WEAM000402

Operation & Maintenance Manual

PC110R-1

HYDRAULIC EXCAVATOR

SERIAL NUMBER

PC110R-1 2265010001 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

1.4.7 SERIAL NUMBERS AND DEALER'S ADDRESS

Machine n. _____ Model _____

Engine n. _____

Travel reduction gear n. _____

Swing reduction gear n. _____

Cab n. _____

Dealer:

_____

_____

_____

_____

Address _____

_____

_____ Tel. _____

Person to contact: _____

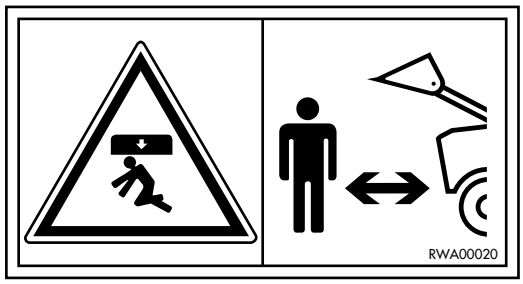
NOTES: _____

2.1.2 PICTOGRAMS AND RELEVANT MEANINGS

The warning and danger plates applied onto the machine are accompanied or represented by pictograms.
The personnel in charge with the operation and maintenance of the machine must know the symbols contained in the pictograms perfectly; the following description illustrates what they look like and their respective meanings.

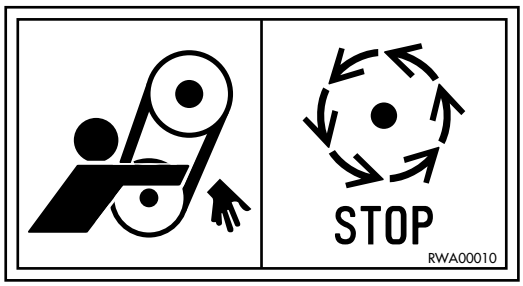
DANGER IN THE WORK AREA

- Do not approach or stand within the equipment operating radius when the boom and the bucket are raised.



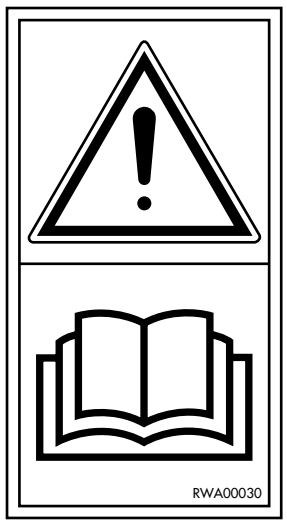
DO NOT OPEN THE HOOD

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

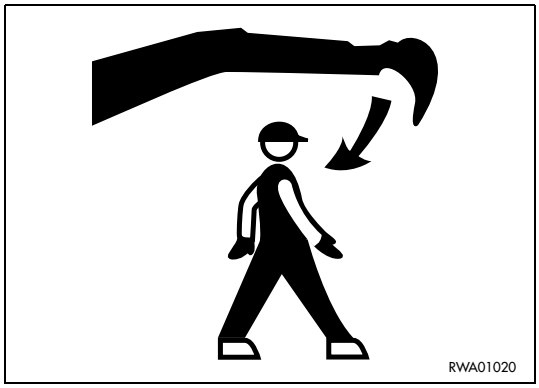


CONSULT THE MANUAL

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

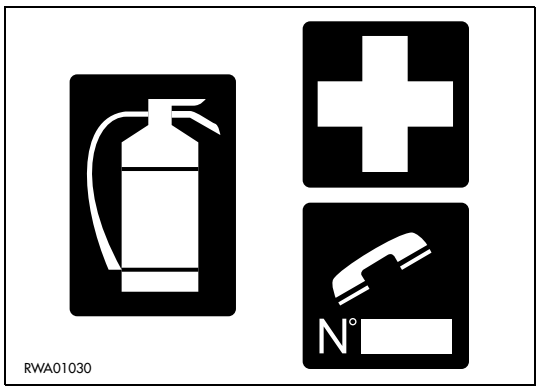


2.2.10 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT



- Do not stand within or approach the operating radius of the work equipment, even when the operator is on board the machine and the engine is running.
- Do not stand or work under the arms or the articulations when the arms are lifted, if you are not sure that the safety locks have been duly engaged.
- Do not carry out any operation requiring the lifting of the arms, if you are not sure that the locks are correctly positioned and coupled to the arms.

2.2.11 FIRE EXTINGUISHERS AND FIRST AID KIT



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

2.2.12 PRECAUTIONS CONCERNING THE CAB STRUCTURE

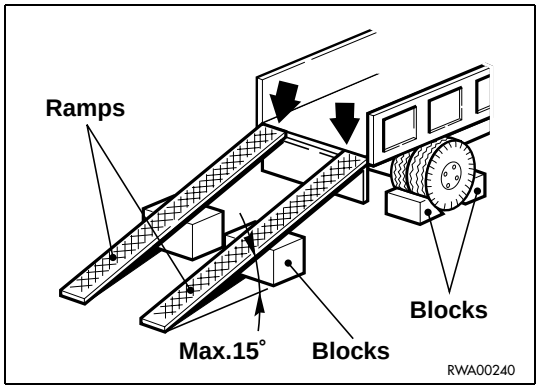
- If the cab is inadvertently hit or the machine overturns during work, the cab may be damaged with consequent reduction of its stiffness and of the safety that must be guaranteed to the operator.
  Consult Komatsu Utility or your Komatsu Utility Dealer to have the cab structure and resistance checked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

2.2.13 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 life of the machine.
- Komatsu Utility cannot be held liable for any damage, accident, product failure resulting from the installation and use of unauthorized equipment.

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. Proceed with extreme care.
- Perform loading and unloading on firm, level ground. Maintain a safety distance from the edges of ditches or from road sides.
- If the vehicles used have not been appositely equipped, put support blocks under the ramps, in order to avoid any bending.
- Always lock 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 side board and their distance must be suitable for the tread of the machine.
- Make sure that the ramps are securely positioned and anchored 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 tracks before starting to load the machine on the vehicle.
- The machine must be loaded on the vehicle with the bucket directed forwards, that is, in the direction of advancement of the vehicle.
- Do not correct the trajectory of the machine on the ramps. If necessary, get down the ramps and start the operation again.
- After loading the machine, block the tracks 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”).

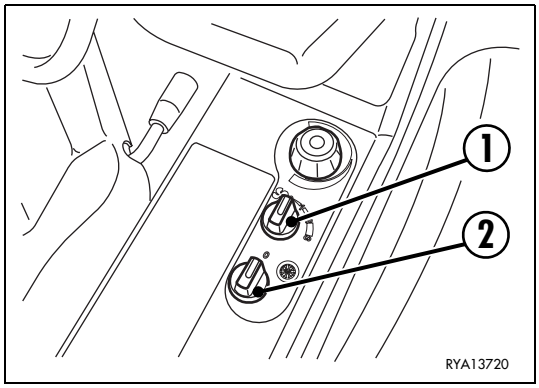
2.5.2 SHIPPING

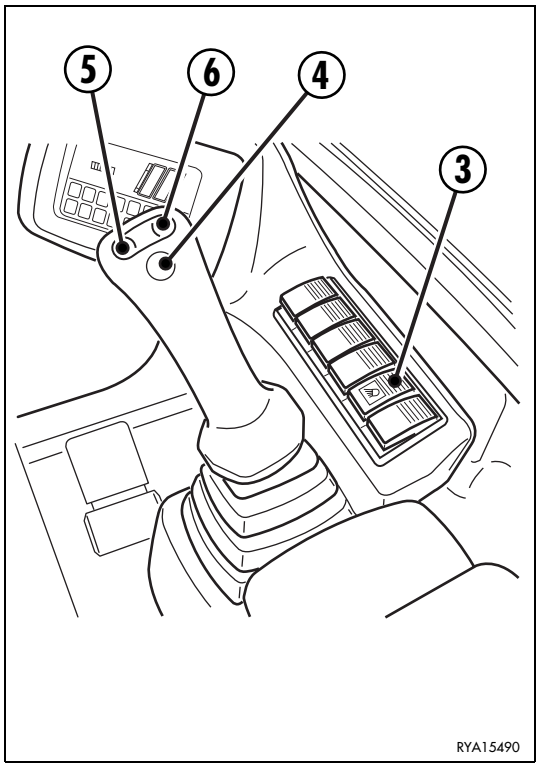
- Define the route to be followed, taking into account the width, height and weight of the transporting vehicle plus the machine.
  Make sure that the overall dimensions of the vehicle and load are compatible with the roads and any tunnel, underpass, bridge, power and telephone line, etc. along the route.
- Keep to the regulations in force regarding the permissible width, height, weight and speed of heavy vehicles.

THE MACHINE AND ITS OPERATIONS

3.3.3 SWITCHES AND PUSH BUTTONS

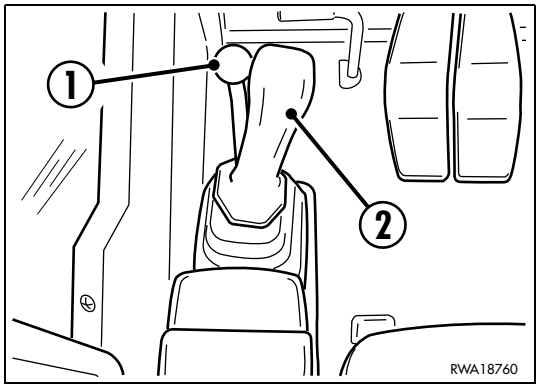
1 - Fan switch
2 - Air conditioner switch (if provided)
3 - Working light and instrument light switch
4 - Horn
5 - Clamshell bucket anticlockwise rotation control button
6 - Clamshell bucket clockwise rotation control button

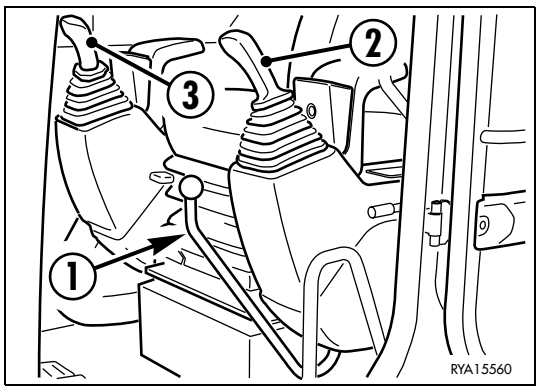


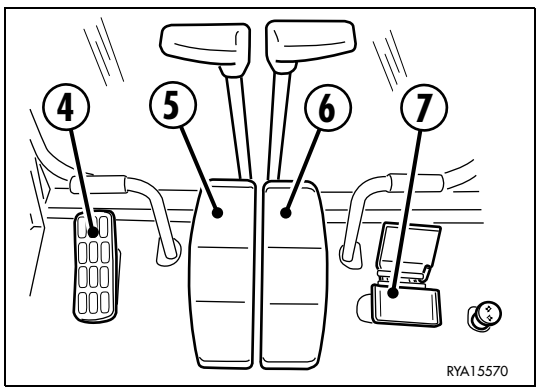


3.3.5 MACHINE CONTROLS

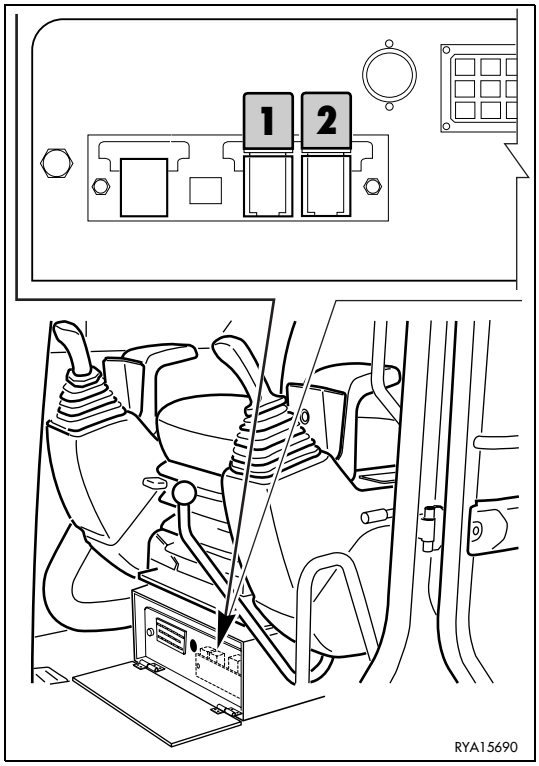
1 - Safety device control lever
2 - Left equipment control lever
3 - Right equipment control lever
4 - Two-piece boom control pedal
5 - Left travel and steering control lever
6 - Right travel and steering control lever
7 - Boom swing control pedal







3.4.1.2 CENTRAL UNIT RELAYS



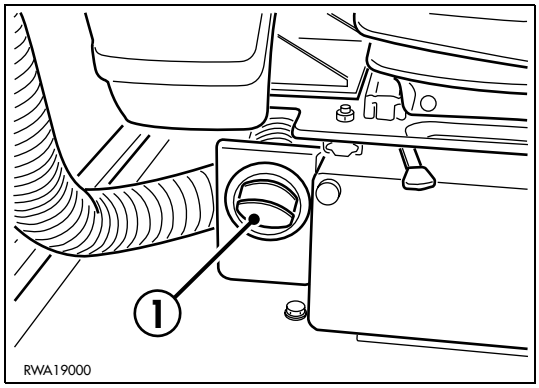
POSITION	DESCRIPTION
1	(RL1) Horn relay
2	(RL2) Relay for working light on the boom

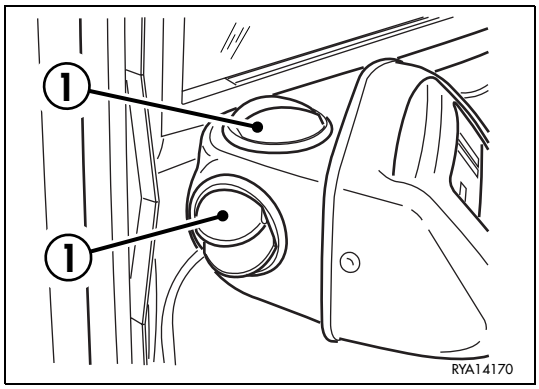
3.5.4 VENTILATION AND HEATING

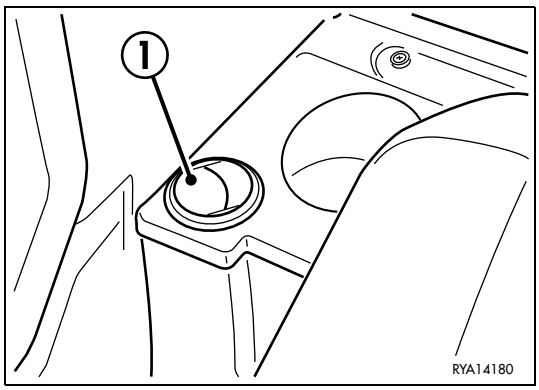
The ventilation and heating of the cab serve to reduce the operator's stress either in summer and in winter; these functions also serve to eliminate the condensate from the front window, thus ensuring visibility during both work and travel.
Ventilation and air change are achieved by means of a three-speed fan positioned inside the cab, under the seat support. The ventilation intensity is adjusted through the switch (2) positioned on the left console.
The ventilation and heating system requires air suction from both inside and outside the cab.
Air suction from the outside is protected by a filter positioned on the right side of the cab.
Air distribution is achieved by means of a series of orientable outlets (1) with adjustable capacity for the inner flow and for the flows that have the function to defrost and defog the front and rear windows.
A radiator having the function to heat the air conveyed into the cab is installed beside the fan; it 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 divided or excluded by means of a tap operated by the handwheel (2) positioned on the left console. The intensity of the flow is adjusted by turning the handwheel clockwise.
The ventilation and heating system includes also the inside air recirculation function. This function ensures more rapid heating and is very useful when the machine is operated in conditions of extreme pollution (tunnels, very dusty places, small or closed places, etc.). The recirculation of air is obtained by turning the handwheel (4) positioned on the rear right side of the cab console completely clockwise.

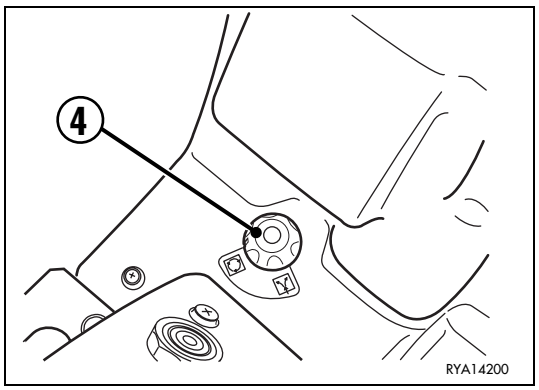
CAUTION

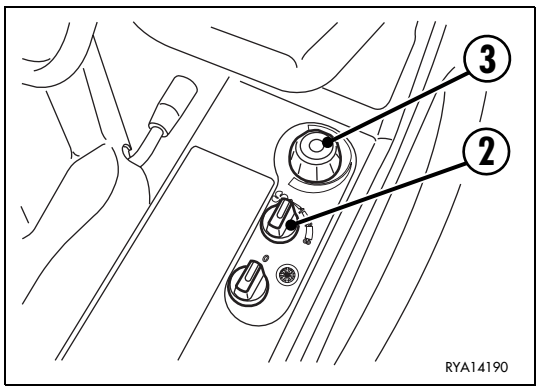
- **Do not use the air recirculation function continuously in rainy or cold days, since this would increase the fogging up of windows on the inside.**











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 by making the engine run at idling speed by means of the hand accelerator.

IMPORTANT

- **Do not accelerate completely or abruptly until the coolant temperature has reached at least 60°C.**

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

4 - During the warming up of the engine, check the colour of the exhaust gases and verify if abnormal noises or vibrations can be noticed; any anomaly must be verified and its cause must be 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 reason, when the coolant temperature has reached approximately 60°C, proceed as follows:

1 - Release the safety device of the controls (See “3.1 SAFETY LOCKS”).

2 - Slowly extend and retract the arm and the bucket completely for several times.

3 - Lower the bucket to the ground and lock the safety device again

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.**
- **Make sure that the upper structure is directed towards the blade and lock it in this position by means of the rotation lock.**
- **The operator must be seated in the driving position with fastened safety belt.**
- **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.**
- **Avoid manoeuvres or changes of direction when travelling at full speed, since the manoeuvres carried out in these conditions cause abrupt movements.**
- **Do not use the speed increase function when changing direction or carrying out a counter-rotation.**

3.10 PRECAUTIONS TO BE TAKEN IN THE COLD SEASON

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

3.10.1 FUEL AND LUBRICANTS

1 - Change the fuel and use the winter fuel 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 COOLANT

DANGER

- **The coolant containing antifreeze is flammable; do not smoke and do not use naked flames during the checks and when preparing the mixture.**
- **Do not use methanol-, ethanol- or propanol-based antifreezes.**

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1 - Use only permanent ethylene glycol-based antifreeze with the addition of anticorrosion and antifoam products.

2 - The antifreeze-water ratio must be 50% (50% antifreeze and 50% water).

3 - Do not use plugging additives, either alone or added to the antifreeze, to eliminate leakages.

4 - Do not mix antifreeze of different brands.

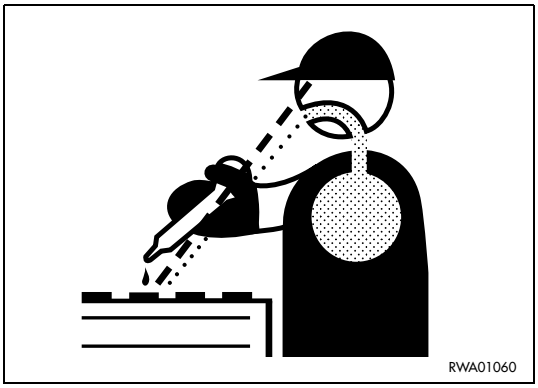
5 - The use of permanent antifreeze requires only the level check and the routine change. It is not necessary to wash the cooling circuit.

6 - The required standards for permanent antifreeze are the following: SAE-J1034 and FEDERAL STANDARD O-A-548D.
In case of doubt regarding the compliance of the antifreeze used with the standards, contact the manufacturer and ask for precise information.

3.14.3 IF THE BATTERY IS DEPLETED

DANGER

- **When checking or carrying out any operation on the battery, stop the engine and make sure that the ignition key 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 the 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 immediately.
- **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 comes into contact with the positive terminal and with 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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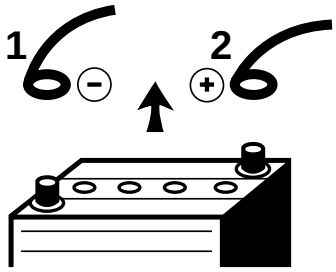
REMOVAL



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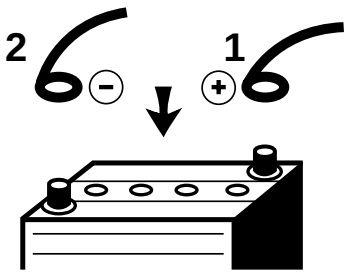
INSTALLATION



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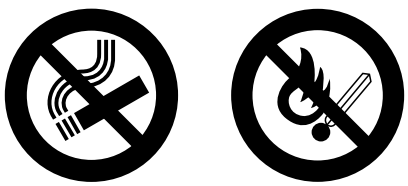
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- Use only permanent ethylene glycol-based antifreeze with the addition of anticorrosion and antifoam products. The antifreeze-water ratio must be 50% (50% antifreeze and 50% water).
- The use of permanent antifreeze requires only the routine change. It is not necessary to wash the cooling circuit.
- Use drinkable water and in any case soft water.
- Do not use corrosion inhibitors containing soluble oil, since they damage the rubber couplings.
- The required standards for permanent antifreeze are the following: SAE-J1034 and FEDERAL STANDARD O-A-548D.
  In case of doubt regarding the compliance of the antifreeze used with the standards, contact your Komatsu Utility Dealer and ask for precise information.

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 work day.
- When refuelling, make sure that there is no water on the fuel drum cover and take care not to draw the condensate from the drum bottom.
- If fuel runs out, or if the fuel filter has been replaced, it is necessary to bleed the pipes.

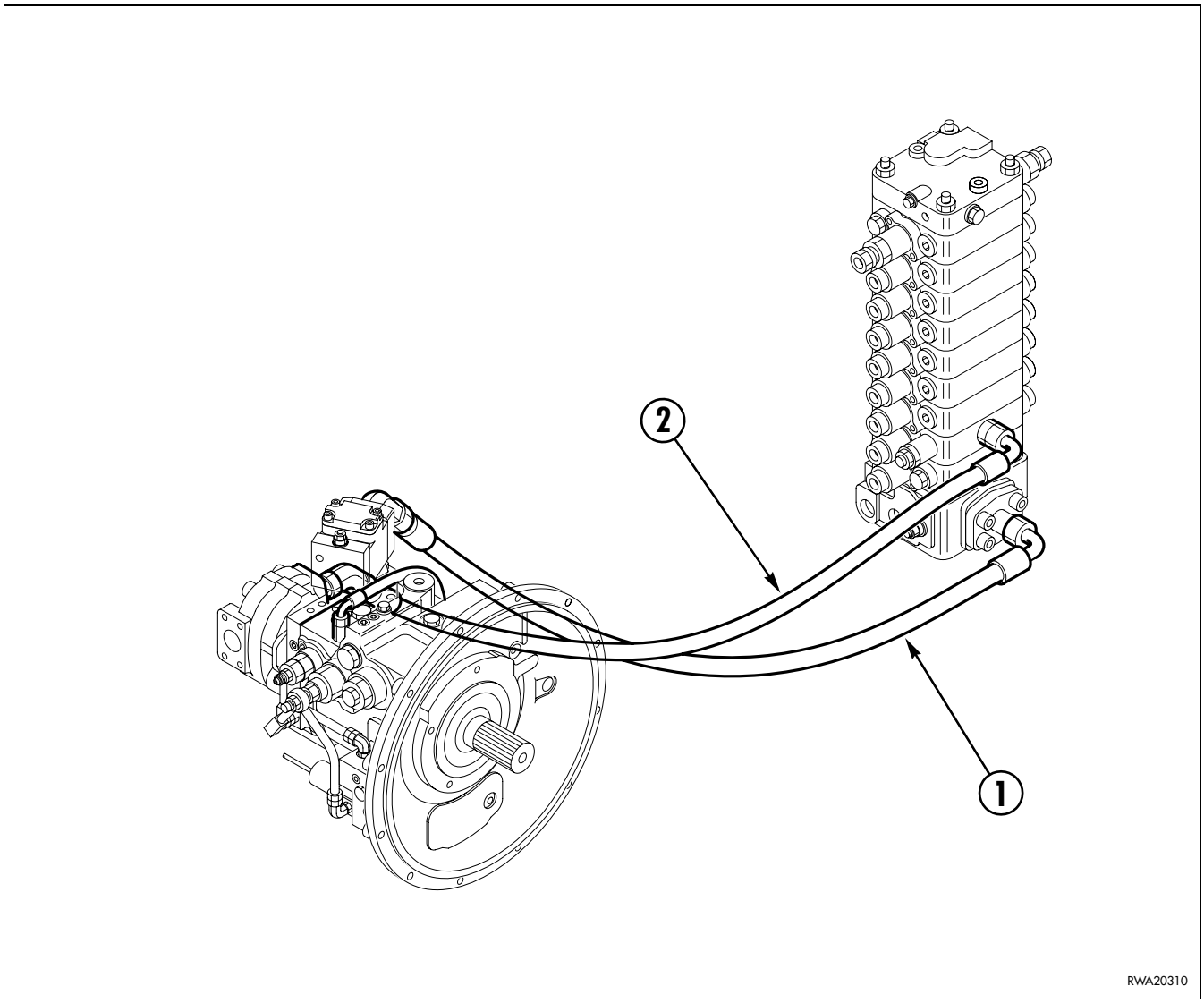
4.2.2 NOTES REGARDING THE HYDRAULIC SYSTEM

- 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.
- 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 - make all the cylinders perform 4-5 movements, stopping them at approx. 100 mm from the end of their stroke;
  3 - slowly make all the cylinders reach the end of their stroke for 3-4 times.

HYDRAULIC SYSTEM

No.	Components related to safety that periodically need changing	Q.ty	Change interval
1	Hydraulic pipe (Main pump delivery)	1	Every 2 years or 4000 hours, whichever occurs first
2	Hydraulic pipe (Secondary pump delivery)	1	
3	Hydraulic pipe (Boom cylinder)	4	
4	Hydraulic pipe (Arm cylinder)	4	
5	Hydraulic pipe (Bucket cylinder)	4	

- 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.



4.7.1.d CLEANING THE WATER SEPARATOR

The water separator can be reached after opening the engine hood (see “3.5.1 ENGINE HOOD”).
To clean the water separator, proceed as follows:

1 - Loosen the screw (1) and drain the fuel contained in the water separator, collecting it into a container with suitable capacity.
Use a 13 mm spanner.

2 - Loosen the central screw (2) and remove the cup (3) and the filtering element (4).
Use a 14 mm spanner.

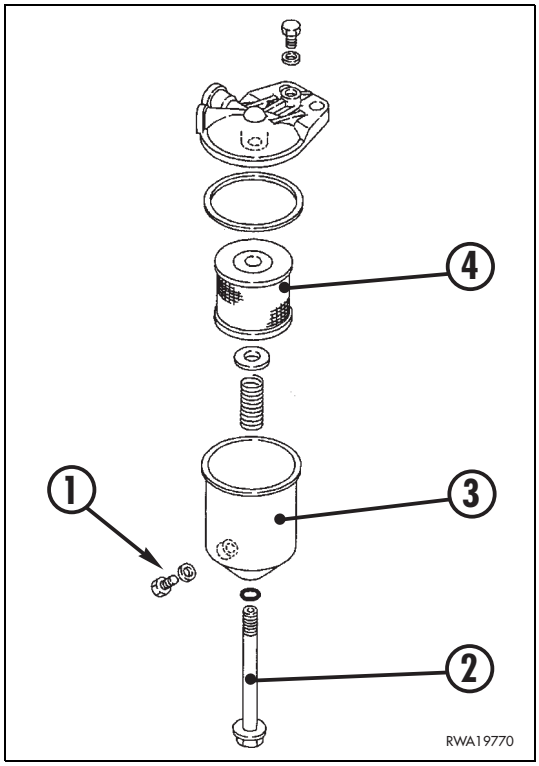
3 - Clean the inside of the cup and the filter with diesel oil or oil.

4 - Put back the filter (4) and the cup (3), tighten the screws (2) and (1) and bleed the fuel supply circuit as recommended for the fuel filter.
(See “4.7.11.e CHANGING THE FUEL FILTER”).

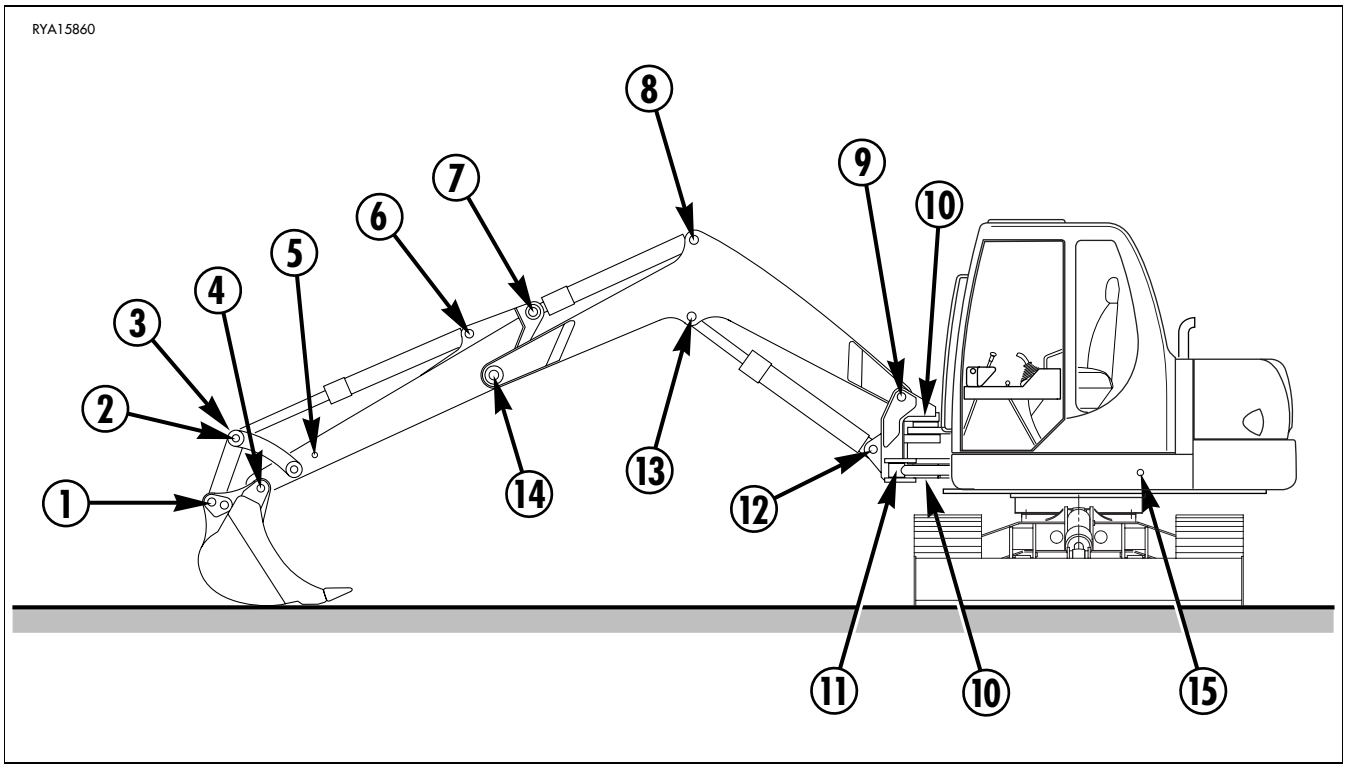
5 - Close the hood and start the engine.

IMPORTANT

- **If the filtering element is clogged or damaged, change it.**



EQUIPMENT LUBRICATION POINTS (MONOBOOM)



1 - Tie rod-bucket coupling pin	(1 point)
2 - Tie rod-lever coupling pin	(1 point)
3 - Bucket cylinder head pin	(1 point)
4 - Bucket fulcrum pin	(1 point)
5 - Lever fulcrum pin	(1 point)
6 - Bucket cylinder base pin	(1 point)
7 - Arm cylinder head pin	(1 point)
8 - Arm cylinder base pin	(1 point)
9 - Boom fulcrum pin	(1 point)
10 - Boom swing fulcrum pin	(2 points)
11 - Boom swing cylinder head pin	(1 point)
12 - Lifting cylinder base pin	(1 point)
13 - Lifting cylinder head pin	(1 point)
14 - Arm fulcrum pin	(1 point)
15 - Boom swing cylinder base pin	(1 point)

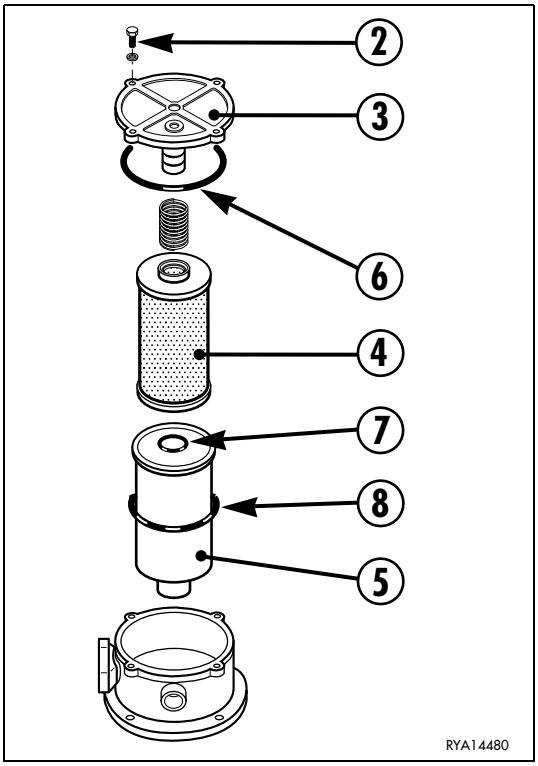
2 - Remove the screws (2) that hold the filter cover (3), remove the cartridge (4) and the filter casing (5).
Use a 13 mm spanner.

3 - Carefully clean the filter casing (5), making sure that the filter gasket (7) and the container gasket (8) are in perfect conditions.

4 - Change the cartridge (4).

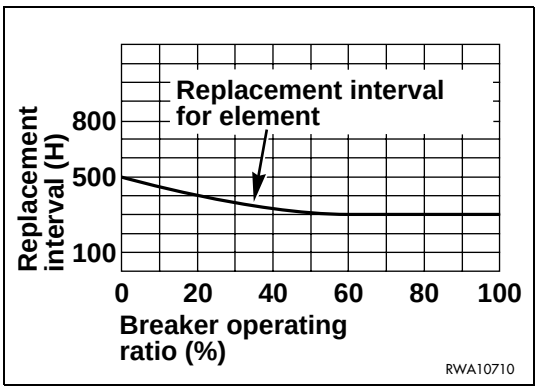
5 - Reassemble all the components proceeding in the reverse order and making sure that the gasket (6) of the cover (3) is sound and correctly positioned in the cover seat.

6 - Close the side cover.



IMPORTANT

- **The hydraulic oil used in machines provided with demolition hammer deteriorates sooner than the oil used in machines that carry out only normal digging operations.**
  On new machines the filter must be changed after the first 100-150 hours of operation, while the successive changes must be carried out according to the intervals indicated on table beside.
- **If the machine contains synthetic biodegradable oil type HEES, the filter must be changed after the first 50 hours of operation.**



4.7.13 MAINTENANCE EVERY 2000 HOURS OF OPERATION

Carry out these operations together with those to be performed EVERY 50, 100, 250, 500 and 1000 HOURS.

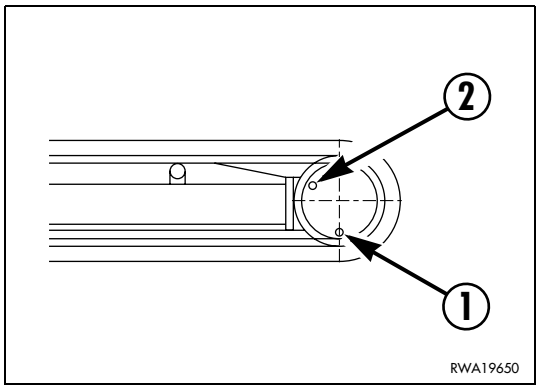
4.7.13.a CHANGING THE OIL IN THE TRAVEL REDUCTION GEARS

DANGER

- **Soon after the machine has been stopped the oil is very hot; let the oil cool down until it reaches a temperature of 40-45°C before changing it.**
- **Oils, filters, coolants and batteries are considered special waste and must be collected and disposed of according to the anti-pollution regulations in force.**

CAUTION

- **On new machines, change the travel reduction gear oil after the first 250 hours of operation and successively every 2000 hours.**



This operation must be carried out with the machine on level ground at a temperature of 40-45°C, so that the oil is more fluid and can be drained easily together with the suspended solid particles.

1 - Move the machine until the drain plug (1) is on the vertical axis in low position.

2 - Remove the drain plug (1) and let all the used oil flow into a container with suitable capacity.
While the oil flows out, remove the level plug (2).
Use a 8 mm hexagon spanner.

3 - After draining the oil, put back the plug (1) and pour new oil of the recommended type through the hole (2) until reaching the lower edge of the hole itself.

4 - Put back the plug (2).

Carry out some movements, stop the machine and check the levels again.
Use only the prescribed oil.
(See “4.3 FUEL, COOLANT AND LUBRICANTS”).

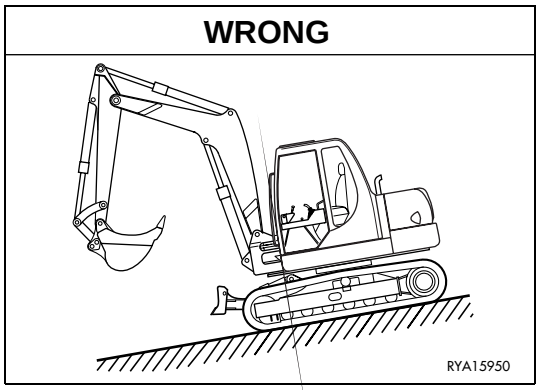
TECHNICAL SPECIFICATIONS

6.1.2 PRECAUTIONS REGARDING THE INSTALLATION OF EQUIPMENT

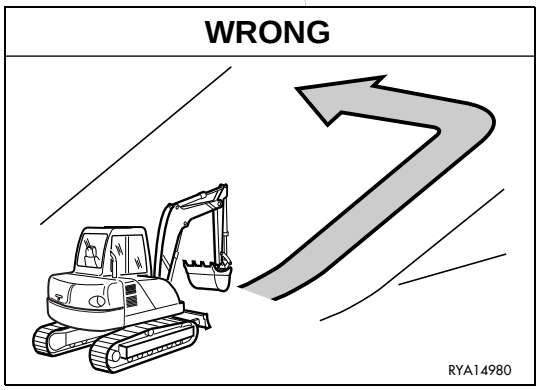
DANGER

- **The use of lengthened work equipment reduces the stability of the machine.**
  If it is necessary to rotate the upper structure on a slope or to travel downhill, be particularly careful, since the machine may lose its balance and overturn.
  The following operations are particularly dangerous, therefore it is highly recommended not to perform them.

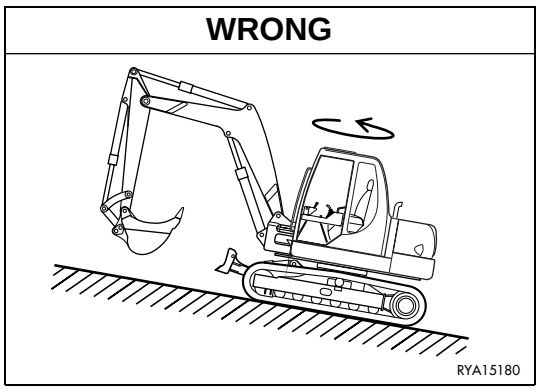
1 - Travelling downhill with raised work equipment.



2 - Transversal crossing of slopes.



3 - Rotation of the upper structure on slopes.



- **When installing work equipment with dimensions exceeding those of the standard equipment, be careful to the space necessary for the movements of the equipment and for the rotation of the upper structure.**
- **Always keep to the correct procedure when installing the boom and arm. Failure to carry out the correct procedure may result in grave risks, therefore it is advisable to contact a Komatsu Utility18 Dealer before installation.**