1) filled with the prescribed grease (see «4.3 FUEL, COOLANT AND LUBRICANTS» and «4.5 LUBRICATION»), lubricate the shafts of the boom extension and retraction chain gears

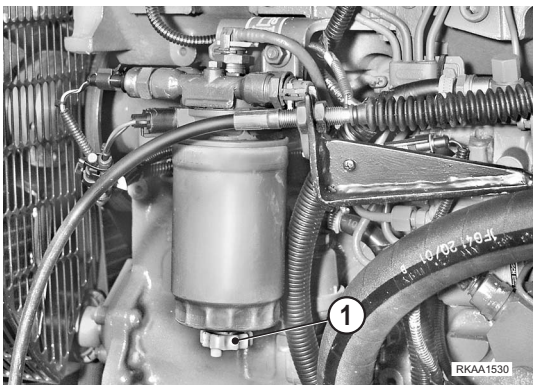

**IMPORTANT**
- **Inject grease until all the old grease has come out.**
- **Remove any grease that may have spread out and clean the area.**

### 4.7.3.c DRAINING THE WATER SEPARATOR

**⚠ DANGER**

- **Fuel is flammable; do not use naked flames and do not smoke while draining the water separator.**
- **If some fuel is spilled, wipe it up immediately.**

This operation serves to drain the condensate water and must be carried out with full tank, in order to prevent air from entering the fuel supply circuit.
The condensate must be drained at the end of work, before the engine has completely cooled down, in order to prevent it from freezing if the temperature drops considerably.
The water separator can be reached after removing the engine hood (see «3.5.1 ENGINE HOOD»).
Drain the condensate by loosening the plug (1), waiting until only clear diesel oil flows out.



## 4.7.3.d LUBRICATING BOOM

**⚠ DANGER**

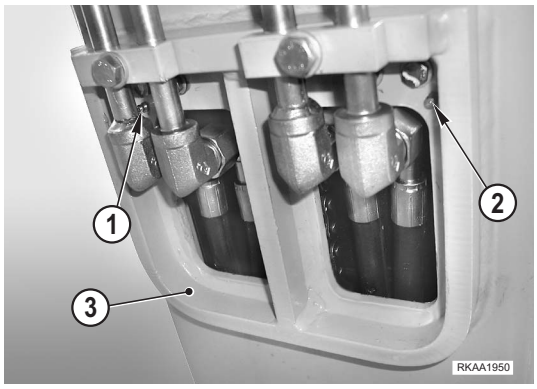
- **The boom sections must be lubricated when they are completely extended. As a safety precaution, position a stand capable of supporting the entire boom under the first telescopic boom before extending the boom sections and lower the stabilizers to the ground, if they are provided.**
- **If the machine isn't equipped with stabilizers, place a safety block in central position under the front part of the frame.**

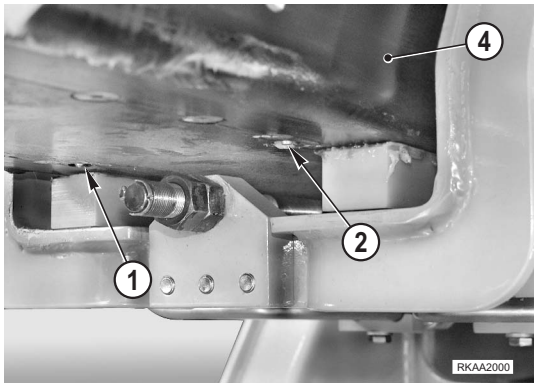
1 - Position the machine on firm and level ground and select the TRAVEL-WORK operating mode; if the machine is equipped with stabilizers, lower them to the ground, otherwise place a block in central position under the frame.

2 - Slowly extend the boom sections until they are completely out and in horizontal position; stop the engine and apply the parking brake.

3 - Remove any used oil from the boom sections and clean the block sliding areas and the grease nipples (1) and (2) thoroughly.

4 - Using the grease nipples (1) and (2) positioned on the lower end of the main (3) and intermediate (4) boom sections, inject grease to lubricate the front sliding pads.

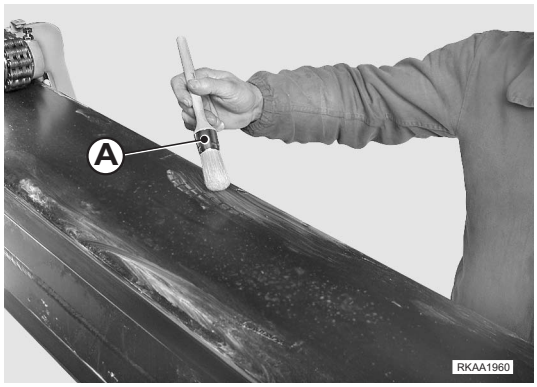


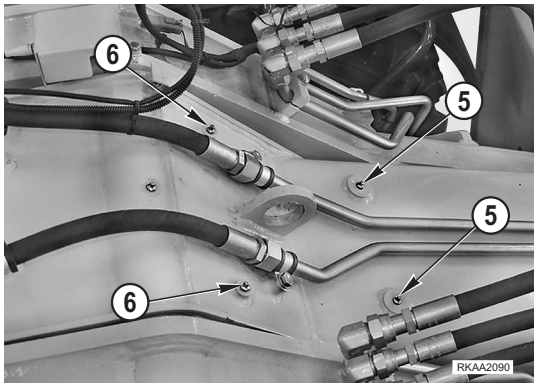

5 - Using a brush (**A**) or a roller, spread grease of the recommended type on sliding surfaces (see «4.3 FUEL, COOLANT AND LUBRICANTS»).

6- Start the engine and extend and retract the boom sections completely several times, in order to distribute the grease evenly on the pads.

7- With the boom sections completely retracted, stop the engine.




8 - Lubricate the upper pads of the intermediate and final boom sections with the grease nipples (5) and (6).

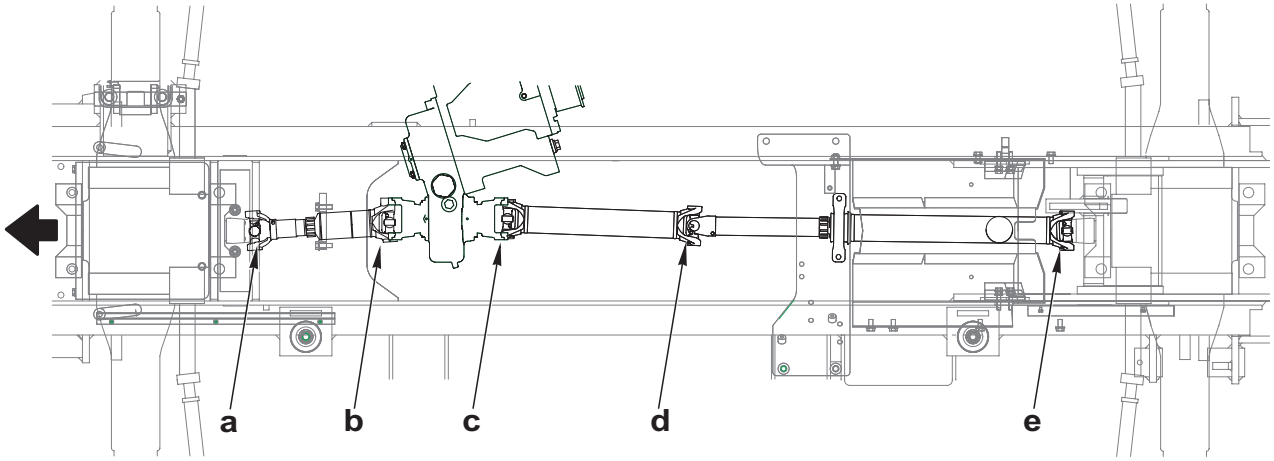


# 4.7.4 MAINTENANCE EVERY 100 HOURS OF OPERATION

- **These maintenance operations should be carried out together with those to be performed every 50 HOURS.**

## 4.7.4.a LUBRICATING THE DRIVE SHAFTS

The propeller shafts must be lubricated after thoroughly cleaning the grease nipples, by applying the greasing pump filled with the prescribed grease.
(See «4.3 FUEL, COOLANT AND LUBRICANTS»).
Once the lubrication procedure has been carried out, make sure that all the points have been lubricated and remove the used grease that may have spread out of the joints.

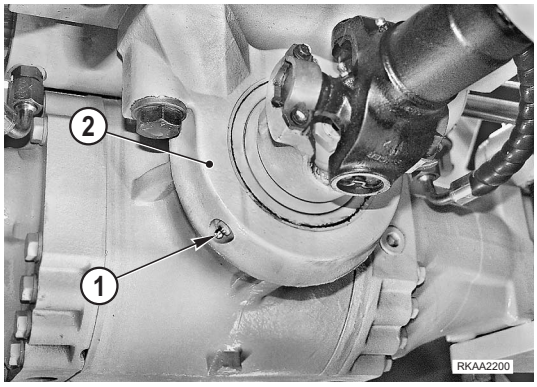


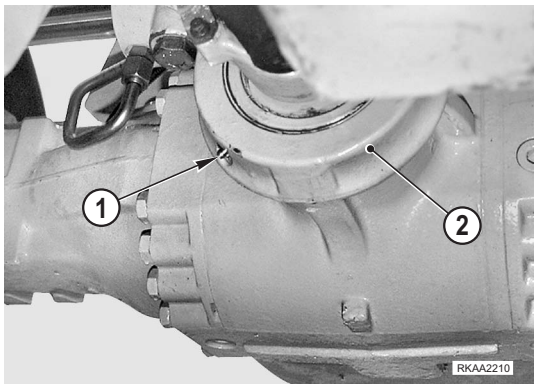

RKA02320

a. 2 points
b. 1 point
c. 1 point
d. 2 points
e. 1 point

## 4.7.4.b LUBRICATING THE FRONT AND REAR AXLE SWING JOINT

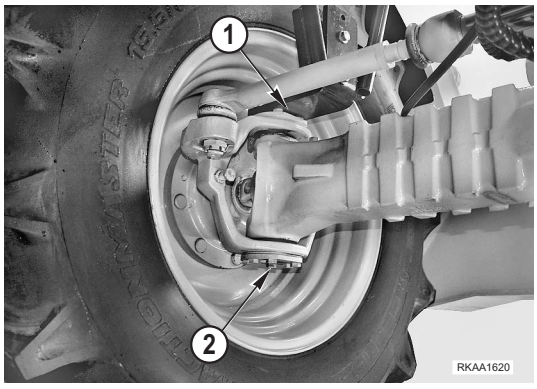
The four lubrication points (1) of the swing axle are located on its support flanges (2).
The joint must be lubricated after thoroughly cleaning the grease nipples, by applying the greasing pump filled with the prescribed grease (see «4.3 FUEL, COOLANT AND LUBRICANTS»).
Once the lubrication procedure has been carried out, remove the used grease that may have spread out of the joints.




## 4.7.4.c LUBRICATING THE WHEEL HUB JOINTS

The lubrication points of the hub joints are shown in the figure and it is important to remember that they are located in symmetrical positions on the machine.
The joints must be lubricated after removing the guards and after thoroughly cleaning the grease nipples (1) and (2), by applying the greasing pump filled with the prescribed grease.
(See «4.3 FUEL, COOLANT AND LUBRICANTS»).
Once the lubrication procedure has been carried out, remove the used grease that may have spread out of the joints and put back the guards.



## 4.7.5 MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION

- These maintenance operations should be carried out after the first 250 hours of operation, together with those to be performed every 250 HOURS.

a - CHANGE THE HYDRAULIC OIL DRAIN FILTER

b - CHANGE THE AXLE OILS (DIFFERENTIAL AND FINAL REDUCTION GEAR UNITS)

c - CHANGE THE TRANSMISSION FILTER

**NOTE**

- **For details on operations not mentioned in this paragraph, see «4.7.8 MAINTENANCE EVERY 500 HOURS OF OPERATION OR EVERY 6 MONTHS» and «4.7.9 MAINTENANCE EVERY 1000 HOURS OF OPERATION OR EVERY YEAR».**

## 4.7.6 MAINTENANCE EVERY 250 HOURS OF OPERATION OR EVERY 3 MONTHS

- These maintenance operations should be carried out together with those to be performed every 10 HOURS and every 50 HOURS.

### 4.7.6.a LUBRICATING THE ARTICULATED JOINTS

**⚠ DANGER**

- **The compensating cylinder must be lubricated on the base side from an intermediate position between the frame and the wheel; always apply the parking brakes and remove the ignition key.**

**IMPORTANT**

- **Clean the grease nipples thoroughly before applying the greasing pump.**
- **After lubrication, remove all the contaminated grease that may have spread out and clean the area.**
- **If the machine is used in difficult conditions, carry out these operations more frequently than usual.**

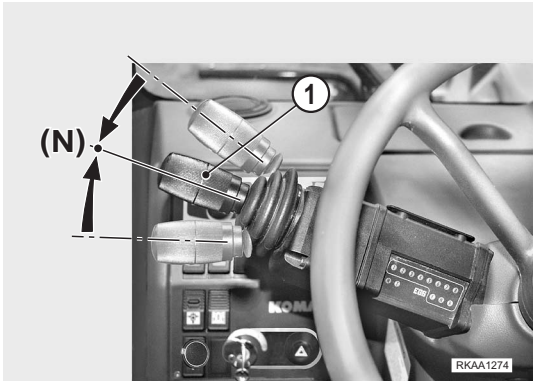
1 - Park the machine on firm and level ground, as described in «3.7.1 PARKING ON LEVEL GROUND».

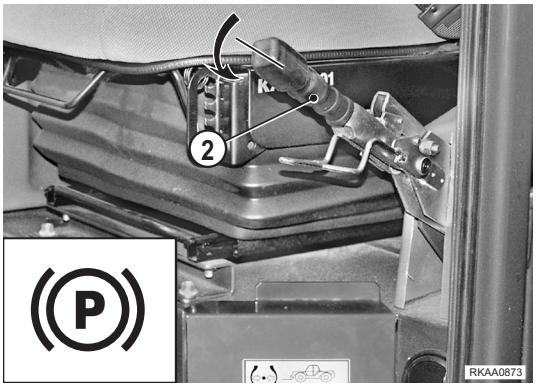
2 - Make sure that the gearshift-reverse lever (1) is in neutral position (N) and apply the parking brake (2).

3 - Stop the engine, proceeding as described in «3.8 STOPPING THE ENGINE».

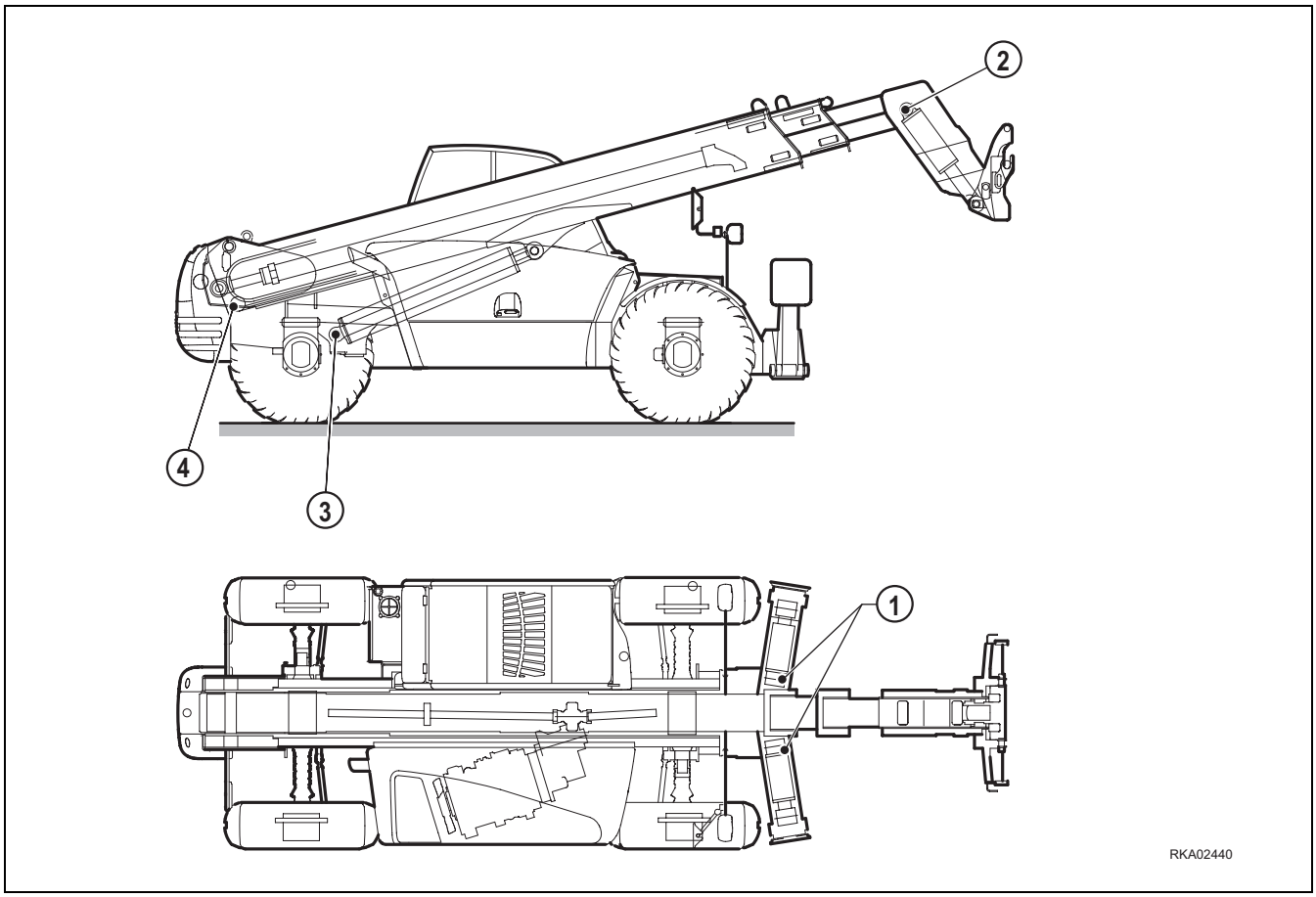
4 - Remove the ignition key. The ignition key must be kept by the person in charge of maintenance until the end of work.

5 - Lubricate using a syringe filled with the prescribed grease. (See «4.3 FUEL, COOLANT AND LUBRICANTS» and the maintenance chart).



**PARTS TO BE LUBRICATED**




| No. | Part | Operation |
|---|---|---|
| 1 | Stabilizer cylinders – base side | 2 points |
| 2 | Tilting cylinder - base side | 1 point |
| 3 | Compensating cylinder - base side | 1 point |
| 4 | Boom inner hoses | See «4.7.6.b» |

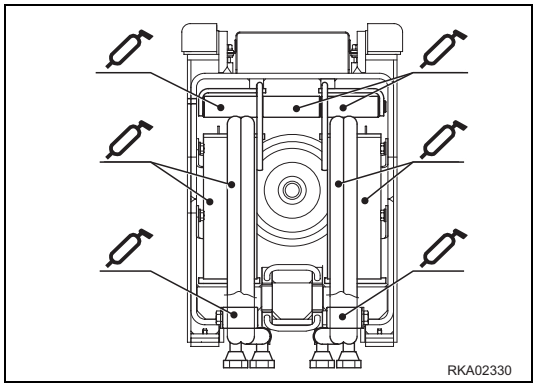
## 4.7.6.b LUBRICATING THE BOOM INNER HOSES, ROLLERS AND GUARD

**⚠ ATTENTION**

- **Before lubricating the guard, carefully remove any contaminated grease.**

Carry out the lubrication procedure with completely retracted boom, after removing the rear cover of the main boom section.

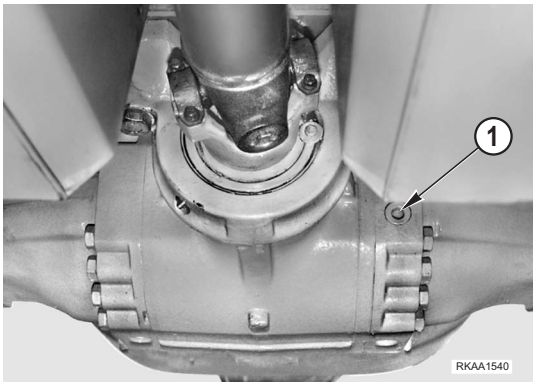
Use only the prescribed grease (see «4.3 FUEL, COOLANT AND LUBRICANTS»), and apply it to the guard with a brush.

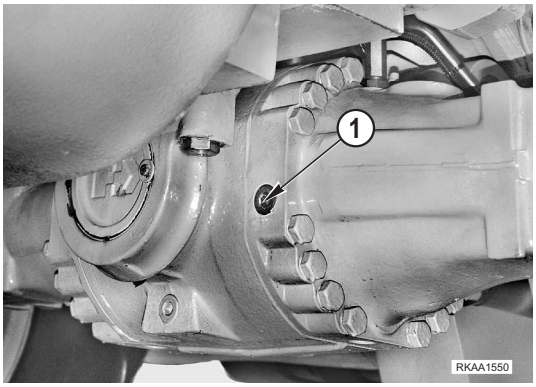


## 4.7.6.c CHECKING THE AXLE OIL LEVEL (FRONT AND REAR AXLE)

**DIFFERENTIAL**

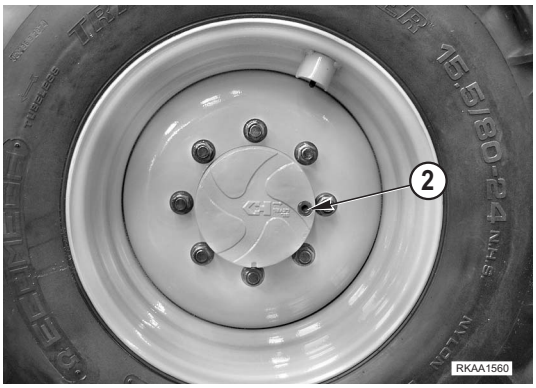
This is a visual check and serves to verify if the lubricant reaches the hole (1); if necessary, top up using the prescribed oil.
(See «4.3 FUEL, COOLANT AND LUBRICANTS»).
The level hole (1) must be used also as filling hole.
Use a 12 mm wrench.




**FINAL REDUCTION GEAR**

This check must be carried out on each reduction gear positioned with its plug on the horizontal axis.
If necessary, move the machine slightly until reaching the specified position, which is indispensable for an accurate check.
This a visual check and serves to verify if the lubricant reaches the hole (2); if necessary, top up using the prescribed oil. (See «4.3 FUEL, COOLANT AND LUBRICANTS»).
Use a 12 mm wrench.



## 4.7.6.d CHECKING THE TRANSMISSION OIL LEVEL

**⚠ DANGER**

- **The transmission oil level must be checked with engine running and transmission still hot; be extremely careful and wear insulating, waterproof gloves in order to avoid severe burns.**

1 - Before carrying out this check, park the machine on level ground; clean the area to be inspected (dipstick, filler cap and reduction gear sight gauge) thoroughly. Heat the transmission oil until it reaches 85–88 °C and keep the engine idling.

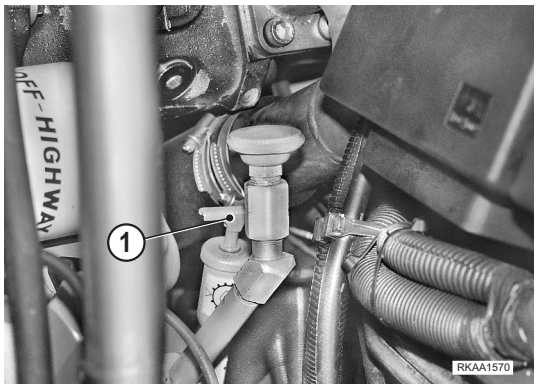
2 - Open the engine hood and extract the dipstick (1).

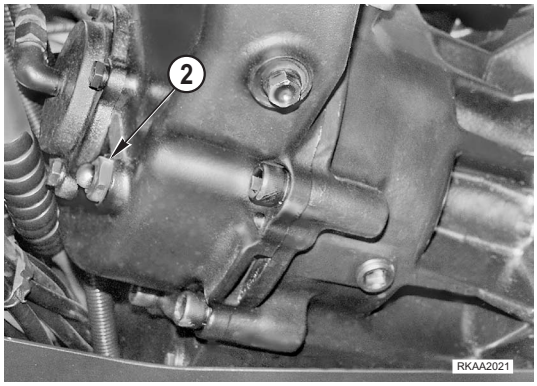
3 - Make sure that the level reaches the maximum mark.
If necessary, with the engine still idling, add the appropriate quantity of the prescribed oil. (See «4.3 FUEL, COOLANT AND LUBRICANTS»).

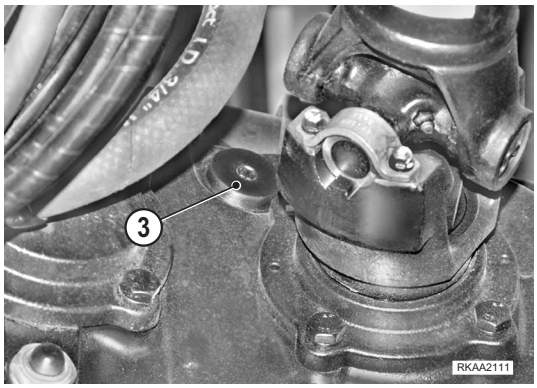
4 - Reintroduce the dipstick and stop the engine.

5 - Make sure that the reduction gear oil level is halfway up the sight gauge (2).
If necessary, remove the filler cap (3) and top up with the prescribed type of oil. (See «4.3 FUEL, COOLANT AND LUBRICANTS»).

6 - Put back the filler cap and wipe up any oil that may have been spilled during the procedure.



## 4.7.6.e CLEANING THE OUTSIDE OF THE RADIATOR AND OF THE HEAT EXCHANGER

**⚠ DANGER**

- **If compressed air, steam or water are directed against a person, they may cause injuries.**
  **Always wear a face shield, a dust mask and safety shoes.**


The radiator can be reached after opening the engine hood (see «3.5.1 ENGINE HOOD»). The cleaning operations must be carried out using a compressed air jet, if necessary with a low pressure water or steam washing cycle; the specific detergents available on the market can be used, provided that the instructions given on their package are followed and the washed parts are carefully dried.

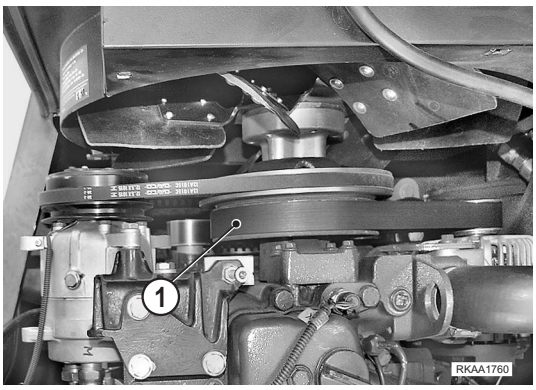
**IMPORTANT**

- **Avoid using products that contain oily components, even if in small quantities, since they facilitate the sticking of dust, which negatively affects the heat exchange process.**
- **Clean the outside of the radiator or of the heat exchanger whenever they are dirty with oil, or greasy or oily substances.**
- **If the machine is used in dusty places, clean the radiator and the heat exchanger more frequently, in order to prevent the fins from clogging.**

## 4.7.6.f CHECKING THE ALTERNATOR-FAN BELT

**⚠ DANGER**

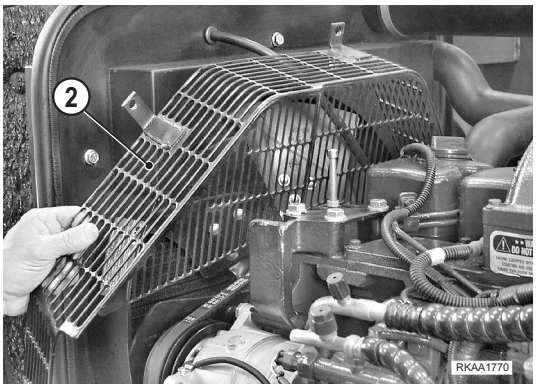
- **Carry out these checking and maintenance operations only with cold engine.**




The belt (1) can be reached after opening the engine hood (see «3.5.1 ENGINE HOOD») and after removing the fan guard (2).

This check is visual, must be carried out with cold engine and consists in inspecting the belt for cuts, fraying, cracks.

If any of these defects can be observed, have the belt changed by a Komatsu Utility Dealer.



## 4.7.6.g CHECKING AND ADJUSTING THE A/C COMPRESSOR BELT TENSION (Optional)

**⚠ DANGER**

- **The adjustment of the belt tension is a mechanical operation and must be carried out without working on the air conditioning system.**
- **Carry out this check with cold engine.**

The compressor belt can be reached after opening the engine hood (see «3.5.1 ENGINE HOOD»).
The check is manual and consists in exerting pressure on the belt (1) at the centre of the section between the compressor (2) and the pulley (3).
If the pressure exerted is approximately 10 kg, the resulting deflection must be approx. 5-6 mm.
When the belt is new, the resulting deflection must be approx. 4 mm.
If the resulting deflection exceeds the values indicated, proceed as follows:

1 - Remove the belt guard (4).

2 - Loosen the screw (5) that fastens the cam (6).

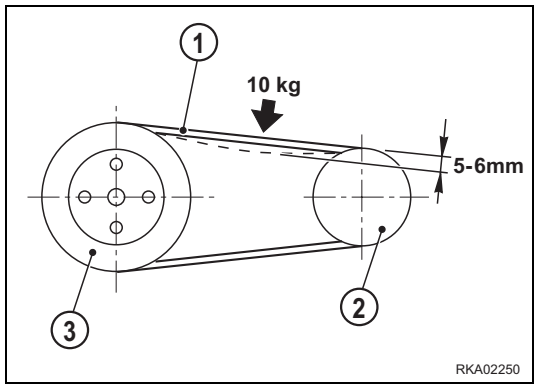
3 - Loosen the screw (7) that fastens the compressor (2).

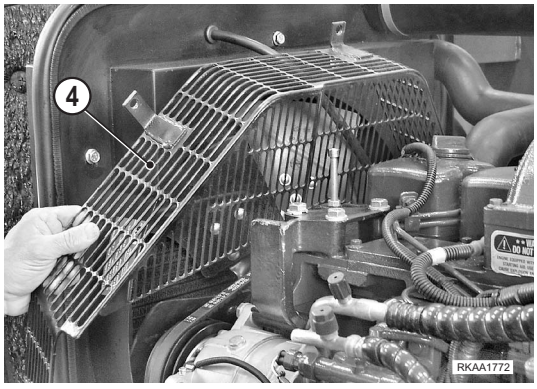
4 - Loosen the nut (8) and tighten the screw (9) to achieve the correct tension.

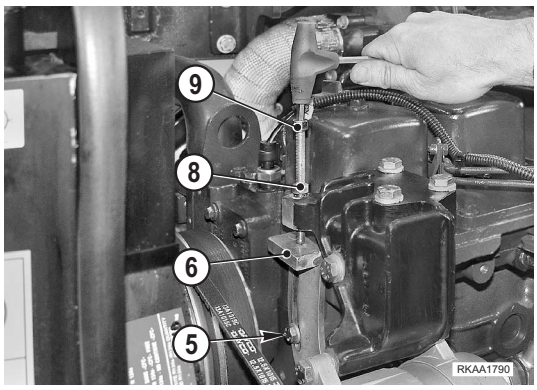
5 - Hold the belt in this position using the screws (7) and the nut (8).

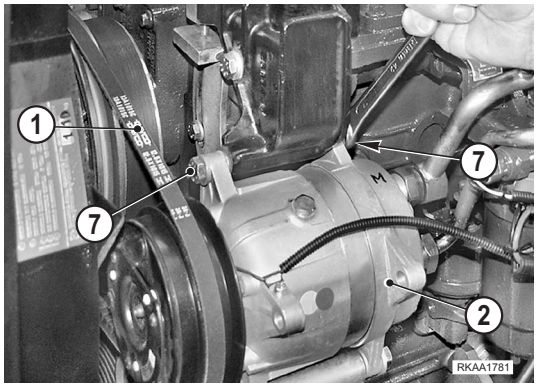
**IMPORTANT**

- **If the belt is worn or in case of doubt regarding its conditions, change it and check its tension again after a few hours of operation.**



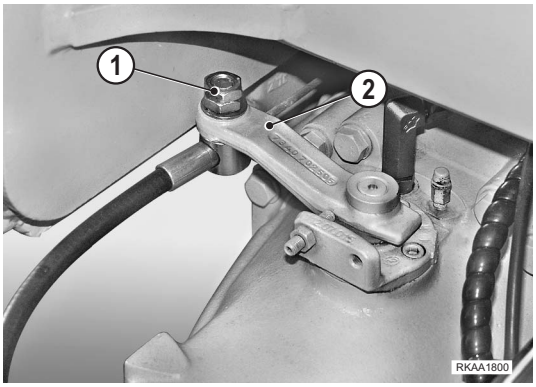



## 4.7.6.h CHECKING THE ADJUSTMENT OF THE PARKING BRAKE

This is a visual check and consists in verifying that the screws (1) simultaneously stop against the retainers (2) when the parking brake is released.
If the levers on which the screws are installed do not perform a full return stroke, do not use the machine and contact your Komatsu Utility Dealer immediately for the necessary service.




## 4.7.6.i CHECKING THE ELECTROLYTE LEVEL

For details on this checking procedure, see «4.7.1 WHEN REQUIRED».

## 4.7.7 MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION
### (Only for machines in which synthetic biodegradable oil HEES is used)

This maintenance operation should be carried out after the first 500 hours of operation, together with those to be performed “EVERY 500 HOURS”.

- CHANGE THE HYDRAULIC OIL AND CLEAN THE INTAKE FILTER

For further details on the various maintenance operations, see «4.7.5 MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION».

## 4.7.8 MAINTENANCE EVERY 500 HOURS OF OPERATION OR EVERY 6 MONTHS

• Carry out the following operations together with those to be performed every 50, 100 and 250 HOURS.

### 4.7.8.a CHANGING THE FUEL FILTER

**⚠ DANGER**

- **Change the filtering element after work, when the engine has cooled down to 40–45°C.**
- **During these operations some fuel may be spilled; clean the dirty areas immediately, in order to prevent any risk of slipping or fire.**
- **Filters are considered special waste and must be collected and disposed of in accordance with the anti-pollution regulations in force.**

The fuel filter and the fuel pump can be reached after opening the engine hood (see «3.5.1 ENGINE HOOD»).

**FUEL FILTER**

1 - Drain the fuel by loosening the plug (1).

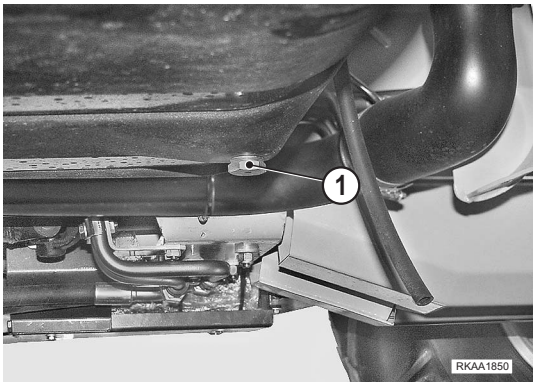
2 - Clean the external surfaces of the unit and then unscrew the old filter (2) using the special wrench provided, then discard the filter.

3 - Clean the inside of the head (3).

4 - Lubricate the gasket of the new filter and tighten until it rests against the gasket.

5 - Give another half turn by hand.

6 - Bleed the fuel supply circuit.




**BLEEDING THE CIRCUIT**

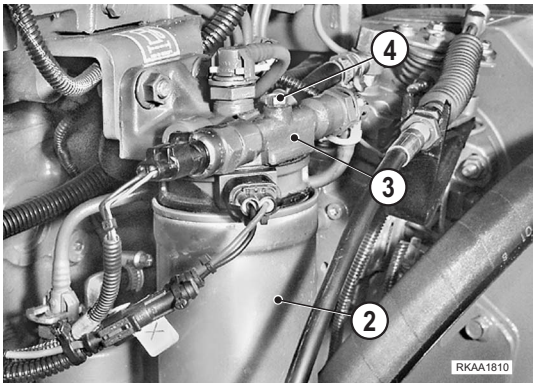
After filling the tank, proceed as follows:

1 - Turn the ignition key to position "**I**".

2 - Loosen the bleeder screw (4) on the filter casing head (3).

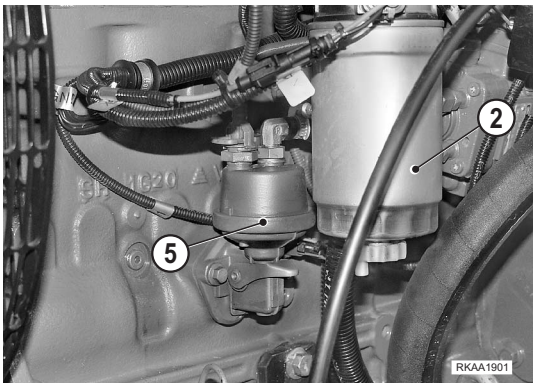
3 - Operate the fuel pump (5) and keep it running until no more air can be observed in the fuel that flows out of the filter head (3).
Tighten the bleeder valve (4).

4 - Start the engine.




**IMPORTANT**

- **If no fuel flows when the fuel pump lever is operated, give the crankshaft 1 turn.**
- **Do not let the starter run for more than 15 seconds. Wait at least 15 seconds before starting the engine again.**
- **If the engine starts regularly and then stops or works irregularly, check if there is air in the circuit; if so, check the fuel filter, the water separator and the fuel pump for leaks.**
- **When all the fuel in the tank has run out, bleed the circuit by proceeding as described above.**



### 4.7.8.b DRAINING THE FUEL TANK

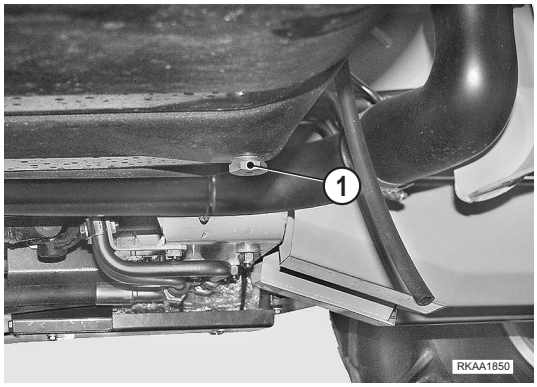
## ⚠ DANGER

- **When draining the fuel tank, avoid spilling fuel, since this may cause fires.**
- **If some fuel is accidentally spilled, clean the dirty area immediately, in order to prevent it from getting slippery and to avoid fires.**
- **Do not smoke, nor use naked flames when carrying out this operation.**
- **Wear waterproof gloves and safety goggles, as fuel may be sprayed out during this operation.**

## ⚠ ATTENTION

- **This operation must be carried out when the fuel level on the indicator is just above the reserve mark. Its purpose is to let out any impurity and condensate that may have accumulated in the fuel tank, without letting any air into the engine fuel supply lines.**

1 - To let the condensate flow out, loosen the drain plug (1) until no more water is present in the fuel that flows out.




**IMPORTANT**

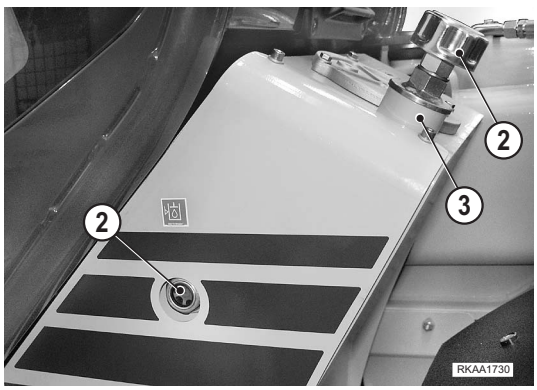
- **The tank must be drained before starting the engine, at temperatures over 0°C; when the temperature is below 0°C, the tank must be drained at the end of work or in any case with the machine at a temperature of 40–45°C, in order to prevent the condensate from freezing when the temperature drops, thereby making the draining operation impossible.**
- **The condensate and the impurities that may have accumulated inside the tank must be eliminated before refuelling.**

### 4.7.8.c CHECKING THE HYDRAULIC OIL LEVEL

## ⚠ DANGER

- **The oil level must be checked when the oil is cold, with the machine on level ground and in travel position.**
- **If it is necessary to top up, stop the engine and release the residual pressure from the tank by slowly loosening the filler cap (2).**

The oil level must reach half of the sight gauge (1) on the tank, where the MIN. and MAX. levels are marked.
If the oil level is near the lower edge of the sight gauge (MIN), top up through the filler (3) using hydraulic oil of the type prescribed (see «4.3 FUEL, COOLANT AND LUBRICANTS»); then put back the filler cap (2).



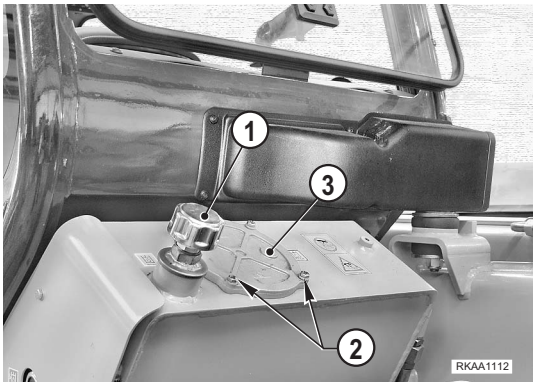

**IMPORTANT**

- **Do not add oil over the MAX. mark (upper edge of the sight gauge), as this would make the oil flow out.**
- **If you notice a constant, unusual decrease in the oil level, contact your Komatsu Utility Dealer.**

## 4.7.8.d CHANGING THE HYDRAULIC OIL DRAIN FILTER

**⚠ DANGER**

- **Soon after the machine has been stopped the hydraulic oil is very hot; allow it to cool down to 40–45°C before changing it.**
- **The hydraulic system is under pressure; slowly loosen the filler cap to release any residual pressure.**
- **Filters are considered special waste and must be collected and disposed of in accordance with the anti-pollution regulations in force.**

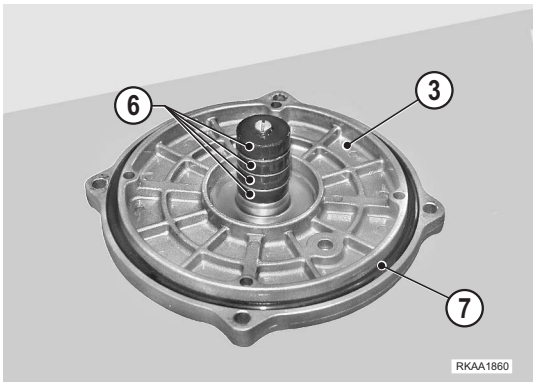



The filter is positioned on the hydraulic system drain outlet and it holds the metal particles that come off the various components due to their wear.
To replace the filter, proceed as follows:

1 - Slowly loosen the filler cap (1) to release any residual pressure from the tank and then remove the cap.
2 - Remove the screws (2) and the filter cover (3).
3 - Remove the cartridge (4) and the spring (5).
4 - Clean the magnetic rings (6) that are positioned on the cover (3) to block the metal particles.
5 - Change the cartridge (4).
6 - Reassemble the whole by proceeding in the reverse order and make sure that the gasket (7) of the cover (3) is not damaged and is correctly housed in its seat.


**⚠ ATTENTION**

- **Thoroughly check the inside of the filter; if there is an unusual quantity of metal particles due to wear, contact your Komatsu Utility Dealer immediately.**

## 4.7.8.e DRAINING CONDENSATE FROM THE OIL TANK (Only for machines in which synthetic biodegradable oil HEES is used)

**⚠ DANGER**

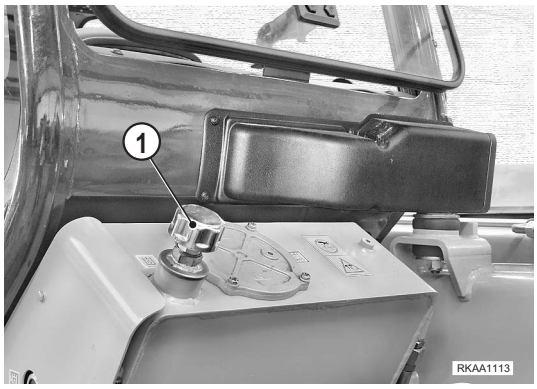
- **After stopping the engine, with the machine in travel condition, release any residual pressure from the tank by slowly loosening the filler cap.**
- **Let the oil cool down to 40–45°C before carrying out this maintenance operation.**
- **If any oil has been spilled, wipe it up immediately, in order to prevent the surface from getting slippery.**
- **Oil is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

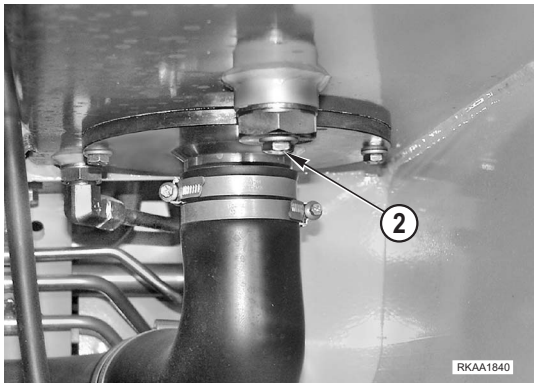
The purpose of this operation is to let any condensate deposited on the bottom of the tank flow out.
To do that, perform the following steps in the sequence indicated:

1 - Loosen the filler cap (1) to release any residual pressure from the tank.

2 - To let the condensate flow out, loosen the drain plug (2) until no more water is present in the fuel that flows out.

3 - Tighten the plug (2).




**IMPORTANT**

- **Condensate should be drained before starting the engine, at temperatures above 0°C. When the temperature is below 0°C, the draining procedure should be carried out at the end of work or in any case with the machine at operating temperature (40–45°C), to prevent the condensate the condensate from freezing, thereby making the draining operation impossible.**

## 4.7.8.f CHANGING THE ENGINE OIL

**⚠ DANGER**

- **Change the oil with the machine parked on level ground and with the boom fully retracted.**
- **Soon after the machine has been stopped, the engine is very hot and may cause burns; let the engine cool down to 40-45°C before draining the oil.**
- **The oil that may be spilled during the oil change will make the ground slippery, therefore, use anti-slip shoes and immediately remove any trace of oil from the floor.**
- **Oils and filters are considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

When changing the engine oil, change also the oil filter (see «4.7.8.g CHANGING THE ENGINE OIL FILTER»).
Proceed as follows:

1 - Open the engine hood (see «3.5.1 ENGINE HOOD»).

2 - Remove the drain plug (1) of the oil pan, gathering the used oil that flows out into a container with suitable capacity.
While the oil flows out, remove the filler cap (2), so that the oil can flow out freely.

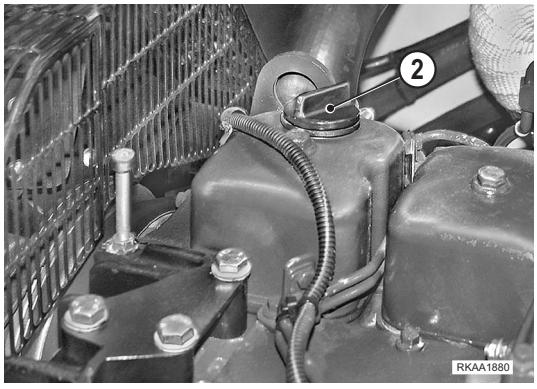
3 - Change the filter (see «4.7.8.g CHANGING THE ENGINE OIL FILTER»).

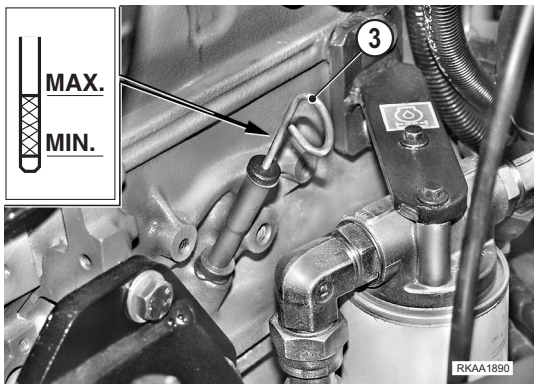
4 - Tighten the plug (1) onto the oil pan and add the prescribed quantity of new oil, using the dipstick (3) to make sure that the oil reaches the MAX. level.

5 - Put back the filler cap (2), start the engine, let it run for 5 minutes and then stop it.
Check the level again and top up if necessary.

6 - Close the engine hood.

Use oil suitable for the ambient temperature.
(See «4.3 FUEL, COOLANT AND LUBRICANTS»).

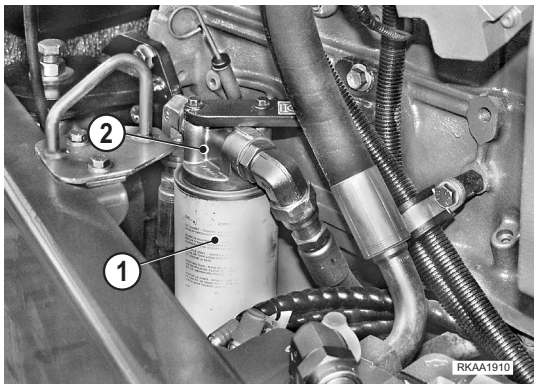



## 4.7.8.g CHANGING THE ENGINE OIL FILTER

**⚠ DANGER**

- **Soon after the machine has been stopped, the engine oil is very hot and may cause burns; let the engine cool down until it reaches a temperature of 40–45°C before draining the oil.**
- **The oil that may be spilled during the oil change will make the ground slippery, therefore, use anti-slip shoes and immediately remove any trace of oil from the floor.**
- **Oils and filters are considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**




This operation must be carried out whenever the oil is changed.
Proceed as follows:

1 - Unscrew and remove the old filter (1) using the special wrench provided.

2 - Clean the contact surface between the gasket and the filter support (2).

3 - Fill the new filter with engine oil, lubricate the gasket and screw thoroughly until the filter rests against the gasket.

4 - Give another half turn by hand.

Start the engine, make sure that there are no leakages and that the low oil pressure warning light goes out.

**IMPORTANT**

- **Do not use the wrench to lock the filter, since this may be damaged and cause oil leakages.**
- **The engine oil filter must be changed when the corresponding warning light on the dashboard comes on.**

## 4.7.8.h CHECKING THE CHAINS FOR OXIDATION (Only for the 3-section boom version)

**⚠ DANGER**

- **This is a visual check and must be performed when the chains are moving slowly. Keep your hands away from the chains.**
- **At the end of this check, before using the machine, or in any case before retracting the boom sections, reassemble and fasten all the chain protection guards.**
  **Failure to comply with these instructions can lead to severe hazard.**
- **The presence of oxide or powder oxide in the lubricant indicates that a chain is corroded and has therefore lost its safety characteristics as defined by the manufacturer.**
  **If this defect is noticed, contact your Komatsu Utility Dealer immediately for a thorough inspection and, if necessary, have the chain replaced.**

Select the WORK operating mode and position the machine on level ground, with boom sections fully retracted and lowered, frame levelled (if the relevant device is provided), parking brake applied and stabilizers (if provided) lowered to the ground.

**NOTE**

- **If the machine is not equipped with stabilizers, place a safety block in central position under the front part of the frame.**

This is a visual check and consists in spotting signs of oxidation on the extension and retraction chains.
For the inspection, proceed as follows:

1 - Remove the screws and the rear cover (1) of the main boom section (2).

2 - While the operator slowly extends the boom sections, inspect the side links of the retraction chain (3) and the sides of the rollers; the presence of lubricant with traces of oxide, or, even worse, of oxide only, means that the chains need the maintenance operations that must usually be performed EVERY 500 HOURS.

The same check must be carried out also on the boom extension upper chains (4), by proceeding as follows:

1 - With boom sections completely extended, stop the engine.

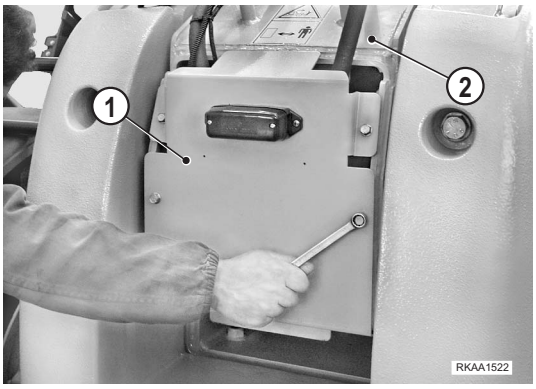
2 - Remove the screws (5), the grease nipple (6) and the casing (7).

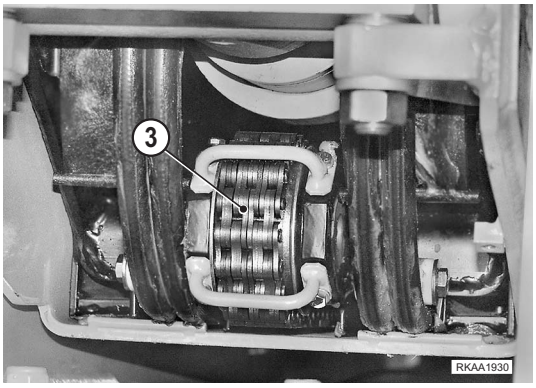
3 - Remove the guard (8).

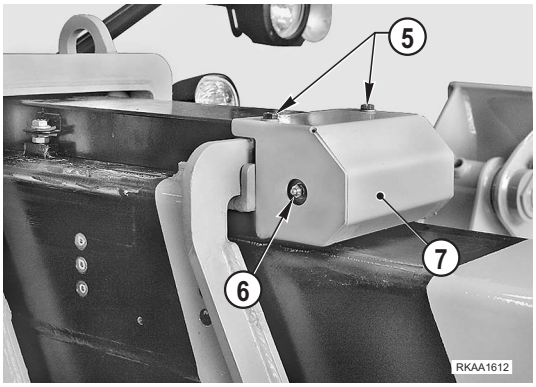
4 - Inspect the extension chains (9) for traces of oxidation;
the presence of lubricant with traces of oxide or of oxide only means that the chains need the maintenance operations that must usually be performed EVERY 500 HOURS.

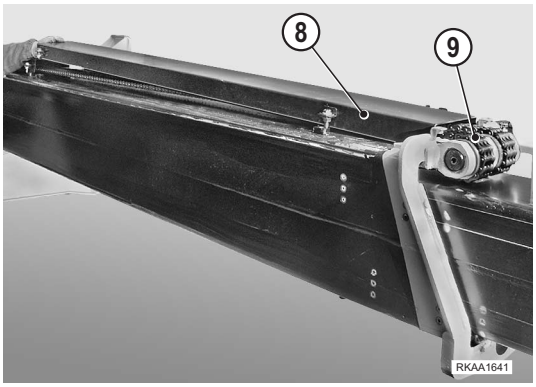
**⚠ ATTENTION**

- **Do not lubricate oxidized chains, as the lubricant promotes the re-penetration of the ejected oxide and increases wear on the driving rollers and the joint.**



## 4.7.8.i CHECKING AND TIGHTENING THE BOOM CHAINS (Only for the 3-section boom version)

**NOTE**

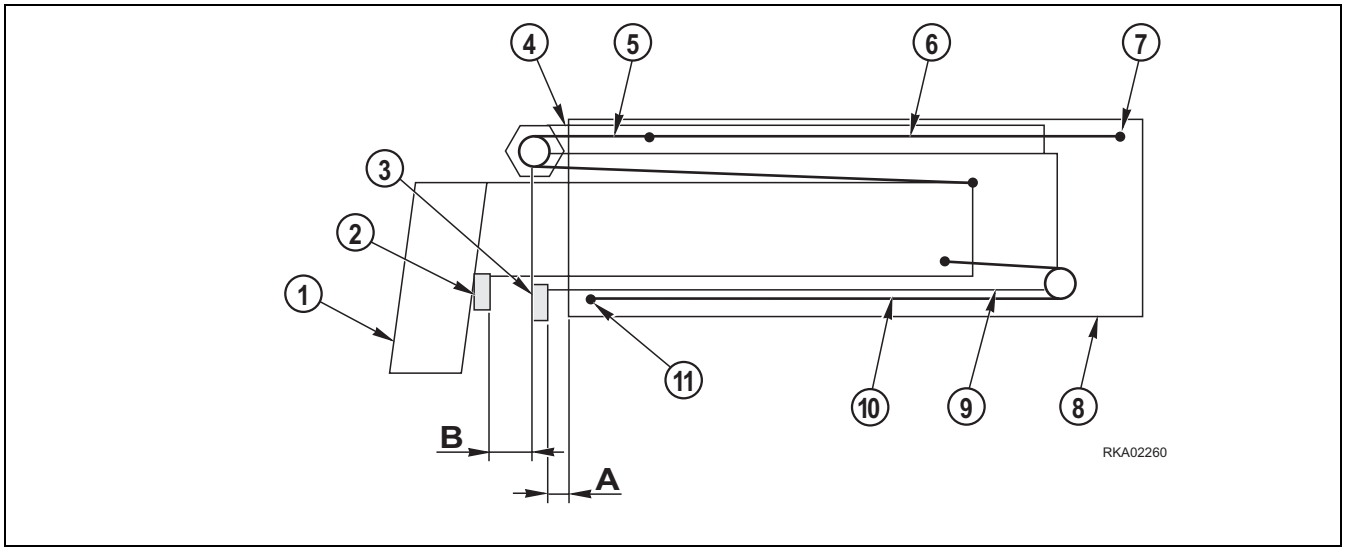
- **A flapping noise between the chain and the boom probably indicates that the chains need tightening.**

## ⚠ DANGER

- **Before starting this check, remove the front equipment and place the machine on firm and level ground (see «3.7.1 PARKING ON LEVEL GROUND»).**
- **The chain checking and tightening procedure must be carried out with boom sections fully extended. As a safety precaution, position under the intermediate boom a stand capable of supporting the entire boom before extending the boom sections and lower the stabilizers to the ground, if provided. Do not rest the boom so as to it can run freely.**
- **At the end of the tension adjustment procedures, before using the machine, or in any case before retracting the boom sections, reassemble and fasten all the chain protection guards. Failure to comply with these instructions can lead to severe hazard.**
- **If the machine isn't equipped with stabilizers, place a safety block in central position under the front part of the frame.**

## ⚠ ATTENTION

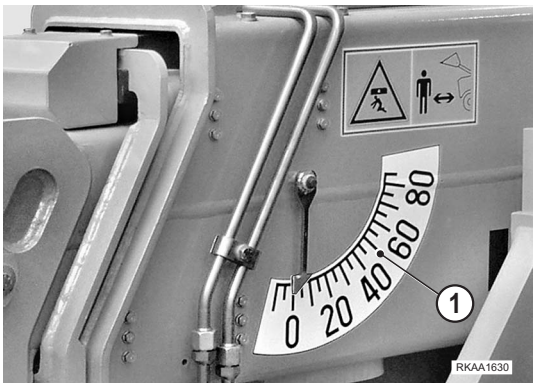
- **Before checking the chains, lubricate the sliding pads (see «4.7.3.a LUBRICATING THE ARTICULATED JOINTS AND THE PADS»).**



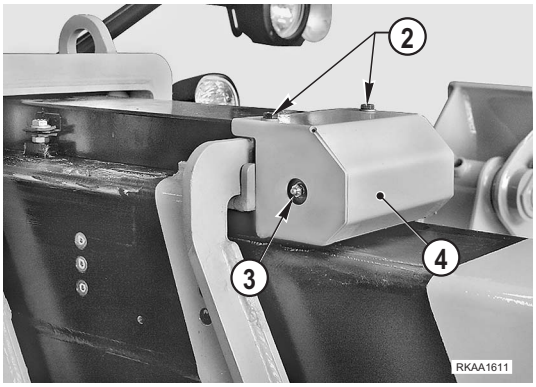

1 - Final boom section
2 - Final section pad
3 - Intermediate section pad
4 - Chain guard
5 - Extension chain
6 - Tie rod
7 - Extension chain adjusting nuts
8 - Main boom section base
9 - Intermediate boom section
10 - Boom retraction chain
11 - Retraction chain adjusting nut

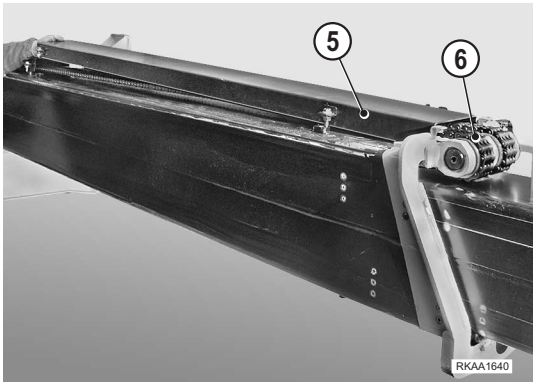
**BOOM RETRACTION CHAIN**

1 - Set the boom in horizontal position and check that the angle indicated on the goniometer (1) is 0°.

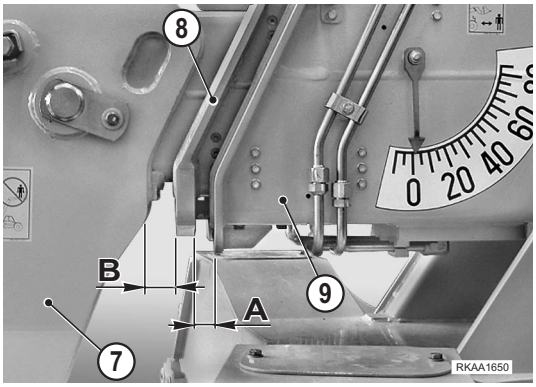



2 - Remove the screws (2) and the grease nipple (3); then remove the rear casing (4) and the upper guards (5) of the chains (6).



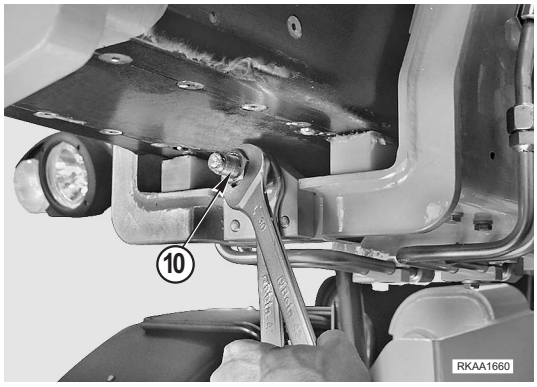




3- Verify that the distance "**B**" is more than 0mm, that is, that the end boom section (7) doesn't rest against the intermediate section (8) when the latter makes contact with the main boom section (9) (A= 0mm).



## ⚠ ATTENTION

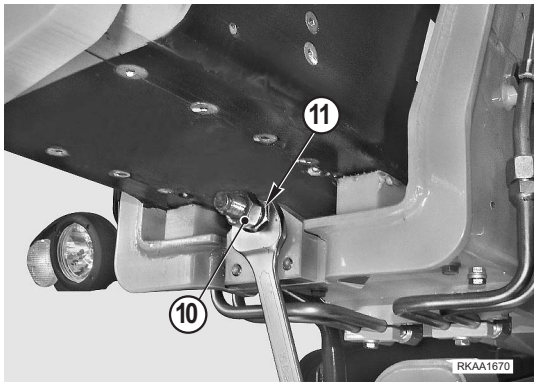
- **If the above condition is not fulfilled, proceed as follows:**
  - **a - loosen the lock nut (10) of the retraction chain adjusting nut (11);**
  - **b - loosen the adjusting nut (11) (by turning it anticlockwise);**
  - **c - extend the boom sections approximately 500 mm and then retract them;**
  - **d - make sure that the intermediate boom section (8) makes contact with the main boom section (9) (A = 0mm);**
  - **e - if necessary, repeat the adjustment procedure until the precise distance/contact is obtained.**




4 - Measure the distance "**B**" when the intermediate boom section is in contact with the main boom section.

5 - Extend the boom sections approximately 500 mm.

6 - Tighten the chain adjusting nut (11) (turning it clockwise) until the distance between the end boom section being retracted and the intermediate section corresponds to "**B**".




**IMPORTANT**

- **After two adjustments have been made, before attempting to carry out the third one, have your Komatsu Utility Dealer check the stretching of the chain.**

**NOTE**

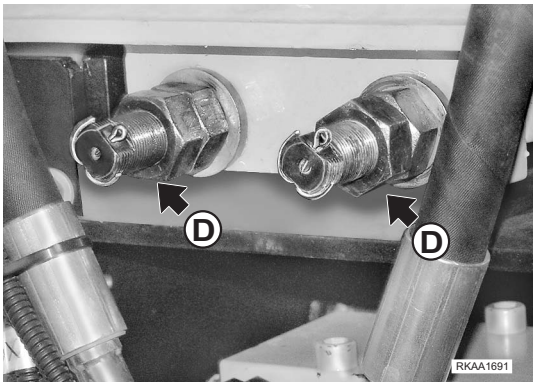
- **If the nut reaches the end of the thread, contact your Komatsu Utility Dealer to have the chain replaced.**

7 - Tighten the lock nut (10) and lock it.

**BOOM EXTENSION CHAINS**

After adjusting the retraction chain, adjust the extension chains using the rear adjustment unit "**D**" and proceed as follows:

1 - Extend the boom completely and place a stand under the intermediate section in order to prevent the boom from falling down.

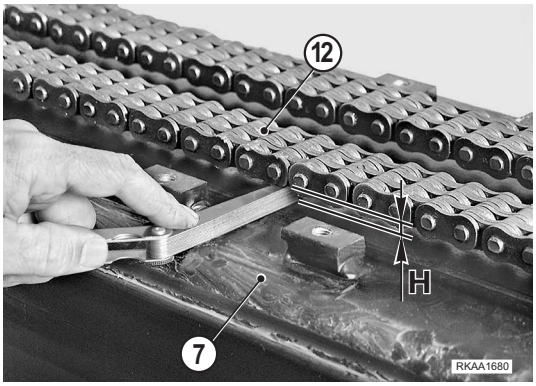



## ⚠ ATTENTION

- **The stand must have a minimum carrying capacity of 10 tons and must be positioned under the intermediate boom section. Do not rest the boom so as to it can run freely.**

2 - Slowly retract the boom sections approximately 50 mm to slacken the chains (12) slightly.

3 - Measure the distance "**H**" between the chains (12) and the surface of the boom (7) halfway between the front sprocket and the rear coupling, that is in the rear casing connection area.

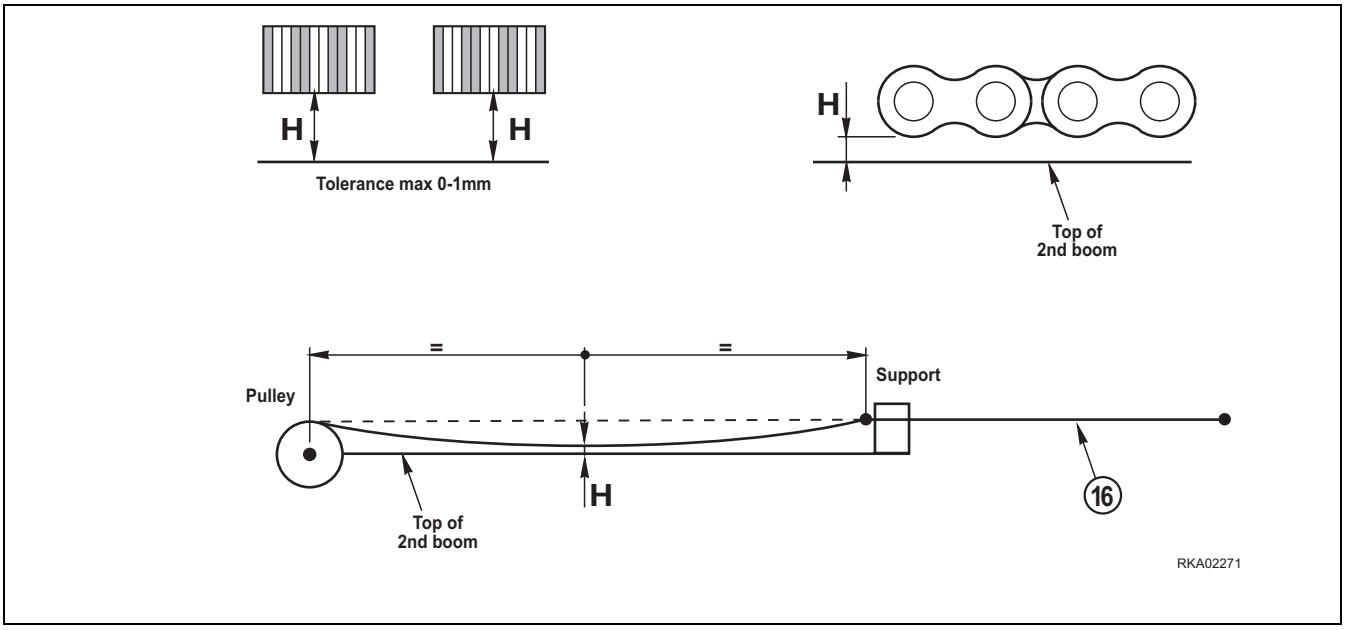



## ⚠ ATTENTION

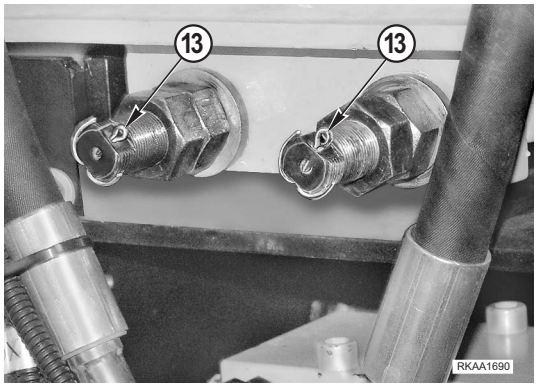
- **H" is a fixed value for this machine and corresponds to:**

| WH613-1 | WH713-1 | WH714-1 | WH714H-1 | WH716-1 |
|---|---|---|---|---|
| 14 mm | 12 mm | | | 8 mm |

- **The distances "H" of the two chains (12) must be equal to each other, and the measure of said distance "H" must be in the range of 0–1 mm.**



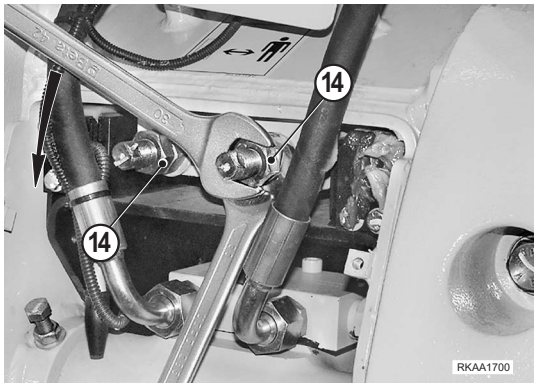
4 - If the distance "**H**" doesn't correspond to the fixed value set for the machine, remove the split pins (13), loosen the lock nuts (14) and screw the tightening nuts (15) without moving the tie rods (16).

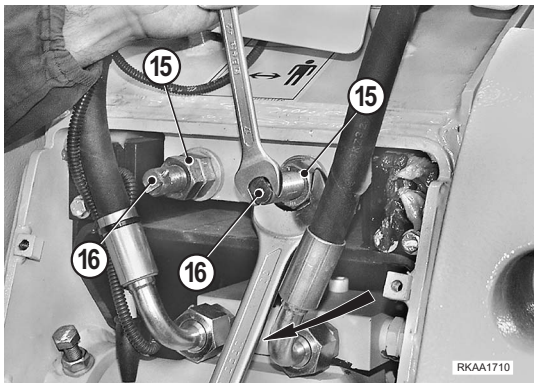



**IMPORTANT**

- **Screw the tightening nuts alternately, taking care to prevent the tie rods (16) and the chains from rotating.**
- **Replace the split pins (13).**

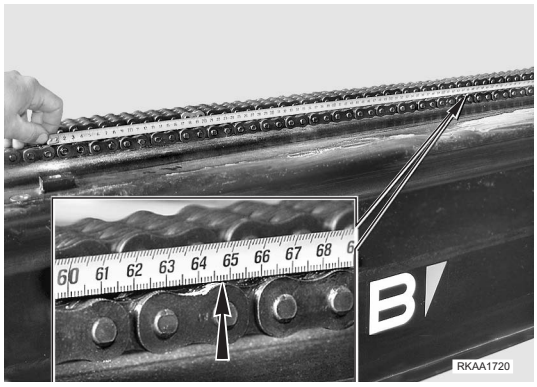
7 - Once the set tension value has been reached, tighten the lock nuts (14).




**NOTE**

- **After two adjustments have been made, before attempting to carry out the third one, have your Komatsu Utility Dealer check the stretching of the chains and evaluate if it is necessary to change them.**
- **The maximum chain stretching allowed corresponds to 3%. For this check, count 33 pitches of the mounted chain; at this point, measure this last distance and if it is equal to or exceeds 647.7±3.5 mm (= 34 pitches of a new chain) it is necessary to change the chain. Contact your Komatsu Utility Dealer to have the chains replaced.**
- **If even one single nut reaches the end of the thread, contact your Komatsu Utility Dealer to have the chains replaced.**



**CHECKING THE ADJUSTMENT**

1 - Fully retract the boom sections and make sure that when the intermediate boom section rests against the main section the distance “**B**” doesn’t exceed 2 mm (0-2mm).

**NOTE**

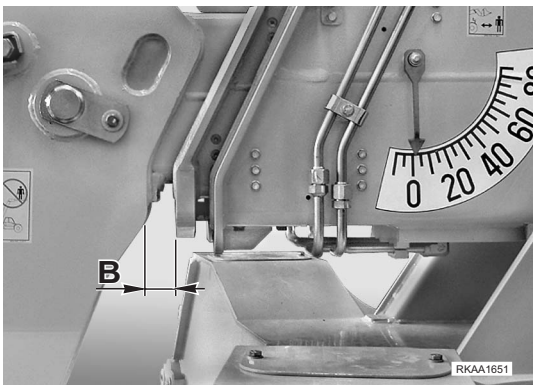
- **If the distance “B” exceeds 2mm, adjust the retraction chain again (see « BOOM RETRACTION CHAIN»).**

2 - Extend the boom sections completely and then retract them approximately 50 mm to slacken the chains slightly.

3 - Check the distance “**H**” on both chains: if the distances “**H**” are shorter than prescribed, adjust the extension chains again (see « BOOM EXTENSION CHAINS»).

4 - Reassemble all the casing and guards (4) and (5) previously removed, taking care to secure them properly.

5 - Put back the grease nipple (3) and carry out the greasing operation.



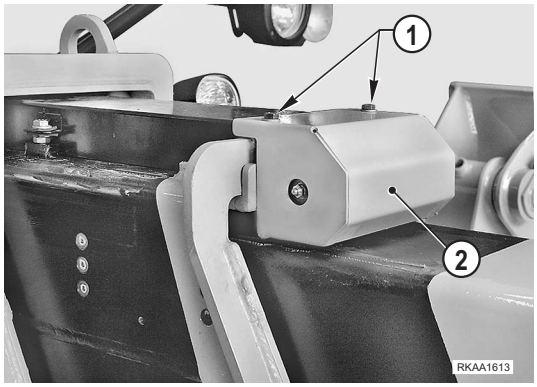

## 4.7.8.j CHECKING THE LENGTH OF THE CHAINS (Only for the 3-section boom version)

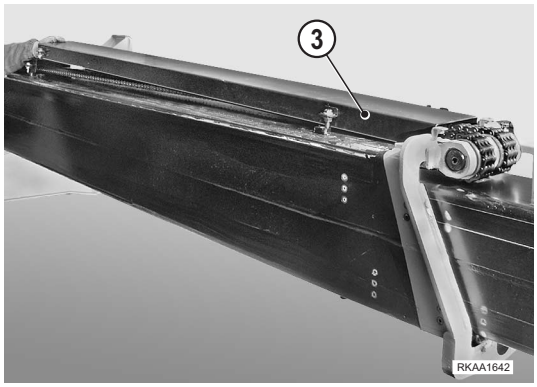
This operation requires the removal of the chains and good knowledge of the operating methods.
Contact your Komatsu Utility Dealer for this operation. As well as removing the chains, they will clean them, check their size and perform the final tension adjustment after reinstalling them.

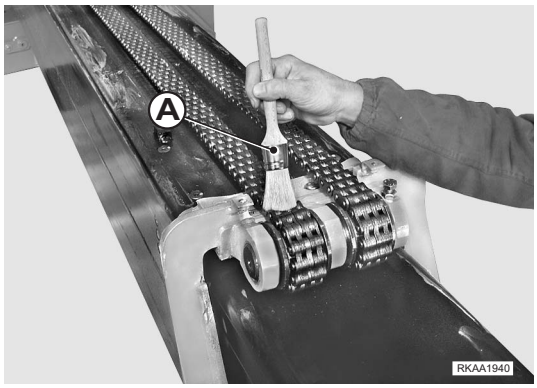
## 4.7.8.k LUBRICATING THE EXTENSION CHAINS (Only for the 3-section boom version)

**⚠ DANGER**

- **Before starting the lubrication procedure, remove the front equipment and place the machine on firm and level ground (see «3.7.1 PARKING ON LEVEL GROUND»).**
- **The chain checking and tightening procedure must be carried out with boom sections fully extended. As a safety precaution, position under the intermediate boom a stand capable of supporting the entire boom before extending the boom sections and lower the stabilizers to the ground, if provided.**
  **Do not rest the boom so as to it can run freely.**
- **At the end of lubricating procedure, before using the machine, or in any case before retracting the boom sections, reassemble and fasten all the chain protection guards.**
  **Failure to comply with these instructions can lead to severe hazard.**
- **If the machine isn't equipped with stabilizers, place a safety block in central position under the front part of the frame.**
- **Carry out the lubricating procedure in a well ventilated area, or, even better, outdoors, since inhaling oil vapours can be harmful.**
- **If using a low pressure oil spray, always wear a suitable facemask for organic and inorganic aerosol filtration, goggles with side shields and waterproof gloves, and spray the oil from a position sheltered from the wind.**




This operation must be carried out only after a negative oxidation test.
This operation must be carried out on the chains that are most subject to stress, i.e. the boom extension chains.
Proceed as follows:

1 - Remove the screws (1), the front casing (2) and the upper guards (3) of the chains.

2 - Using a low pressure oil spray filled with the prescribed oil (see «4.3 FUEL, COOLANT AND LUBRICANTS») or a brush (**A**), spray or spread oil on the inner part of the links and on the chain rollers.

**NOTE**

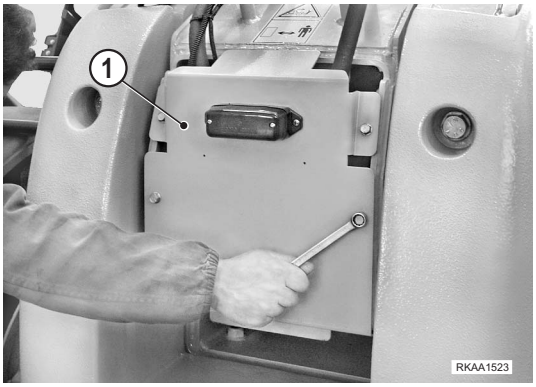
- **The oil must be new, have the same viscosity as the engine oil and be suitable for the ambient temperature at which the machine is operated.**

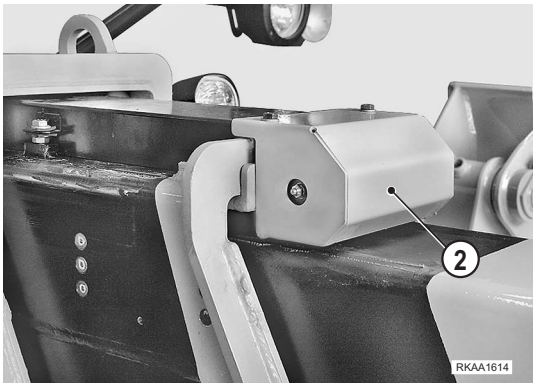
3 - Perform a few retraction and extension movements to facilitate oil penetration.

4 - With boom fully extended, wipe up any excess oil and put back the casing (2) and the guards (3).

## 4.7.8.l CHECKING THE CLEARANCE OF THE CHAIN DRIVING GEAR BUSHINGS (Only for the 3-section boom version)

This maintenance operation must be carried out together with those described in the previous paragraph, with the machine parked in the same conditions as described above.
The inspection is carried out after removing the guards (1) and (2), with a feeler gauge or with gauged wires introduced between bushing and pin on the side where the chain doesn't rest.
If the clearance reaches 1 mm, contact your Komatsu Utility Dealer.




## 4.7.8.m CHECKING THE SLIDING BLOCK CLEARANCE

This check requires the removal of some parts and good knowledge of the operating methods is therefore essential.

Contact your Komatsu Utility Dealer to have this inspection carried out. During the maintenance service to be carried out EVERY 500 HOURS, they will also adjust any boom block clearance due to settling or wear.

## 4.7.8.n CHECKING THE WHEEL NUT DRIVING TORQUE

This check serves to restore the correct driving torque of the wheels on the hubs.
The driving torque must be checked by means of a torque wrench (1) set according to the values indicated in paragraph «4.4.1 STANDARD DRIVING TORQUES».

**IMPORTANT**

- **Do not increase the specified driving torque and keep it within the prescribed ranges.**
- **Do not lubricate the thread when checking the driving torque.**

# 4.7.9 MAINTENANCE EVERY 1000 HOURS OF OPERATION OR EVERY YEAR

- **Carry out the following maintenance operations together with those to be performed EVERY 50, 100, 250 and 500 HOURS.**

## 4.7.9.a CHANGING THE FRONT AND REAR AXLE OIL

**⚠ DANGER**

- **Oil is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

This operation must be carried out with the machine positioned on level ground and at operating temperature, so that the oil becomes fluid and can easily be drained, which facilitates the elimination of any suspended solid particles.

**DIFFERENTIAL**

1 - Remove the drain plug (2) and let the used oil flow out completely. While the oil flows out, remove the plug (1).
Use a 12mm hexagon wrench.

2- Once the oil has been drained, put back the plug (2) and add oil of the prescribed type through the plug hole (1), until reaching the level corresponding to the lower edge of the hole itself.

3- Put back the plug (1).

**FINAL REDUCTION GEAR**

1 - Move the machine until the plug (3) is in low position on the vertical axis.

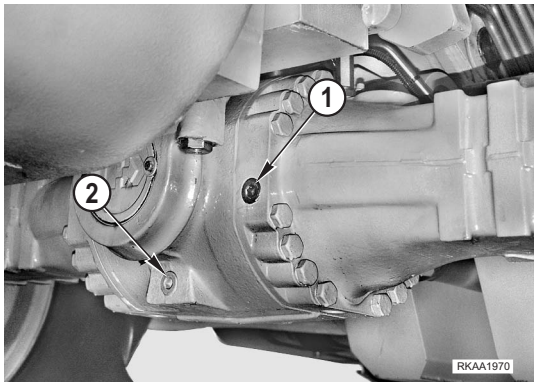
2 - Remove the plug (3) and let the used oil flow out.
Use a 12mm hexagon wrench.

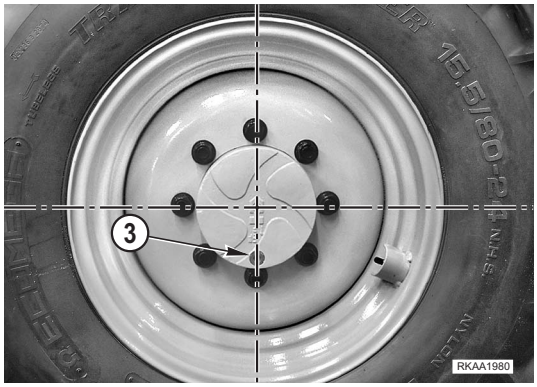
3 - Once the oil has been drained, move the machine until the plug (3), which serves also as level indicator, is positioned on the horizontal axis.

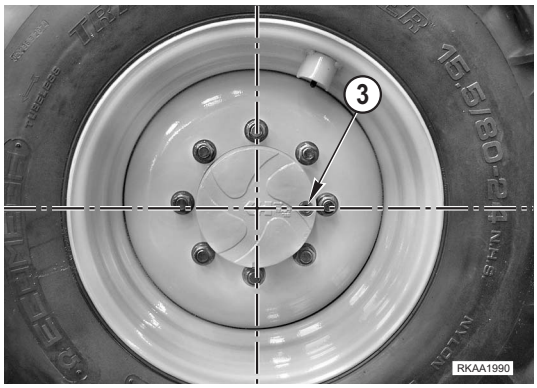
4 - Add oil of the prescribed type until reaching the lower edge of the hole itself.

5 - Put back the plug (3).

Carry out some forward and backward movements, stop the machine and check the levels again.
Always use oil of the prescribed type. (See «4.3 FUEL, COOLANT AND LUBRICANTS».



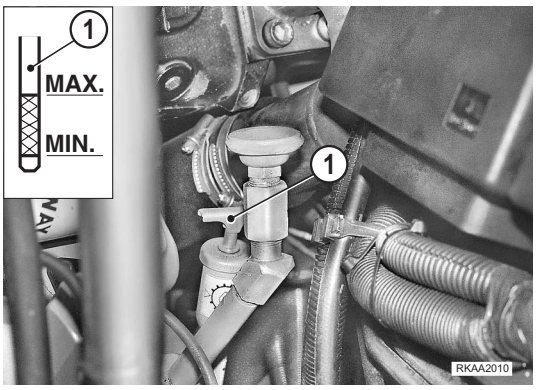
## 4.7.9.b CHANGING THE HYDRAULIC TRANSMISSION OIL

**⚠ ATTENTION**

- **Before warming up the machine to change the oil, thoroughly clean the transmission and the final reduction gear to remove any impurities from the areas involved in the operation.**

**⚠ DANGER**

- **Carry out this operation with the machine parked on level ground, with boom fully retracted and lowered and with parking brake applied.**
- **The hydraulic transmission oil must be drained at operating temperature, which is very high, and may cause severe burns; wear insulating gloves, goggles and safety shoes.**
- **Immediately clean any area dirty with oil.**
- **Oil is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**



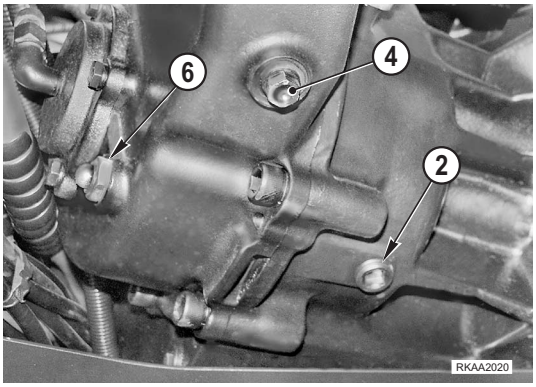

**TRANSMISSION**

When changing the transmission oil, also change the filter.
Proceed as follows:

1 - With the machine at operating temperature, stop the engine, open the engine hood and extract the dipstick (1).

2 - Remove the drain plug (2) and let the oil flow into a container with suitable capacity.

3 - Remove the filter (3) and change it. (See «4.7.9.c CHANGING THE HYDRAULIC TRANSMISSION FILTER»).

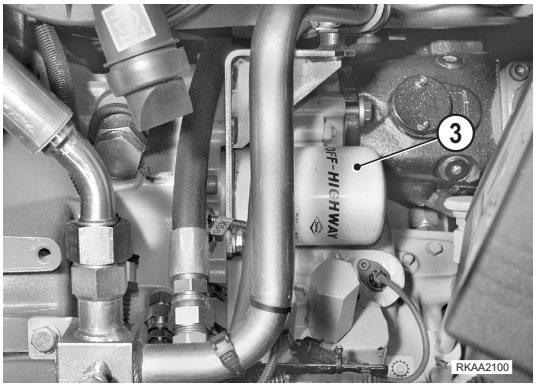



**DRIVING GEAR**

4 - Remove the drain plug (4) and let the oil flow into a container with suitable capacity.

5 - While the oil flows out, remove the filler cap (5).

6 - When the oil has been drained, clean the drain plug (4) and put it back.




**REFILLING**

7 - Refill with the prescribed oil through the filler cap (5), up to half the level gauge (6).
For the relevant specifications, see «4.3 FUEL, COOLANT AND LUBRICANTS».

8 - Put back the driving gear filler cap (5).

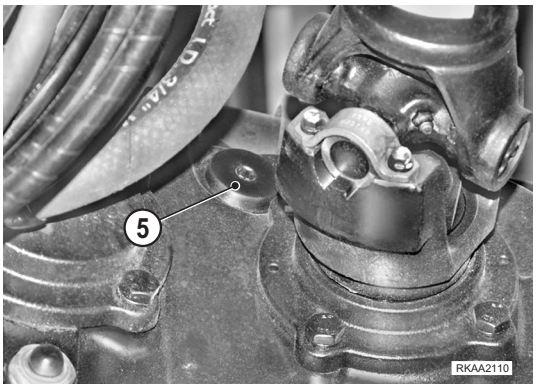
9- Put back the transmission drain plug (2) and fill with oil until reaching the MAX. mark on the dipstick (1).

10 - Start the engine and let it idle to fill the converter and the internal circuits.

11 - While the engine is idling, add oil until reaching the MAX. mark again.

12 - When the oil reaches a temperature of approximately 85–88°C, add oil until reaching the MAX. mark.

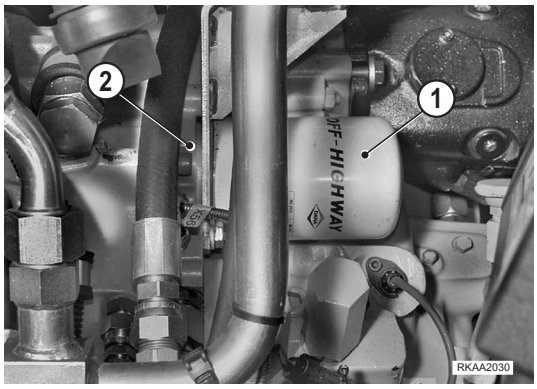
13 - Close the engine hood.

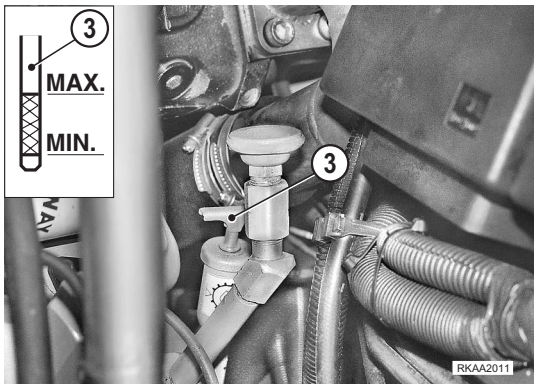


## 4.7.9.c CHANGING THE HYDRAULIC TRANSMISSION FILTER

**⚠ DANGER**

- **Soon after the machine has been stopped the transmission unit is very hot and may cause burns; let the machine cool down before changing the filter.**
- **The oil that may be spilled during the replacement of the filter will cause the floor to become slippery: use anti-slip shoes and immediately remove any trace of oil from the floor and the transmission unit.**
- **Oils and filters are considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**




Carry out this operation whenever the transmission oil is changed.
Proceed as follows:

1- While the transmission oil is being drained, use the special wrench provided to unscrew and remove the old filter (1).

3 - Clean the contact surface between the gasket and the filter support (2).

4 - Lubricate the gasket, fit it in its seat and screw the filter thoroughly until it touches the gasket.

5 - Give another half turn by hand.

6 - Start the engine, let it idle and let the oil warm up until reaching the operating temperature.

7 - Top up until reaching the MAX. mark on the dipstick (3). (See «4.7.6.d CHECKING THE TRANSMISSION OIL LEVEL»).

## 4.7.9.d CHECKING THE ENGINE COOLANT LEVEL AND TOPPING UP

- For information on this maintenance operation, see «4.7.2.c CHECKING THE ENGINE COOLANT LEVEL» and «4.7.2.d CHECKING THE RADIATOR FLUID LEVEL».

# 4.7.10 MAINTENANCE EVERY 2000 HOURS OF OPERATION OR EVERY 2 YEARS

- **Carry out these maintenance operations together with those to be performed every 50, 100, 250, 500 and 1000 HOURS.**

## 4.7.10.a CHECKING THE ALTERNATOR AND THE STARTER

- Have this inspection carried out by your Komatsu Utility Dealer.

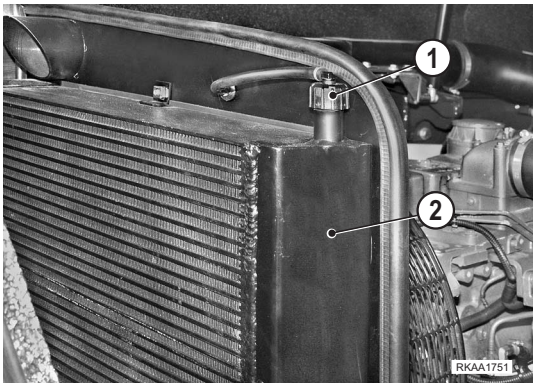
## 4.7.10.b CHANGING THE ALTERNATOR BELT

This procedure must be carried out by qualified personnel.
Have this operation performed by your Komatsu Utility Dealer.

## 4.7.10.c CHANGING THE COOLANT

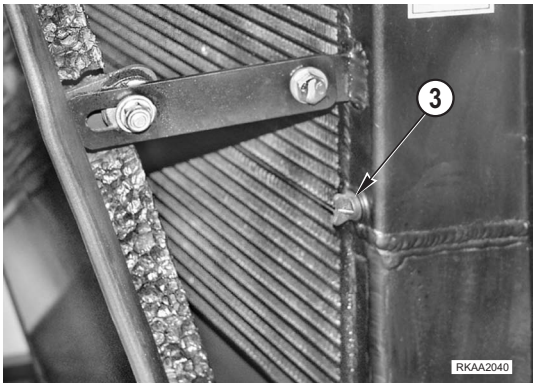
**⚠ DANGER**

- **Soon after the machine has been stopped the coolant is very hot and under pressure and it may cause serious burns; let the engine cool down until it reaches approximately 40–45°C before changing the coolant.**
- **Slowly loosen the radiator cap, in order to release any residual pressure.**
- **Coolant is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

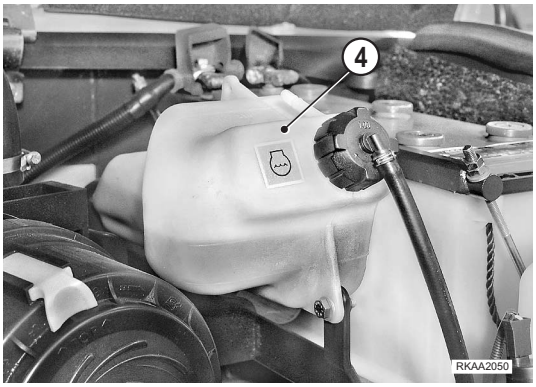



**IMPORTANT**

- **The change of permanent coolant does not require any washing cycle to remove deposits from the circuit.**




1 - Open the engine hood (see «3.5.1 ENGINE HOOD»).
2 - Loosen and remove the upper cap (1) of the radiator (2).
3 - Loosen and remove the radiator drain plug (3) and let the fluid flow out.
Drain the expansion tank (4) while the fluid flows out.
4 - Put back the drain plug (3) and fill the radiator with new fluid (see «4.3 FUEL, COOLANT AND LUBRICANTS»).
5 - Start the engine and let it run at accelerated idle speed for a few minutes; check the level again and top up before putting back the upper cap (1).
6 - Fill the expansion tank (4) until reaching the maximum level.
7 - Close the engine hood.



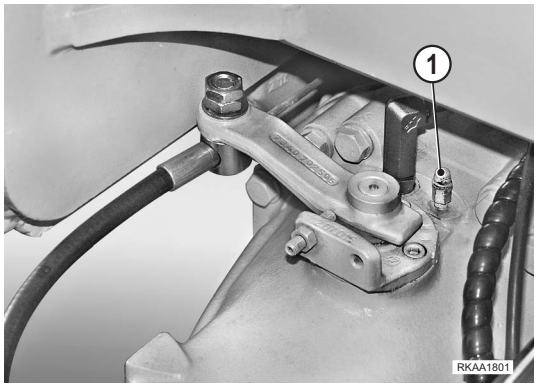
## 4.7.10.d CHANGING THE BRAKING SYSTEM OIL

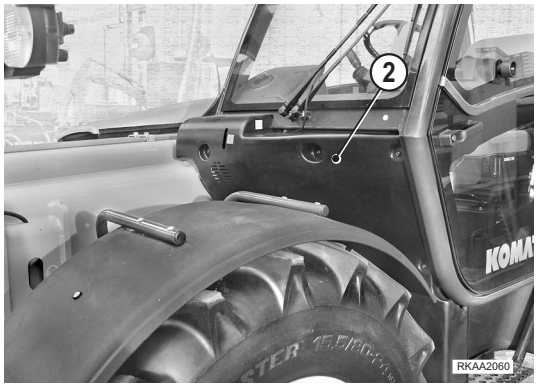
**⚠ DANGER**

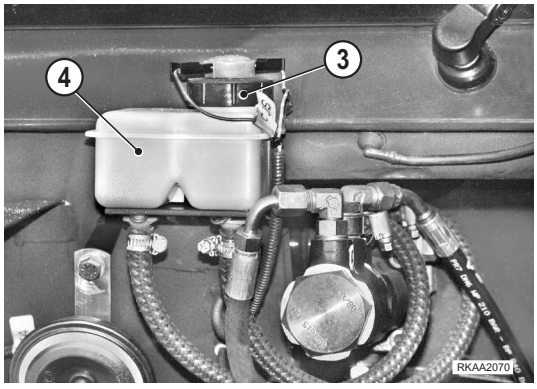
- **Oil spilled on the floor may cause the floor to become slippery; immediately clean any dirty area.**
- **Oil is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

Before changing the braking system oil, it is advisable to brake a few times in order to warm up and fluidize the oil and therefore facilitate draining.
The oil change and the bleeding of the braking system must be carried out with the machine positioned on level ground, with boom fully retracted and lowered and parking brake applied.
Drain the oil and wash the system, proceeding as follows:

1 - Apply a small pipe for the collection of the oil to the drain screws (1) and loosen them.
2 - Remove the front guard (2) and the cap (3) from the reservoir (4).
3 - Operate the brake pedal until the oil contained in the reservoir (4) runs out.
4 - Fill the reservoir (4) with new oil and keep pressing the pedal; fill the reservoir (4) more than once until the used oil (about 0.8 l) has been changed completely; bleed any residual air. (See the following paragraph).
For details on the oil to be used, see «4.3 FUEL, COOLANT AND LUBRICANTS»



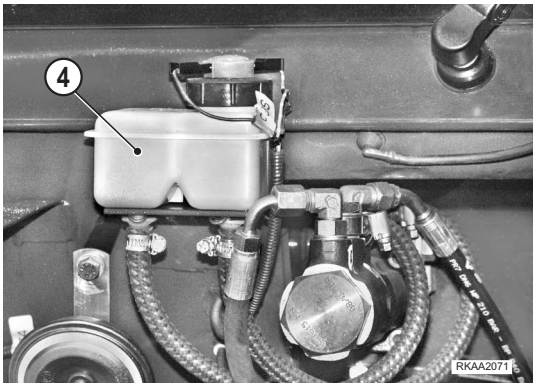
## BLEEDING THE BRAKING CIRCUIT

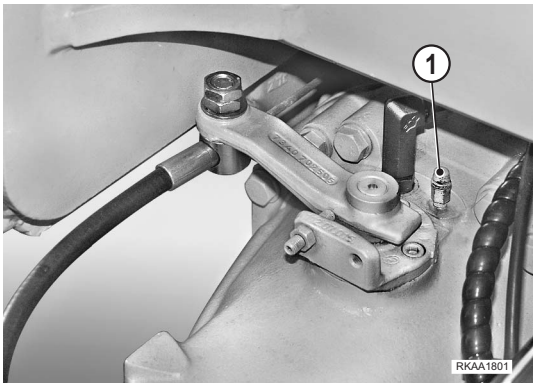
This operation is important, since it ensures the braking efficiency and power of the machine.
Proceed as follows:

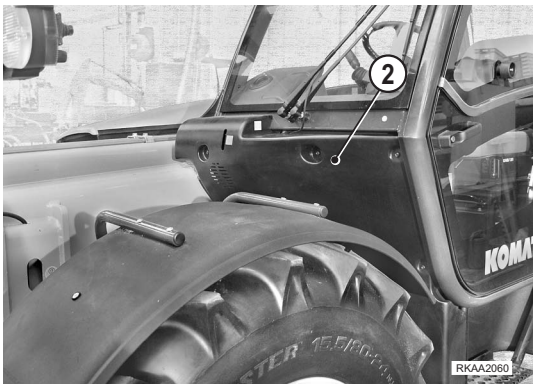
1 - Make sure that the oil in the braking system reservoir (4) reaches the maximum level.
2 - Start the engine and let it idle.
Press the brake pedal thoroughly and, while keeping it pressed, loosen the drain screw (1) of the relevant brake assembly until the pedal reaches the end of stroke.
3 - While keeping the pedal completely pressed, tighten the drain screw (1).
4 - Release the brake pedal, wait a few seconds and repeat the operations described above until no air bubbles can be noticed in the oil that flows out of the drain screw (1).
5 - Carry out the same procedure on the remaining brake assemblies.
6 - After bleeding, start the machine and check the braking performance (see «4.7.2.g CHECKING THE SERVICE BRAKES»); if necessary, repeat the bleeding procedure.
7 - Put back the front guard (2).

**IMPORTANT**

- **When bleeding the system, apply a small pipe to the screws (1), in order to collect the oil.**
- **The bleeding procedure must be carried out on both axles (four braking assemblies).**
- **Check the oil level in the braking system reservoir frequently and top up whenever the oil level is near the minimum mark.**
- **To top up, use only new oil of the prescribed type.**



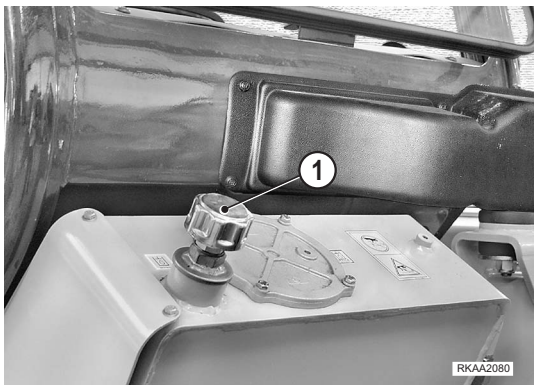



## 4.7.10.e CHANGING THE HYDRAULIC OIL AND CLEANING THE INTAKE FILTER

**⚠ DANGER**

- **After stopping the engine, with the machine positioned on level ground, boom fully retracted and lowered and parking brake applied, release any residual pressure from the tank by slowly loosening the filler cap.**
- **Let the oil cool down to 40–45°C before carrying out this maintenance operation.**
- **Immediately clean any area dirty with oil.**
- **Oil is considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**



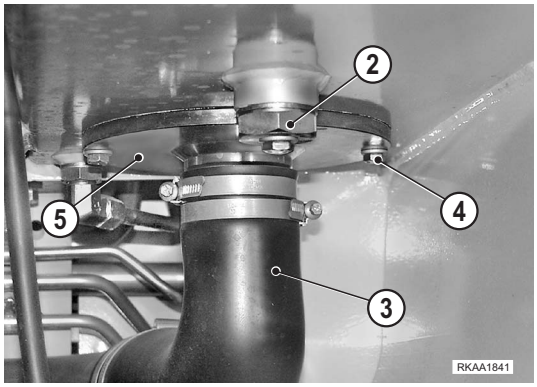

1- Remove the filler cap (1).

2- Remove the drain plug (2) and let the oil flow out, gathering it into a container with suitable capacity.

3- Loosen the clamps and disconnect the intake coupling (3).

4 - Loosen and remove the screws and remove the flange (5) complete with gasket (6) and filter (7).

5- Clean the filter (7) using light solvents (kerosene, diesel oil, etc.); dry the filter with low-pressure compressed air (max. 3 bars).




**IMPORTANT**

- **Carefully check the condition of the filtering element grid and if there is any doubt about its soundness, change it.**

6- Position the gasket (6) and put back the flange (5) complete with filter (7).

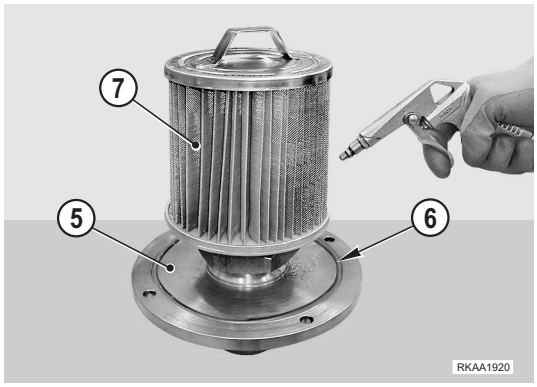
7 - Connect the intake coupling (3) and secure it with the clamps.

8- Change the drain filter (see «4.7.8.d CHANGING THE HYDRAULIC OIL DRAIN FILTER».

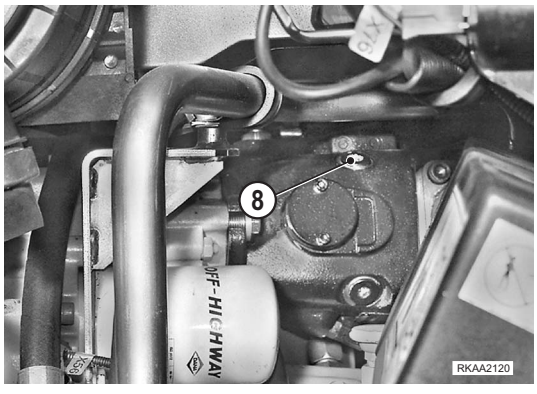
9- Put back the drain plug (2) and fill the oil tank with the prescribed oil until reaching the correct level.

10- Open the engine hood.

11- Loosen the bleed plug (8) that is positioned on the hydraulic pump, until no air bubbles can be observed in the oil that flows out. Tighten the bleed plug (8) and close the engine hood.




12 - Put back the filler cap (1), start the engine and operate the machine making each piston move several times in order to bleed the system.
Stop the machine in maintenance position, check the oil level again and top up if necessary.
Always use oil of the prescribed type (See «4.3 FUEL, COOLANT AND LUBRICANTS»).




**IMPORTANT**

- **Do not start the engine with empty tank, since this would certainly damage the pump.**

# 4.7.11 MAINTENANCE EVERY 3 YEARS

## 4.7.11.a CHANGING THE SAFETY BELT

The machine is equipped with a seat provided with homologated safety belt.
Change the safety belt every three years even if it shows no cuts, worn fabric or damaged seams.
Before installing a new belt, make sure that the anchor screws are not worn or corroded.

# 4.7.12 MAINTENANCE EVERY 3000 HOURS OF OPERATION OR EVERY 3 YEARS

## 4.7.12.a CHANGING THE ENGINE THERMOSTATIC VALVE

This procedure must be carried out by qualified personnel.
Have this operation performed by your Komatsu Utility Dealer.

## 4.7.12.b CHECKING THE ENGINE ANTIVIBRATION AND RETAINING SCREWS

This procedure must be carried out by qualified personnel.
Have this operation performed by your Komatsu Utility Dealer.

## 4.7.12.c CHECKING AND ADJUSTING THE ENGINE VALVE CLEARANCE AND THE INJECTION TIMING ADVANCE

Since these checks and adjustment operations require the use of special tools, have these operations carried out by qualified personnel supplied by your Komatsu Utility Dealer.

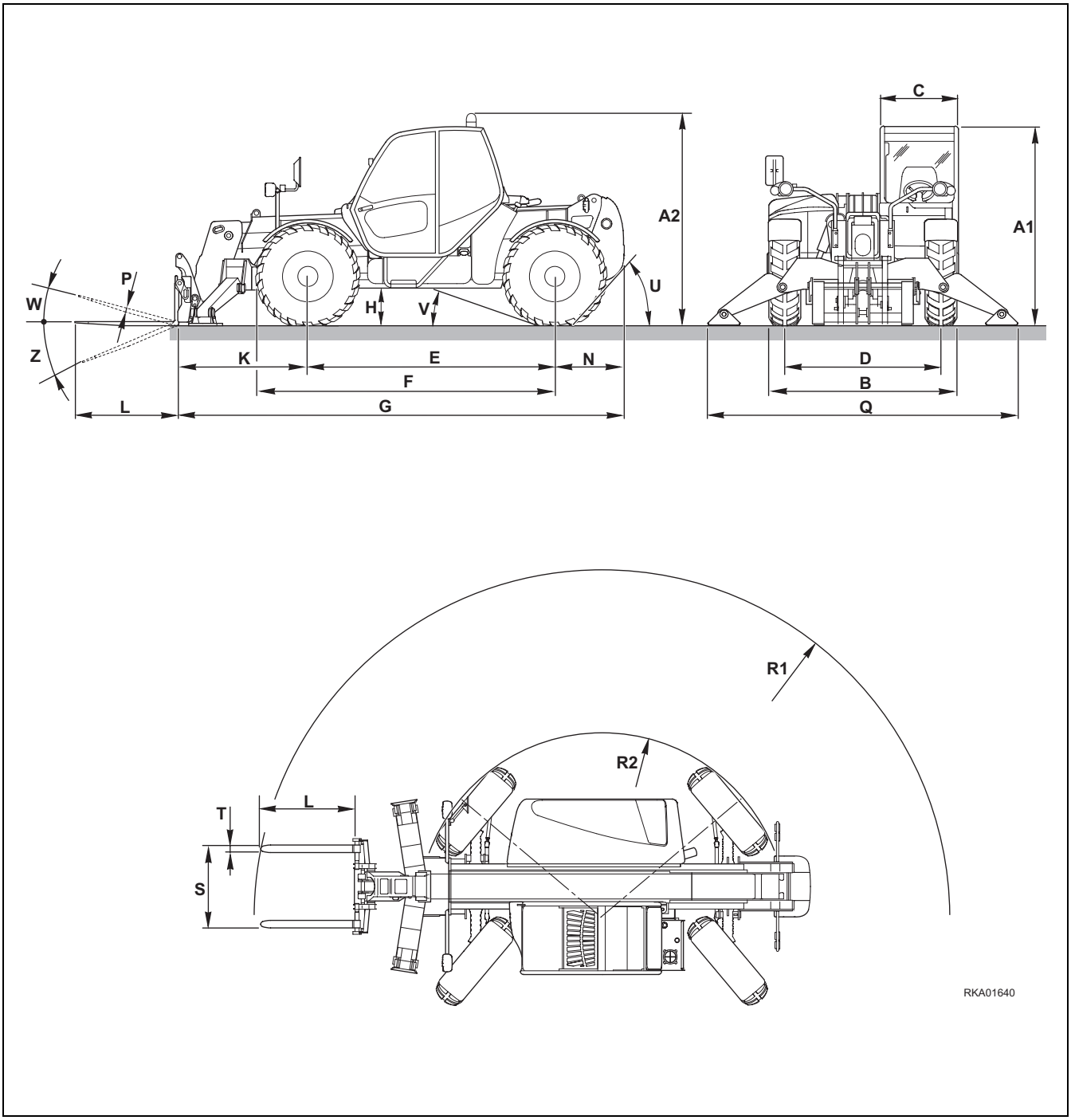
# TECHNICAL DATA

# 5.1 TECHNICAL DATA

## 5.1.1 DIMENSIONS WITH FORKS

**NOTE**

- **The following dimensional data refer to the machine equipped with the tyres listed below:**
  **WH609 - WH609 turbo:....405/70-24 PR14**
  **WH613 - WH613 turbo:....405/70-24 PR14**
  **WH713: .....15.5/80 24 PR12**
  **WH714 - WH714H: .....14.00 24 PR16**
  **WH716: .....14.00 24 PR16**



Unit of measurement: mm

| | WH609 | WH613 | WH713 | WH714 | WH714H | WH716 |
|---|---|---|---|---|---|---|
| **A1** | 2390 | 2390 | 2435 | 2450 | 2450 | 2450 |
| **A2** | 2555 | 2555 | 2600 | 2615 | 2615 | 2615 |
| **B** | 2370 | 2370 | 2370 | 2405 | 2405 | 2405 |
| **C** | 960 | 960 | 960 | 960 | 960 | 960 |
| **D** | 2005 | 2005 | 2005 | 2005 | 2005 | 2005 |
| **E** | 3020 | 3020 | 3350 | 3350 | 3350 | 3350 |
| **F** | 4469 | 4469 | 5099 | 5124 | 5124 | 5124 |
| **G** | 5525 | 5700 | 6170 | 6170 | 6170 | 6865 |
| **H** | 400 | 400 | 430 | 465 | 465 | 465 |
| **K** | 1660 | 1835 | 1720 | 1720 | 1720 | 2415 |
| **L** | 1220 | 1220 | 1220 | 1220 | 1220 | 1220 |
| **N** | 845 | 845 | 1100 | 1100 | 1100 | 1100 |
| **P** | 50 | 50 | 50 | 50 | 50 | 50 |
| **Q** | – | 3630 | 3630 | 3630 | 3630 | 3630 |
| **R1** | 5072 | 5273 | 5336 | 5336 | 5336 | 5959 |
| **R2** | 3615 | 3615 | 3724 | 3724 | 3724 | 3724 |
| **S** | 1214 | 1214 | 1214 | 1214 | 1214 | 1214 |
| **T** | 100 | 100 | 100 | 130 | 130 | 130 |
| **U** | 47° | 47° | 38° | 39° | 39° | 39° |
| **V** | 19° | 19° | 20° | 21° | 21° | 21° |
| **W** | 23° | 23° | 23° | 23° | 23° | 23° |
| **Z** | 117° | 117° | 117° | 117° | 117° | 117° |

# 5.1.2 TECHNICAL CHARACTERISTICS

## 5.1.2.1 TECHNICAL CHARACTERISTICS WH609 (Aspirated engine)

### TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, without stabilizers, without frame levelling device, without rear axle swing lock) | kg | 8660 |

### ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | 4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 60 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 320 |

### ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

### TRAVEL SPEED

**(calculated with 405/70-24 PR14 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| **km/h** | 5 | 11 | 16 | 21 | 33 | 5 | 11 | 21 |

### TYRES

**NOTE**

**•The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**

**To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

## 5.1.2.2 TECHNICAL CHARACTERISTICS WH609 (Turbo engine)

### TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, without stabilizers, without frame levelling device, without rear axle swing lock) | kg | 8660 |

### ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

### ELECTRICAL SYSTEM

| | |
|---|---|
| Alternator | 12 V |
| Electrical output | 90 A |
| Grounding | negative |
| Battery | 110 Ah-12 V |
| Starter | 3 kW |

### TRAVEL SPEED

**(calculated with 405/70-24 PR14 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 6 | 13 | 19 | 25 | 38 | 6 | 13 | 25 |

### TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

## 5.1.2.3 TECHNICAL CHARACTERISTICS WH613 (Aspirated engine)

### TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, with stabilizers, without frame levelling device, without rear axle swing lock) | kg | 9800 |

### ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | 4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 60 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 320 |

### ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

### TRAVEL SPEED

**(calculated with 405/70-24 PR14 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 5 | 11 | 16 | 21 | 33 | 5 | 11 | 21 |

### TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

## 5.1.2.4 TECHNICAL CHARACTERISTICS WH613 (Turbo engine)

### TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, with stabilizers, without frame levelling device, without rear axle swing lock) | kg | 9800 |

### ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

### ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

### TRAVEL SPEED

**(calculated with 405/70-24 PR14 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 6 | 13 | 19 | 25 | 38 | 6 | 13 | 25 |

### TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 405/70-24 PR14 | Ecomega | 4.5 bar |

## 5.1.2.5 TECHNICAL CHARACTERISTICS WH713

## TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, with stabilizers, with frame levelling device, without rear axle swing lock) | kg | 10550 |

## ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

## ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

## TRAVEL SPEED

**(calculated with 15.5/80-24 PR12 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 5 | 11 | 17 | 23 | 35 | 5 | 11 | 23 |

## TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 15.5/80-24 PR12 | Ecomega | 4.0 bar |
| **Optionals** | 15.5/80-24 PR14 | Ecomega | 4.5 bar |
| **Optionals** | 14.00 -24 PR12 | Ecomega | 4.25 bar |
| **Optionals** | 15.5 -25 PR16 | Ecomega | 4.0 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 15.5/80-24 PR12 | Ecomega | 4.0 bar |
| **Optionals** | 15.5/80-24 PR14 | Ecomega | 4.5 bar |
| **Optionals** | 14.00 -24 PR12 | Ecomega | 4.25 bar |
| **Optionals** | 15.5 -25 PR16 | Ecomega | 4.0 bar |

## 5.1.2.6 TECHNICAL CHARACTERISTICS WH714

## TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, with stabilizers, with frame levelling device, without rear axle swing lock) | kg | 10620 |

## ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

## ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

## TRAVEL SPEED

**(calculated with 14.00 -24 PR16 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 6 | 13 | 19 | 25 | 38 | 6 | 13 | 25 |

## TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |
| **Optionals** | 15.5 -25 PR16 | Ecomega | 4.0 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |
| **Optionals** | 15.5 -25 PR16 | Ecomega | 4.0 bar |

## 5.1.2.7 TECHNICAL CHARACTERISTICS WH714H

## TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, with stabilizers, with frame levelling device, without rear axle swing lock) | kg | 11180 |

## ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

## ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

## TRAVEL SPEED

**(calculated with 14.00 -24 PR16 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| **km/h** | 6 | 13 | 19 | 25 | 38 | 6 | 13 | 25 |

## TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |

## 5.1.2.8 TECHNICAL CHARACTERISTICS WH716

## TOTAL WEIGHT

| | | |
|---|---|---|
| Total weight (machine ready to start equipped with forks, stabilizers, frame levelling device and rear axle swing lock) | kg | 11590 |

## ENGINE

| | | |
|---|---|---|
| Komatsu diesel engine model | | S4D104E-1 |
| Rated power (2300 rpm EEC 80/1269) | kW | 74 |
| Maximum torque (1400±100 rpm EEC 80/1269) | Nm | 398 |

## ELECTRICAL SYSTEM

| | | |
|---|---|---|
| Alternator | | 12 V |
| Electrical output | | 90 A |
| Grounding | | negative |
| Battery | | 110 Ah-12 V |
| Starter | kW | 3 |

## TRAVEL SPEED

**(calculated with 14.00 -24 PR16 tyres and engine at 2300 rpm)**

| GEARS | 1st | 2nd | 3rd | 4th | 5th | R1 | R2 | R3 |
|---|---|---|---|---|---|---|---|---|
| km/h | 6 | 13 | 19 | 25 | 38 | 6 | 13 | 25 |

## TYRES

**NOTE**

- **The maximum inflation pressure indicated on the tyre may differ from the pressure stated in the table below.**
  **To ensure the maximum stability of the machine, KEEP TO THE INFLATION PRESSURE VALUES INDICATED IN THE TABLE, which have been agreed with the tyre manufacturers in accordance with the standards set by the European Tyre and Rim Technical Organisation (ETRTO).**

**⚠ ATTENTION**

- **It is absolutely forbidden mount tyres not indicated below. For more informations contact your Komatsu Utility Dealer.**

### FRONT TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |

### REAR TYRES

| | SIZE | MAKE | INFLATION PRESSURE |
|---|---|---|---|
| **Standard** | 14.00 -24 PR16 | Ecomega | 5.5 bar |

## 5.1.3 VIBRATIONS TO WHICH THE OPERATOR IS SUBJECTED

- According to the results of the tests carried out to determine the vibrations transmitted to the operator by the machine, the upper limbs are subjected to vibrations lower than 2.5 m/sq.sec., while the seated part of the body is subjected to vibrations lower than 0.5 m/sq.sec.

## 5.1.4 LOAD DISTRIBUTION ON THE AXLES

**NOTE**

- **The values indicated in the table below refer to the machine ready to start with operator on board, equipped with forks, filled with coolant, lubricants and fuel, without optional equipment.**

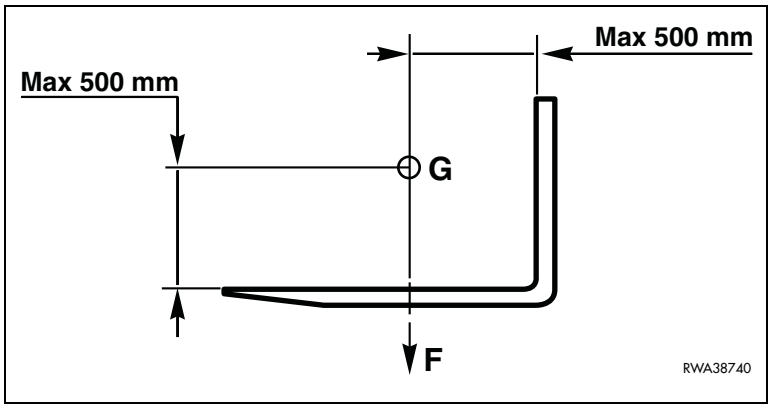
| | | WH609<br>WH609 turbo | WH613<br>WH613 turbo | WH713 | WH714 | WH714H | WH716 |
|---|---|---|---|---|---|---|---|
| Load on front axle | kg | 4050 | 5290 | 5230 | 5300 | 5230 | 5760 |
| Load on rear axle | kg | 4610 | 4510 | 5320 | 5320 | 5950 | 5830 |
| Weight of the machine | kg | 8660 | 9800 | 10550 | 10620 | 11180 | 11590 |

# 5.1.5 OPERATING PERFORMANCE

## 5.1.5.1 OPERATING PERFORMANCE WITH FORKS (ON WHEELS)

**NOTE**

- **The indicated data have been taken with centre of gravity (G) of the load positioned at 500 mm.**




| | | WH609<br>WH609 turbo | WH613<br>WH613 turbo | WH713 | WH714 | WH714H | WH716 |
|---|---|---|---|---|---|---|---|
| Max. lifting capacity | kg | 3500 | 3500 | 3700 | 4000 | 4500 | 4000 |
| Lifting capacity at max. height | kg | 2700<br>(1000) | 2000<br>(350) | 2000<br>[3000] | 1500<br>[3000] | 2000<br>[3500] | 2000 |
| Lifting capacity with max. outreach | kg | 1100 | 300 | 600 | 450 | 520 | 280 |
| Max. lifting height | m | 9.0 | 12.4 | 12.9 | 13.9 | 13.9 | 15.9 |
| Reach at max. lifting height | m | 0.4 | 1.4 | 0.7 | 1.0 | 1.0 | 1.8 |
| Max. forward outreach | m | 5.2 | 8.8 | 8.7 | 9.6 | 9.6 | 11.7 |
| Outreach with 1 ton load | m | 5.2* | 6.0 | 6.5 | 7.1 | 7.9 | 7.1 |

( ): without frame levelling

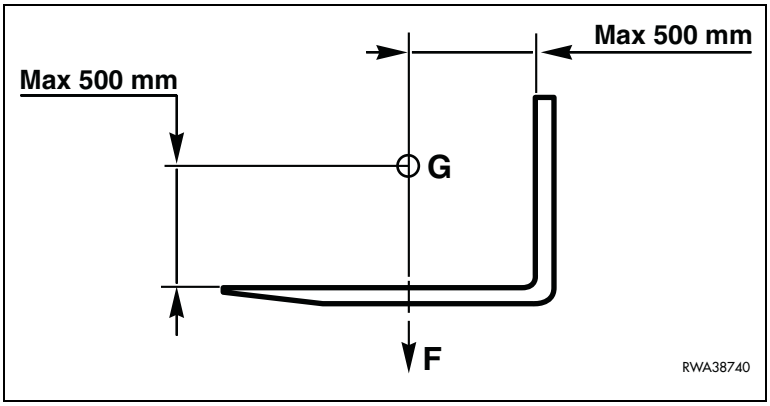
[ ]: with rear axle swing lock

* : max. outreach

## 5.1.5.2 OPERATING PERFORMANCE WITH FORKS (ON STABILIZERS)

**NOTE**

- **The indicated data have been taken with centre of gravity (G) of the load positioned at 500 mm.**




| | | WH613<br>WH613 turbo | WH713 | WH714 | WH714H | WH716 |
|---|---|---|---|---|---|---|
| Max. lifting capacity | kg | 3500 | 3700 | 4000 | 4500 | 4000 |
| Lifting capacity at max. height | kg | 3500 | 3700 | 4000 | 4000 | 2500 |
| Lifting capacity with max. outreach | kg | 1230 | 1460 | 1300 | 1350 | 1000 |
| Max. lifting height | m | 12.7 | 13.1 | 14.1 | 14.1 | 16.1 |
| Reach at max. lifting height | m | 0.8 | 0.1 | 0.4 | 0.4 | 1.0 |
| Max. forward outreach | m | 8.8 | 8.7 | 9.6 | 9.6 | 11.7 |
| Outreach with 1 ton load | m | 8.8* | 8.7* | 9.6* | 9.6* | 11.7* |

* : max. outreach