Operation & Maintenance Manual

SEAM023200

PC75UU-3

HYDRAULIC EXCAVATOR

SERIAL NUMBERS PC75UU-15001 and up

⚠ WARNING

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

NOTICE

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

1. FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. Keep this manual handy and have all personnel read it periodically. If this manual has been lost or has become dirty and can not be read, request a replacement manual from Komatsu or your Komatsu distributor.

If you sell the machine, be sure to give this manual to the new owners.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

This manual may contain attachments and optional equipment that are not available in your area. Consult Komatsu or your Komatsu distributor for those items you may require.

⚠ WARNING

- **Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
- **Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.**
- **The procedures and precautions given in this manual apply only to intended uses of the machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.**
- **The description of safety is given in SAFETY INFORMATION on page 0-2 and in SAFETY from page 1-1.**

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

2. SAFETY INFORMATION

Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance.

To identify safety messages in this manual and on machine labels, the following signal words are used.

DANGER – **This word is used on safety messages and 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 precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

WARNING – **This word is used on safety messages and safety labels where there is a potentially dangerous situation which could result in serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

CAUTION – **This word is used on safety messages and safety labels for hazards which could result in minor or moderate injury if the hazard is not avoided. This word might also be word for hazards where the only result could be damage to the machine.**

NOTICE – **This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.**

Safety precautions are described in SAFETY from page 1-1.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact Komatsu distributor.

3. INTRODUCTION

3.1 INTENDED USE

This Komatsu HYDRAULIC EXCAVATOR is designed to be used mainly for the following work:
- Back hoe work
- Smoothing work
- Ditching work
- Side ditching work
- Loading work

See the section "12.11 WORK POSSIBLE USING HYDRAULIC EXCAVATOR" for further details.

3.2 FEATURES

In addition to the functions generally found on small hydraulic excavators with boom offset, this machine also has the following mechatronics equipment.

- Interference prevention device
  If the bucket comes close to the cab, this device functions to stop the work equipment and to sound an alarm. Please read the instructions on the method of operation and the precautions in the safety section, and be sure to use this device correctly.

- Auto-stop device for work equipment
  This device automatically controls the display of the digging depth, the setting for the amount that the boom can be raised or lowered, and the positioning of the left offset. For details of the method of the operation, see "12.19 HANDLING 4-SYSTEM".

3.3 BREAKING IN THE MACHINE

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

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

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

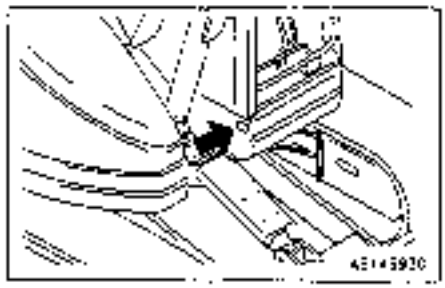
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration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

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

4. LOCATION OF PLATES, TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

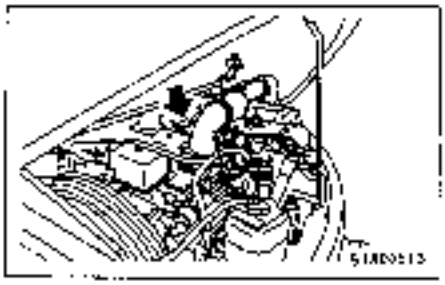
4.1 MACHINE SERIAL NO. PLATE POSITION

On the bottom right of the cab.



4.2 ENGINE SERIAL NO. PLATE POSITION

On the upper side of the engine cylinder head cover.



4.3 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.:	
Engine serial No.:	
Distributor name:	
Address:	Phone:
Service personnel for your machine:	

REMARKS

5. CONTENTS

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTION, ATTACHMENT

SAFETY

⚠ WARNING

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

This safety section also contains precautions for optional equipment and attachments.

6. GENERAL PRECAUTIONS

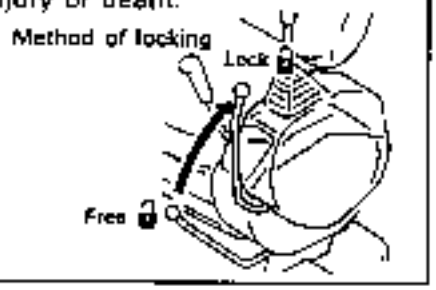
⚠ WARNING: For reasons of safety, always follow these safety precautions.

SAFETY RULES

- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- Do not operate the machine if you are not feeling well, or if you are taking medicine which will make you sleepy, or if you have been drinking. Operating in such a condition will adversely affect your judgement and may lead to an accident.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.
- Always follow all rules related to safety.

SAFETY FEATURES

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired if damaged.
- Use safety features such as safety lock levers and the seat belt properly.
- Never remove any safety features. Always keep them in good operating condition.
  Safety lock lever → See "12.12 PARKING MACHINE".
- Improper use of safety features could result in serious bodily injury or death.



CLOTHING AND PERSONAL PROTECTIVE ITEMS

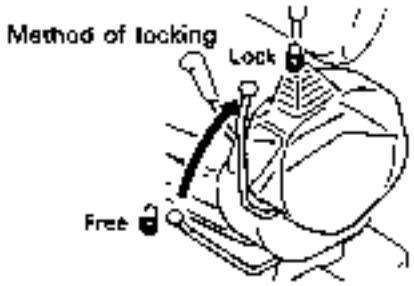
- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death.
- Also, do not wear oily clothes, because they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask or gloves when operating or maintaining the machine. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials particularly when driving pins with a hammer and when cleaning the air cleaner element with compressed air. Check also that there is no one near the machine.
- Check that all protective equipment functions properly before using.

UNAUTHORIZED MODIFICATION

Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

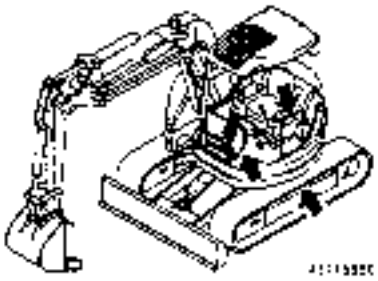
ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

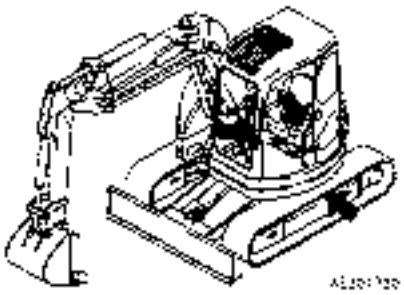
- When standing up from the operator's seat, always place the safety lock levers securely in the LOCK position. If you accidentally touch the levers when they are not locked, the work equipment may suddenly move and cause serious injury or damage.
- When leaving the machine, lower the blade and ripper completely to the ground, set the safety lock levers to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key and take it with you.



MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- When getting on or off the machine, always face the machine and use the handrails and steps.
- Never hold any control levers or lock levers when getting on or off the machine.
- To ensure safety, always maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps to ensure that you support yourself.
- If there is any oil, grease, or mud on the handrails or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Never stand on the engine hood, which is slippery and dangerous.
- When getting on or off the machine, or when moving along the top of the track, if you hold the handrail inside the door when moving on top of the track shoe, and the door lock is not locked securely, the door may move and cause you to fall.
  Always lock the door securely.





PRECAUTIONS FOR OPENING AND CLOSING SLIDING DOOR

It is very dangerous if fingers are caught in the sliding door.
Open and close the sliding door with its knob.
When closing the sliding door, in particular, take care not to get your fingers and hand caught between it and the cab pillar.

FIRE PREVENTION FOR FUEL AND OIL

Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly flammable and can be hazardous.

Always observe the following:

- Keep any flame or lighted cigarette away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.

A0055020

A0055030

A0055040

PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURE

- Immediately after operations are stopped, the engine oil and hydraulic oil are at high temperature and are still under pressure. Attempting to remove the cap, drain the oil or water, or replace the filters may lead to serious burns. Always wait for the temperature to go down, and follow the specified procedures when carrying out these operations.

- To prevent hot water from spurting out, stop the engine, wait for the water to cool, then loosen the cap slowly to relieve the pressure before removing the cap.
  (When checking if the water temperature has gone down, put your hand near the front face of the radiator and check the air temperature. Be careful not to touch the radiator.)

- To prevent hot oil from spurting out, stop the engine, wait for the oil to cool, then loosen the cap slowly to relieve the pressure before removing the cap.
  (When checking if the oil temperature has gone down, put your hand near the front face of the hydraulic tank and check the air temperature. Be careful not to touch the hydraulic tank.)

A0055050

ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be hazardous to your health if it is inhaled.
Komatsu does not use asbestos in its products, but if you handle materials containing asbestos fibers, follow the guidelines given below:

- Never use compressed air for cleaning.
- Use water to keep down the dust when cleaning.
- If there is danger that there may be asbestos dust in the air, operate the machine from an upwind position whenever possible.
- Use an approved respirator if necessary.

CRUSHING OR CUTTING PREVENTION

Do not enter, or put your hand or arm or any other part of your body between movable parts such as the work equipment and cylinders, or between the machine and work equipment.
If the work equipment is operated, the clearance will change and this may lead to serious damage or personal injury.
If it is necessary to go between movable parts, always lock the levers and be sure that the work equipment cannot move. For details, see **"8. PRECAUTIONS FOR MAINTENANCE".**

FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them.
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.
- Know what to do in the event of a fire or injury.
- Decide the phone numbers of persons (doctor, ambulance, fire station, etc.) to contact in case of an emergency. Post these contact numbers in specified places and make sure that all personnel know the numbers and correct contact procedures.

PRECAUTIONS FOR ATTACHMENTS

- When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu or your Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.
- Any injuries, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu.

VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, or you handle fuel, flushing oil, or paint, open the doors and windows to ensure that you provide adequate ventilation to prevent gas poisoning.
- If opening the doors and windows still does not provide adequate ventilation, set up fans.

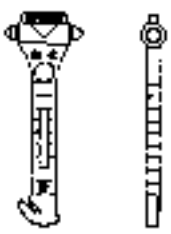
A0055C70

PRECAUTIONS WITH CAB GLASS

If by mistake the cab glass on the work equipment side should crack, there is danger of direct contact between the operator's body and the work equipment. This is extremely dangerous.
If the glass is cracked, stop operations immediately and replace the glass.

EMERGENCY EXIT FROM OPERATOR'S CAB

- If it should become impossible to open the door, break the window glass with the attached hammer, then escape.
- When escaping, remove the broken pieces of the glass from the sash so that you will not cut yourself with them. Take care not to slip on the broken and scattered pieces.
  Part No. of hammer: 20U-54-25910



Hammer A(20-628

AE301110

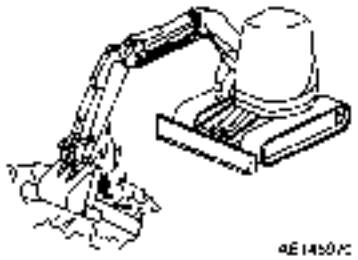
7. PRECAUTIONS DURING OPERATION

⚠ WARNING: Failure to follow these safety precautions may lead to a serious accident.

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Check the terrain and condition of the ground at the worksite, and determine the best and safest method of operation.
- Make the ground surface as hard and horizontal as possible before carrying out operations. If the jobsite is dusty, spray water before starting operations.
- If you need to operate on a road, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences and putting up No Entry signs around the worksite.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Check the ground condition and the depth and flow of water before operating in water or crossing a river. NEVER be in water which is in excess of the permissible water depth.



CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the days work. Failure to carry out these checks may lead to serious injury or damage.

- Completely remove all flammable materials accumulated around the engine and battery, return all fuel containers to their proper place, remove all parts and tools from the operator's compartment, and remove any dirt from the mirrors, handrails, and steps.
- Check the coolant level, fuel level, and oil level in the hydraulic tank, check for clogging of the air cleaner, and check the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check for wear or damage to the seat belt and seat belt mounting equipment.
- Check that the gauges work properly, and check that the control levers are all at the NEUTRAL position.
- Check that the mirrors and window glass provide a clear view.

If the above inspections show any abnormality, carry out repairs immediately.

WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, and check for people and objects that might be in the way.
- Never start the engine if a warning tag has been attached to the blade control lever.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- An additional worker may ride in the machine only when sitting in the passenger seat. Do not allow anyone to ride on the machine body.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.

7.2 OPERATING MACHINE

CHECKS AFTER STARTING ENGINE

Failure to carry out the checks properly after starting the engine will lead to delays in discovery of abnormalities, and this may lead to serious injury or damage to the machine.
When carrying out the checks, use a wide area where there are no obstructions. Do not allow anyone near the machine.

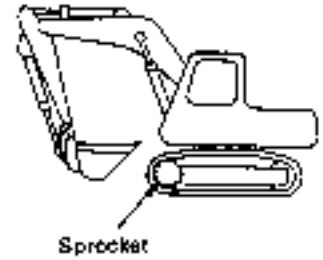
- Check the operation of the gauges and equipment, and check the operation of the blade, ripper, brakes, travel system, and steering system.
- Checks for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of air, oil, or fuel.
- If any abnormality is found, carry out repairs immediately.
  If the machine is used when it is not improper condition, it may lead to serious injury or damage to the machine.

PRECAUTIONS WHEN STARTING OFF

Check the direction of the track frame before operating the travel lever.

- When the blade is at the rear of the machine, the operation of the travel lever is reversed, so operate the machine carefully. **Method of steering machine → See "12.4 MOVING MACHINE OFF".**
  Before moving the machine off, check again that there are no persons or obstacles in the surrounding area.
- When moving the machine off, sound the horn to warn people in the surrounding area.
- Always sit in the operator's seat when driving the machine.
- Fasten your seat belt securely.
- The operator must not let any other person sit anywhere except in the assistant's seat.
- Always close the door of the operator's cab and check that the door is locked in position securely.

Travel in reverse direction



Sprocket

4EJ05401

CHECK WHEN CHANGING DIRECTION

To prevent serious injury or death, always do the following before moving the machine or doing the leveling work.

- Before changing between forward and reverse, reduce speed and stop the machine.
- Before operating the machine, sound the horn to warn people in the area.
- Check that there is no one near the machine. Be particularly careful to check behind the machine.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Ensure that no unauthorized person can come within the direction of turning or direction of travel.

Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

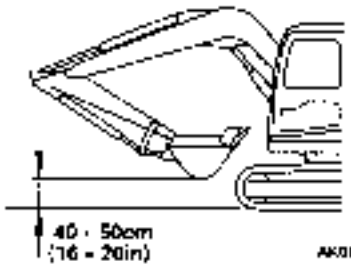
ADOST150

ADOST200

PRECAUTIONS WHEN TRAVELING

- Never turn the key in the starting switch to the OFF position when traveling.
  It is dangerous if the engine stops when the machine is traveling, because it becomes impossible to operate the steering.
- It is dangerous to look around you when operating. Always concentrate on your work.
- It is dangerous to drive too fast, or to start suddenly, stop suddenly, turn sharply, or zigzag.
- If you find any abnormality in the machine during operation (noise, vibration, smell, incorrect gauges, air leakage, oil leakage, etc.), move the machine immediately to a safe place and look for the cause.
- Set the work equipment to a height of 40 – 50 cm (16 – 20 in) from the ground level and travel on level ground.
- When traveling, do not operate the work equipment control levers. If the work equipment control levers have to be operated, never operate them suddenly.
- Do not operate the steering suddenly. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
- When traveling on rough ground, travel at low speed, and avoid sudden changes in direction.
- Avoid traveling over obstacles as far as possible. If the machine has to travel over an obstacle, keep the work equipment as close to the ground as possible and travel at low speed. Never travel over obstacles which make the machine tilt strongly (10° or more).
- When travelling or carrying out operations, always keep your distance from other machines or structures to avoid coming into contact with them.
- NEVER be in water which is in excess of the permissible water depth.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the mass of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.

Travel posture



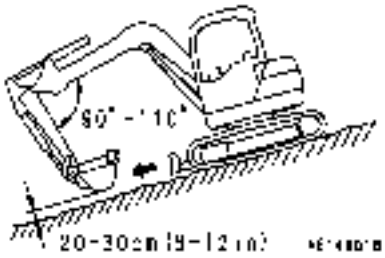
AK05210

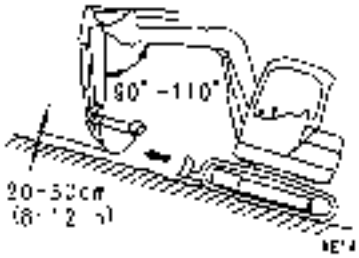
INCORRECT

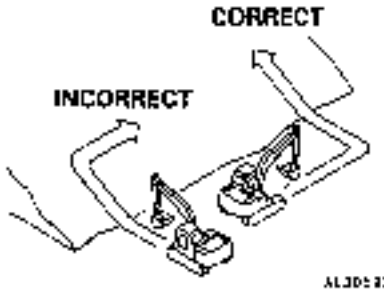
AM01BC10

TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping to the side.
- When traveling on slopes, keep the blade approximately 20 – 30 cm (8 – 12 in) above the ground. In case of emergency, quickly lower the bucket to the ground to help the machine to stop.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to perform these operations.
- Do not travel on grass, fallen leaves, or wet steel plates. Even slight slopes may cause the machine to slip to the side, so travel at low speed and make sure that the machine is always traveling directly up or down the slope.
- If the engine stops on a slope, place the travel lever at the neutral position and lower the bucket to the ground. Do not operate the steering. There is danger that the machine will turn under its own weight.

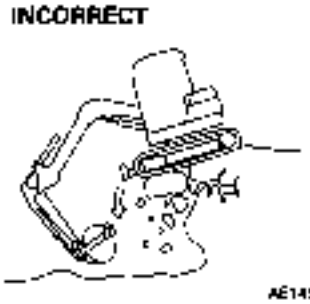






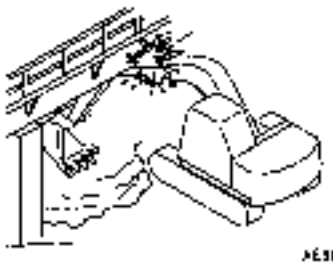
PROHIBITED OPERATIONS

- Do not dig the work face under an overhang. This may cause the overhang to collapse and fall on top of the machine.
- Do not carry out deep digging under the front of the machine. The ground under the machine may collapse and cause the machine to fall. Take emergencies into consideration and set with the travel motor at the rear and the track (undercarriage) at right angles to the road shoulder before digging to enable the machine to move back quickly. If the ground under the machine collapses and there is no time to drive in reverse, do not suddenly raise the arm and boom. In some cases, it may in fact be safer to lower the arm and boom.
- Do not swing the work equipment to the side when it is carrying a heavy load. The stability to the side is less than the stability to the front, so there is danger that the machine may turn over.
- Limits on use
  To prevent accidents caused by breakage of the work equipment or tipping over of the machine under excessive load, do not use the machine in excess of its capacity. Always be sure to keep within the maximum specified load and safe angle determined for the structure.



PRECAUTIONS WHEN OPERATING

- Be careful not to approach too close to the edge of cliffs.
- Carry out only work that is specified as the purpose of the machine.
  Carrying out other operations will cause breakdowns.
  Specified operations → See "12.11 WORK POSSIBLE USING HYDRAULIC EXCAVATOR".
- Do the following to ensure good visibility.
  - When operating in dark places, turn on the working lamps and front lamps, and install lighting at the jobsite if necessary.
  - Do not carry out operations in fog, mist, snow, or heavy rain, or other conditions where the visibility is poor. Wait for the weather to clear so that visibility is sufficient to carry out work.
- Always do as follows to prevent the work equipment from hitting other objects.
  - When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, be extremely careful not to let the bucket, boom, or arm hit anything.
  - To prevent accidents caused by hitting other objects, always operate the machine at a speed which is safe for operation, particularly in confined spaces, indoors, and in places where there are other machines.
  - Never pass the bucket over the head of any worker or over the operator's cab on a dump truck.

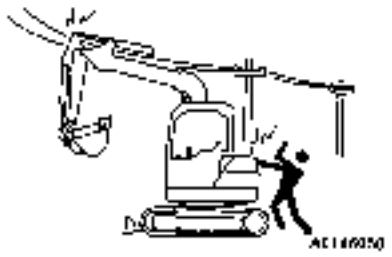


AE30E1C

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- Do not let the machine touch overhead electric cables. Even going close to high-voltage cables can cause electric shock. Always maintain the safe distance given below between the machine and the electric cable.
- To prevent accidents, always do as follows.
  - On jobsites where there is danger that the machine may touch the electric cables, consult the electricity company before starting operations to check that the actions determined by the relevant laws and regulations have been taken.
  - Wear rubber shoes and gloves. Lay a rubber sheet on top of the operator's seat, and be careful not to touch the chassis with any exposed part of your body.
  - Use a signalman to give warning if the machine approaches too close to the electric cables.
  - If the work equipment should touch the electric cable, the operator should not leave the operator's compartment.
  - When carrying out operations near high voltage cables, do not let anyone come close to the machine.
  - Check with the electricity company about the voltage of the cables before starting operations.
  - Keep the following safety distance between the machine and an electric cable.

	Voltage	Min. safety distance
Low voltage	100 - 200 V	2 m
	6,600 V	2 m
Very high voltage	22,000 V	3 m
	66,000 V	4 m
	154,000 V	5 m
	187,000 V	6 m
	275,000 V	7 m
	500,000 V	11 m



OPERATE CAREFULLY ON SNOW

- When working on snow or icy roads, even a slight slope may cause the machine to slip to the side, so always travel at low speed and avoid sudden starting, stopping, or turning. There is danger of slipping particularly on uphill or downhill slopes.
- With frozen road surfaces, the ground becomes soft when the temperature rises, so the travel conditions become unstable. In such cases be extremely careful when traveling.
- When there has been heavy snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen, so always carry out operations carefully.
  When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the bucket to the ground to stop the machine.
- The load varies greatly according to the characteristics of the snow, so adjust the load accordingly and be careful not to let the machine slip.

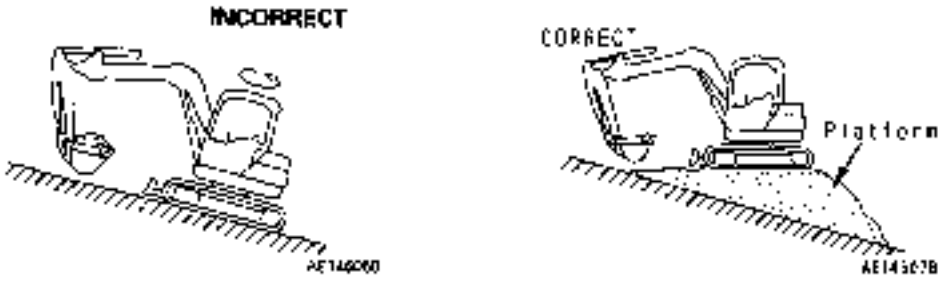
WORKING ON LOOSE GROUND

- Do not operate the machine on soft ground. It is difficult to get the machine out again.
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse under the mass or vibration of your machine, it could fall or tip over and this could result in serious injury or death. Remember that the soil after heavy rain, blasting, or earthquakes is weakened in these areas.
- Earth laid on the ground and the soil near ditches is loose. It can collapse under the mass or vibration of your machine and cause your machine to tip over.
- Install the head guard (FOPS) when working in areas where there is danger of falling stones.
- Install the ROPS and wear the seat belt when working in areas where there is danger of falling rocks or of the machine turning over.

PRECAUTIONS WHEN WORKING ON SLOPES

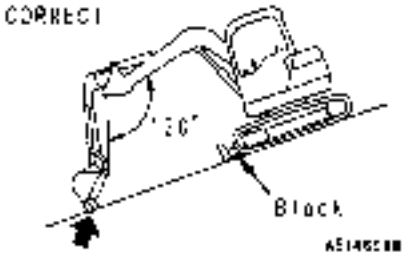
- When working on slopes, there is danger that the machine may lose its balance and turn over when the swing or work equipment are operated. Always carry out these operations carefully.
- Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous.
- If the machine has to be used on a slope, pile the soil to make a platform that will keep the machine as horizontal as possible.

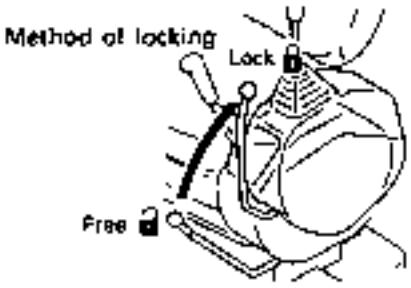
Piled soil on slope → See "12.10 PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS".



PARKING MACHINE

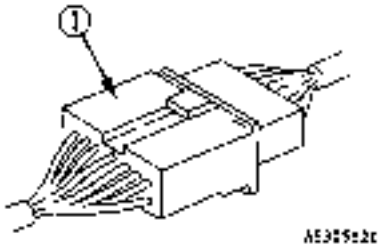
- Park the machine on level ground where there is no danger of falling rocks or landslides, or of flooding if the land is low, and lower the work equipment to the ground.
- If it is necessary to park the machine on a slope, set blocks under the tracks to prevent the machine from moving, then dig the work equipment into the ground.
- After stopping the engine, operate the right work equipment control lever several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit.
- When parking on public roads, provide fences, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see the machine clearly, and park the machine so that the machine, flags, and fences do not obstruct traffic.
- When leaving the machine, set the safety lock lever to the LOCK position, stop the engine, and use the key to lock all the equipment. Always remove the key and take it with you.
- Always close the door of the operator's compartment.





PRECAUTIONS IN COLD AREAS

- After completing operations, remove all water, snow, or mud stuck to the wiring harness, connector ①, switches, or sensors, and cover these parts.
  If the water freezes, it will cause malfunctions of the machine when it is next used, which may lead to unexpected accidents.
- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- Operate the control levers to relieve the hydraulic pressure (raise to above the set pressure for the hydraulic circuit and release the oil to the hydraulic tank) to warm up the oil in the hydraulic circuit. This ensures good response from the machine and prevents malfunctions.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that this will ignite the battery.
  When charging or starting the engine with a different power source, melt the battery electrolyte and check for leakage of battery electrolyte before starting.



7.3 TRANSPORTATION

PRECAUTIONS FOR TRANSPORTATION

- When transporting the machine, follow the relevant rules and regulations, and take steps to ensure safety.
- When selecting the transportation route, take into consideration the maximum width, height, and weight of the machine when loaded on the trailer.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For machines equipped with a cab, always lock the door securely.
- The machine can be divided into units for transportation, so please contact your Komatsu distributor when transporting.

7.4 BATTERY

BATTERY HAZARD PREVENTION

Battery electrolyte contains sulphuric acid, and batteries generate hydrogen gas, so mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Never bring any lighted cigarette or flame near the battery.

- When working with batteries, ALWAYS wear safety glasses and rubber gloves.

- If you spill acid on your clothes or skin, immediately flush the area with large amounts of water.

- Battery acid could cause blindness if splashed into the eyes. If acid gets into your eyes, flush them immediately with large quantities of water and see a doctor at once.

- If you accidentally drink electrolyte, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately.

- Before working with batteries, stop the engine and turn the starting switch to the OFF position.

- Avoid short-circuiting the battery terminals (between the positive ⊕ terminal and negative ⊖ terminal) through accidental contact with metal objects, such as tools.

- When installing the battery, connect the positive ⊕ terminal first, and when removing the battery, disconnect the negative ⊖ terminal (ground side) first.

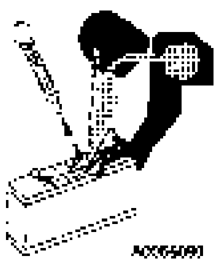
- When removing or installing, check which is the positive ⊕ terminal and negative ⊖ terminal, and tighten the nuts securely.
  If the battery electrolyte is near the LOWER LEVEL, add distilled water. Do not add distilled water above the UPPER LEVEL.

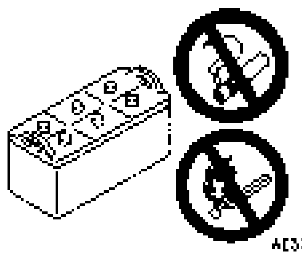
- When cleaning the top surface of the battery, wipe it with a damp cloth. Never use gasoline, thinner, or any other organic solvent or cleaning agent.

- Tighten the battery caps securely.

- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that this will ignite the battery.
  When charging or starting the engine with a different power source, melt the battery electrolyte and check for leakage of battery electrolyte before starting.

- Always remove the battery from the chassis before charging it.





STARTING WITH BOOSTER CABLES

If any mistake is made in the method of connecting the booster cables, it may cause a fire, so always do as follows.

- Carry out the starting operation with two workers (with one worker sitting in the operator's seat).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine.
- Be sure to connect the positive ⊕ cable first when installing the booster cables. Disconnect the ground or negative ⊖ cable first when removing them.
- The final ground connection is the connection of the ground to the engine block of the problem machine. However, this will cause sparks, so be sure to connect it as far as possible from the battery.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.

INCORRECT

A00570

CHARGING BATTERY

If the battery is handled incorrectly when it is being charged, there is danger that the battery may explode, so follow the instructions in HANDLING BATTERY and in the instruction manual for the charger, and always observe the following precautions.

- Carry out the charging in a well-ventilated place, and remove the battery caps. This disperses the hydrogen gas and prevents explosion.
- Set the voltage on the charger to match the voltage on the battery to be charged. If the voltage setting is wrong, it will cause the charger to overheat and catch fire, and this may lead to an explosion.
  Connect the positive ⊕ charging clip of the charger to the positive ⊕ terminal of the battery, then connect the negative ⊖ charging clip to the negative ⊖ terminal of the battery. Be sure to tighten both terminals securely.
- If the battery charge is less than 1/10 of the rated charge, and high speed charging is carried out, set to a value below the rated capacity of the battery.
  If there is an excessive flow of charging current, it may cause leakage or evaporation of the electrolyte, which may catch fire and explode.

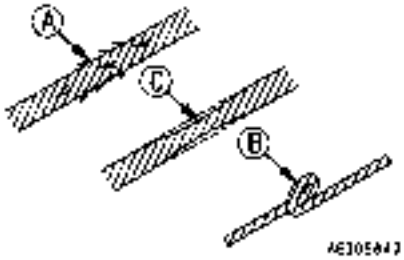
INCORRECT

A00561'C

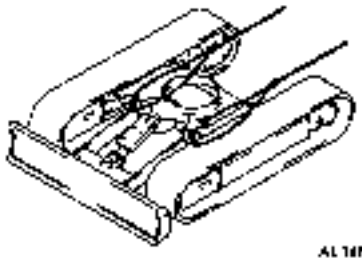
7.5 TOWING

WHEN TOWING

- Injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection of the wire rope, so always do as follows.
- Do not tow in a different way from the method given in the section "16.2 METHOD OF TOWING MACHINE".
- Always wear leather gloves when handling wire rope.
- When carrying out the preparation for towing with another worker, agree on signals before starting the operation.
- If the engine on the problem machine will not start or there is a failure in the brake system, please contact your Komatsu distributor for repairs.
- It is dangerous to tow a machine on a slope, so choose a place where there is a gradual slope. If there is no place with a gradual slope, carry out work to make the slope as small as possible.
- If a problem machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity for the weight of the problem machine.
- Do not use a wire rope which has cut strands Ⓐ, kinks Ⓑ, or reduced diameter Ⓒ.



AE105443


AL169090

7.6 LIFTING OPERATIONS

PROHIBITIONS FOR LIFTING OPERATIONS

Do not use the work equipment to carry out lifting operations.
In particular, do not do the following.

- Do not weld a hook to the bucket to lift a load.
- Do not fit a wire rope to the bucket teeth to lift a load.
- Do not wind a wire rope directly around the boom or arm to lift a load.

7.7 WINDOW WASHER FLUID

TYPE OF WINDOW WASHER FLUID

Use window washer fluid of ethyl alcohol type.
The vapor of window washer fluid of methyl alcohol type may contain elements harmful to humans.
Since the window washer fluid tank is installed inside the machine, use window washer fluid of ethyl alcohol type.

8.1 BEFORE CARRYING OUT MAINTENANCE

NOTIFICATION OF FAILURE

Carrying out maintenance not described in the Komatsu operation and maintenance manual may lead to unexpected failures.
Please contact your Komatsu distributor for repairs.

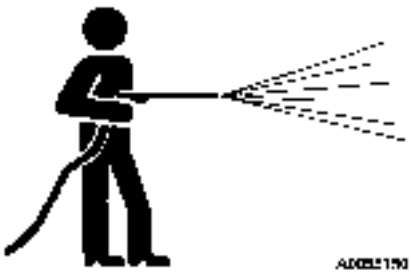
WARNING TAG

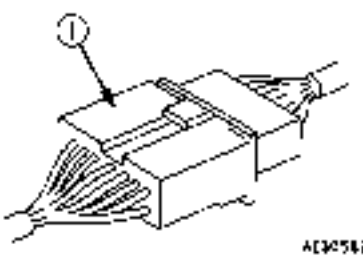
- ALWAYS attach the "DO NOT OPERATE" warning tag to the blade control lever in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine if necessary.
- If others start the engine, or touch or operate the blade control lever while you are performing service or maintenance, you could suffer serious injury or death.

Warning tag Part No. 09963-03000

CLEAN BEFORE INSPECTION AND MAINTENANCE

- Clean the machine before carrying out inspection and maintenance. This will ensure that dirt does not get into the machine and will also ensure that maintenance can be carried out safely.
- If inspection and maintenance are carried out with the machine still dirty, it will be difficult to find the location of problems, and there is also the danger that you will get dirty or mud in your eyes, and that you will slip and injure yourself.
- When washing the machine, always do as follows.
  - Wear non-slip shoes to prevent yourself from slipping on the wet surface.
  - When using high-pressure steam to wash the machine, always wear protective clothing. This will protect you from being hit by high-pressure water, and cutting your skin or getting mud or dust into your eyes.
  - Do not spray water directly on to the electrical system (sensors, connectors) ①. If water gets into the electrical system, there is danger that it will cause defective operation and malfunction.





KEEP WORK PLACE CLEAN AND TIDY

Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean the tidy to enable you to carry out operations safely.
If the work place is not kept clean and tidy, there is danger that you will trip, slip, or fall over and injure yourself.

APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.
When working with others, misunderstandings between workers can lead to serious accidents.

RADIATOR WATER LEVEL

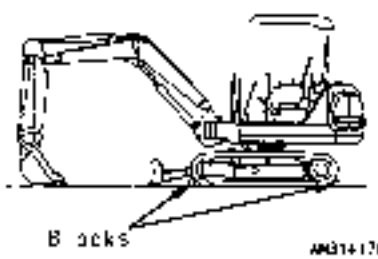
- When inspecting the radiator water level, stop the engine, and wait for the engine and radiator to cool down. Check the water level in the sub-tank. Under normal conditions, do not open the radiator cap.
- If there is no sub-tank, or the radiator cap must be removed, always do as follows.
- Wait for the radiator water temperature to go down before checking the water level.
  (When checking if the water temperature has gone down, put your hand near the engine or radiator and check the air temperature. Be careful not to touch the radiator or engine.)
- Release the internal pressure before removing the radiator cap, and remove the radiator cap slowly.

A0065090

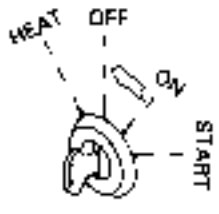
A0067090

STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

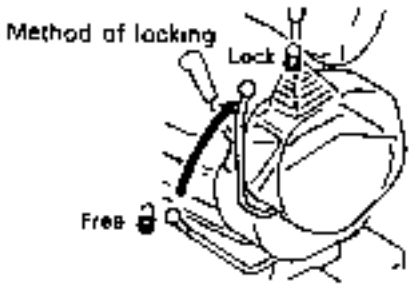
- When carrying out inspection and maintenance, park the machine on level ground where there is no danger of falling rocks or land slides, or of flooding if the land is low, then lower the work equipment to the ground and stop the engine.
- Operate the right-hand work equipment control lever several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit, then set safety lock levers ① (Installed on only left side, if machine is equipped with cab) to the LOCK position.
- Put blocks under the track to prevent the machine from moving.
- The worker carrying out the maintenance should be extremely careful not to touch or get caught in the moving parts.



AM314178



AM039140



PROPER TOOLS

Use only tools suited to the task. Using damaged, low quality, faulty, or makeshift tools could cause personal injury.
Broken pieces of chisels or hammers could fly into your eyes and blind you.

A0001170

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

Hoses and other parts of the fuel, hydraulic, and brake system are critical parts for ensuring safety, so they must be replaced periodically.
Replacement of safety critical parts requires skill, so please ask your Komatsu distributor to carry out replacement.

- Replace these components periodically with new ones, regardless of whether or not they appear to be defective.
  These components deteriorate over time, and can cause fire because of oil leakage or failure in the work equipment system.
- Replace or repair any such components if any defect is found, even though they have not reached the time specified.

Replacement of safety critical parts →
See "22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS".

USE OF LIGHTING

- When checking fuel, oil, or battery electrolyte, always use lighting with anti-explosion specifications.
  If such lighting equipment is not used, there is danger of explosion.
- If work is carried out in dark places without installing lighting, there is danger of injury, so always install proper lighting.
- Even if it is dark, do not use a lighter or flame instead of lighting. There is danger of starting a fire, and if the battery gas ignites, it may cause an explosion.
- When using the machine as the power supply for the lighting, follow the instructions in this Operation and Maintenance Manual.

A0056180

PREVENTION OF FIRE

There is danger of the fuel and battery gas catching fire during maintenance, so always follow the precautions below when carrying out maintenance.

- Store fuel, oil, grease, and other flammable materials away from flame.
- Use non-flammable materials as the flushing oil for cleaning parts. Do not use diesel oil or gasoline. There is danger that they will catch fire.
- Never smoke when carrying out inspection or maintenance. Always smoke in the prescribed place.
- When checking fuel, oil, or battery electrolyte, always use lighting with anti-explosion specifications. Never use lighters or matches as lighting.
- When carrying out grinding or welding operations on the chassis, remove any flammable materials to a safe place.
- Be sure that a fire extinguisher is present at the inspection and maintenance point.

A0063020

8.2 DURING MAINTENANCE

PERSONNEL

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.
Extra precaution should be used when grinding, welding, and using a sledge-hammer.

ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Do not allow anyone other than the workers close to the machine or attachment.
- Place attachments that have been removed from the machine in a safe place so that they do not fall. Put a fence around the attachments, and set up No Entry signs to prevent unauthorized persons from coming close.

WORK UNDER THE MACHINE

- Stop the machine on firm, level ground, and always lower all work equipment to the ground before performing service or repairs under the machine.
- Always block the track shoes securely.
- It is extremely dangerous to work under the machine if the track shoes are off the ground and the machine is supported only by the work equipment. Never work under the machine if the machine is poorly supported.

WORK ON TOP OF MACHINE

- When carrying out maintenance on top of the machine, make sure that the footholds are clean and free of obstructions, and follow the precautions below to prevent yourself from falling.
  - Do not spill oil or grease.
  - Do not leave tools lying around.
  - Mind your step when you are walking.
- Never jump down from the machine. When getting on or off the machine, always use the steps and handrails, and maintain three-point contact (both feet and one hand or both hands and one foot) at all times.
- Use protective equipment if necessary.

LOCKING INSPECTION COVERS

When carrying out maintenance with the inspection cover open, lock it securely with a lock bar. If maintenance is carried out with the inspection cover open and not locked in position, it may close suddenly if knocked or blown by the wind, and may cause injury to the operator.

MAINTENANCE WITH ENGINE RUNNING

To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- When carrying out operations near rotating parts, there is danger of being caught in the parts, so be extremely careful.
- When cleaning inside the radiator, set safety lock levers to the LOCK position to prevent the work equipment from moving.
- Do not touch any control levers. If any control lever must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Never touch the fan blade or fan belt with any tool or any part of your body. There is danger of serious injury.

DO NOT DROP TOOLS OR PARTS INSIDE MACHINE

- When opening the inspection window or tank oil filler to carry out inspection, be careful not to drop any nuts, bolts, or tools inside the machine.
  If such parts are dropped into the machine, it will cause breakage of the machine, mistaken operation, and other failures. If you drop any part into the machine, always be sure to remove it from the machine.
- When carrying out inspection, do not carry any unnecessary tools or parts in your pocket.

PRECAUTIONS WHEN USING HAMMER

When using a hammer, always wear safety glasses, safety helmet, and other protective clothing, and put a brass bar between the hammer and the part being hammered.
If hard metal parts such as pins, edges, teeth, or bearings are hit with a hammer, there is danger that broken pieces might fly into your eyes and cause injury.

REPAIR WELDING

Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. Gas is generated, and there is danger of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.
The qualified welder must follow the precautions given below.

- Disconnect the battery terminals to prevent explosion of the battery.
- Remove the paint from the place being welded to prevent gas from being generated.
- If hydraulic equipment or piping, or places close to these are heated, flammable vapor or spray will be generated, and there is danger of this catching fire, so avoid applying heat to such places.
- If heat is applied directly to rubber hoses or piping under pressure, they may suddenly burst, so cover them with fireproof sheeting.
- Always wear protective clothing.
- Ensure that there is good ventilation.
- Clear up any flammable materials, and make sure that there is a fire extinguisher at the workplace.

PRECAUTIONS WITH BATTERY

When repairing the electrical system or when carrying out electrical welding, remove the negative ⊖ terminal of the battery to stop the flow of current.

Handling battery → See "16.4 IF BATTERY IS DISCHARGED".

A2205850

WHEN ABNORMALITY IS LOCATED

- If any abnormality is found during inspection, always carry out repairs. In particular, if the machine is used when there is any abnormality in the brakes or work equipment systems, it may lead to serious accident.
- Depending on the type of failure, please contact your Komatsu distributor for repairs.

RULES TO FOLLOW WHEN ADDING FUEL OR OIL

If any flame is brought close to fuel or oil, there is danger that it will catch fire, so always follow the precautions below.

- Stop the engine when adding fuel or oil.
- Do not smoke.
- Spilled fuel and oil may cause you to slip, so always wipe it up immediately.
- Always tighten the cap of the fuel and oil fillers securely.
- Always add fuel and oil in a well-ventilated place.

A0055020

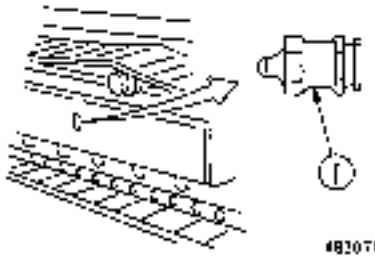
A0055030

A0055040

PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

- Grease is pumped into the track tension adjustment system under high pressure. If the specified procedure for maintenance is not followed when making adjustment, valve ① may fly out and cause damage or personal injury.
- When loosening grease drain valve ①, never loosen it more than one turn.
- Never put your face, hands, feet, or any other part of your body directly in front of any grease drain valve.

Adjusting track tension → See "24.2 WHEN REQUIRED".



HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to personal injury or damage. If any damaged hoses or loose bolts are found, stop work and contact your Komatsu distributor for repairs.
- Replacing high-pressure hoses requires a high level of skill, and the torque is determined according to the type of hose and size, so please do not carry out replacement yourself. Ask your Komatsu distributor to carry out replacement.

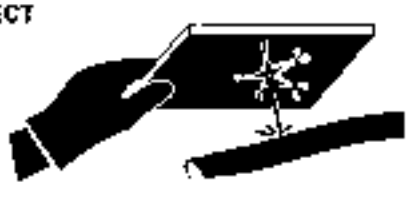
PRECAUTIONS WITH HIGH-PRESSURE OIL

When inspecting or replacing high-pressure piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious injury or damage, so always do as follows.

- For details of the method of releasing the pressure, **see "8.1 BEFORE CARRYING OUT MAINTENANCE, STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE"**. Never carry out inspection or replacement before releasing the pressure completely.
- Wear safety glasses and leather gloves.
- If there is any leakage from the piping or hoses, the piping, hoses, and the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses. If it is difficult to locate the leakage, always please contact your Komatsu distributor for repairs.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately for medical attention.

INCORRECT

CORRECT



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE

Immediately after stopping operations, the engine coolant, oil at all parts, the exhaust manifold, and the muffler are at high temperature.
In this condition, if the cap is removed, or the oil is drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature to go down, then carry out the inspection and maintenance in accordance with the procedures given in this manual.

Cleaning inside of cooling system → See "24.2 WHEN REQUIRED".
Checking coolant level, oil level in hydraulic tank → see "24.3 CHECK BEFORE STARTING".
Checking lubricating oil level, adding oil → see "24.3-9 PERIODIC MAINTENANCE".
Changing oil, replacing filters → see "24.7-11 PERIODIC MAINTENANCE".

A006500

CHECKS AFTER INSPECTION AND MAINTENANCE

Failure to carry out inspection and maintenance fully, or failure to check the function of various maintenance locations may cause unexpected problems and may even lead to personal injury or damage, so always do as follows.

- Checks when engine is stopped
  - Have all the inspection and maintenance locations been checked?
  - Have all the inspection and maintenance items been carried out correctly?
  - Have any tools or parts dropped inside the machine? It is particularly dangerous if they get caught in the lever linkage.
  - Has water and oil leakage been repaired? Have bolts been tightened?

- Checks when engine is running
  For details of checks when the engine is running, **see "8.2 DURING MAINTENANCE, MAINTENANCE WITH ENGINE RUNNING"**, and be extremely careful to ensure safety.

- Do the inspection and maintenance locations work normally?

- Is there any oil leakage when the engine speed is raised and load is applied to the hydraulic system?

WASTE MATERIALS

To prevent pollution, particularly in places where people or animals are living, always follow the procedures given below.

- Never dump waste oil in a sewer system, rivers, etc.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground.

- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.

INCORRECT

A0056220

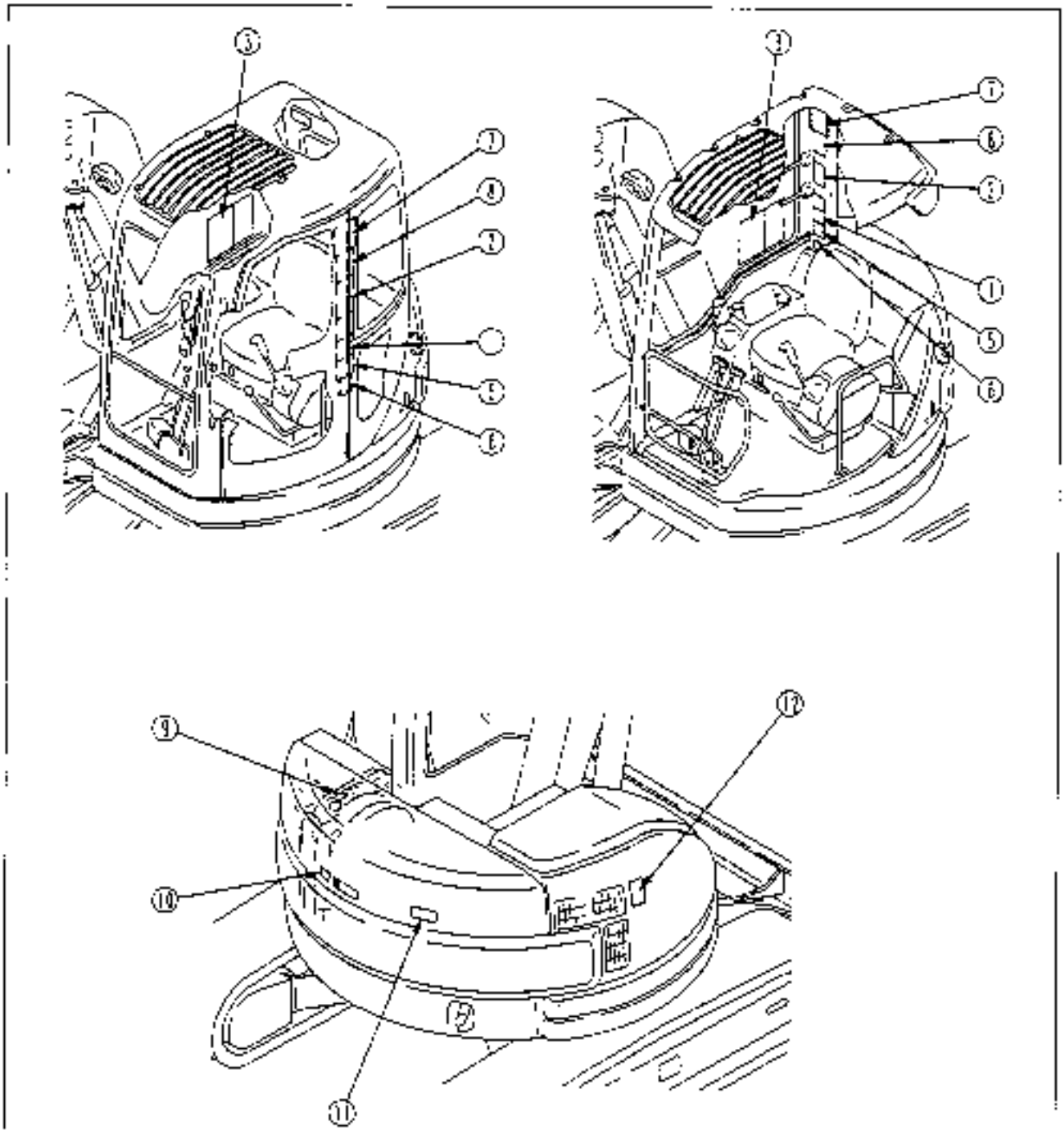
9. POSITION FOR ATTACHING SAFETY LABELS

Always keep these labels clean. If they are lost or damage, attach them again or replace them with a new label.

There are other labels in addition to the safety labels listed as follows, so handle them in the same way.

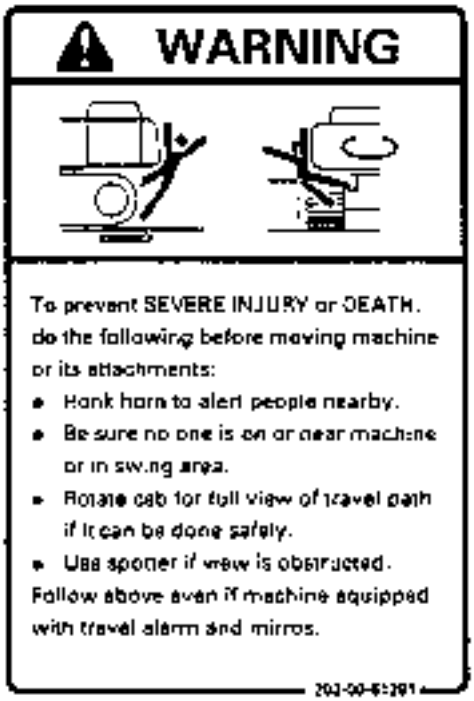
Safety labels may be available in languages other than English. To find out what labels are available, contact your Komatsu distributor.

9.1 POSITION FOR ATTACHING SAFETY LABELS

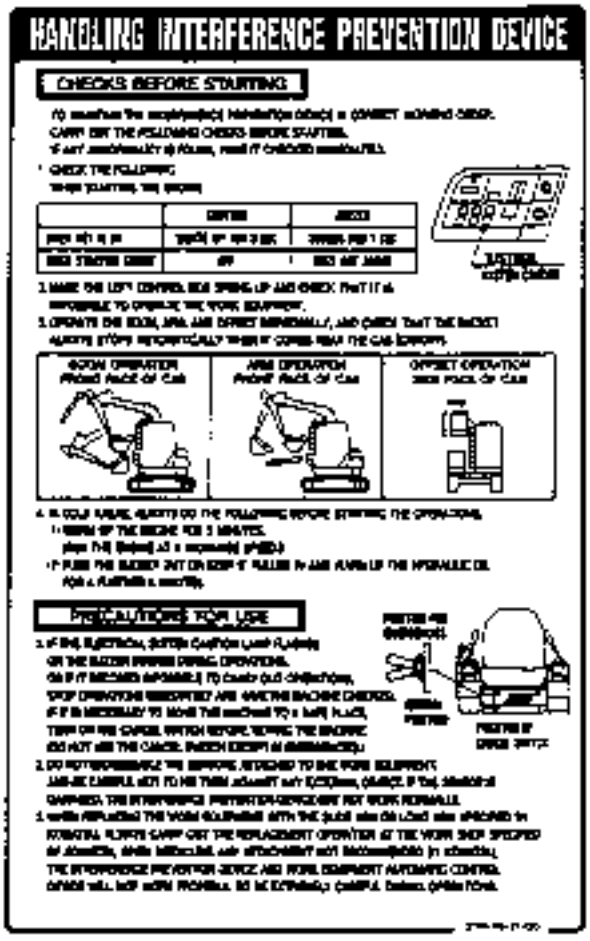


1. Warnings for leaving operator's seat (203-00-61270)

2. Warnings before operating machine (203-00-61291)



3. Cautions for handling interference prevension device (21W-98-21420)



5. Warnings when adjusting track tension (14X-98-11551)

⚠ WARNING

High pressure hazard at track adjuster.

When adjusting track tension, never open plug more than one turn.
Turning further could cause injury from flying plug and grease.

See manual for adjustment instructions.

14X-98-11551

7. Warnings for high voltage (203-00-61310)

⚠ DANGER

Hazardous voltage hazard
Serious injury or death can occur if machine or attachments are not kept safe distance away from electric lines.

Line voltage	Safe Distance
6.6kv	At least 10ft(3m)
66.0kv	At least 16ft(5m)
275.0kv	At least 33ft(10m)

203-00-61310

6. Warning for removing window (20U-98-21910)

⚠ WARNING

To prevent SEVERE INJURY or DEATH, follow instructions below:
- To avoid contact with boom, DO NOT lean outside right side window.
- If right side window is broken or becomes dislodged, have it repaired immediately.

20U-98-21910

8. Warnings for operation, inspection and maintenance (14X-98-11580)

⚠ WARNING

Improper operation and maintenane can cause serious injury or death.

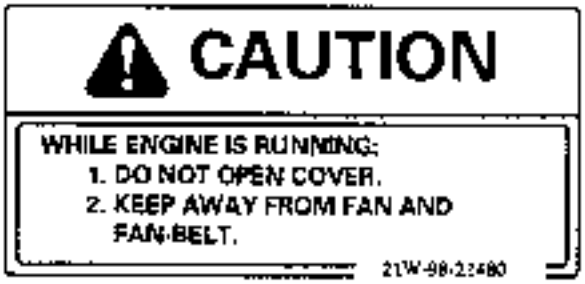
Read manual and labels before operation and maintenance.
Follow instructions and warnings in manual and in labels on machine.

Keep manual in machine cab near operator.
Contact komatsu distributor for a replacement manual.

14X-98-11580

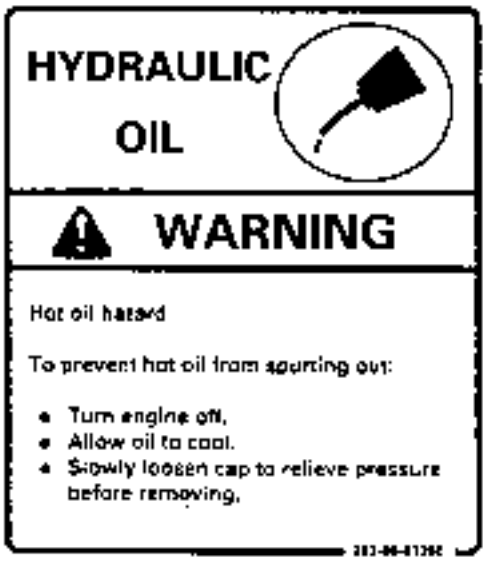
9. Warnings for high temperature coolant (14X-98-11531)

10. Warnings for opening engine hood (21W-98-21480)



11. Keeping out of turning area (20Y-00-21270)

12. Warnings for high temperature hydraulic oil (203-00-61260)

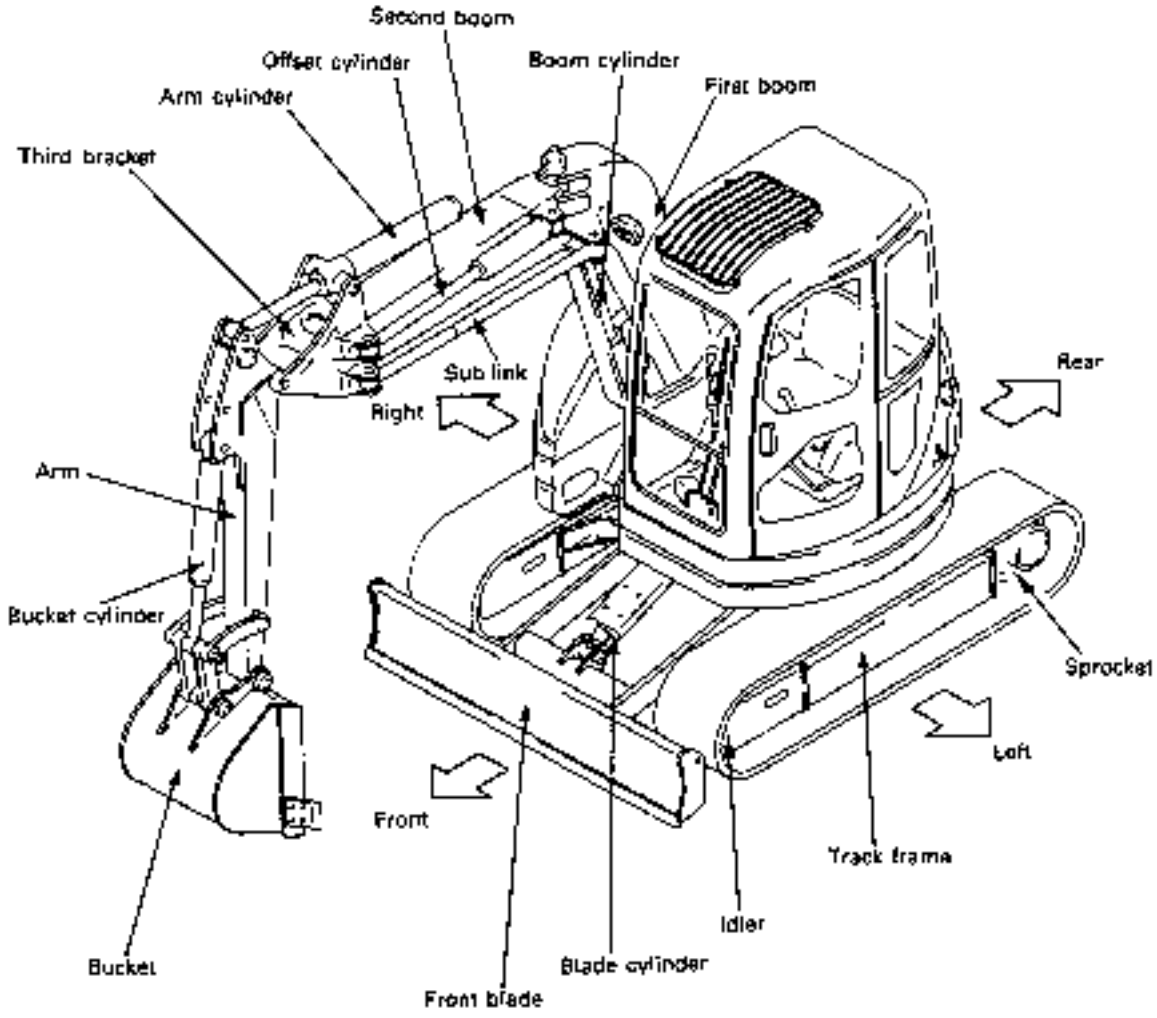


OPERATION

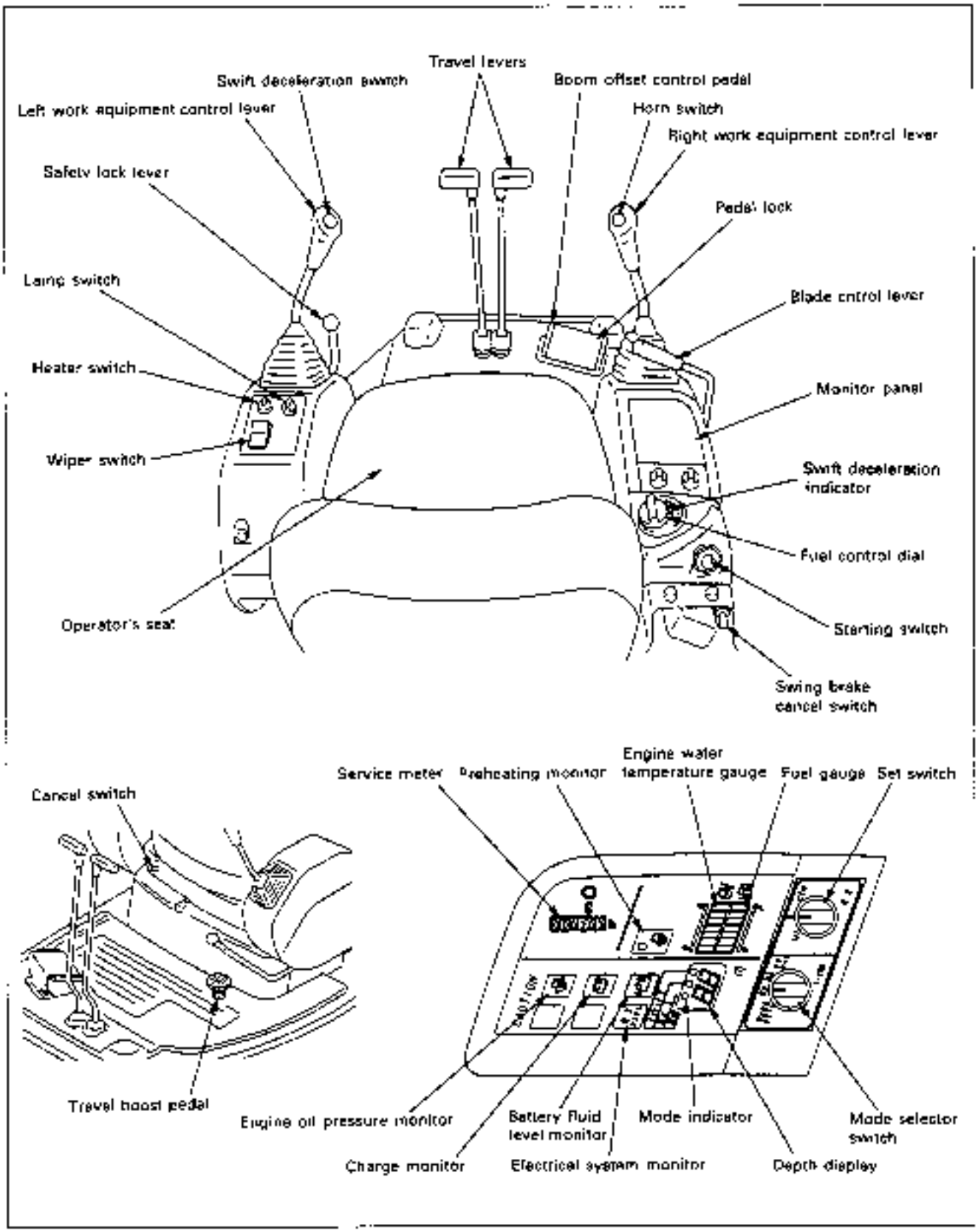
10. GENERAL VIEW

10.1 GENERAL VIEW OF MACHINE

If directions are indicated in this section, they refer to the directions shown by the arrows in the diagram below.



10.2 GENERAL VIEW OF CONTROLS AND GAUGES



11. EXPLANATION OF COMPONENTS

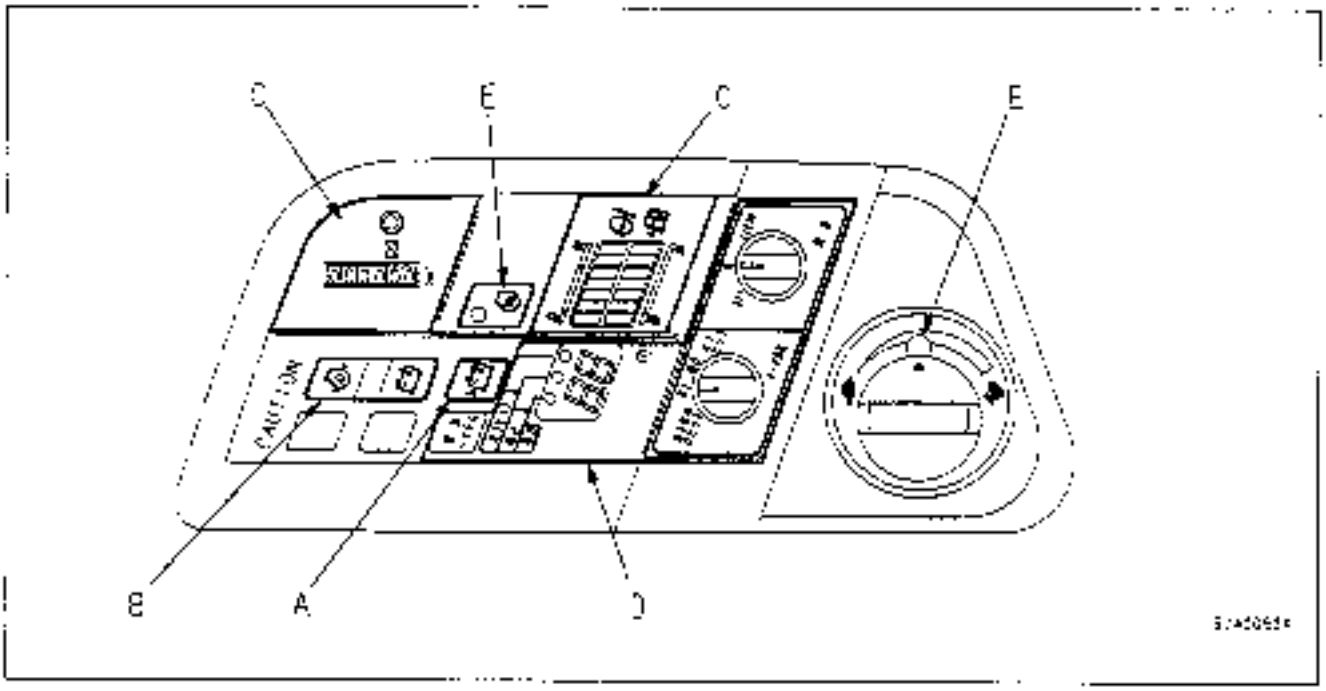
The following is an explanation of the devices needed for operating the machine.

To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

Before reading the explanation of components, please read the table below to check what equipment is installed to your machine.

	Item	No.
Machine monitor	A Basic check items	11.1.1
	B Emergency stop items	11.1.2
	C Meters	11.1.3
	D 4-System	11.1.4
	E Pilot lamp	11.1.5
Switches	Starting switch	11.2.1
	Fuel control dial	11.2.2
	Swift deceleration switch	11.2.3
	Swing brake cancel switch	11.2.4
	Horn switch	11.2.5
	Lamp switch	11.2.6
	Cab heater switch	11.2.7
	Wiper switch	11.2.8
	Room lamp switch	11.2.9
Control levers and pedals	Lock lever	11.3.1
	Left work equipment lever	11.3.2
	Right work equipment lever	11.3.3
	Blade control lever	11.3.4
	Travel levers	11.3.5
	Pedal lock	11.3.6
	Boom offset control pedal	11.3.7
	Travel boost pedal	11.3.8
Engine hood		11.4
Front window		11.5
Sliding door		11.6
Rear window		11.7
Hammer for emergency escape		11.8
Fuse box		11.9
Fusible link		11.10
Cap with lock, cover		11.11
Tool box		11.12
Grease gun holder		11.13
Operation and maintenance manual pocket		11.14

11.1 MACHINE MONITOR



A. BASIC CHECK ITEMS (11.1.1)

This displays the basic items that should be checked before starting the engine.

If there is any abnormality, the appropriate monitor lamp will flash.

When the engine is started, the monitor lamp will go off even if there are abnormalities.

B. EMERGENCY STOP ITEMS (11.1.2)

These are items which need to be observed while the engine is running. If any abnormality occurs, items which need to be repaired immediately are displayed.

If there is any abnormality, the appropriate monitor lamp will flash and the buzzer will sound to indicate the location of the abnormality.

⚠ CAUTION

If any monitor lamp flashes, stop the work, and repair it immediately.

C. METERS (11.1.3)

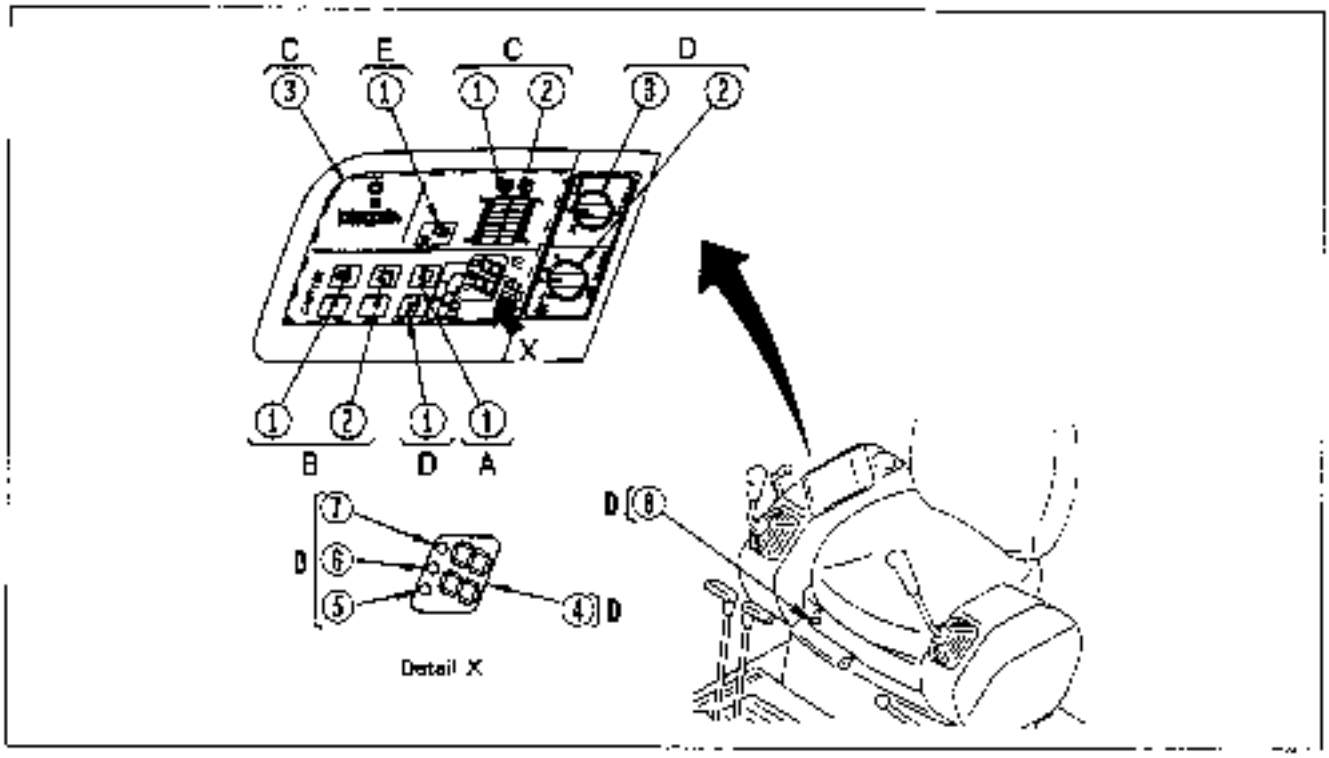
This shows the engine water temperature and fuel level.

D. 4-SYSTEM (11.1.4)

This carries out the display and setting for the automatic work equipment control system and interference prevention system for the bucket and cab.

E. PILOT LAMP (11.1.5)

This shows the condition of preheating.

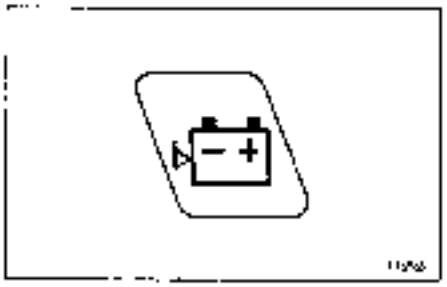


11.1.1 A BASIC CHECK ITEM

1. BATTERY FLUID LEVEL

This warns the operator if the battery fluid level drops. When the engine is stopped, if the starting switch is turned to the ON position, this lamp should light up and then go out after approx. 3 seconds.

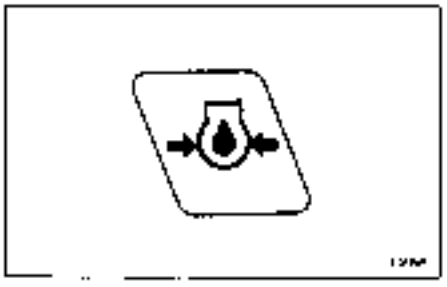
If it does not go out, check the battery fluid level. For details of the method of checking, see "24.2 WHEN REQUIRED".



11.1.2 B EMERGENCY STOP ITEM

⚠ CAUTION

If the monitor flashes, stop the engine immediately and carry out the following action.



1. ENGINE OIL PRESSURE

This lamp flashes if the engine lubricating oil pressure drops below the normal value. If it flashes, stop the engine and check the condition. For details, see "16.5 OTHER TROUBLE".

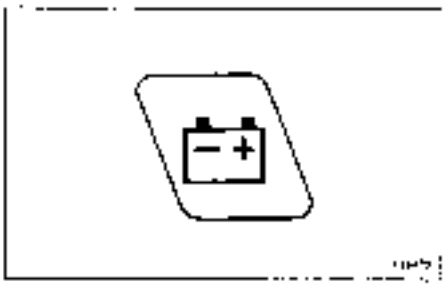
REMARK

When the engine is stopped, and the starting switch is turned to the ON position, this lamp lights up, but it does not indicate an abnormality.

2. CHARGE LEVEL

This monitor indicates an abnormality in the charging system while the engine is running.

If the monitor lamp flashes, stop the engine and check the V-belt tension. If any abnormality is found, see "16.5 OTHER TROUBLE".



REMARK

When the engine is stopped, and the starting switch is turned to the ON position, this lamp lights up, but it does not indicate an abnormality.

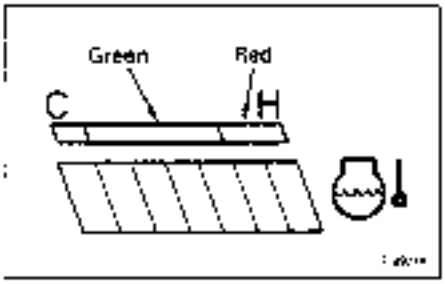
11.1.3 C METERS

1. ENGINE WATER TEMPERATURE GAUGE

This displays the engine cooling water temperature. During normal operation, the lamp should light up in the green range.

If the lamp in the red range lights up during operation, run the engine at low idling and wait for the temperature to go down to the green range.

After starting the engine, warm up it until the green range lights up

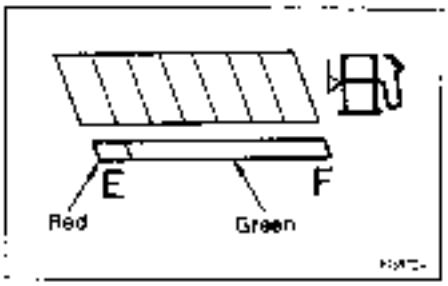


2. FUEL GAUGE

This shows the fuel level in the fuel tank. During normal operation, the lamp should light up in the green range.

If the lamp in the red range flashes during operation, there is less than 21 liters (5.5 US gal, 4.6 UK gal) of fuel remaining, so check and add fuel.

The correct level may not be displayed for a short time after the starting switch is turned to the ON position, but this is not an abnormality.

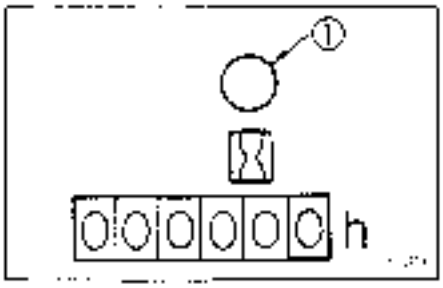


3. SERVICE METER

This meter shows the total operation hours of the machine. The service meter advances while the engine is running – even if the machine is not traveling.
Set the periodic maintenance intervals using this display.

While the engine is running, operation display ① at the top inside of the meter will light to show that the meter is advancing.

Meter will advance by 1 for each hour of operation regardless of the engine speed.

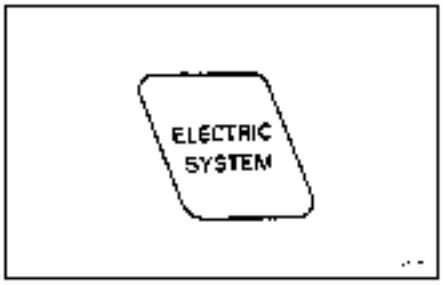


11.1.4 D 4-SYSTEM

1. ELECTRIC SYSTEM

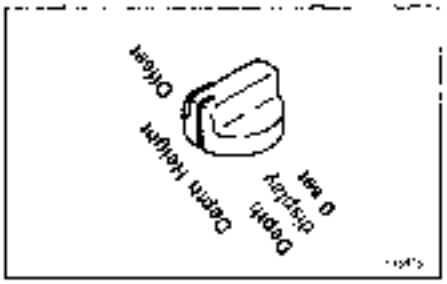
If there is any abnormality in the 4-system line (interference prevention system and automatic work equipment control system), a warning signal is emitted, so stop the engine. The cause of the abnormality is displayed as an error code on the depth display, so check the condition. For details of the method of checking, see "15.5 OTHER TROUBLE".

When the engine is started or stopped with the starting switch at the ON position, the buzzer may sound and this lamp may light up momentarily, but this does not indicate any abnormality.



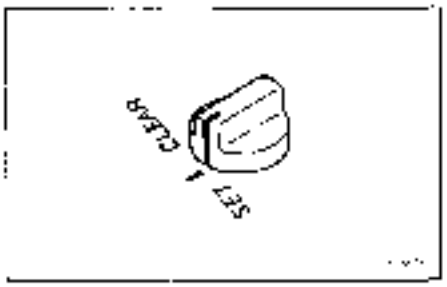
2. MODE SELECTOR SWITCH

This switch is used to select the depth display 0 set mode, depth mode, height mode, or offset mode.



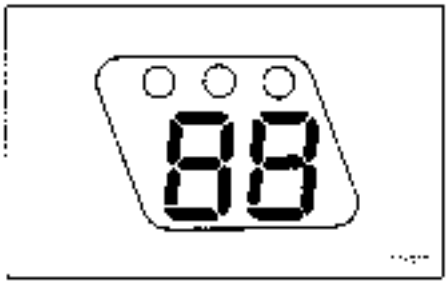
3. SETTING SWITCH

This switch is used to set or clear the mode selected by the mode selector switch.



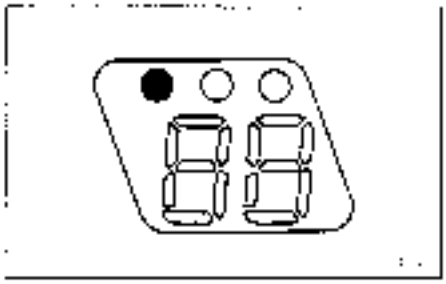
4. DEPTH DISPLAY

This shows the depth of the bucket from the ground level.
When the bucket is above the ground level, UP is always displayed.
If a height lower than the ground surface is set as the standard surface (when in the depth display 0 set mode), the depth from the standard surface is displayed.
If any abnormality occurs in the 4-system, a two digit number is displayed to inform the location of the abnormality.



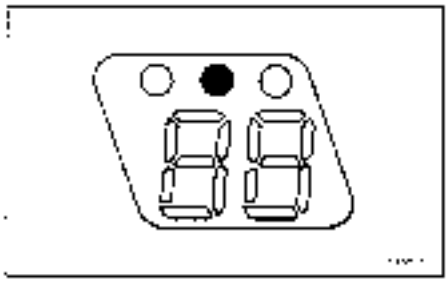
5. DEPTH MODE INDICATOR

This lights up when the amount the boom can be lowered is set.
It lights up when the mode selector switch is set to DEPTH, and shows that the boom lower amount is set.



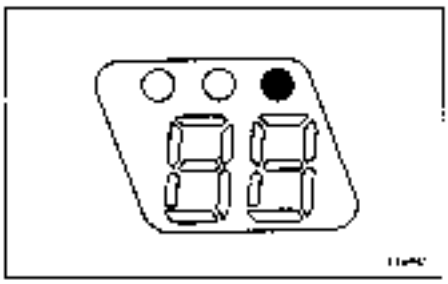
6. HEIGHT MODE INDICATOR

This lights up when the amount the boom can be raised is set.
It lights up when the mode selector switch is set to HEIGHT, and shows that the boom raise amount is set.

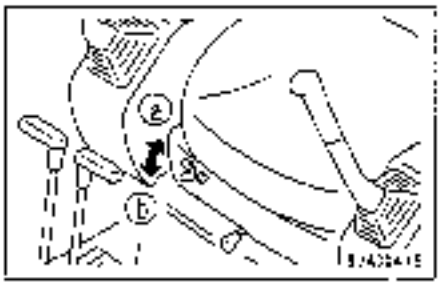


7. OFFSET MODE INDICATOR

This lights up when the left offset amount is set.



8. CANCEL SWITCH



⚠ WARNING

Never carry out operations with the CANCEL switch ON. The 4-system is not actuated and the work equipment does not stop automatically, so there is danger that it will hit the chassis.

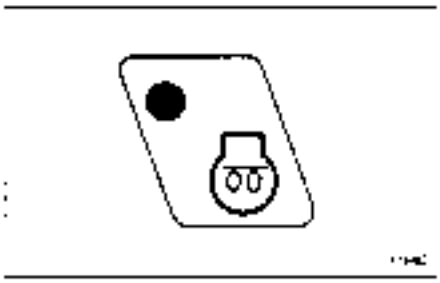
Use this switch to move the work equipment only in cases where an abnormality occurs in the 4-system and the work equipment stops.

ⓐ ON: Auto-stop cancel
ⓑ OFF: Normal operating condition

When the switch is at the ON position and it is released, it automatically returns to the OFF position.

11.1.5 E PILOT LAMP

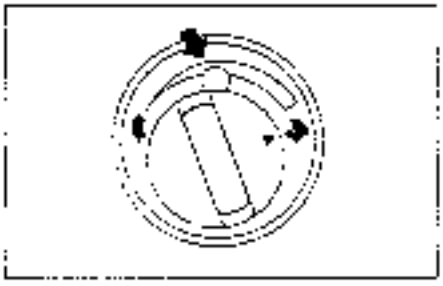
1. PRE-HEATING MONITOR



This monitor lamp indicates the pre-heating time required when starting the engine at an ambient temperature below 0°C (32°F).

The monitor lamp lights when the starting switch is turned to the HEAT position and goes off after approx. 18 seconds to show that the pre-heating is completed.

2. SWIFT DECELERATION PILOT LAMP



Pilot lamp ② informs the operator that the swift deceleration function has been actuated.

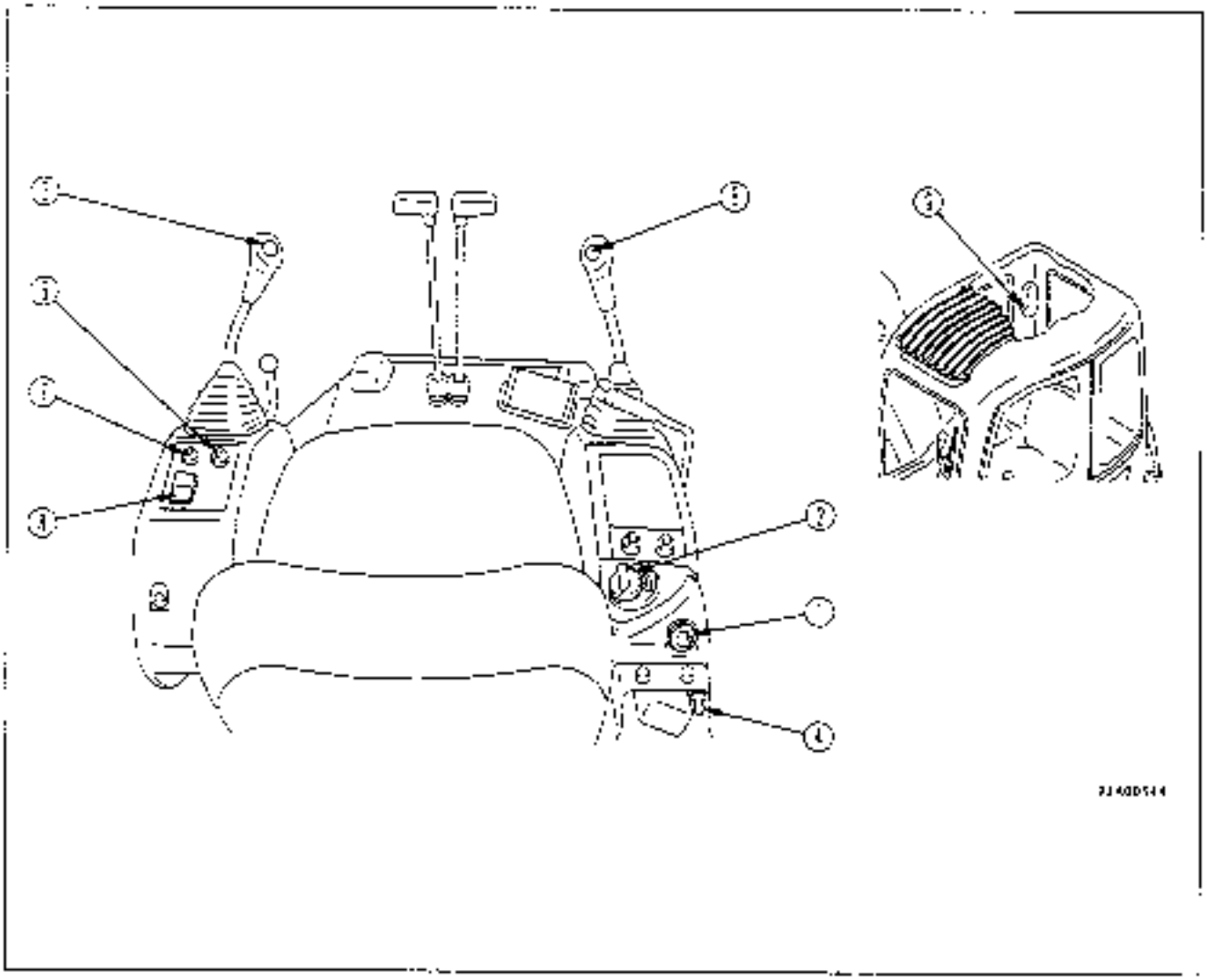
Actuated: ON
Canceled: OFF

When the swift deceleration switch is pressed, the swift deceleration pilot lamp light up.
When the switch is pressed again, the lamp goes out.

REMARK

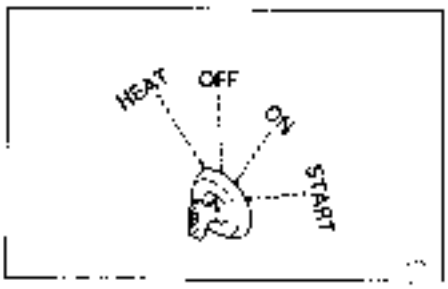
While the swift deceleration pilot lamp is lighted up, the engine speed will stay at low idling even if the fuel control dial is operated.

11.2 SWITCHES



1. STARTING SWITCH

This switch is used to start or stop the engine.



OFF position:

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, the electrical circuits are switched off and the engine stops.

ON position:

In this position, electric current flows in the charging and lamp circuits.

Keep the starting switch key at the ON position while the engine is running.

START position:

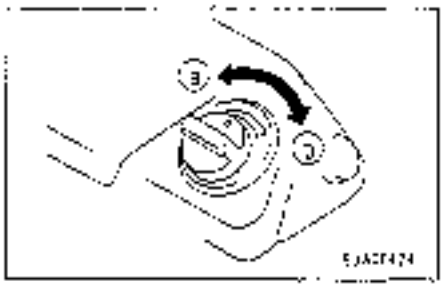
This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

HEAT position:

Turn the starting switch key to the HEAT position when starting in cold weather.

When the key is turned to the HEAT position, the preheating monitor lights up. Keep the key at this position until the preheating monitor goes out. When the preheating monitor goes out, release the key immediately.

When the key is released, it will return to OFF, so turn it immediately to the START position to start the engine.



2. FUEL CONTROL DIAL

Dial adjusts the engine speed and output.

ⓐ Low idling: Dial turned to left (counterclockwise)

ⓑ Full speed: Dial turned to right (clockwise)

REMARK

While the swift deceleration pilot lamp is lighted up, the engine speed will stay at low idling even if the fuel control dial is operated.

To restore the engine speed, press the swift deceleration switch on the left control lever to cancel the deceleration function.

3. SWIFT DECELERATION SWITCH

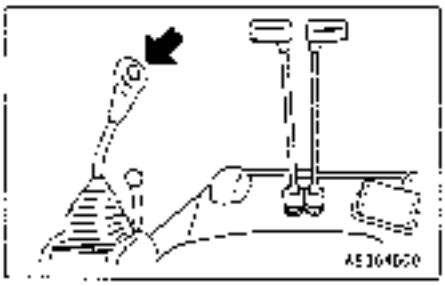
⚠ WARNING

Return the work equipment and travel levers to the neutral position before operating the swift deceleration switch. If the switch is operated when any lever is being operated, the engine speed will suddenly change.

When the travel levers and left and right work equipment control levers are at the neutral position, and the engine output is not needed, this switch is used to activate the system to lower the engine speed and reduce the fuel consumption.

When the switch in the center of the knob of the left work equipment control lever is pressed, the swift deceleration pilot lamp lights up and the engine speed goes down to low idling.

When the switch is pressed again, the engine speed returns to the speed set by the fuel control dial.



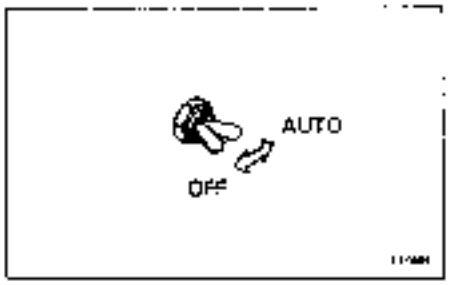
REMARK

- When the fuel control dial is at the low idling position, even if this switch is pressed, the engine speed will not go down any lower.
- If the engine speed does not rise, it is possible that this switch is ON. Look at the swift deceleration pilot lamp to check the condition of the switch.
- When the swift deceleration switch is ON, if the starting switch is turned OFF, the deceleration function is canceled.

4. SWING BRAKE CANCEL SWITCH

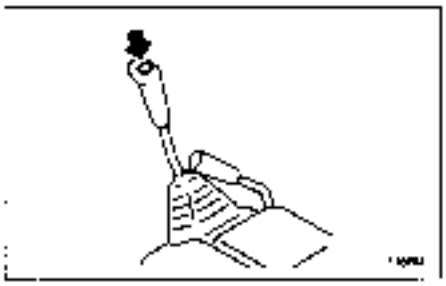
This switch is used to cancel the swing holding brake when the swing holding brake is applied.

AUTO position: Automatic
OFF position: Cancel



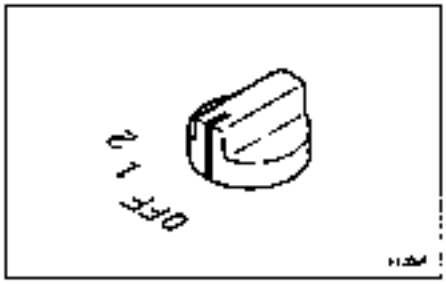
5. HORN SWITCH

When the switch in the center of the knob of the right work equipment control lever is pressed, the horn will sound.



6. LAMP SWITCH

This lights up the head lamps and the panel lamp.
Position 1: Panel lamp lights up.
Position 2: Head lamps and panel lamp light up.
Position OFF: Lamps go off.

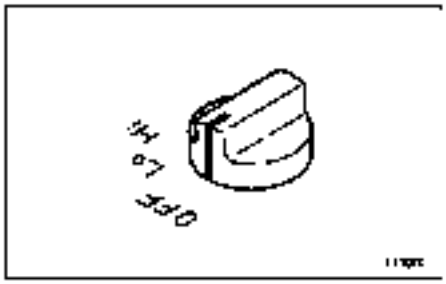


7. CAB HEATER SWITCH

This switch is used to heat the operator's compartment. The flow rate of the hot air can be set to two levels.

Hi position: Strong
Lo position: Weak
OFF position: Cab heater is stopped.

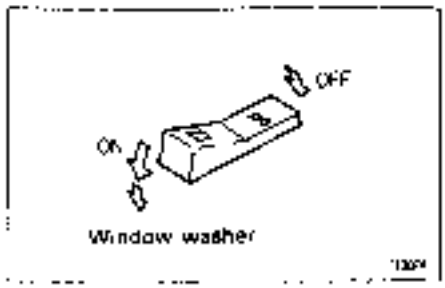
The cab is heated by hot water from the engine, so if the engine cooling water temperature is low, the cab will not heat up.



8. WIPER SWITCH

This operates the wipers for the front glass.

ON position: Wiper actuated
OFF position: Wiper stopped



REMARK

If the window washer system is installed, the washer fluid is sprayed out when the wiper switch is pushed in further from the ON position.

Be careful of the following when operating this system.

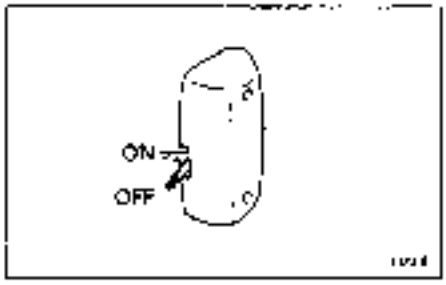
- Do not keep the switch pressed at the washer spray position for more than ten seconds continuously.
- Do not press the switch to the washer spray position if the washer fluid container is empty.

9. ROOM LAMP SWITCH

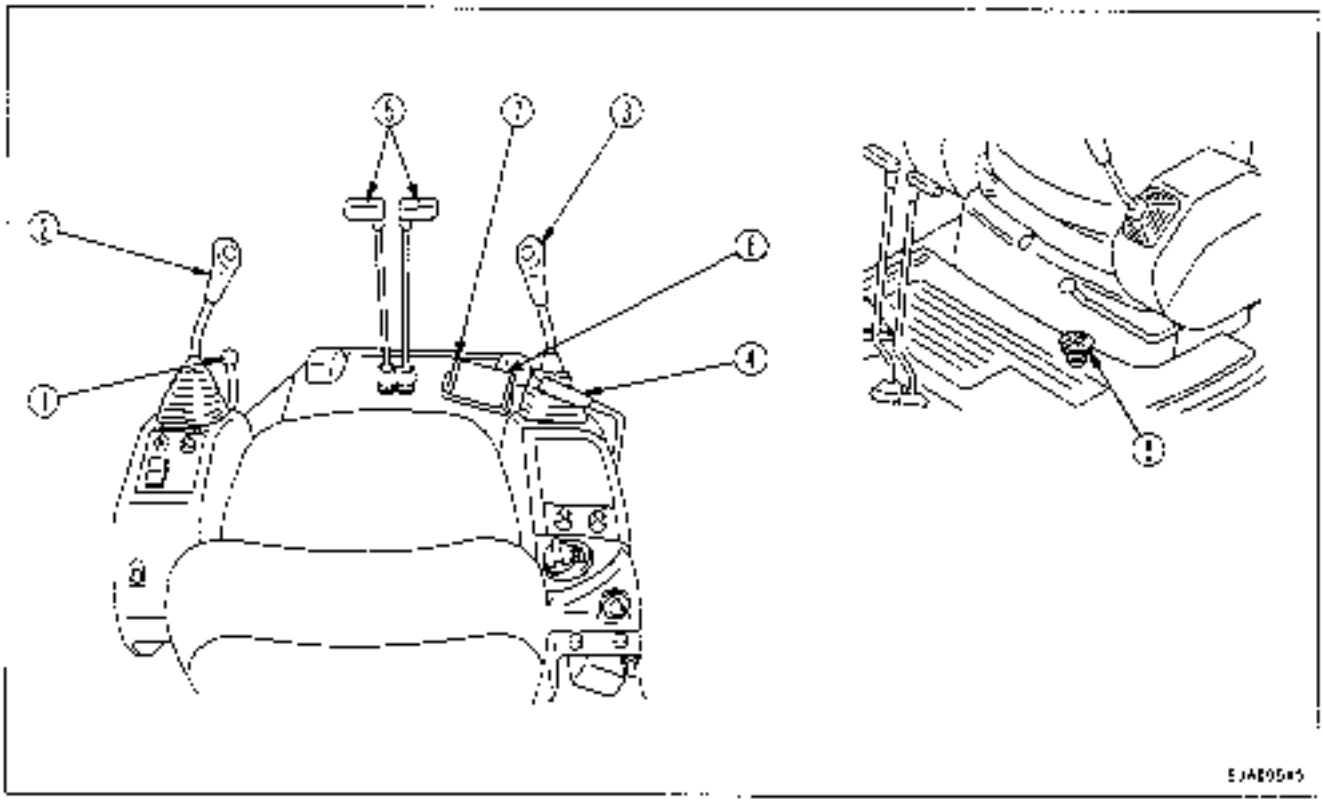
This lights up the room lamp.

ON position: Lights up

The room lamp can be turned on even when the starting switch is at the OFF position, so be careful not to leave it on by mistake.



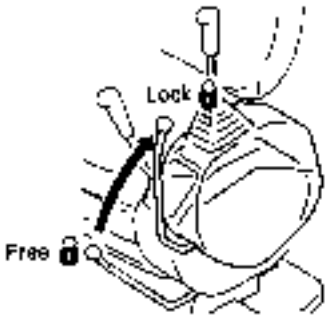
11.3 CONTROL LEVERS AND PEDALS



1. LOCK LEVER (FOR LEFT AND RIGHT WORK EQUIPMENT LEVERS)

⚠ WARNING

- When leaving the operator's compartment, set the safety lever securely to the LOCK position. If the gear shift lever is not locked, and it is touched by mistake, this may lead to a serious accident.
- If the safety lever is not placed securely in the LOCK position, the control lever may not be properly locked. Check that the situation is as shown in the diagram.

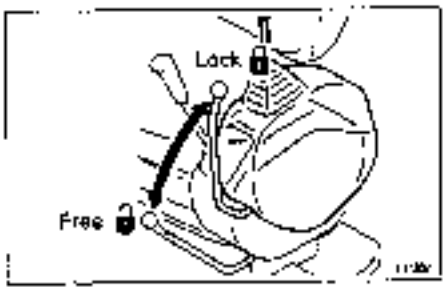


⚠ WARNING

- Even when the lock lever is in the lock position, it does not lock the blade.
- When pulling the lock lever up, be careful not to touch the work equipment control lever. If the lock lever is not pulled up fully, there is danger that the work equipment or swing may move.

⚠ WARNING

Be careful not to touch the work equipment lever when pushing down the lock lever from the lock position to the free position.

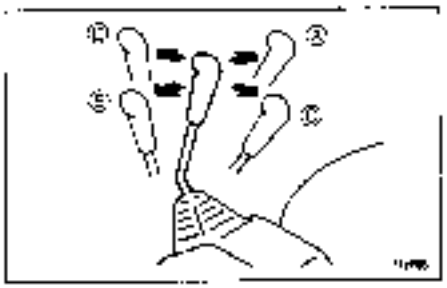


This is a device to lock the work equipment and swing. When the lever is pulled, the lever stand springs up and is locked.

This lock lever is a hydraulic lock type, so it is possible to move the work equipment control levers even when it is in the lock position, but the work equipment and swing motors will not move.

2. LEFT WORK EQUIPMENT LEVER

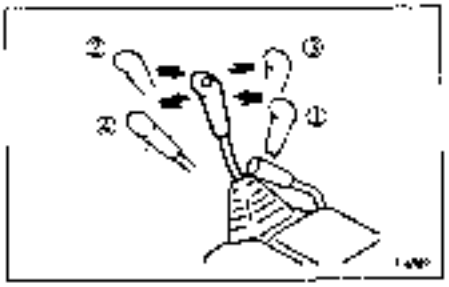
This lever is used to operate the arm and upper works.



Swing operation	Arm operation
Ⓐ Swing to right	Ⓒ Arm IN
Ⓑ Swings to left	Ⓓ Arm OUT

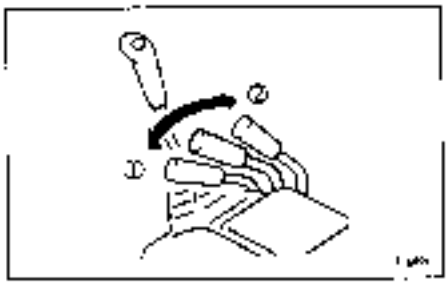
3. RIGHT WORK EQUIPMENT LEVER

This lever is used to operate the boom and bucket.



Boom operation	Bucket operation
① RAISE	③ DUMP
② LOWER	④ CURL

4. BLADE CONTROL LEVER



NOTICE

This lever is not locked even when the lock lever is at the LOCK position, so when not operating the blade, be careful not to touch this lever.

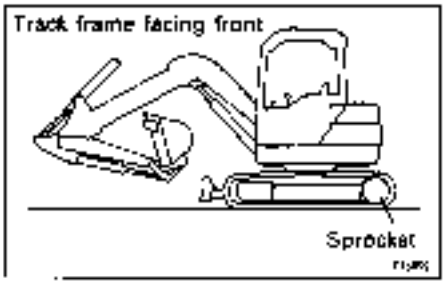
This lever is used to control the blade.

① LOWER
② RAISE

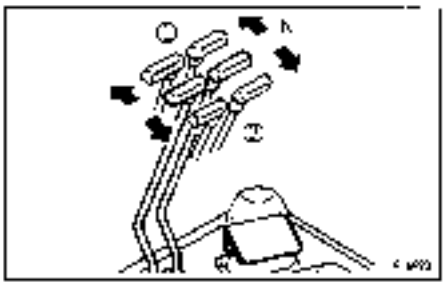
5. TRAVEL LEVERS

⚠ WARNING

When the track frame is facing the rear, the direction of the travel operation is reversed.
Before operating the travel lever, check if the track frame is facing the front or the rear.
(The track frame is facing the front if the sprocket is at the rear.)



① FORWARD:
The lever is pushed forward
② REVERSE:
The lever is pulled back
N (Neutral): The machine stops

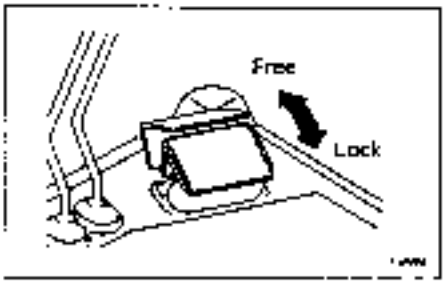


6. PEDAL LOCK (FOR BOOM OFFSET CONTROL PEDAL)

⚠ WARNING

When not operating the boom offset, always keep it locked with the pedal lock.
If the control pedal is not locked and it is touched by mistake, it may lead to a serious accident.

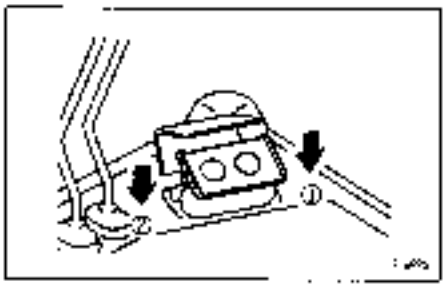
This locks the boom offset control pedal.
The pedal is locked by fitting the plate over the pedal.



7. BOOM OFFSET CONTROL PEDAL

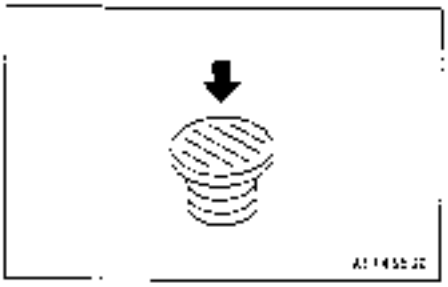
This pedal offsets the boom to the left or right.

① Right offset
② Left offset



8. TRAVEL BOOST PEDAL

Press this pedal to boost the travel speed.
For details of the travel speed, see SPECIFICATIONS.

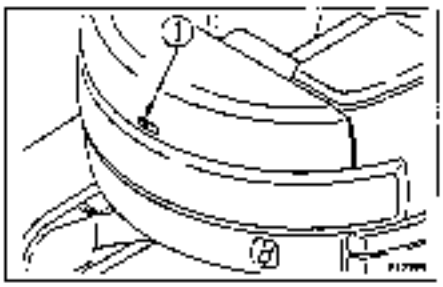


11.4 ENGINE HOOD

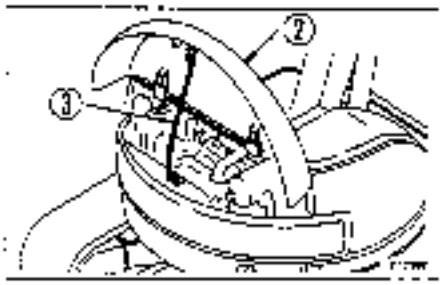
⚠ WARNING

When carrying out inspection or maintenance inside the engine hood, always use the hood support lever to keep the engine hood open.

1. Press engine hood knob ① to release the lock.



2. Push hood ② up, then fix the hood in position with hood support lever ③.

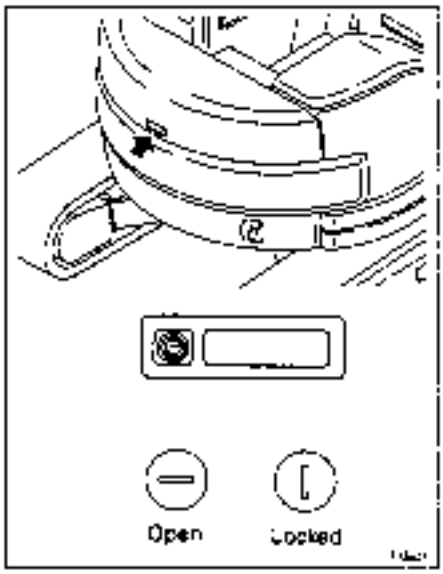


3. To close hood ②, remove hood support lever ③, secure it firmly in the lever lock, then lower the hood slowly and push the hood down to apply the lock.

NOTICE

Always keep the hood locked except when opening the hood.

It is possible to check if the lock is applied by looking at the direction of the key groove in the open knob.



11.5 FRONT WINDOW

⚠ WARNING

When opening the front window, always hold the grip firmly with both hands and pull up. If you use only one hand, your hand may slip and get caught.

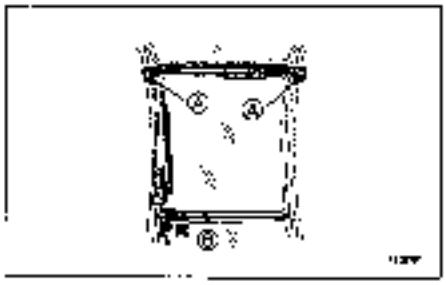
It is possible to store (pull up) the front window (top) in the roof of the operator's compartment.

When opening

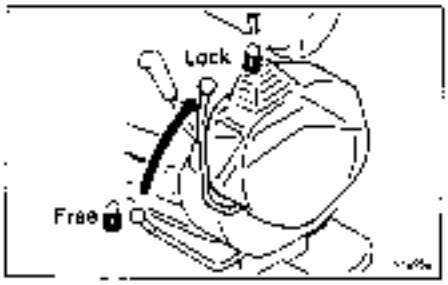
⚠ WARNING

When the front window is open, there is danger that it will fall, so always lock it with left and right lock pins Ⓐ.

1. Stop the machine on flat ground, lower the work equipment to the ground, and stop the engine.



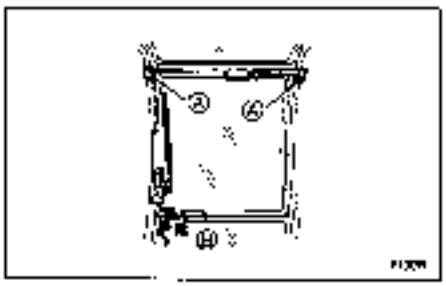
2. Set the lock lever for the work equipment control levers securely to the LOCK position.



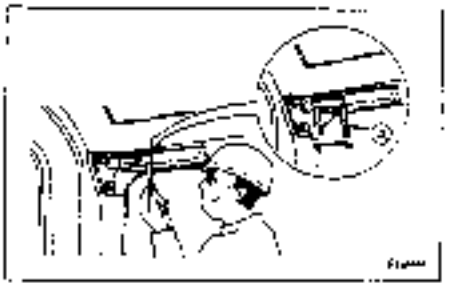
3. Disconnect the wiring for the wiper motor from socket Ⓑ.

NOTICE

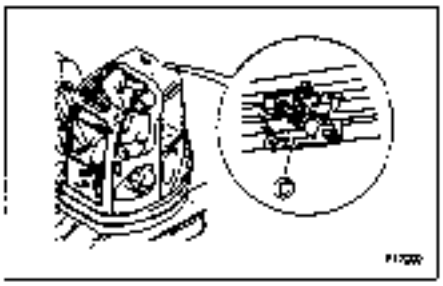
If it is attempted to open the front window without disconnecting the wiring, the wiring will be torn off.



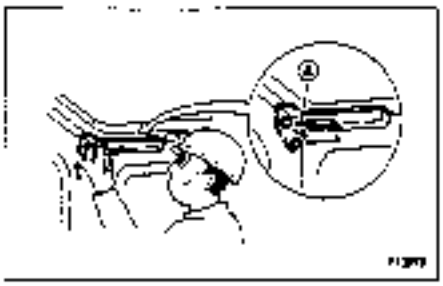
4. Pull lock pins Ⓐ at the top left and right sides of the front window to the inside to release the lock.



5. From the inside of the operator's cab, hold the bottom grip with the left hand and the top grip with the right hand, pull up the window, and push it in fully until it is locked by catch Ⓒ.



6. Lock with lock pins Ⓐ on the left and right sides.

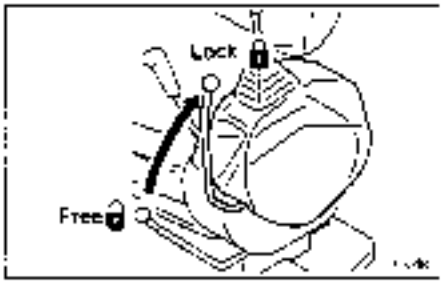


When closing

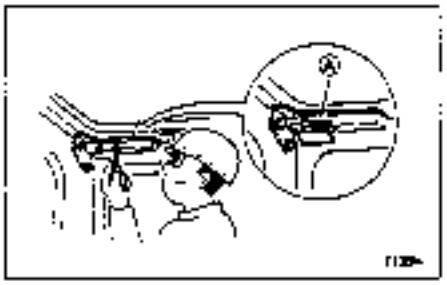
⚠ WARNING

When closing the window, lower it slowly and be careful not to get your hand caught.

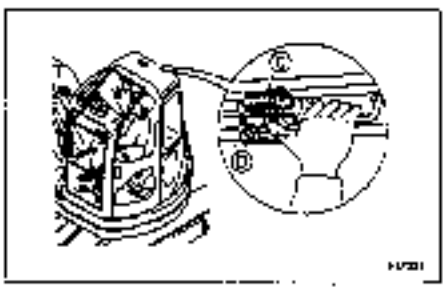
1. Stop the machine on flat ground, lower the work equipment to the ground, and stop the engine.
2. Set the lock lever for the work equipment control levers securely to the LOCK position.



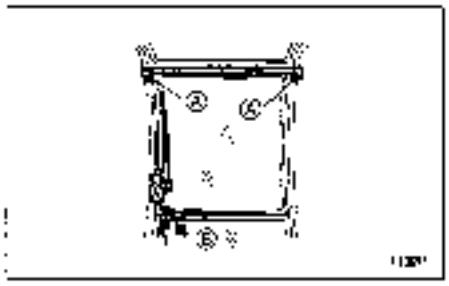
3. Release lock pins Ⓐ.



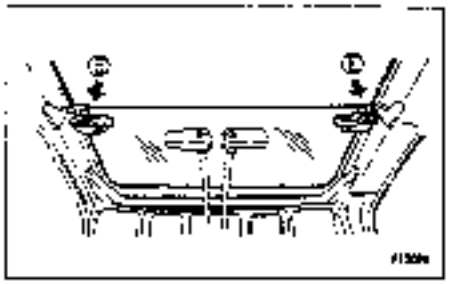
4. Hold the grip at the bottom of the front window with your left hand and the grip at the top with your right hand, release the lock of catch Ⓒ with your right thumb, then pull the top grip slowly and lower the front window. When releasing the lock of catch Ⓒ, push release lever Ⓑ in the direction of the arrow to release the lock.

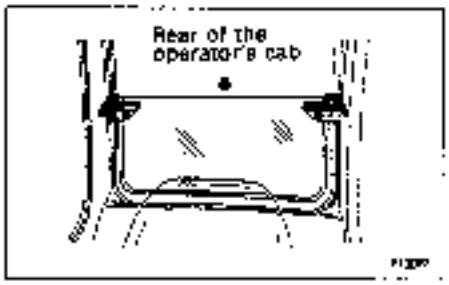


5. Lock securely with lock pins Ⓐ at the left and right sides.
6. Connect the wiper motor wiring to socket Ⓐ.



- **Removing front window (bottom)**
  With the front window open, remove lock pin E, and the bottom part of the front window can be removed. Store the removed bottom part of the front window at the rear of the operator's cab.

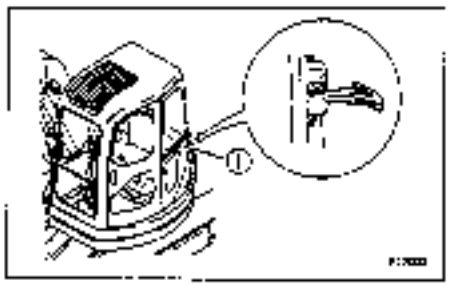




11.6 SLIDING DOOR

⚠ CAUTION

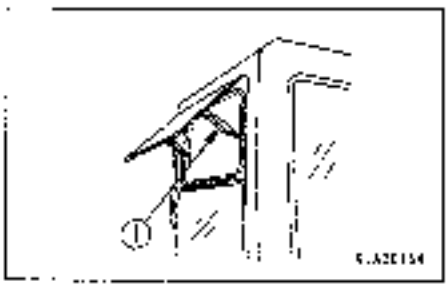
With the sliding door on the cab specification machines, always check that the lock is applied, regardless of whether the door is open or closed.
Always open or close the door only on level ground.
Avoid opening or closing the door on slopes, as the operating force may suddenly change.



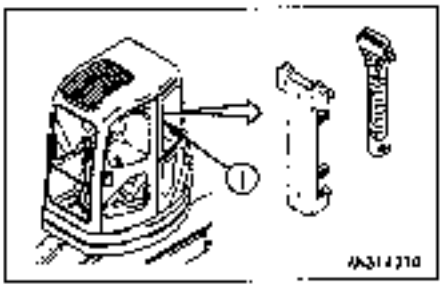
- **Door lock**
  When closing the door, pull the handle back, then release lock ① and pull the door forward.

11.7 REAR WINDOW (MACHINE EQUIPPED WITH CAB)

The rear window can be opened and closed.
Lock it securely with lever lock ①.
To open the window, release the lock and push the rear window up to the rear.

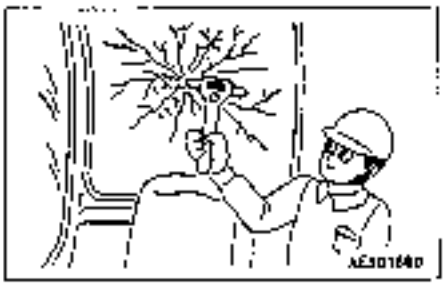


11.8 HAMMER FOR EMERGENCY ESCAPE (MACHINE EQUIPPED WITH CAB)



In case it becomes impossible to open the door, a hammer ① to be used for escape from the cab is installed.

When escaping, break the window glass with hammer ①.



NOTICE

When escaping, remove the broken pieces of the glass from the sash so that you will not cut yourself with them. Take care not to slip on the broken and scattered pieces.

11.9 FUSE BOX

NOTICE

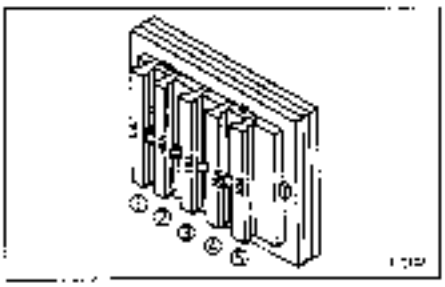
Before replacing a fuse, be sure to turn off the starting switch.

The fuses protect the electrical equipment and wiring from burning out.

If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace a fuse with another of the same capacity.

11.9.1 FUSE CAPACITY AND CIRCUIT NAME

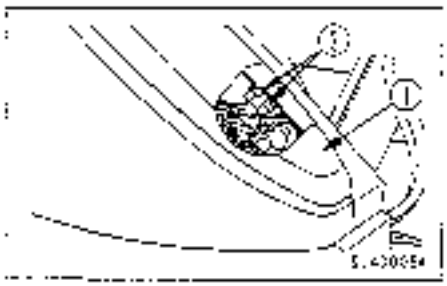


No.	Fuse capacity	Name of circuit	Remarks
①	5 A	Engine control system	–
②	15 A	Electrical system controller, monitor panel	–
③	10 A	Electrical system prolix circuit	–
④	20 A	*Heater, horn *Wiper, *Room lamp, *Radio (opt)	–
⑤	30 A	Working lamp, reset power source, swing parking brake, buzzer, opt power source	–

*: These items are only for the cab specification machine.

11.10 FUSIBLE LINK

If the power does not come on when the starting switch is turned to the ON position, the wire-shaped fusible link ② may be cut, so remove cover ① on the right side of the chassis, and check or replace.



REMARK

A fusible link is a large fuse wire installed in a circuit where there is a large current flowing.

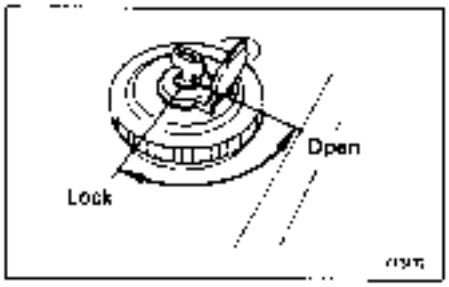
It acts in the same way as a normal fuse to prevent electrical components and wiring from burning out if there is an abnormal current.

11.11 CAP WITH LOCK, COVER

Locks are fitted to the fuel tank filler port, operator's cab, engine hood, and tool box cover.

Use the starting key to lock or unlock these places.

11.11.1 METHOD OF LOCKING AND UNLOCKING CAP WITH LOCK (FOR THE FUEL TANK FILLER PORT)



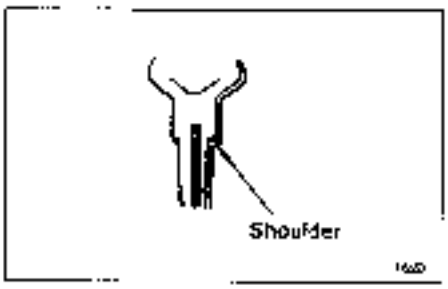
TO OPEN THE CAP

1. Insert the key into the cap.
2. Turn the key clockwise, align the match mark on the cap with the rotor groove, then remove the cap.

TO LOCK THE CAP

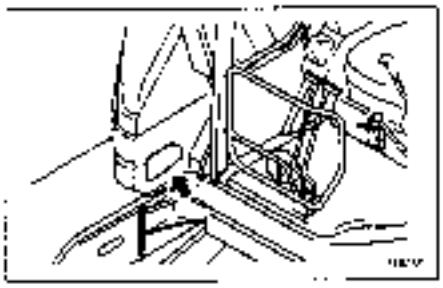
1. Turn the cap into place.
2. Turn the key and take the key out.

   Insert the key as far as it will go. If the key is turned before it is inserted all the way, it may break.



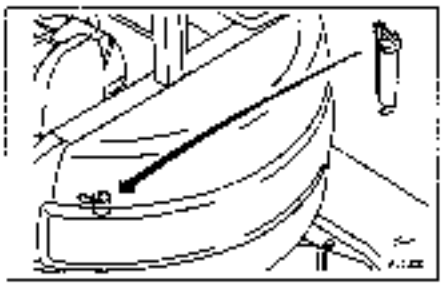
11.12 TOOL BOX

This is used for keeping tools.



11.13 GREASE GUN HOLDER

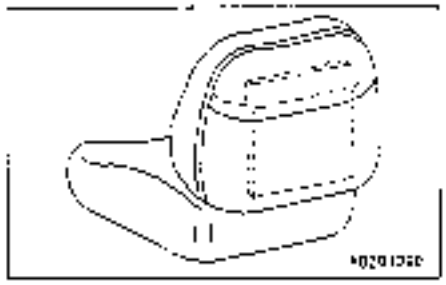
This is inside the engine room. When not using the grease gun, fit it in the holder.



11.14 OPERATION AND MAINTENANCE MANUAL POCKET

There is a pocket in the back of the operator's seat to hold the Operation and Maintenance Manual.

Always keep the Operation and Maintenance Manual in this pocket so that it is possible to read it whenever necessary.



12. OPERATION

12.1 CHECK BEFORE STARTING ENGINE

12.1.1 WALK-AROUND CHECK

⚠ WARNING

Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler may cause fire.
Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.

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

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

1. **Check sensors for damage**
   Check the sensors for damage. If any abnormality is found, please contact your Komatsu distributor for service or repair.

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

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

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

5. **Check for oil leakage from hydraulic equipment, hydraulic tank, hoses, joints**
   Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.

6. **Check the undercarriage (track, sprocket, idler) for damage, wear, loose bolts, or leakage of oil from rollers**

7. **Check for damage to handrail, loose bolts**
   Repair any damage and tighten any loose.

8. **Check for damage to gauges, monitor, loose bolts**
   Check that there is no damage to the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

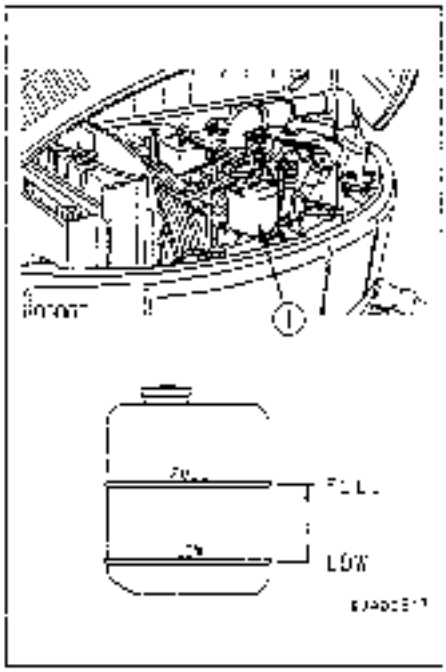
9. **Check for damage to window, wrong position of window**
   Check that the window is not damaged or out of place. If it is damaged, replace it with a new window. If the window comes out of place during operations and is damaged, stop operations immediately and repair the window.

10. **Check, clean rear view mirror**
    Check that the rear view mirror is not damaged. If it is damaged, replace it with a new mirror. Clean the surface of the mirror and adjust it to an angle where the rear of the machine (the portion behind the engine hood) can be seen from the operator's seat.

11. **Check seat belt and mounted clamp**
    Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with a new part.

12.1.2 CHECK BEFORE STARTING

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



CHECK AND REFILL COOLANT

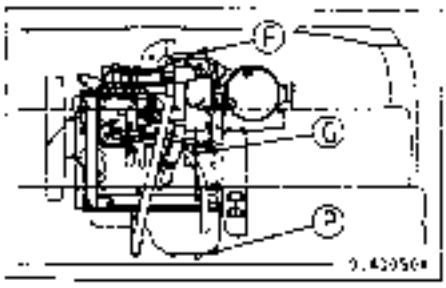
⚠ WARNING

Do not open the radiator cap unless necessary. When checking the coolant, always check the sub-tank when the engine is cold.

1. Open the engine hood and check that the cooling water level is between FULL and LOW on sub-tank ① (shown in the diagram on the right).
   If the water level is low, add water through the water filler of sub-tank ① to the FULL level.
2. After adding water, tighten the cap securely.
3. If the sub-tank becomes empty, first inspect for water leaks and then fill the radiator and the sub-tank with water.

CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Open the engine hood.
2. Remove dipstick ⑮ and wipe the oil off with a cloth.
3. Insert dipstick ⑮ fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick ⑮.
   If the oil level is below the L mark, add engine oil through oil filler ⑯.



For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

5. If the oil is above the H mark, drain the excess engine oil from drain plug Ⓔ, and check the oil level again.

6. If the oil level is correct, tighten the oil filler cap securely and close the engine hood.

REMARK

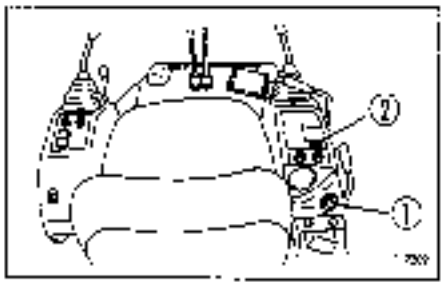
When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.

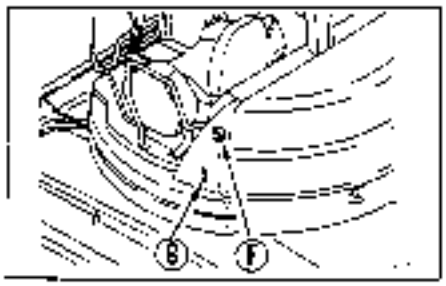
If the machine is at an angle, make it horizontal before checking.

CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, thoroughly clean up any spillage.





1. Insert the key in starting switch ①, and turn it to the ON position to light up the monitor.

2. Check the fuel level on fuel gauge ②. If the fuel level is low, add fuel through fuel filler port Ⓕ and check the level on sight gauge Ⓖ.

   Fuel capacity: 80 ℓ (21.1 US gal, 17.6 UK gal)

   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

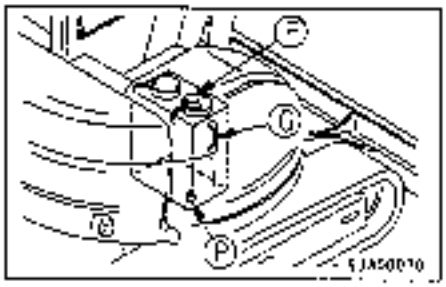
3. After adding fuel, tighten the cap securely.

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

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

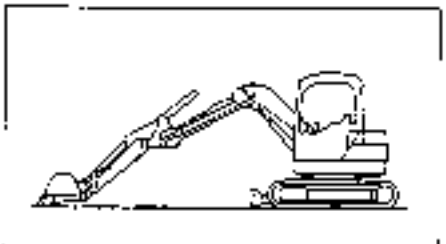
1. If the work equipment is not in the condition shown in the diagram on the right, run the engine at low speed, lower the blade to the ground, retract the arm and bucket cylinders, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.



2. Check that the oil level is between H and L line on sight gauge Ⓖ.

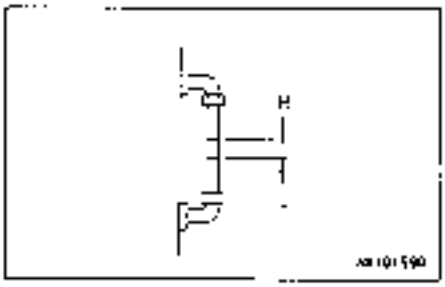
NOTICE

Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.



3. If the level is below that L mark, remove the upper cover of the hydraulic tank on the right side of the machine, add oil through oil filler Ⓕ.

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



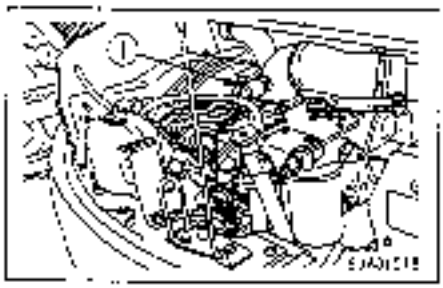
REMARK

The oil level will vary depending upon the oil temperature. Accordingly, use the following as a guide:

- When the oil temperature is close to the ambient temperature (10 to 30°C (50 to 86°F)), the level will be close to bottom line L on the sight gauge.
- When the oil temperature is the normal operating temperature (50 to 80°C (122 to 176°F)), the level will be close to top line H on the sight gauge.

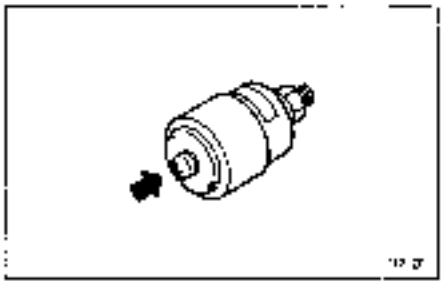
CHECK DUST INDICATOR

1. Open the engine hood and check that the red piston is not showing in dust indicator ①.



2. If the red piston has appeared, clean or replace the element immediately.
   For details of the method of cleaning the element, see "24.2.1 CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT".

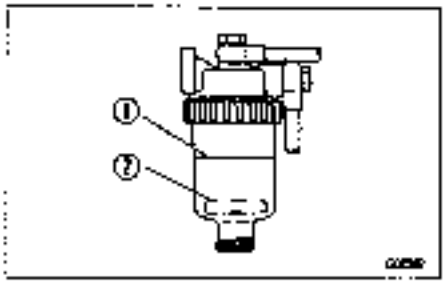
3. After checking, cleaning, and replacing, press the knob of dust indicator ①, to return the red piston to its original position.



CHECK WATER SEPARATOR

The water separator separates water mixed in the fuel. If float ② is at or above red line ①, drain the water. For the draining procedure, see section "WHEN REQUIRED".

Even if a water separator is installed, be sure to check the fuel tank to remove water and sediment in the fuel.



12.1.3 ADJUST OPERATOR'S SEAT

FORE-AND-AFT ADJUSTMENT OF SEAT

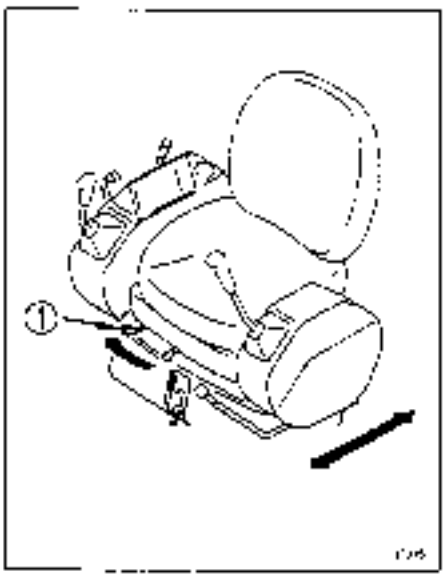
⚠ WARNING

Adjust the seat position at the beginning of each shift or when operators change.

The seat and console box can move forward and backward.

Move lever ① to the right, set the seat in a position that is easy to operate, then release the lever.

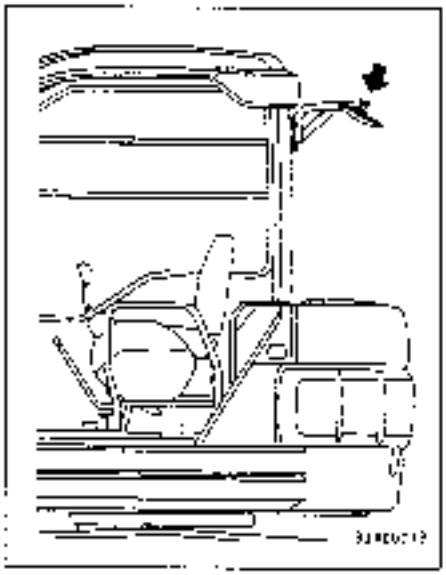
Fore-and-aft adjustment: 80 mm (3.2 in) (4 stages)



Adjust the position of the operator's seat to match the operation. For example, when carrying out deep digging operations, the view below the front of the machine is improved if you slide it to the front.

12.1.4 ADJUST MIRROR

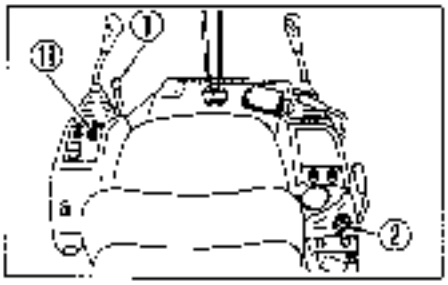
Adjust the angle of the mirror so that the rear of the machine (the portion behind the engine hood) can be seen clearly from the operator's seat.



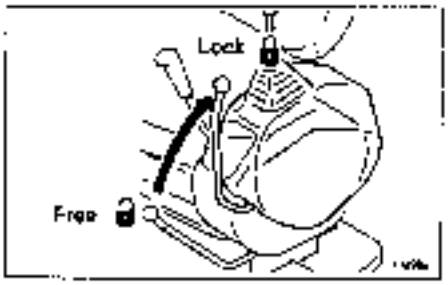
12.1.5 OPERATIONS AND CHECKS BEFORE STARTING ENGINE

⚠ WARNING

If the control levers are touched by accident, the work equipment may move suddenly. When leaving the operator's compartment, always set the lock lever securely to the LOCK position.



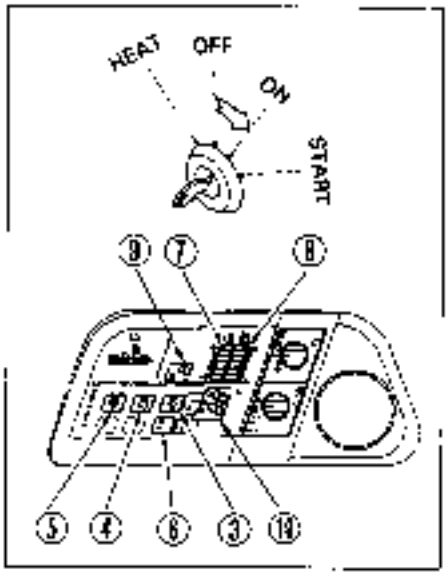
1. Check that lock lever ① is at the LOCK position.
2. Check the position of each lever.



3. Insert the key in starting switch ②, turn the key to the ON position, then carry out the following checks.

   (1) The buzzer will sound for approx. 1 sec., and the following monitors and gauges will light up for approx. 3 sec.
   - Battery electrolyte level ③
   - Charge level monitor ④
   - Engine oil pressure monitor ⑤
   - Electric system monitor ⑥
   - Engine water temperature gauge ⑦
   - Fuel gauge ⑧
   - Pre-heating monitor ⑨
   - Depth display ⑩

   If the monitors or gauges do not light up or the buzzer does not sound, there is probably a broken bulb or disconnection in the monitor wiring, so contact your Komatsu distributor for repairs.

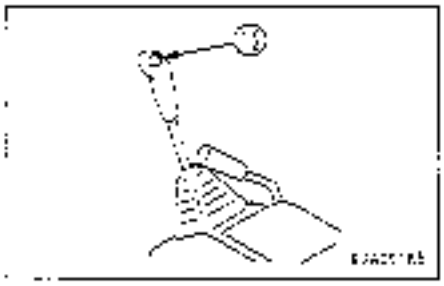


After approx. 3 sec., the following monitors will remain on and the other monitors will go out.

- Charge level monitor ④
- Engine oil pressure monitor ⑤
- Engine water temperature gauge ⑦
- Fuel gauge ⑧

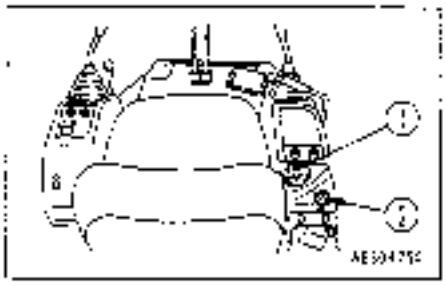
(2) Turn lamp switch ⑪ to turn on the head lamps.
If the lamps do not light up, there is probably a broken bulb or disconnection in the wiring, so contact your Komatsu distributor for repairs.

(3) Press horn switch ⑫ and check that the horn sounds.



12.2 STARTING ENGINE

12.2.1 NORMAL STARTING



⚠ WARNING

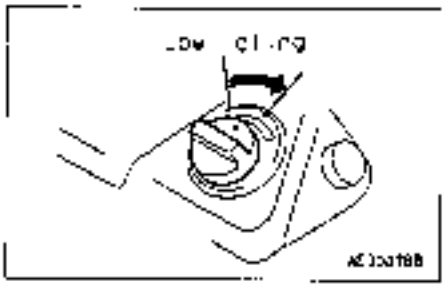
Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

NOTICE

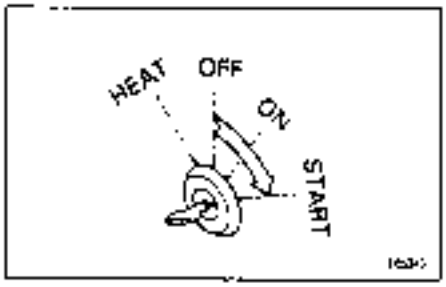
Do not keep the starting motor rotating continuously for more than 20 seconds.

If the engine will not start, wait for at least 2 minutes before trying to start the engine again.

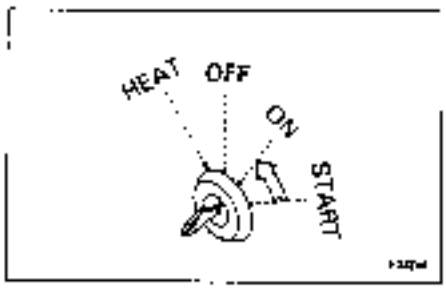
1. Turn fuel control dial ① to the center position between LOW IDLING and HIGH IDLING.



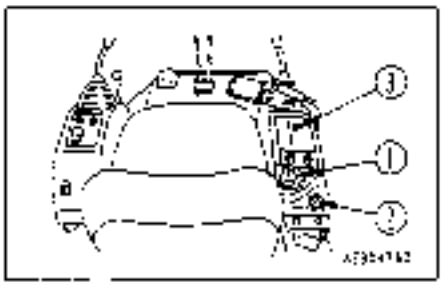
2. Turn the key in starting switch ② to the START position. The engine will start.



3. When the engine starts, release the key in starting switch ②. The key will return automatically to the ON position.



12.2.2 STARTING IN COLD WEATHER



⚠ WARNING

Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

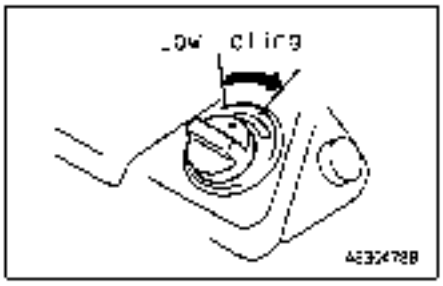
NOTICE

Do not keep the starting motor rotating continuously for more than 20 seconds.

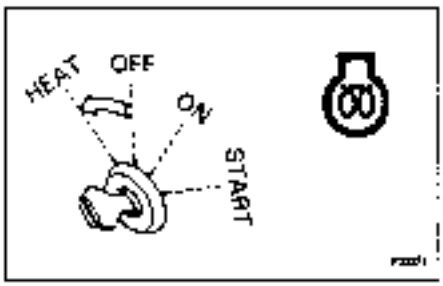
If the engine fails to start, repeat steps from 2 and after waiting for about 2 minutes.

When starting in low temperatures, do as follows.

1. Turn fuel control dial ① to the center position between LOW IDLING and HIGH IDLING.



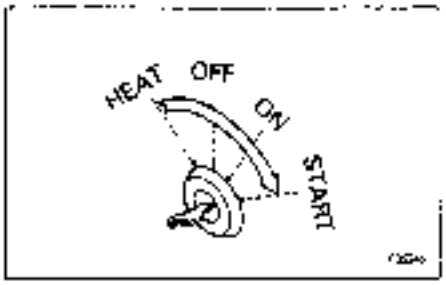
2. Hold the key in starting switch ② at the HEAT position, and check that preheating monitor ③ lights up.
   After approx. 30 seconds, preheating monitor ③ goes out to inform that the preheating is completed.



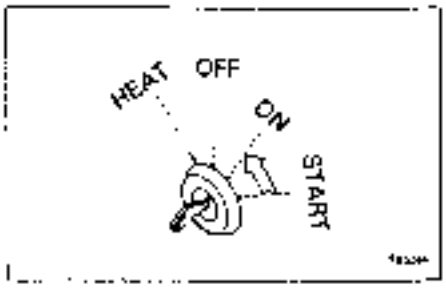
REMARK

The monitor and gauge also light up when the key is at the HEAT position, but this does not indicate any abnormality.

3. When preheating monitor ③ goes out, turn the key in starting switch ② to the START position to start the engine.



4. When the engine starts, release the key in starting switch ②. The key will return automatically to the ON position.



12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE

⚠ WARNING

- **Emergency stop**
  If there has been any abnormal actuation or trouble, turn the starting switch key to the OFF position. The electrical system and engine will stop. Then contact your Komatsu distributor for inspection.

- **If the work equipment is operated without warming the machine up sufficiently, the response of the work equipment to the movement of the control lever will be slow, and the work equipment may not move as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warming-up operation fully.**

NOTICE

The most suitable temperature for the hydraulic oil is 50 – 80°C, but in order to extend the life of the machine, the temperature must be raised to at least 20°C before starting work.

NOTICE

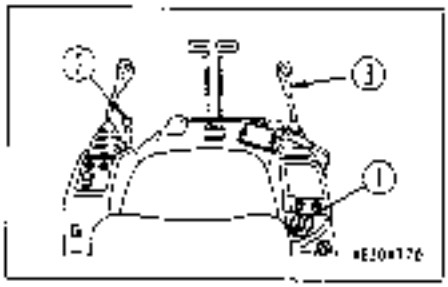
Do not suddenly operate the levers when the hydraulic oil temperature is below 20°C.

NOTICE

Do not suddenly accelerate the engine before the warming-up operation is completed.

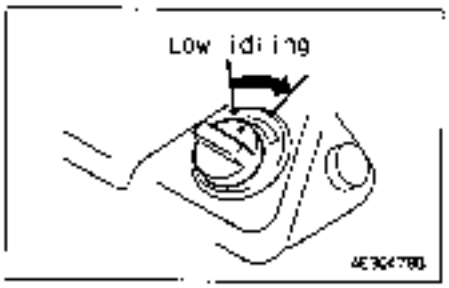
Do not run the engine at low idling or high idling continuously for more than 20 minutes.

If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.

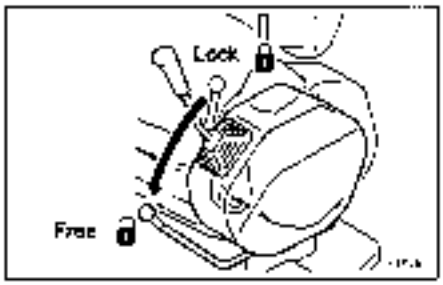


After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

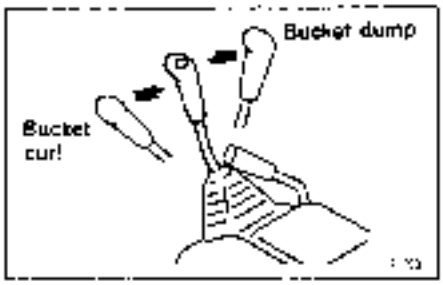
1. Turn fuel control dial ① to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load.



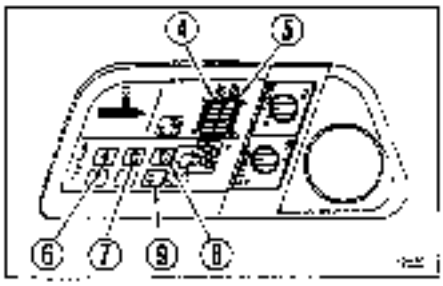
2. Set lock lever ②: to the FREE position, and raise the bucket from the ground.



3. Operate bucket control lever ① slowly to move the bucket cylinder to the end of the stroke and hold it for 5 minutes.

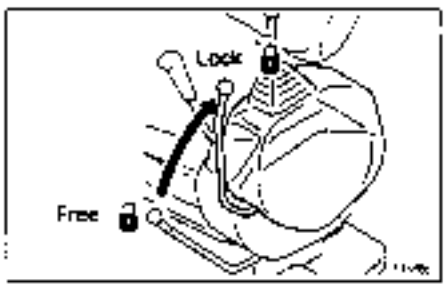


4. After carrying out the warming-up operation, check that each gauge and monitor lamp is in the following condition.
   - Engine water temperature gauge ④: Inside green range
   - Fuel gauge ⑤: Inside green range
   - Engine oil pressure monitor ⑥: OUT
   - Charge monitor ⑦: OUT
   - Battery electrolyte level monitor ⑧: OUT
   - Electric system monitor ③: OUT

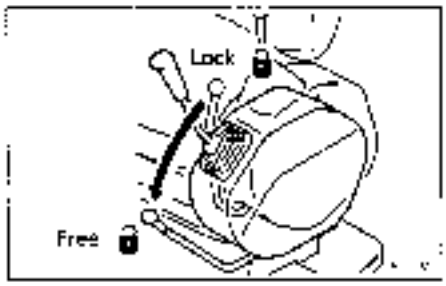


5. Check that there is no abnormal exhaust gas color, noise, or vibration.

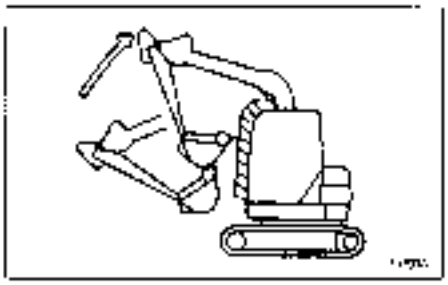
6. Set lock lever ② to the LOCK position and check that it is impossible to operate the swing and work equipment with the left and right work equipment control levers.



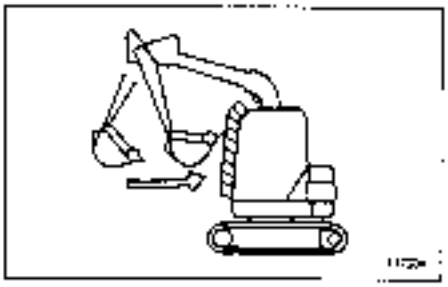
7. Set lock lever ② to the FREE position and carry out the following inspection of the actuation of the interference prevention device.



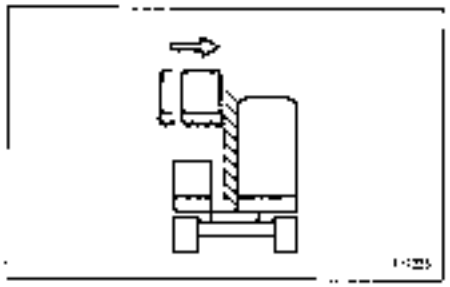
- Set the work equipment in the posture shown in the diagram on the right, then operate the boom **RAISE** and check that the work equipment automatically stops when it comes close to the operator's compartment.
  If it stops, lower the boom and cancel the automatic stop.



- Set the work equipment in the posture shown in the diagram on the right, then operate the arm IN and check that the work equipment automatically stops when it comes close to the operator's compartment.
  If it stops, move the arm out and cancel the automatic stop.



- Set the work equipment in the posture shown in the diagram on the right, then operate the left offset and check that the work equipment automatically stops when it comes close to the operator's compartment.
  If it stops, operate the right offset and cancel the automatic stop.



If any abnormality is found during the check, carry out Step 3 and warm up the hydraulic oil, then carry out the check again.

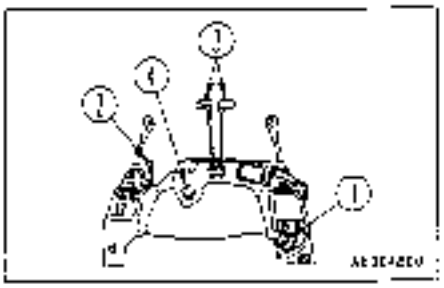
If there is still an abnormality, stop the machine in a safe place, then stop the engine and contact your Komatsu distributor for inspection and repair.

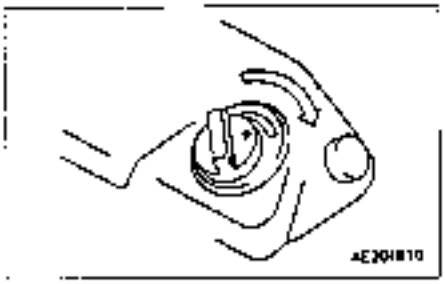
12.4 MOVING MACHINE OFF

12.4.1 MOVING THE MACHINE FORWARD

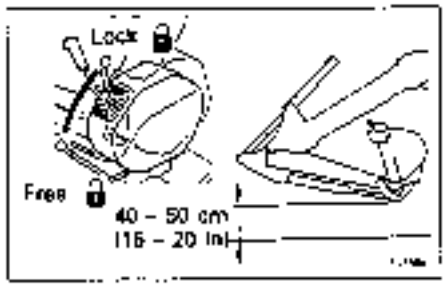
⚠ WARNING

- **Before operating the travel levers, check the direction of the track frame. If the sprocket is at the front, the operation of the travel levers is reversed.**
- **When moving off, check that the area around the machine is safe, and sound the horn before moving.**
- **Clear all personnel from the machine and the area.**
- **Clear all obstacles from the path of the machine.**





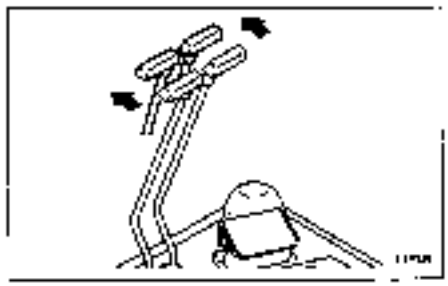
1. Turn fuel control dial ① towards the high idling position to increase the engine speed.



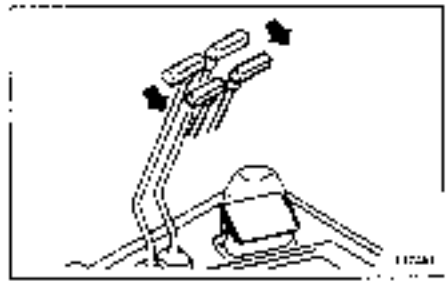
REMARK

If the engine speed does not rise, it is possible that the switch deceleration switch is ON. Check the swift deceleration display lamp. For details of operation of the swift deceleration switch, see "11.2 SWITCHES".

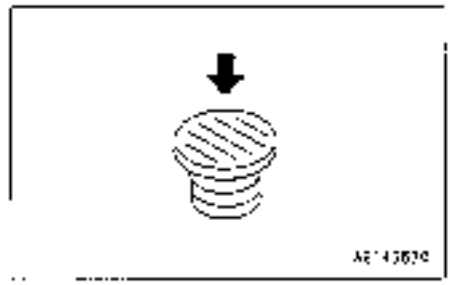
2. Set lock lever ② in the FREE position, fold the work equipment, and raise it 40 – 50 cm (16 – 20 in) from the ground.



3. Raise the blade.



4. Operate right and left travel levers ③ as follows.
   - When the sprocket is at the rear of the machine.
     Pull levers ③ backward slowly to move the machine off.
   - When the sprocket is at the front of the machine
     Push levers ③ forward slowly to move the machine off.

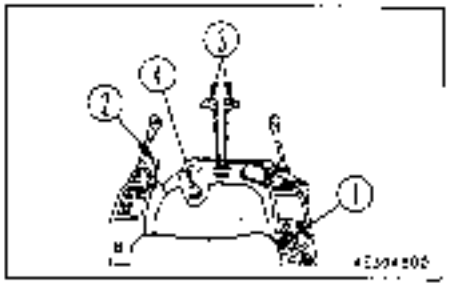


5. When speed boost pedal ④ is pressed, the travel speed will increase.
   For details of the travel speed, see SPECIFICATIONS.

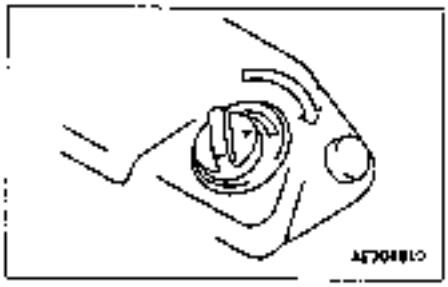
12.4.2 MOVING THE MACHINE BACKWARD

⚠ WARNING

- **Before operating the travel levers, check the direction of the track frame. If the sprocket is at the front, the operation of the travel levers is reversed.**
- **When moving off, check that the area around the machine is safe, and sound the horn before moving.**
- **Clear all personnel from the machine and the area.**
- **Clear all obstacles from the path of the machine.**
- **Use extreme care when reversing the machine. Note there is an blind spot behind the machine.**



1. Turn fuel control dial ① towards the high idling position to increase the engine speed.

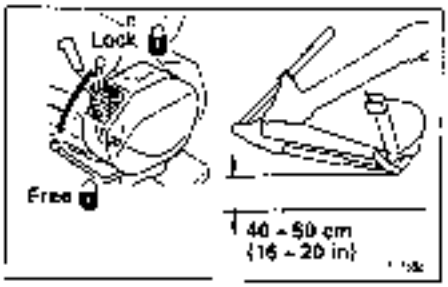


REMARK

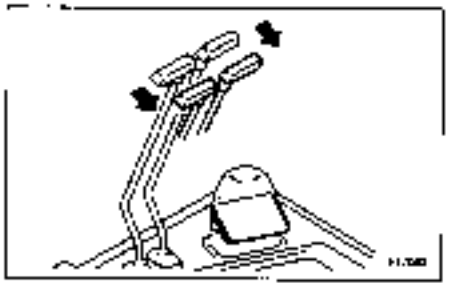
If the engine speed does not rise, it is possible that the switch deceleration switch is ON. Check the swift deceleration display lamp. For details of operation of the swift deceleration switch, see "11.2 SWITCHES".

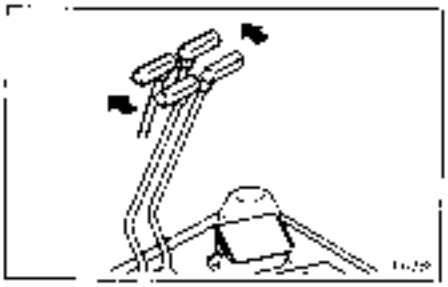
2. Set lock lever ② in the FREE position, fold the work equipment, and raise it 40 – 50 cm (16 – 20 in) from the ground.

3. Raise the blade.



4. Operate right and left travel levers ③ as follows.
   - When the sprocket is at the rear of the machine.
     Push levers ③ forward slowly to move the machine off.
   - When the sprocket is at the front of the machine
     Pull levers ③ backward slowly to move the machine off.





12.5 STEERING MACHINE

12.5.1 STEERING (CHANGING DIRECTION)

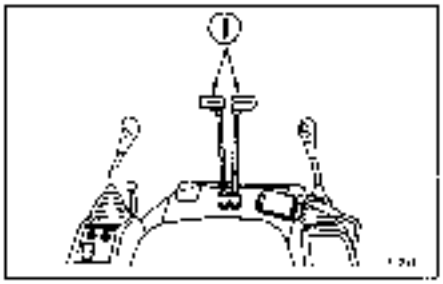
⚠ WARNING

Before operating the travel levers, check the position of the sprocket. If the sprocket is at the front, the operation of the travel levers is reversed.

Use the travel levers to change direction.

Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.

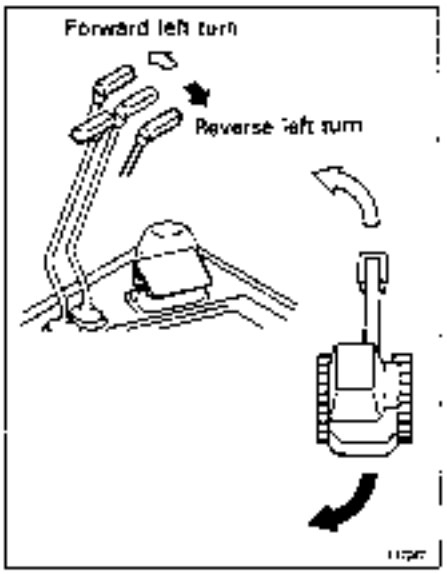
Operate two travel levers ① as follows.



CHANGING DIRECTION OF MACHINE WHEN STOPPED

When turning to the left:

Push the right travel lever forward to travel left when traveling forward; and pull it back to turn left when traveling in reverse.



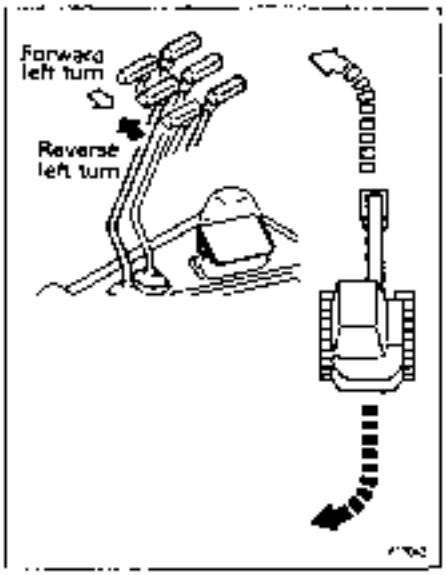
REMARK

When turning to the right, operate the left travel lever in the same way.

STEERING WHEN TRAVELING (LEFT AND RIGHT TRAVEL LEVERS BOTH OPERATED IN SAME DIRECTION)

When turning to the left:

If the left travel lever is returned to the neutral position, the machine will turn to the left.



REMARK

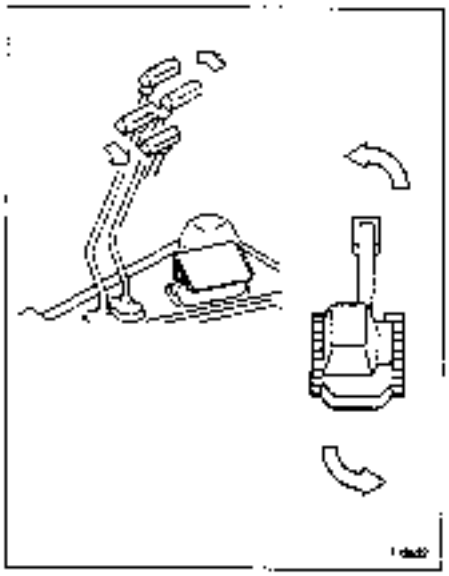
When turning to the right, operate the right travel lever in the same way.

WHEN MAKING COUNTER-ROTATION TURN (SPIN TURN)

When turning left using counter-rotation, pull the left travel lever back and push the right travel lever forward.

REMARK

When turning right using counter-rotation, pull the right travel lever back and push the left travel lever forward.



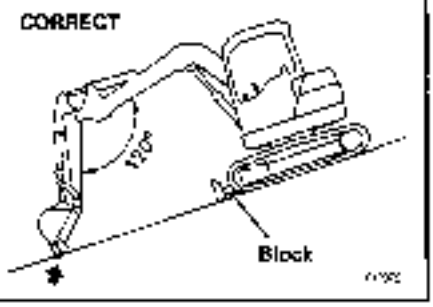
12.6 STOPPING MACHINE

⚠ CAUTION

Avoid stopping suddenly. Give yourself ample room when stopping.

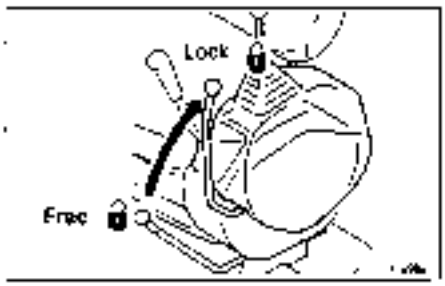
⚠ WARNING

When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, insert blocks underneath the track shoes. As an additional safety measure, thrust the bucket into the ground.

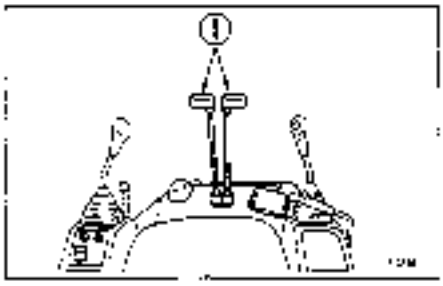


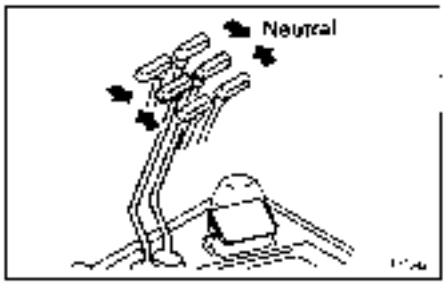
⚠ WARNING

If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always apply the lock securely.



1. Put the left and right travel levers ① in the neutral position, then stop the machine.

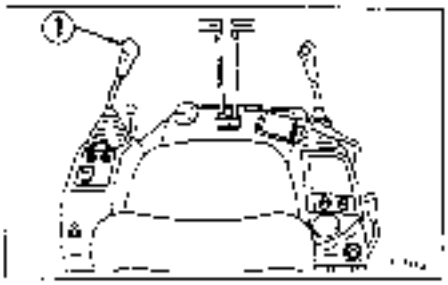




12.7 SWINGING

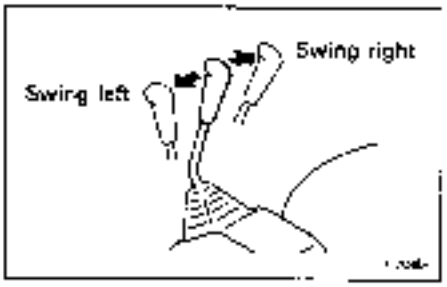
⚠ WARNING

When operating the swing, check that the area around the machine is safe.



1. Operate left work equipment control lever ① to swing the upper structure.

2. When swing operation is not required, align upper structure in parallel with track frame and set work equipment control lever ① to N (neutral) position. This operation causes swing brake to be applied.



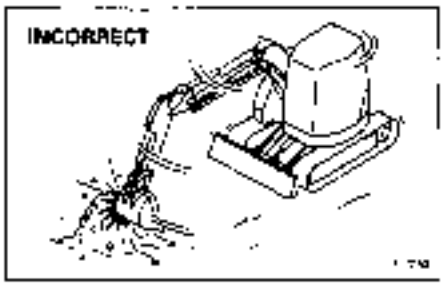
12.8 PROHIBITIONS FOR OPERATION

⚠ WARNING

If it is necessary to operate the work equipment lever when the machine is traveling, stop the machine before operating the work equipment lever.

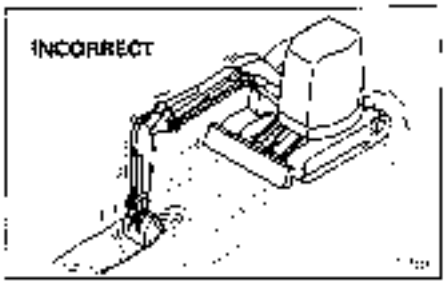
PROHIBITED OPERATIONS USING SWING FORCE

Do not use the swing force to compact soil or break earth mounds or walls.
When swinging, do not dig the bucket teeth into the soil.
These operations will damage the work equipment.



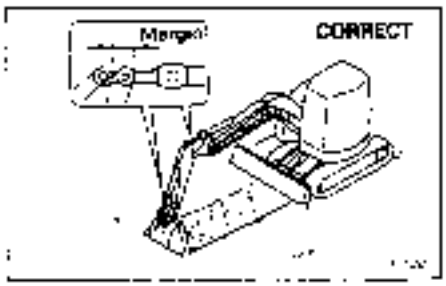
PROHIBITED OPERATIONS USING TRAVEL FORCE

Do not leave the bucket dug into the ground and use the travel force to excavate. This will bring excessive force to bear on the rear of the machine.



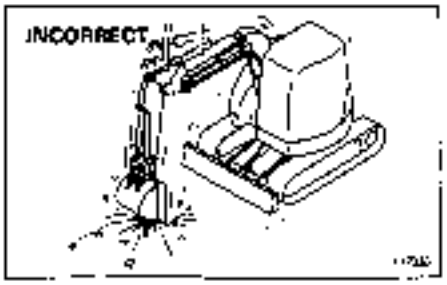
PRECAUTIONS WHEN OPERATING HYDRAULIC CYLINDERS TO END OF STROKE

If the cylinder is operated to the end of its stroke during operations, force will be brought to bear on the stopper inside the cylinder, and this will reduce the life of the machine. To prevent this, always leave a small safety margin when operating the cylinders.



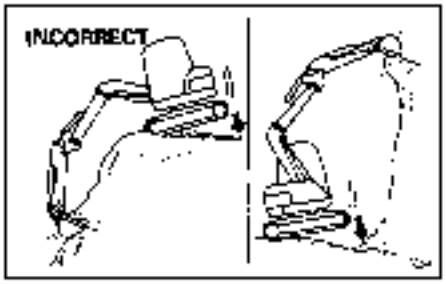
PROHIBITED OPERATIONS USING DROPPING FORCE OF BUCKET

Do not use the dropping force of the bucket as a pickaxe, breaker, or pile driver. This will bring excessive fore to bear on the rear of the machine, and will not only damage the machine, but is also dangerous.



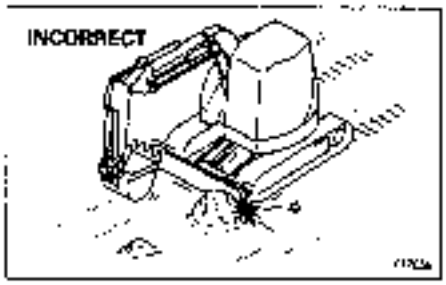
PROHIBITED OPERATIONS USING DROPPING FORCE OF MACHINE

Do not use the dropping force of the machine for digging.
It is better to excavate hard rocky ground after breaking it up by some other means. This will not only reduce damage to the machine but make for better economy.



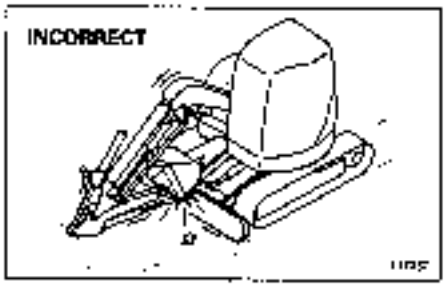
AVOID HITTING BLADE

Be careful not to hit the blade against rocks or boulders. This will cause premature damage to the blade or cylinders.



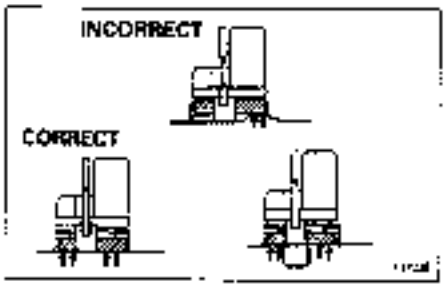
BE CAREFUL WHEN FOLDING IN WORK EQUIPMENT

When folding in the work equipment to the travel or transportation posture, be careful not to let the bucket hit the blade.



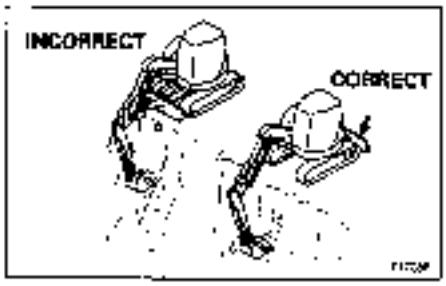
SUPPORT BLADE ON BOTH SIDES

When using the blade as an outrigger, never support the machine with only one end of the blade.



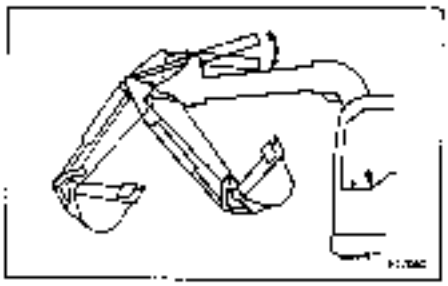
BE CAREFUL OF BLADE DURING BACKHOE OPERATIONS

When carrying out deep digging operations with the blade at the front, be careful not to let the boom cylinder hit the blade. Always position the blade at the back unless it is needed at the front.

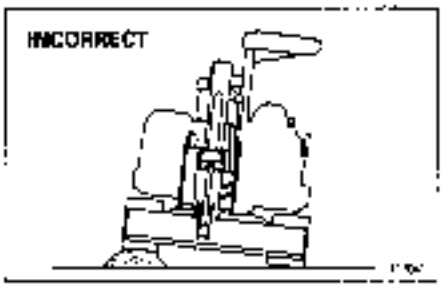


BE CAREFUL OF INTERFERENCE WITH ARM CYLINDER

If the arm is operated, the position of the rear end of the arm cylinder will change. Be careful not to let it catch on electric wires or to contact anything in the surrounding area.

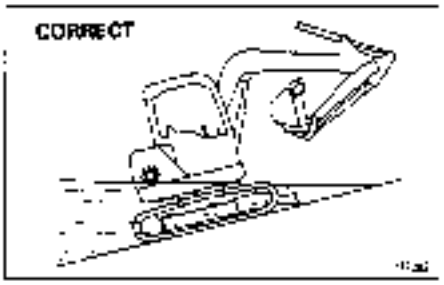


12.9 PRECAUTIONS FOR OPERATION



PRECAUTIONS WHEN TRAVELING

When traveling over obstacles such as boulders or tree stumps, the machine (in particular, the undercarriage) is subjected to a large shock, so reduce the travel speed and travel over the obstacle at the center of the tracks. As far as possible, remove such obstacles or avoid traveling over them.

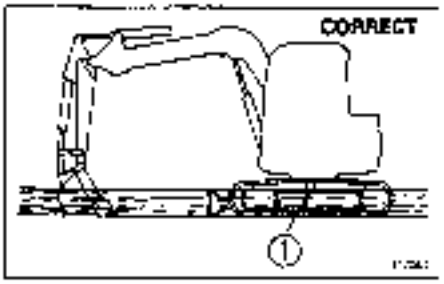


PERMISSIBLE WATER DEPTH

NOTICE

When driving the machine out of water, if the angle of the machine exceeds 15°, the rear of the upper structure will go under water, and water will be thrown up by the radiator fan. This may cause the fan to break.

Be extremely careful when driving the machine out of water.

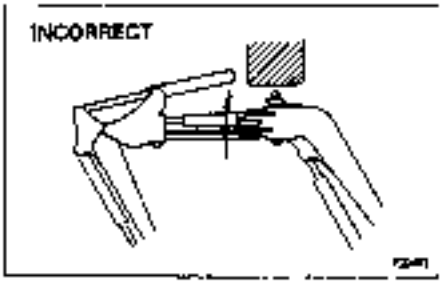


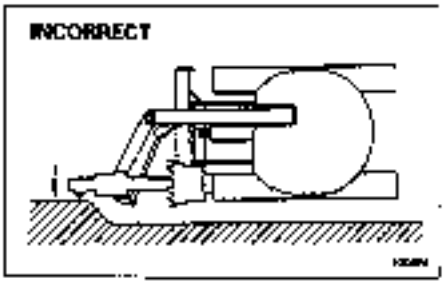
Do not immerse the machine in water by more than the permissible depth (under center of carrier roller ①).

In addition, for parts that have been immersed in water for a long time, pump in grease until the old grease comes out from the bearings. (Around the bucket pins)

PROTECTION OF SENSORS FROM OBSTACLES

Be careful not to hit interference prevention sensors or sensor levers with other objects (logs, ditches, steel sheets, etc.).



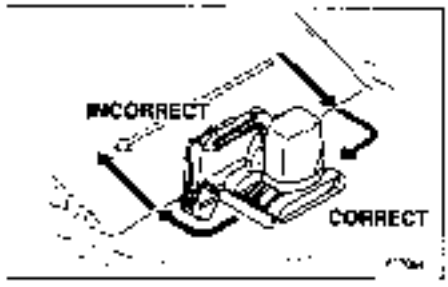


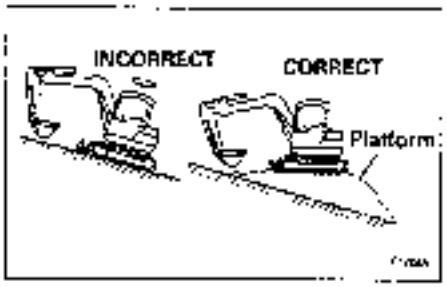
12.10 PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

TRAVELING DOWNHILL

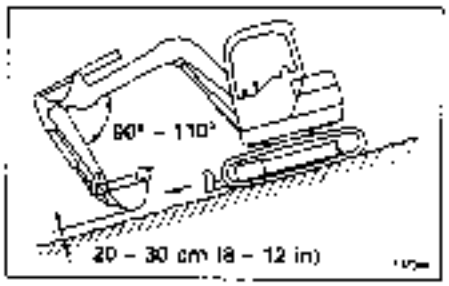
⚠WARNING

- **When traveling, raise the bucket approx. 20 – 30 cm (8 – 12 in) from the ground.**
  Do not travel downhill in reverse.
- **When traveling over ridges or other obstacles, keep the work equipment close to the ground and travel slowly.**
- **It is dangerous to turn on slopes or to travel across slopes. Always go down to a flat place to perform these operations. It may be longer, but it will ensure safety.**
- **If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.**
- **Turning or operating the work equipment when working on slopes may cause the machine to lose its balance and turn over, so avoid such operations. It is particularly dangerous to swing downhill when the bucket is loaded.**
  If such operations have to be carried out, pile soil to make platform on the slope so that the machine can be kept horizontal when operating.
- **Do not travel on slopes of over 30° as there is danger that the machine may overturn.**

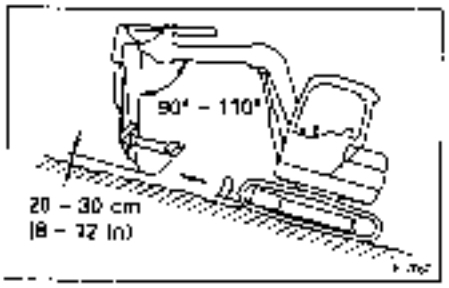




1) When traveling down steep hills, use the travel lever and fuel control lever to keep the travel speed low.
   When traveling down slopes of more than 15°, set the work equipment in the posture shown in the figure on the right, and lower the engine speed.



2) When traveling up a steep hill of more than 15°, set the work equipment in the posture shown in the diagram on the right.



BRAKING WHEN TRAVELING DOWNHILL

To brake the machine during downhill runs, put the travel lever in the neutral position. This will cause the brake to be automatically applied.

IF SHOES SLIP

When traveling uphill, if the shoes slip or it is impossible to travel uphill using the force of the track only, it is possible to use the pulling force of the arm to help the machine travel uphill.

IF ENGINE STOPS

If the engine stops when traveling uphill, move the travel levers to the neutral position, lower the bucket to the ground, stop the machine, then start the engine again.

PRECAUTIONS ON SLOPES

- If the engine stops when the machine is on a slope, never use the left work equipment control lever to carry out swing operations. The upper structure will swing under its own weight.
- Do not open or close the sliding door on the cab specification machine if the machine is on a slope. This may cause a sudden change in the operating force.
  Always keep the sliding door locked.

12.11 WORK POSSIBLE USING HYDRAULIC EXCAVATOR

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

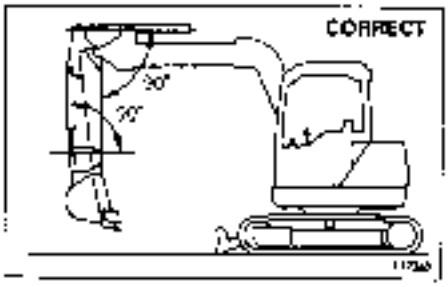
12.11.1 BACKHOE WORK

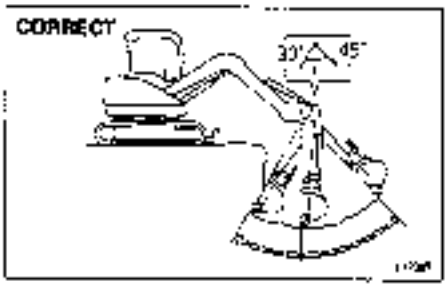
When condition of the machine is as shown in the diagram at right, each cylinders maximum pushing excavation force is obtained when the bucket cylinder and link, arm cylinder and arm are at 90°.

When excavating, use this angle effectively to optimize your work efficiency.

The range for excavating with the arm is from a 45° angle away from the machine to a 30° toward the machine.

There may be some differences depending on the excavation depth, but try to use within the above range rather than going all the way to the extreme end of the cylinder stroke.

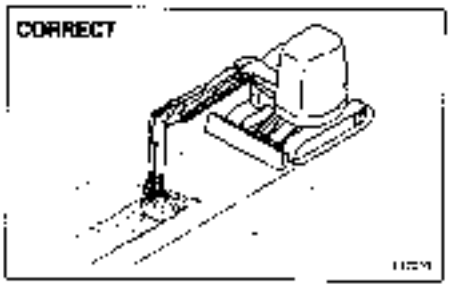




12.11.2 DITCHING WORK

Ditching work can be performed efficiently by attaching a bucket to match the width of the ditch and then setting the tracks parallel to the line of the ditch to be excavated.

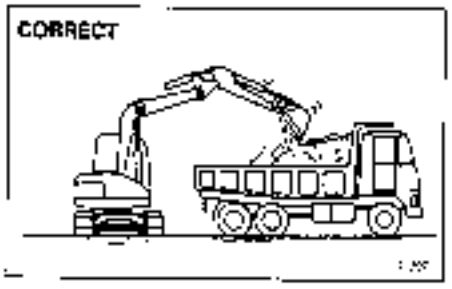
To excavate a wide ditch, first dig out both sides and then finally remove the center portion.



12.11.3 LOADING WORK

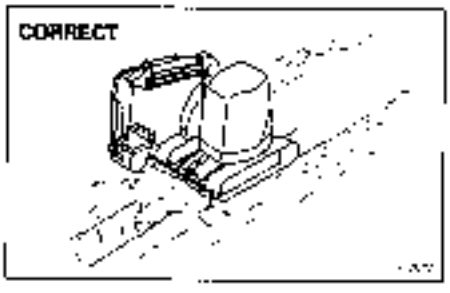
In places where the swing angle is small, work efficiency can be enhanced by locating the dump truck in a place easily visible to the operator.

Loading is easier and capacity greater if you begin from the front of the dump truck body than if loading is done from the side.



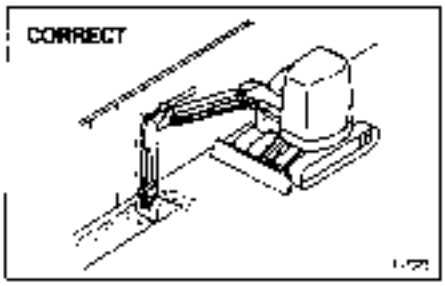
12.11.4 SMOOTHING WORK

When refilling after excavation and when smoothing the ground surface, use the blade.



12.11.5 SIDE DITCHING WORK

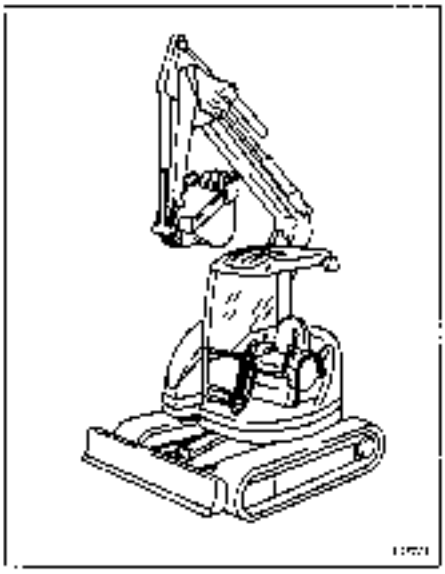
When the boom offset is used, it is possible to carry out side ditching work in confined spaces without swinging the upper works.



12.11.6 OPERATIONS IN CONFINED SPACES

When operating in a confined space, set the work equipment in the posture in the diagram on the right. This will allow the machine to swing freely in any area where it is possible for the tracks to enter.

When swinging the cab specification machine, the front left corner of the cab protrudes beyond the track. (Approx. 70 mm (2.8 in))



Minimum swing posture

1. Offset the boom to the right.
2. Extend the arm cylinder and bucket cylinder fully, and fold the work equipment.
3. Extend the boom cylinder fully.
4. Offset the boom to the left and move to a point just before the interference prevention device is actuated.

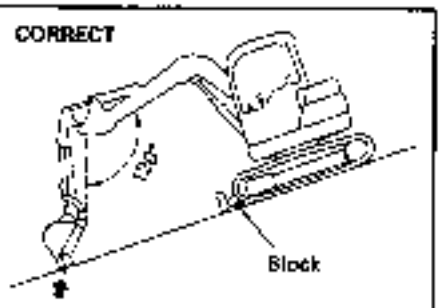
12.12 PARKING MACHINE

⚠ CAUTION

Avoid stopping suddenly. Give yourself ample room when stopping.

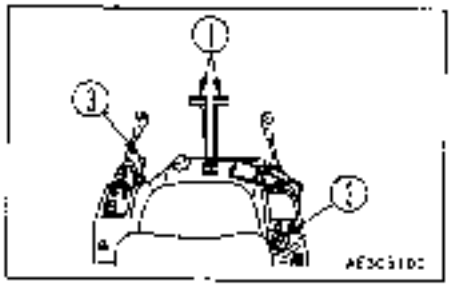
⚠ WARNING

When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, insert blocks underneath the track shoes. As an additional safety measure, thrust the bucket into the ground.

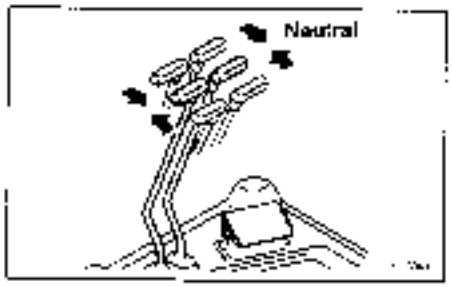


⚠ WARNING

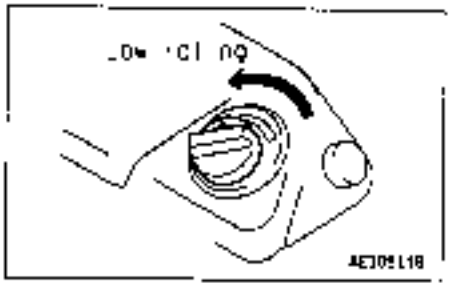
If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always apply the lock securely.



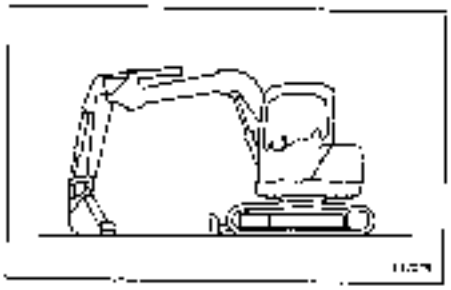
1. Put left and right travel levers ① in the neutral position.



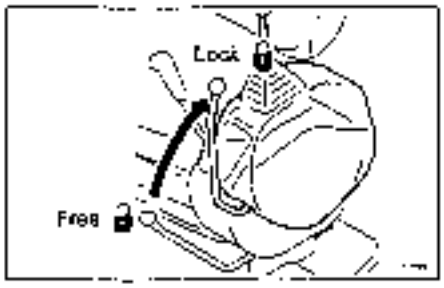
2. Lower the engine speed to low idling by fuel control dial ②.



3. Lower the bucket horizontally until the bottom touches the ground.
4. Lower the blade to the ground.

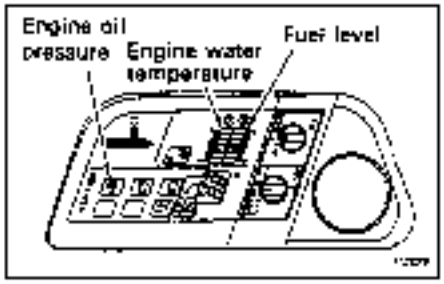


5. Set lock lever ③ in the LOCK position.



12.13 CHECK AFTER FINISHING WORK

Check the engine water temperature, engine oil pressure and fuel level on the monitor.



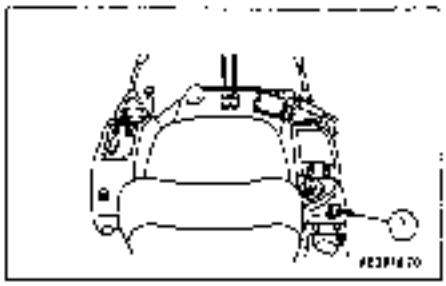
12.14 STOPPING ENGINE

NOTICE

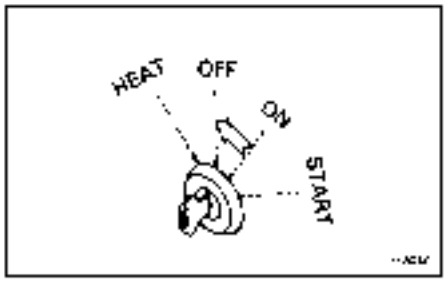
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Turn the key in starting switch ① to the OFF position and stop the engine.
3. Remove the key from starting switch ①.



12.15 CHECK AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, paintwork, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.

2. Fill the fuel tank.

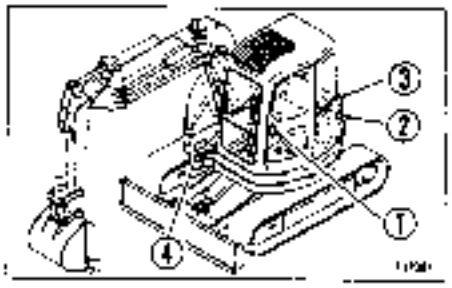
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.

4. Remove any mud stuck to the undercarriage.

12.16 LOCKING

Always lock the following places.

① Door of operator's cab
Always remember to close the window.
② Fuel tank filler port
③ Engine hood
④ Tool receptacle cover



REMARK

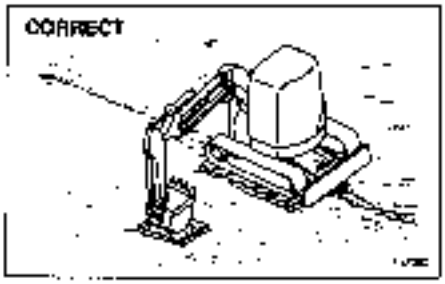
Use the starting switch key to open and close all these covers.

12.17 HOW TO ESCAPE FROM MUD

Always operate carefully to avoid getting stuck in mud. If the machine does get stuck in mud, use the following procedures to get the machine out.

12.17.1 WHEN ONE SIDE IS STUCK

When only one side is stuck in mud, use the bucket to raise the track, then lay boards or logs and drive the machine out. If necessary, put a board under the bucket also.

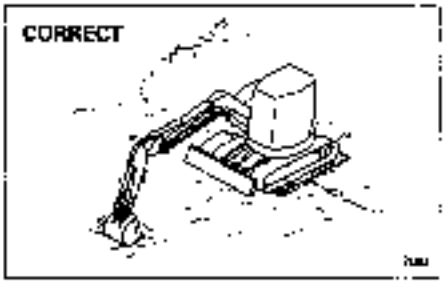


NOTICE

When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. (Never push with the teeth). The angle between the boom and arm should be 90° to 110°.

12.17.2 WHEN BOTH SIDES ARE STUCK

When the tracks on both sides are stuck in mud and the machine will not move, lay boards as explained above, and dig the bucket into the ground in front. Then pull in the arm as in normal digging operations and put the travel levers in the FORWARD position to pull the machine out.



12.18 REPLACEMENT OF BUCKET

⚠ WARNING

- **When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.**
- **When the bucket is removed, place it in a stable condition.**

NOTICE

After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.

Stop the machine on a firm, flat surface. When performing joint work, make clear signals to each other and work carefully for safety's sake.

1. Place the bucket in contact with a flat surface.

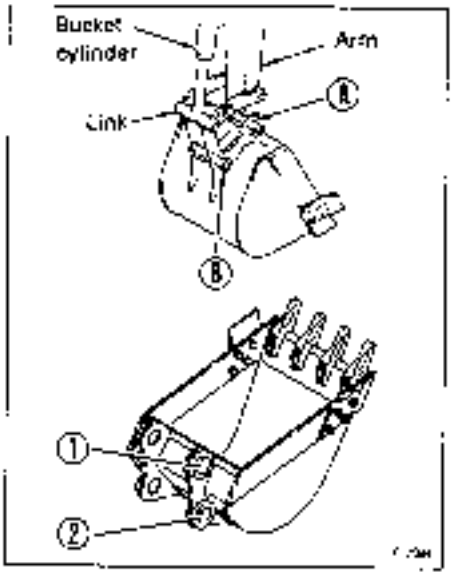
REMARK

When removing the pins, place the bucket so that it is in light contact with the ground.

If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

2. Remove the stopper bolts and nuts, then remove pins Ⓐ and Ⓑ, and remove the bucket.

3. Align the arm with holes ① and the link with holes ②, then coat with grease and install pins Ⓐ and Ⓑ.

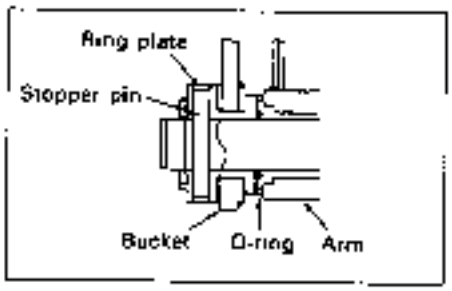


REMARK

When installing the bucket, the O-ring is easily damaged, so set the O-ring on the arm at the position shown in the diagram on the right.

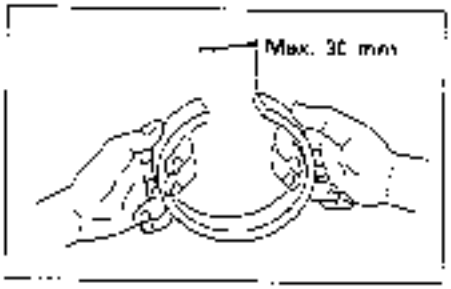
When knocking the pin in, fit the O-ring in the regular groove.

4. Install the ring plate and stopper pin for each pin.



Handling ring plate

Do not make a gap of more than 30 mm (1.18 in) in the ring plate. If there is play in the ring when it is installed to the bucket, replace it with a new part.



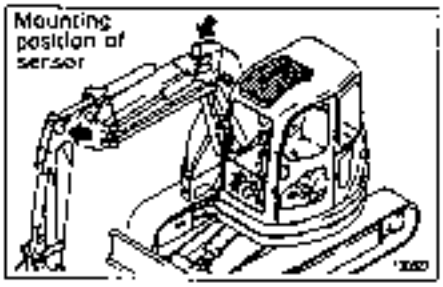
12.19 HANDLING 4-SYSTEM

The 4-system is an automatic control device for the work equipment and a device to prevent interference between the bucket and cab.

To ensure that this device works properly, always keep to the following points.

⚠ WARNING

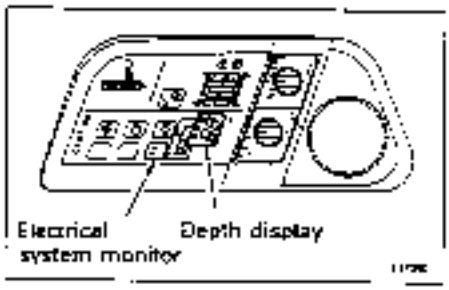
- **Never remove, install, or disassemble and repair any sensor. This will cause mistaken actuation of the interference prevention device.**
  Always contact your Komatsu distributor for repairs.
- **If any sensor if hit or any external damage is found, check the actuation condition of the automatic stop.**
  If any abnormality is found, please contact your Komatsu distributor.
- **Never carry out any work in which the sensors go below water.**
  If any sensor should be immersed in water, check the actuation condition of the automatic stop.
- **The auto-stop cancel switch must only be used for moving the machine to a safe place when there is an abnormality in the 4-system. It must not be used for any other reason.**
- **When changing to the telescopic arm or long arm specified by Komatsu, ask your Komatsu distributor to change the attachment.**
- **If the attachment is changed from the standard work equipment, the 4-system will not work normally. If the work equipment is replaced by an attachment made by another company, please consult your Komatsu distributor first.**



NOTICE

- **If an abnormality occurs in the 4-system, the controller will carry out self diagnosis. Electrical system monitor on the monitor panel will flash, the buzzer will sound, and the error code will be displayed on the depth display.**
  For details of the correct action to carry out, see "16.5 OTHER TROUBLE".

- **Depending on the location of the failure of the 4-system the controller may not carry out self diagnosis, and it may become impossible to operate the work equipment. If this happens, move the machine to a safe place, and contact your Komatsu distributor for inspection.**



NOTICE

Before using the 4-system, always carry out the checks before starting and after starting.

In cold areas, carry out thorough warming up before using the machine. If the hydraulic oil temperature is low, the automatic stop may be out of position.

12.19.1 INTERFERENCE PREVENTION DEVICE (BETWEEN BUCKET AND CAB)

During left offset, if the arm and boom are pulled in too far, or during right offset, if the arm and boom are pulled in and it is attempted to offset to the left, this device will warn that the bucket will hit the cab, and will automatically stop the work equipment.

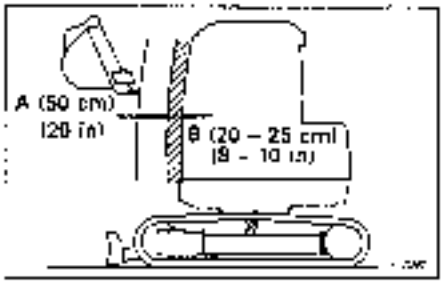
⚠ WARNING

This device is a preventive device intended only for unexpected cases, so it is dangerous to relay on it completely during operations. Always be careful that the work equipment does not come close to the cab during operations.

OPERATION OF INTERFERENCE PREVENTION DEVICE

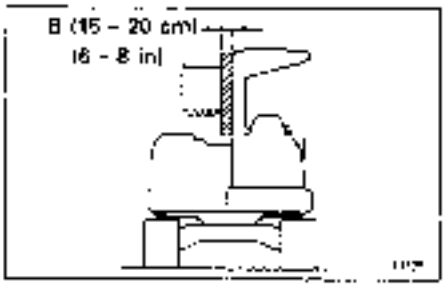
Reduced speed range (front to rear direction only)

If the work equipment is operated so that it comes close to the operator's compartment, when the bucket enters area A in the diagram on the right, the work equipment speed will drop. This is to prevent the load in the bucket from being spilled when the work equipment is stopped.



Automatic stop

If the bucket continues to come close and enters area B in the diagram on the right, the work equipment will automatically stop.

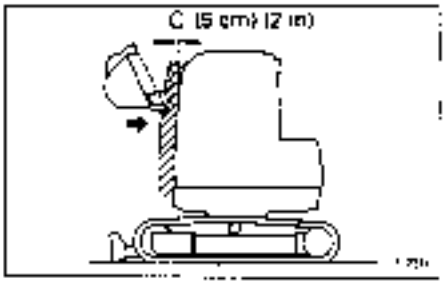


Emergency stop

If for any reason the work equipment is not automatically stopped in area B above, all operations (boom, arm, bucket, swing) will stop when it enters area C in the diagram on the right.

When this happens, error code 61 is displayed on the depth display on the monitor panel, and self diagnosis is carried out. If the cancel switch is operated and the bucket is moved to the front or the right, the self diagnosis is canceled and it becomes possible to carry out normal operations.

However, if this situation should occur, have the system checked immediately.



OPERATION WHEN THERE IS AUTOMATIC STOP

⚠ WARNING

After using the cancel switch to cancel the automatic stop, never try to raise the boom, pull in the arm, or operate the left offset.

After automatic stop, it is impossible to raise the boom, pull in the arm, or operate the left offset.

Move the work equipment to the front or to the right to move it away from the operator's compartment, then carry out normal operations.

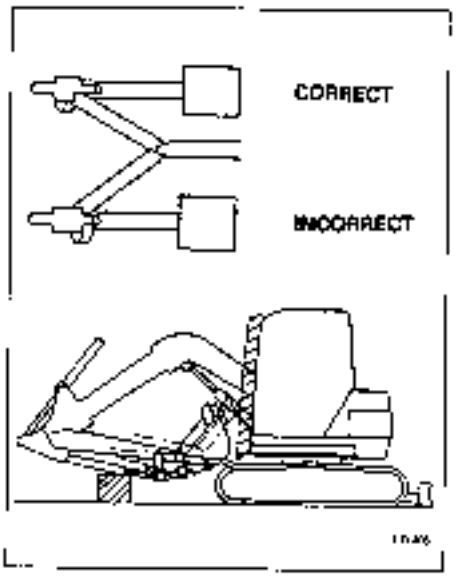
REMARK

(1) After automatic stop, even if the work equipment is moved 5 – 10 cm (2.0 – 4.0 in) to the front or right, it is impossible to raise the boom, pull in the arm, or operate the left offset, but this does not indicate a failure.

(2) After automatic stop, if the work equipment is moved forward approx. 50 cm (20 in) and the boom is raised or the arm is pulled in, the movement will be slow (if the engine is running at low idling, it may even be impossible to raise the boom or pull the arm in), so move the work equipment more than 50 cm (20 in) before carrying out operations again.

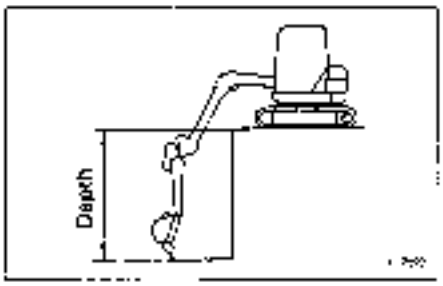
(3) When the machine is not being used, lower the work equipment to the ground.
If there is hydraulic drift and the bucket enters the emergency stop range, the work equipment will not move when the engine is started again.

(4) Do not use the left offset when transporting the machine.
If there is hydraulic drift and the bucket enters the emergency stop range, the work equipment will not move when the engine is started again.

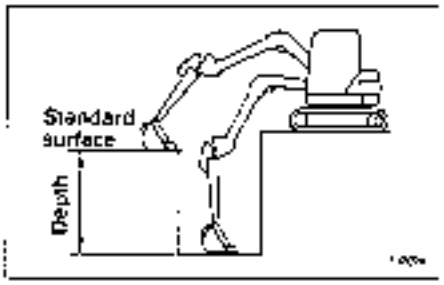


12.19.2 HANDLING AUTOMATIC CONTROL DEVICE

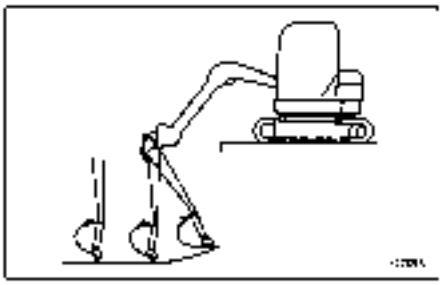
Depth display: This displays the depth from the ground surface.



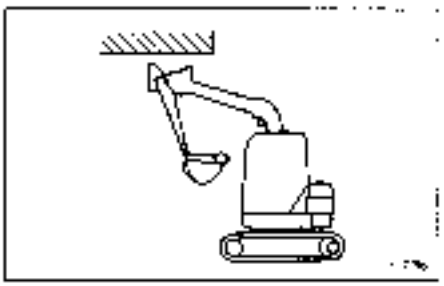
Depth display 0 set mode: This displays the depth from the standard surface.



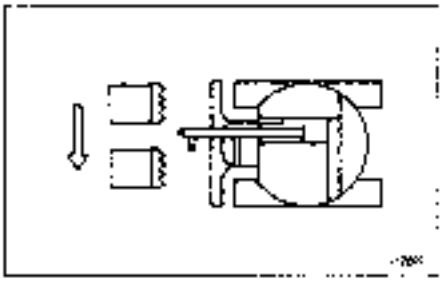
Depth mode: This sets the amount the boom can be lowered.



Height mode: This sets the amount the boom can be raised.



Offset mode: This determines the left offset position for operations such as ditch digging.

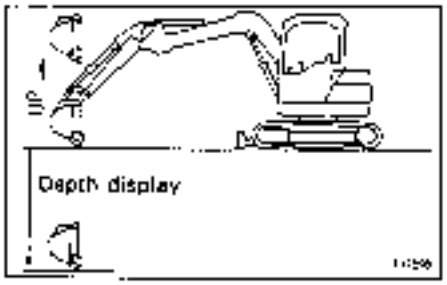


It is possible to set either the depth display or depth display 0 set mode together with the other three modes, so use these settings to match the operation.

DEPTH DISPLAY (DEPTH FROM GROUND SURFACE)

When the engine is started and the switch is ON, the depth display will always indicate the depth from the ground surface unless the depth display 0 set mode is being used.

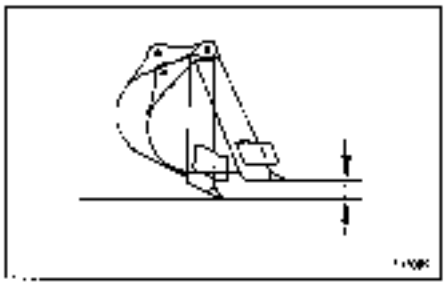
If is work equipment is above ground level, UP is displayed.



REMARK

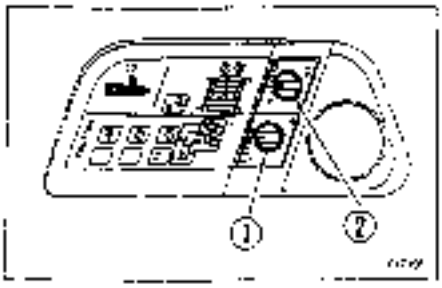
This display assumes that the bucket is pointing down, so if the bucket is in the condition shown in the diagram on the right, the actual depth may be different from the display depth.

When measuring the depth, always set the machine horizontal.

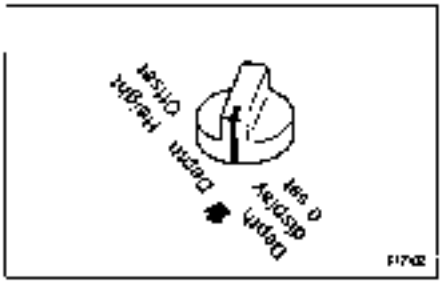


SETTING DEPTH DISPLAY 0 SET MODE (DEPTH FROM STANDARD SURFACE)

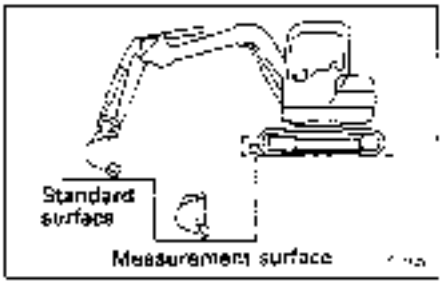
This displays the desired standard surface as 0.0 m (0.0 in), and displays the depth of the bucket from this surface.



1. Turn mode selector switch ① to the depth display 0 set mode position.

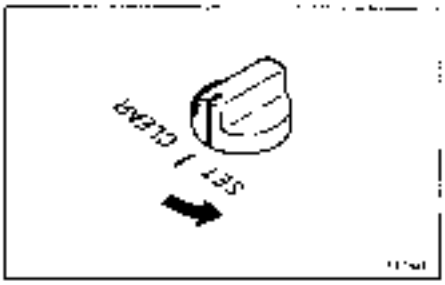


2. Set the machine horizontal, and align the bucket with the position to use as the standard surface.
   When aligning, the way in which the bucket is placed becomes the standard for the depth display.

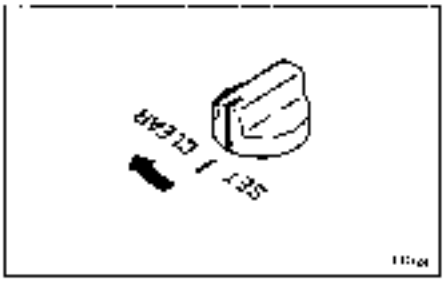


3. Turn setting switch ② to the SET position. The depth display will become 0.0 m.

4. Move the bucket to the point that is to be measured (measurement surface).



5. To return the setting so that it measures the depth from the ground surface, turn mode selector switch ① to the depth display 0 set mode position, then turn setting switch ② to the CLEAR position.
   The display will return to the depth display measured from the ground surface.

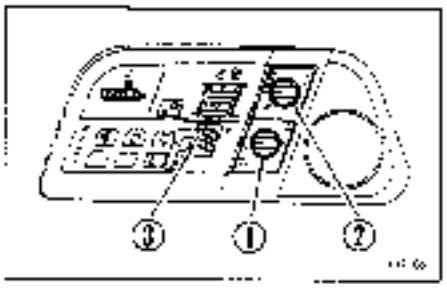


REMARK

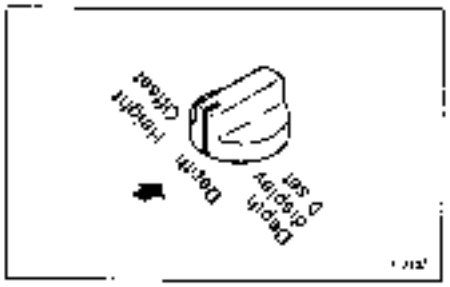
- When carrying out the measurement, place the bucket in the same posture at the measurement point as it was at the standard surface.
- If the starting switch is turned OFF in the mode set condition, the mode set condition is canceled.

SETTING DEPTH MODE

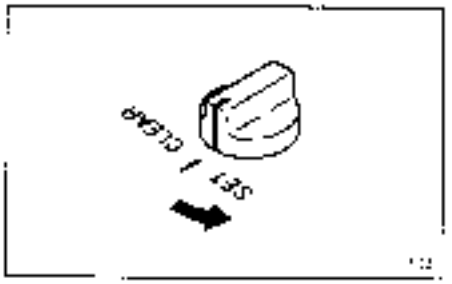
When the boom is lowered to the desired set depth, it will automatically stop.



1. Turn mode selector switch ① to the depth mode position.
2. Lower the boom to the position to be set.



3. Turn setting switch ② to the **SET** position. The buzzer will sound twice and indicator ③ will light up.
4. If the boom is raised, then lowered again, it will stop at the set point.



REMARK

The stop position may differ slightly as follows according to the operating conditions.

(1) If the boom is lowered slowly, the boom will stop slightly before the set position.

(2) In cold weather, it may go beyond the set position before stopping, so be sure to carry out the warming-up operation thoroughly to warm up the hydraulic oil before starting operations. For details of the warming up the procedure, see "12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE".

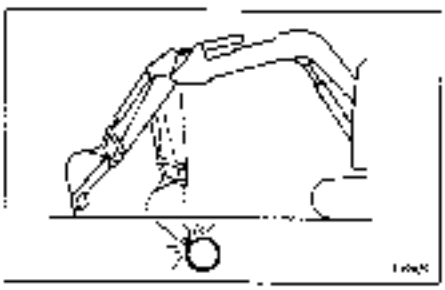
REMARK

In the depth mode, the amount the boom can be lowered is set.

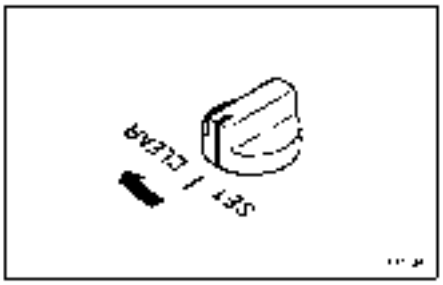
The arm and bucket cannot be set, so operations such as automatic horizontal digging cannot be carried out.

NOTICE

If the depth is set with the arm and bucket pushed out shown in the diagram on the right, the bucket level may become lower when the arm and bucket are pulled in, so take care to avoid damage underground piping, etc.



5. When canceling the depth mode, turn mode selector switch ① to the depth mode position, then turn setting switch ② to the CLEAR position.
   Indicator ③ will go out.

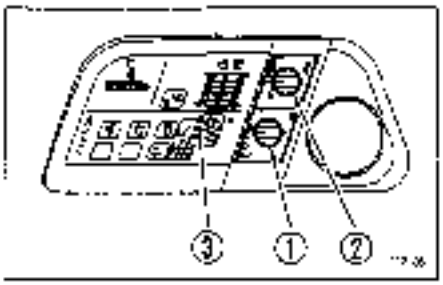


REMARK

When the mode is set, if the starting switch is turned OFF, the mode setting is canceled.

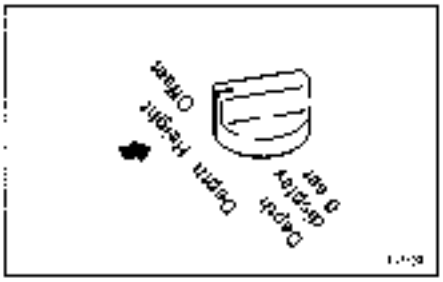
SETTING HEIGHT MODE

When the boom is raised to the desired set height, it will automatically stop.



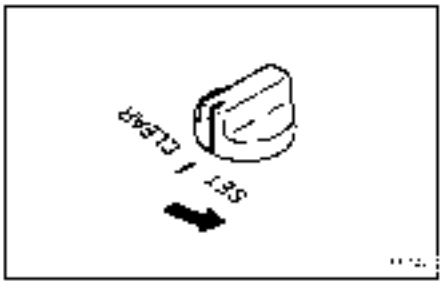
1. Turn mode selector switch ① to the height mode position.

2. Raise the boom to the position to be set.



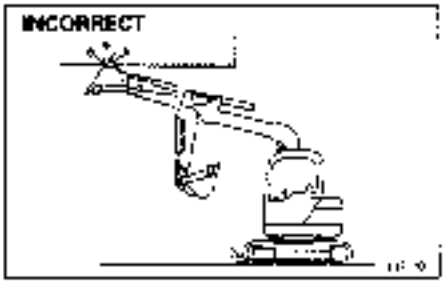
3. Turn setting switch ② to the SET position. The buzzer will sound twice and indicator ③ will light up.

4. If the boom is lowered, then raised again, it will stop at the set point.

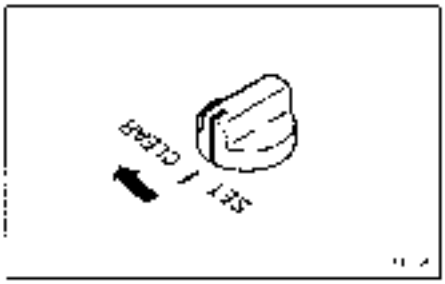


NOTICE

The height mode sets the amount that the boom can be raised.
If the boom height is set with the arm and bucket pulled in as shown in the diagram on the right, the bucket may become higher when the arm and bucket are moved out, so be careful not to contact anything around the machine.



5. When canceling the height mode, turn mode selector switch ① to the height mode position, then turn setting switch ② to the CLEAR position.
   Indicator ③ will go out.

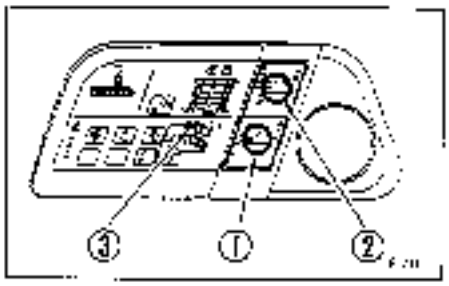


REMARK

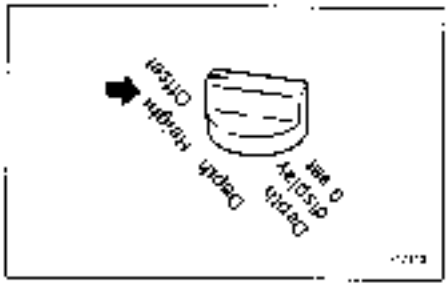
When the mode is set, if the starting switch is turned OFF, the mode setting is canceled.

SETTING OFFSET MODE

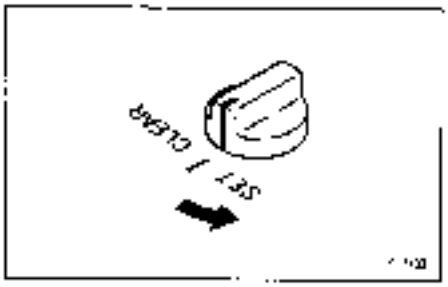
When the boom is offset to the left to the desired set position, it will automatically stop.



1. Turn mode selector switch ① to the offset mode position.
2. Offset the boom to the position to be set.



3. Turn setting switch ② to the SET position. The buzzer will sound twice and indicator ③ will light up.
4. If the boom is offset to the right, then to the left again, it will stop at the set point.



5. When canceling the offset mode, turn mode selector switch ① to the offset mode position, then turn setting switch ② to the CLEAR position.
   Indicator ③ will go out.

REMARK

When the mode is set, if the starting switch is turned OFF, the mode setting is canceled.

12.20 HANDLING RUBBER SHOES (RUBBER SHOES ONLY)

12.20.1 SKILLFUL USE OF RUBBER SHOES

Rubber shoes have excellent properties that are not found in metal shoes. However, if they are used in the same way as metal shoes, full use cannot be made of their advantages. Be sure to operate with rubber shoes in a way that matches the condition of the jobsite and the nature of the work.

Comparison of rubber shoes and metal shoes

	Rubber shoes	Metal shoes
Little vibration	Excellent	Average
Smooth travel	Excellent	Good
Little noise	Excellent	Average
No damage to paved surface	Excellent	Average
Easy to handle	Excellent	Average
Easily damaged	Average	Excellent
Strong drawbar pull	Excellent	Excellent

Considering the properties of the material used, rubber shoes offer various advantages. However, their weak point is lack of strength. Therefore, it is important to understand the advantages of rubber shoes, and to follow the precautions regarding handling and prohibited work. This will extend the life of the rubber shoes and will enable the machine to display the advantages of rubber shoes to the maximum. Before using rubber shoes, always read "12.20.3 PRECAUTIONS WHEN USING RUBBER SHOES".

12.20.2 WARRANTY FOR RUBBER SHOES

It is important to inspect and maintain the tracks at the correct tension. Furthermore, these shoes must not be used near objects where they are likely to suffer damage, such as the corners of steel plates, U-shaped grooves, and blocks, on crushed rock or the sharp edges of rocks, iron beams or scrap iron.

If the customer carries out prohibited work or does not follow the precautions for operation, the damage resulting from the customer's mistaken use of the machine shall not be included in the scope of the warranty.

12.20.3 PRECAUTIONS WHEN USING RUBBER SHOES

PROHIBITED WORK

Do not carry out the following types of work.

- Carrying out operations and steering on crushed rock, extremely rough hard rock, steel beams, scrap iron, or near the edges of steel plates will cause damage to the rubber shoes.

- In places such as riverbeds where there are large numbers of large and small boulders, the stones may get caught and damage the rubber shoes or make the shoes come off. If dozing operations are carried out when the shoes slip, this will also reduce the life of the rubber shoes.

- Be careful not to get oil, fuel, or chemical solvent on the rubber shoes. If such a substance should get on the shoes, remove it immediately. Furthermore, do not travel on road surfaces where oil has collected.

- When putting the machine into long-term storage (3 months or more), store the machine indoors where it is protected from direct sunlight or rain.

- Do not use the machine in high temperature areas, such as areas where there is burning wood, steel plate that have been left under the hot sun, or places where asphalt is being laid.

- Do not move the machine with the crawler on one side raised using the work equipment. This will cause damage to the rubber shoes and may cause the shoes to come off.

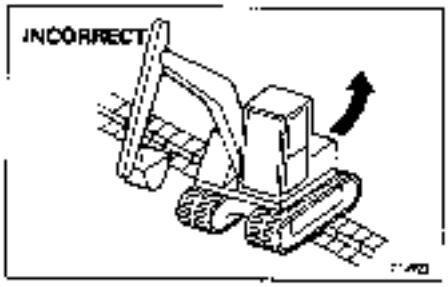
12.20.4 PRECAUTIONS WHEN USING

Be careful of the following points when carrying out work.

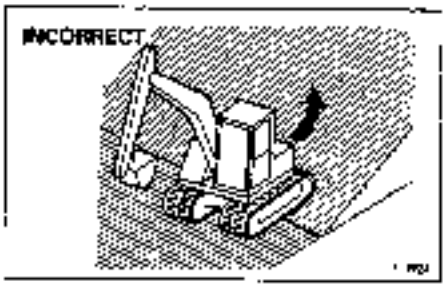
- Avoid carrying out counterrotation turns on concrete surfaces.
- Avoid making sudden changes in direction. This may cause premature wear or damage to the rubber shoes.
- Avoid operating the steering when traveling over places where there is a big difference in height. When traveling over obstacles or places where there is a difference in height, drive the machine at right angles to the obstacles to prevent the shoes from coming off.
- If the machine has been raised using the bucket, lower it slowly.
- Avoid doing work with materials that produce oil when crushed (soya beans, corn, or vegetables squeezed for oil), or wash the machine after using it.
- Avoid handling materials that will attach the adhesion of the steel core such as salt, ammonium sulphate, potassium chloride, potassium sulphate, calcium superphospate; or wash the machine after use.
- The adhesion of the core will be attacked by salt, so avoid using the machine in coastal areas.
- When handling salt, sugar, wheat, or soya beans, if there is any deep cut in the rubber shoes, these substances may get into the lugs or cut portion of the rubber, so always repair the rubber before use.
- Do not carry out work that involves scraping against walls or concrete embankments.
- Rubber shoes slip extremely easily on snow or frozen roads. Be careful not to slip when traveling or working on slopes.
- The properties of rubber shoes change when working in extremely cold places, and this will reduce the life of the rubber shoe.
- Because of the properties of rubber, use the rubber shoes within a range of -25°C – +55°C (–13°F – 131°F).

- When working, be careful not to damage the rubber shoes with the bucket.
- To prevent the shoes from coming off, always maintain the correct tension. If the tracks are slack, the shoes will come off under the following conditions. Even when the tension is correct, be extremely careful when carrying out these operations.

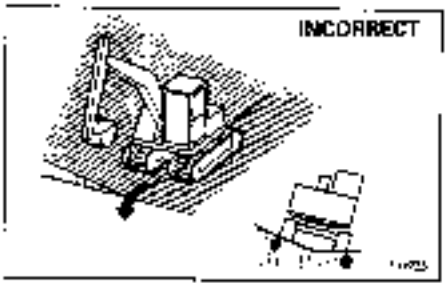
1. When traveling over curbs, rocks, or places where there is a big difference in level (approx. 20 cm (8 in)), do not turn the machine. When traveling over such objects, always travel at right angles to the object.



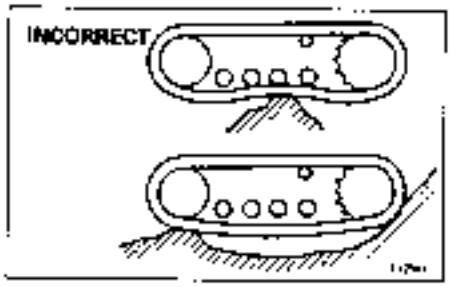
2. When traveling in reverse up a slope, do not turn when moving from flat ground onto the slope.
If it is necessary to turn on slopes, be sure to turn gradually.



3. Avoid travelling along the edge of a slope or on rough ground with the track on one side raised (with the machine tilting at angle of more than approx. 10°), and one side on the flat ground. To avoid damage to the rubber shoes, travel with both tracks on flat ground.

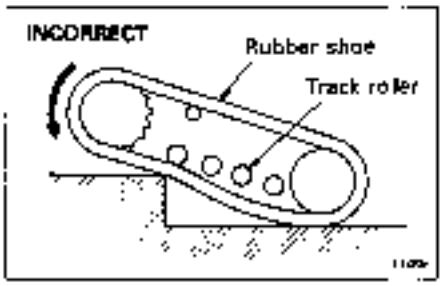


4. In Items 1 - 3, if the rubber track is loose, avoid turning in the posture in the diagram.

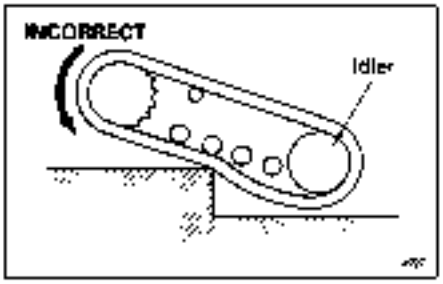


(Mechanism of rubber shoe coming off track)

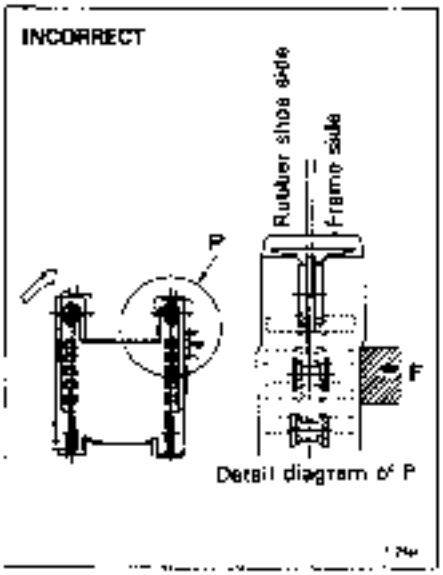
1) When traveling over an obstacle, a gap is formed between the track roller and the rubber shoe.
In this condition, the rubber shoe may come off.



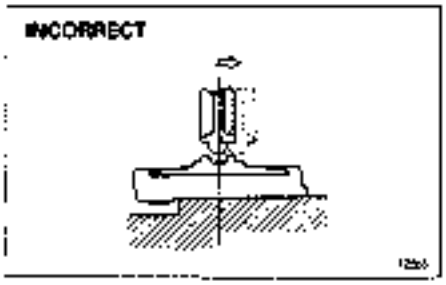
2) If the machine travels further in reverse, a gap is formed among the track roller, idler and the rubber shoe.



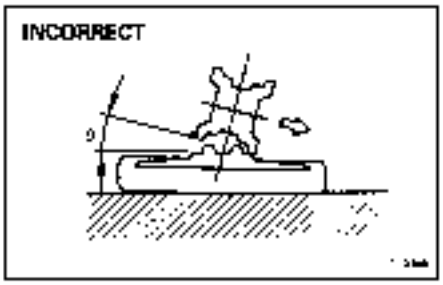
- When turning in a condition where the rubber shoe cannot move to the side because of the object it is passing over, or because of some other object.
- When the idler or track roller are out of alignment with the core because of movement of the rubber shoe out of alignment.



- If the machine travels in reverse in this condition, the rubber shoe will come off.



- If the machine is turned in this condition, the rubber shoe will come off.



13. TRANSPORTATION

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

13.1 LOADING, UNLOADING WORK

⚠ WARNING

- **Loading or unloading the machine can be a dangerous operation, so be particularly careful.**
- **Make sure the ramp has sufficient width, length and tickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.**
- **Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes.**
  Be sure the ramp surface is clean and free of grease, oil, ice and loose materials.
- **Never change the direction of travel when on the ramps. If it is necessary to change direction, drive off the ramps and correct the direction, then drive on to the ramps again.**
- **When turning the machine on the trailer, the machine's footing is unstable, so carry out the operation slowly.**

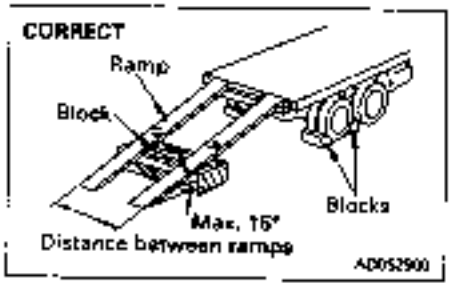
⚠ CAUTION

Always check that the sliding door on the cab specification machine is locked, regardless of whether it is open or closed. Do not open or close the door on ramps or on a platform. This may cause a sudden change in the operating force.

When loading or unloading, always use ramps or a platform and carry out the operations as follows.

1. Properly apply the brakes on the trailer and insert blocks beneath the tires to ensure that it does not move. Then fix the ramps in line with the centers of the trailer and the machine. Be sure that the two sides are at the same level as one another.

   Make the angle of the gangplank a maximum of 15°.
   Set the distance between the ramps to match the center of the tracks.



2. Lower the engine speed using the fuel control lever.

3. Set in the direction of the ramps, lower the work equipment as far as possible without letting it hit the trailer, then travel slowly to load or unload the machine.

If the work equipment is installed to the machine, load from the front: if the work equipment is not installed, load from the rear.

When on the ramps, do not operate any lever other than the travel lever.

4. Load the machine correctly in the specified position on the trailer.

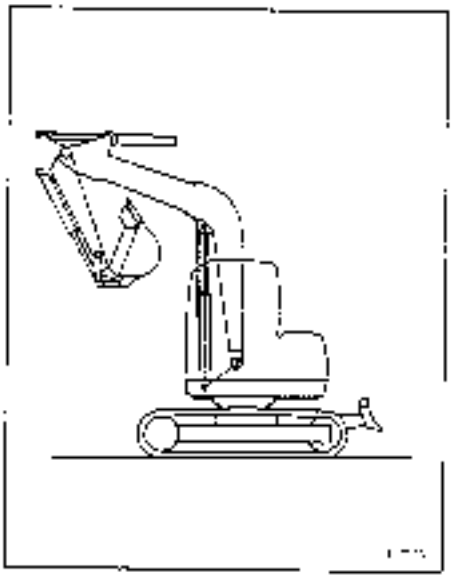
13.2 METHOD FOR LIFTING CHASSIS

⚠ WARNING

- **Never raise the machine with any worker on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **Never try to lift the machine in any posture other than the posture given in the procedure below.**
  There is danger that the machine may lose its balance.

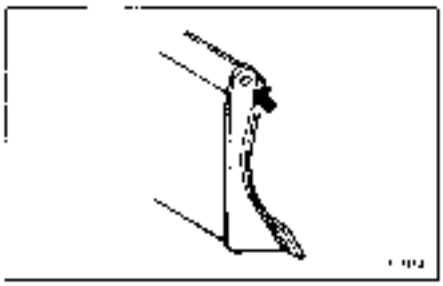
When lifting the chassis, carry out operation as follow on level ground.

1. Start the engine, swing the upper structure so that the blade is at the rear of the machine, then place the swing lock lever at the LOCK position.
2. Raise the blade to the maximum height.
3. Extend the bucket cylinder and arm cylinder fully, operate the work equipment control lever so that the boom cylinder is perpendicular to the graound, then place the lock lever at the LOCK position.
4. If the boom is offset to the left or right, operate the offset pedal so that the boom is straight, then place the pedal lock in the LOCK position.



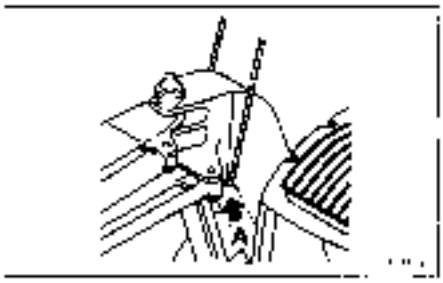
5. Stop the engine, check that there is nothing around the operator's compartment, then get down from the machine.
   For machines with cab specification, be sure to close the cab door and front glass securely.

6. Install shackles to the two lifting holes at the ends of the blade, then fix the wire rope.



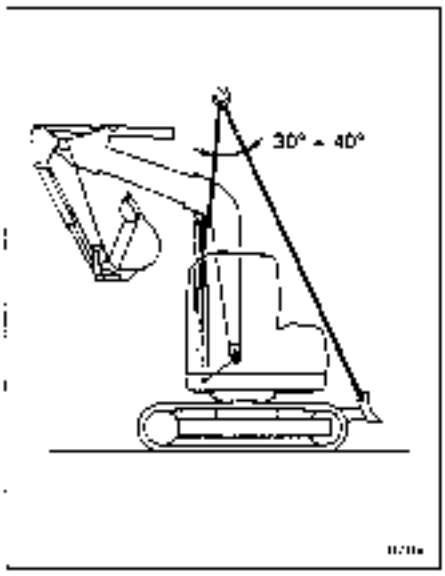
7. Pass the wire through portion A of the boom.

8. When operating the crane to apply tension to the wire, fit wooden blocks at the places where the wire contacts the chassis.



9. Make the lifting angle of the wire rope 30° – 40° and carry out the lifting operation.

10. After lifting the machine off the ground, check carefully that the machine is balanced.



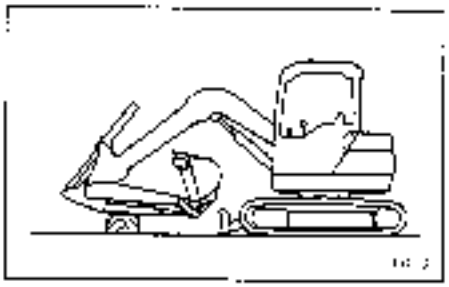
13.3 PRECAUTIONS FOR LOADING

After loading to the specified position, secure the machine as follows.

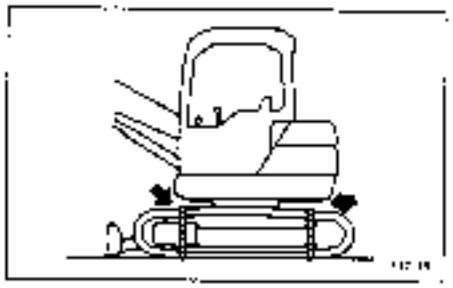
1. After loading the machine, fully extend the bucket and arm cylinders, then slowly lower the boom.
2. Lower the blade.
3. Stop the engine and remove the starting switch key.

NOTICE

When transporting the machine, place rectangular timber under one end of the bucket cylinder to prevent it touching the ground, thereby saving it from possible damage.



4. Lock all the control levers securely with the lock lever.
5. When transporting the machine, place rectangular timber underneath the front and rear track shoes to prevent the machine from moving about. Also, hold it down with chains or rope. Be particularly careful to ensure that the machine does not slip sideways.



13.4 PRECAUTIONS FOR TRANSPORTATION

⚠ WARNING

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

Obey all state and local laws governing the weight, width and length of a load. Observe all regulations governing wide loads.

NOTICE

Always retract the car radio antenna.

⚠ WARNING

For machines with cab specification, always check that the door is closed and locked before transporting the machine.

14. COLD WEATHER OPERATION

14.1 PRECAUTIONS FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

14.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

14.1.2 COOLANT

⚠ WARNING

Keep antifreeze fluid away from an open flame. Never smoke when using antifreeze.

NOTICE

Never use methanol, ethanol or propanol based antifreeze.

Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.
Absolutely avoid using any water leak preventing agent irrespective of whether it is used independently or mixed with an antifreeze.
Do not mix one antifreeze with a different brand.

For details of the antifreeze mixture when changing the coolant, see "24.2 WHEN REQUIRED".

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.
Standard requirements for permanent antifreeze.

- SAE J1034
- FEDERAL STANDARD O-A-548D

14.1.3 BATTERY

⚠ WARNING

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

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

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

Rate of charge \ Temp. of fluid	20°C	0°C	−10°C	−20°C
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

14.2 CAUTIONS AFTER COMPLETION OF WORK

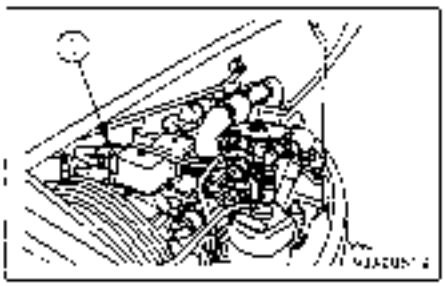
To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on concrete or hard ground. If this is impossible, park the machine on wooden boards. The boards help protect the tracks from being freezed in soil and the machine can start next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
  If electrolyte level is found low, add distilled water in the morning before beginning work. Do not add the water after the day's work so as to prevent fluid in the battery from freezing in the night.

14.3 PREPARING THE CAB HEATER

If the ambient temperature drops, use the cab heater.

- When using the cab heater, turn valve ① on the water manifold counterclockwise to open it.
- When leaving the cab heater unused for a long time, turn valve ① clockwise to close it.



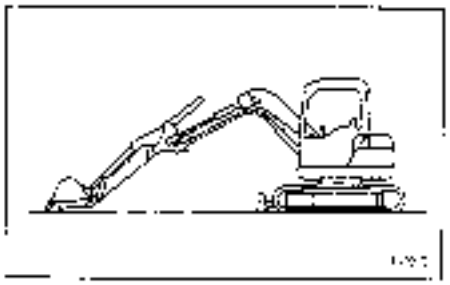
14.4 AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.

15. LONG-TERM STORAGE

15.1 BEFORE STORAGE



NOTICE

To protect the cylinder rod when the machine is not being used, set the work equipment in the posture shown in the diagram. (This prevents rusting of the cylinder rod)

When putting the machine in storage for a long time, do as follows.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors. In case it is indispensable to leave it outdoors, park the machine on the well-drained concrete and cover it with canvas etc.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C (32°F), always add antifreeze to the cooling water.
- Lock each control lever and pedal with the lock lever and pedal lock.

15.2 DURING STORAGE

⚠ WARNING

If it is unavoidably necessary to carry out the rustpreventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

Operate the engine and move the machine for a short distance once a month so that a new film of oil will be coated over movable parts and component surface. At the same time, also charge the battery.

15.3 AFTER STORAGE

NOTICE

If the machine is stored without carrying out the monthly rust prevention operation, request your Komatsu distributor for service.

Carry out the following procedure when taking the machine out of long-term storage.

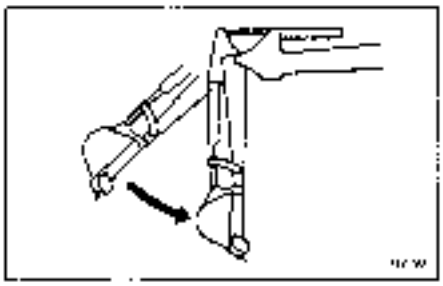
- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places.
- Because plastic materials are used for the fuel tank, never clean it using trichloroethylene as this will deteriorate the fuel tank strengh.

16. TROUBLESHOOTING

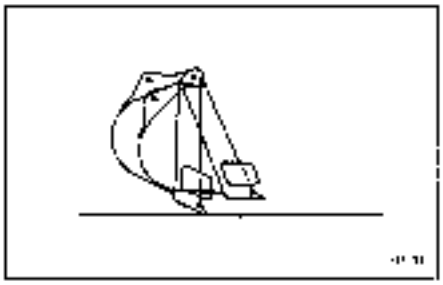
16.1 PHENOMENA THAT ARE NOT FAILURES

Note that the following phenomena are not failures:

1) When the arm is pulled in, the speed of movement will drop momentarily when the arm is more or less vertical.



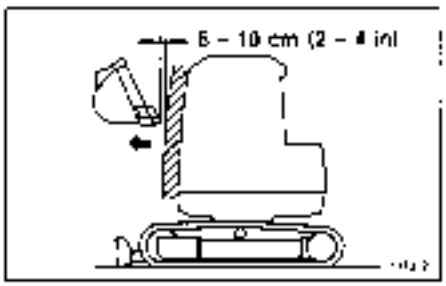
2) The arm speed will drop momentarily when the bucket teeth are more or less horizontal.



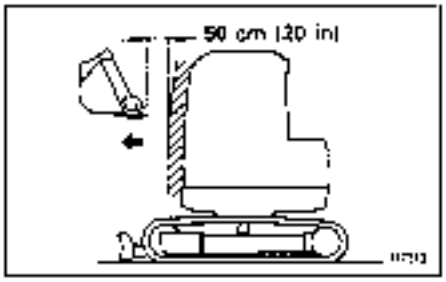
3) When starting or stopping the swing, noise will be emitted from the brake valve.
4) When going down a steep slope at low speed, a noise will be emitted from the travel motor.

PHENOMENA THAT ARE NOT FAILURES ON THE 4-SYSTEM

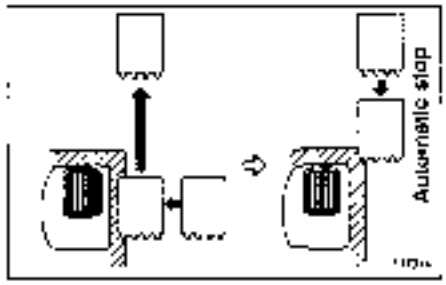
1) After automatic stop, even when the work equipment has been moved 5 – 10 cm (2 – 4 in) to the front or right, it is impossible to raise the boom, pull the arm in, or operate the left offset.



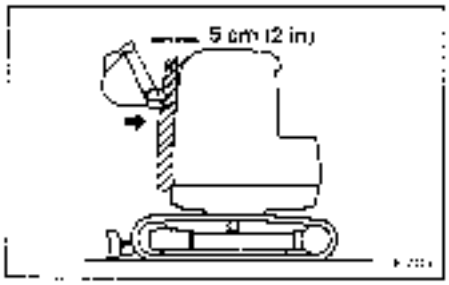
2) After automatic stop, when the work equipment has been moved 50 cm (20 in) to the front, the speed of the work equipment is slow when the boom is raised or the arm is pulled in.
(If the engine is running at low idling, it may even be impossible to raise the boom or pull the arm in.)



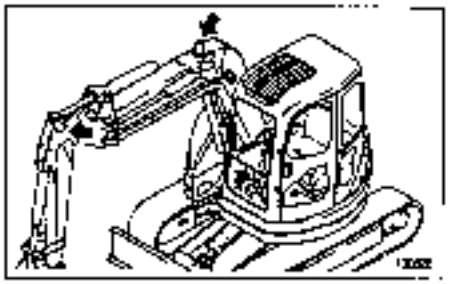
3) After automatic stop when the boom is offset to the left, if the work equipment is moved to the front to escape from the condition, and is then returned to the original position, it automatically stops on the way. (If it is offset 5 cm (2 in) to the right, it can be returned to the original posture.)



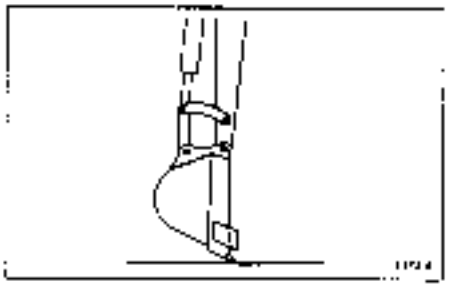
4) After automatic stop, when the cancel switch is turned on and the work equipment is moved closer to the operator's compartment, the controller carries out self diagnosis and it becomes impossible to operate the swing or any of the work equipment. (Error code 61 is displayed.)



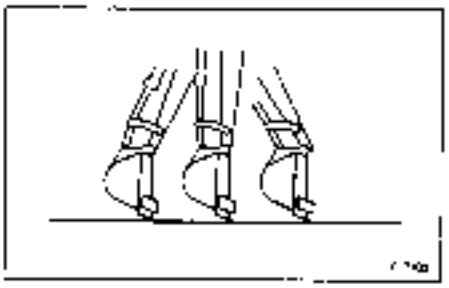
5) When the work equipment angle sensor has been removed and installed again, the automatic stop position will change.



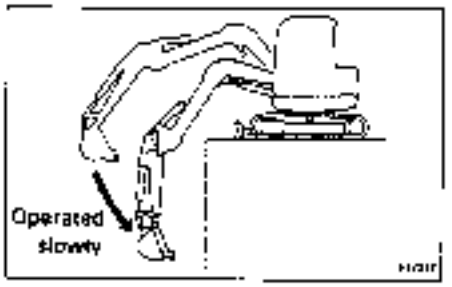
6) When the cutting edge of the bucket is lowered to the ground surface, the depth display does not become 0.0 m (0.0 in).



7) The depth display changes according to the position of the bucket.



8) The boom stops before the point set for the depth mode. (This happens particularly when the boom is lowered slowly.)
9) In cold weather, the stop position changes when the interference prevention device and automatic control device are actuated. (This returns to normal when the hydraulic oil is warmed up.)



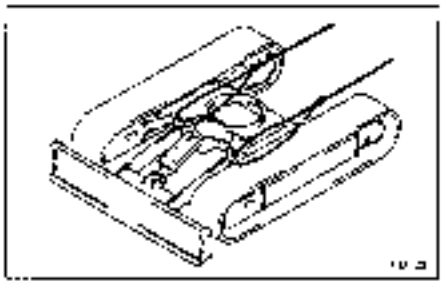
16.2 METHOD OF TOWING MACHINE

⚠ WARNING

When towing the machine, use a wire rope that has ample strength for the weight of the machine that is being towed.

If the machine sinks in mud and cannot get out under its own power, or if the drawbar pull of the excavator is being used to tow a heavy object, use a wire rope as shown in the diagram on the right.

Place piece of wood between the wire ropes and body to protect them wear or damage.



16.3 PRECAUTIONS ON PARTICULAR JOBSITES

⚠ WARNING

Never carry out any operation where the sensor goes under water.
If the sensor should go under water, check the actuation of the automatic stop.
If there is any abnormality, please contact your Komatsu distributor for repairs.

1. When carrying out digging operations in water, if the work equipment mounting pin goes into the water, carry out greasing every time the operation is carried out.

2. For heavy-duty operations and deep digging, carry out greasing of the work equipment mounting pins every time before operation.

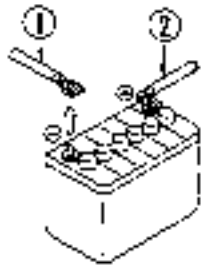
After greasing, operate the boom, arm, bucket, and blade several times, then grease again.

16.4 IF BATTERY IS DISCHARGED

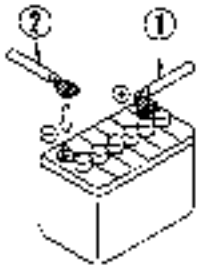
⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting key to the OFF position before starting.**
- **The battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **When handling battery, always wear protective goggles.**
- **When removing the battery, first disconnect the cable from the ground (normally, from the negative ⊖ terminal). When installing, install the positive ⊕ terminal first. If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks.**
- **If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.**

When removing, disconnect the cable from the ground terminal first.



When installing, connect the cable to the positive ⊕ terminal first.



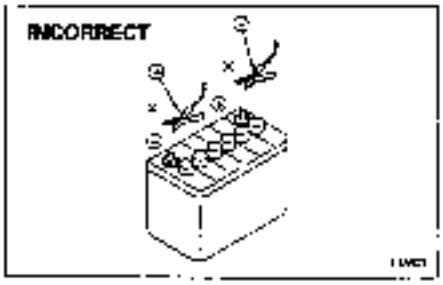
16.4.1 STARTING ENGINE WITH BOOSTER CABLE

When starting the engine with a booster cable, do as follows:

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

- **When connecting the cables, never contact the positive ⊕ and negative ⊖ terminals.**
- **When starting the engine with a booster cable, always wear safety glasses.**
- **Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.**
- **Make sure that there is no mistake in the booster cable connections. The final connection is to the revolving frame, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.**
- **Use care when removing the cables from the machine that has been started. Do not allow the cable ends to contact each other or the machine, to avoid hydrogen explosion.**

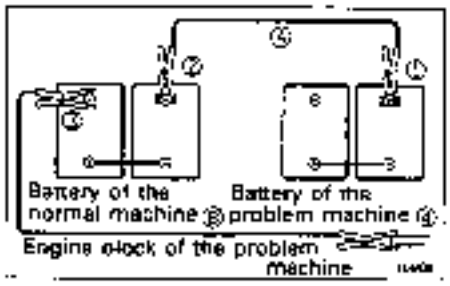


NOTICE

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

CONNECTING THE BOOSTER CABLES

Keep the starting switch at the OFF position.



Connect the booster cable as follows, in the order of the numbers marked in the diagram.

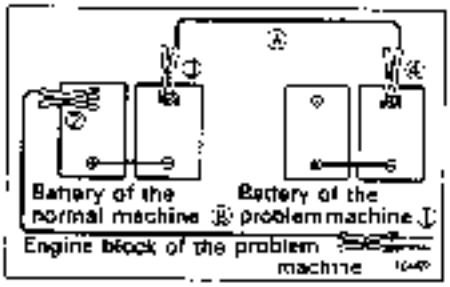
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect one clip of booster cable Ⓑ to the negative ⊖ terminal of the normal machine.
5. Connect the other clip of booster cable Ⓑ to the engine block of the problem machine.

STARTING THE ENGINE

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine. Refer to "12.2 STARTING ENGINE".

DISCONNECTING THE BOOSTER CABLES

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



1. Remove one clip of booster cable Ⓑ from the engine block of the problem machine.
2. Remove the other clip of booster cable Ⓑ from the negative ⊖ terminal of the normal machine.
3. Remove one clip of booster cable Ⓐ from the positive ⊕ terminal of the normal machine.
4. Remove the other clip of booster cable Ⓐ from the positive ⊕ terminal of the problem machine.

16.5 OTHER TROUBLE
16.5.1 ELECTRICAL SYSTEM
- (I: Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	• Defective wiring • Defective adjustment of fan belt tension	(• Check, repair loose terminals, disconnections) • Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge lamp does not go out even when engine is running	• Defective alternator • Defective wiring	(• Replace) (• Check, repair)
Abnormal noise is generated from alternator	• Defective alternator	(• Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge
Pinion of starting motor keeps going in and out	• Insufficient battery charge	• Charge
Starting motor turns engine sluggishly	• Insufficient battery charge • Defective starting motor	• Charge (• Replace)
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge
Pre-heating monitor does not light	• Defective wiring • Defective monitor	(• Check, repair) (• Replace)
Oil pressure monitor does not light up when engine is stopped (starting switch at ON position)	• Defective monitor • Defective oil pressure switch	(• Replace) (• Replace)

16.5.2 CHASSIS

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Speed of travel, swing, boom, arm, bucket is slow	• Lack of hydraulic oil	• Add oil to specified level, see CHECK BEFORE STARTING
Pump generates abnormal noise	• Clogged element in hydraulic tank strainer	• Clean, see EVERY 2000 HOURS SERVICE
Excessive rise in hydraulic oil temperature	• Loose fan belt	• Adjust fan belt tension, see EVERY 250 HOURS SERVICE
	• Lack of hydraulic oil	• Add oil to specified level see CHECK BEFORE STARTING
Track comes off	• Track too loose	• Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket		
Bucket rises slowly, does not rise	• Lack of hydraulic oil	• Add oil to specified level, see CHECK BEFORE STARTING

16.5.3 ENGINE

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure monitor lights up	• Engine oil pan oil level is low (sucking in air)	• Add oil to specified level, see CHECK BEFORE STARTING
	• Clogged oil filter element	• Replace cartridge, see EVERY 500 HOURS SERVICE
	• Defective tightening of oil pipe joint, oil leakage from damaged part	(• Check, repair)
	• Defective monitor lamp	(• Replace lamp)
Steam is emitted from top part of radiator (pressure valve)	• Cooling water level low, water leakage	• Add cooling water, repair, see CHECK BEFORE STARTING
	• Loosen fan belt	• Adjust fan belt tension, see EVERY 250 HOURS SERVICE
	• Dirt or scale accumulated in cooling system	• Change cooling water, clean inside of cooling system, see WHEN REQUIRED
	• Clogged radiator fin or damaged fin	• Clean or repair, see EVERY 500 HOURS SERVICE
Red range on engine water temperature gauge lights up	• Defective thermostat	(• Replace thermostat)
	• Loose radiator filler cap (high altitude operation)	• Tighten cap or replace packing
	• Defective water level sensor	(• Replace sensor)
White range on engine water temperature gauge lights up	• Defective thermostat	(• Replace thermostat)
Engine does not start when starting motor is turned	• Lack of fuel	• Add fuel, see CHECK BEFORE STARTING
	• Air in fuel system	• Repair place where air is sucked in, see EVERY 500 HOURS SERVICE
	• Defective fuel injection pump or nozzle	(• Replace pump or nozzle)
	• Starting motor cranks engine sluggishly	See ELECTRICAL SYSTEM
	• Preheating monitor does not light up	
	• Defective compression ○ Defective valve clearance	(○ Adjust valve clearance)

ENGINE (cont'd) (16.5.3)

Problem	Main causes	Remedy
Exhaust gas is white or blue	• Too much oil in oil pan	• Add oil to specified level, see CHECK BEFORE STARTING
	• Improper fuel	• Change to specified fuel
Exhaust gas occasionally turns black	• Clogged air cleaner element	• Clean or replace, see WHEN REQUIRED
	• Defective nozzle	(• Replace nozzle)
	• Defective compression	(• See defective compression above)
Combustion noise occasionally makes breathing sound	• Defective nozzle	(• Replace nozzle)
Abnormal noise generated (combustion or mechanical)	• Low grade fuel being used	• Change to specified fuel
	• Overheating	• Red range of engine water temperature gauge lights up as above
	• Damage inside muffler	(• Replace muffler)
	• Excessive valve clearance	(• Adjust valve clearance)

16.5.4 4-SYSTEM RELATED PARTS

If any error code is displayed on the depth display portion of the monitor panel, follow the procedure given in the table below for the action to take after self diagnosis.

Action to take after self diagnosis

Error code	Machine condition	Probable cause	Action
21	Auto stop distance is too far	Abnormality in model selector signal	Operations can still be carried out, but have the machine checked immediately.
22	Auto stop distance is too far	Abnormality in work equipment selector signal	
31	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in boom angle sensor	Use the cancel switch to move the machine to a safe place, then have the machine checked immediately.
32	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in arm angle sensor	
34	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in offset angle sensor	
41	Swing operation and operation of all work equipment cannot be carried out	Abnormality in basic pressure lock solenoid valve	Use the cancel switch to move the machine to a safe place, then have the machine checked immediately. However, depending on the location of the failure, it may be impossible to carry out operations even when the cancel switch is turned on, so in such cases, have the machine checked immediately.
42	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in offset solenoid valve	
44	Boom LOWER, arm IN, offset left cannot be carried out	Abnormality in boom LOWER solenoid valve	
51	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in boom RAISE solenoid valve	
52	Boom RAISE, arm IN, offset left cannot be carried out	Abnormality in arm IN solenoid valve	
61	Swing operation and operation of all work equipment cannot be carried out	Abnormality in automatic stop position	If the cancel switch is used to move the bucket to the front or to the right, the self diagnosis is canceled and it becomes possible to operate the machine again, but have the machine checked immediately.
No error code is displayed, but swing operation and operation of all work equipment cannot be carried out			Have the machine checked immediately.

MAINTENANCE

17. GUIDES TO MAINTENANCE

Do not carry out any inspection and maintenance operation that is not given in this manual.

Perform maintenance work on **hard, flat ground.**

Check service meter:
Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

Komatsu genuine replacement parts:
Use Komatsu genuine parts specified in the parts list as replacement parts.

Komatsu genuine oils:
Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

Always use clean washer fluid:
Use automobile window washer fluid and be careful not to let any dirt get into it.

Clean oil and grease:
Use clean oil and grease. Also, keep containers of the oil and grease clean. Keep foreign materials away from oil and grease.

Keeping the machine clean:
Always keep the machine clean. This makes is easier to find parts causing problems. Keep in particular grease fittings, breathers and oil level gauges clean and avoid foreign matters from getting in them.

Be careful of hot water and oil:
Draining hot oils and coolants and removing their filters immediately after the engine stops are hazardous. Allow the engine to cool.
If the oil has to be drained when it is cold, warm up the oil to a suitable temperature (approx. 20 – 40°C (68 – 104°F)) before draining it.

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

Fuel strainer:
If your machine is equipped with a fuel strainer, do not remove it while fueling.

Oil change:
Check or change oils in the places where dust is scarce to keep foreign materials away from oils.

Warning tag:
Attach the warning tag to the starting switch or other appropriate control lever to avoid someone who is not aware of the circumstances from starting the engine.

Obey precautions:
During the operation, always obey the precautions on the safety label stuck to the machine.

Welding instructions:
- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding the cable within 1 m from the area to be welded.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

Fire prevention:
Use nonflammable cleaner or light oil for cleaning parts. Keep flame or cigarette light away from light oil.

Clamp faces:
When O-ring or gaskets are removed, clean the clamp faces and replace the O-rings and gaskets with new ones. Be sure to fit O-rings and gaskets when assembling.

Objects in your pockets:
Keep your pockets free of loose objects which can fall out and drop into the machinery; especially when you work on the machinery while bending over it.

Checking undercarriage:
When working in rocky areas, check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nuts. Loosen the track tension a little when working in such areas.

Precautions when washing machine:
- Never spray steam or water directly on the connectors and mechatronics parts.
- Do not allow water to get on the monitors and controllers inside the operator's cab.
- Never spray steam or water directly at the radiator or oil cooler portions.
- Acryl is used for the rear face, roof, and left face of the cab specification machine, so do not wipe it with any dirty cloth or chemical (thinner, gasoline, etc.). If any of these parts is scratched, polish it with a compound. When cleaning it, use water and a clean cloth to remove all the mud and dirt.
- Plastic is used for the fuel tank, so never use trichlene when washing. Washing with trichlene will lower the strength of the fuel tank.
- Because plastic materials are used for the fuel tank, never clean it using trichloroethylene as this will deteriorate the fuel tank strengh.

Pre-and post-work checks:
Before starting work in mud, rain, snow or at seashore, check plugs and valves for tightness.
Wash the machine immediately after the work to protect components from rusting.
Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.

Dusty worksites:
When working at dusty worksites, do as follows:
- Inspect the dust indicator to see whether the air cleaner is blocked up. Clean the air cleaner at shorter intervals than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.

Avoid mixing oils:
Never mix oils of different brands. If you have only oil which is a different brand from the one that is used in the machine, do not add it but replace all the oil.

18. OUTLINES OF SERVICE

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

Item	Kind of fluid
Engine oil pan	SAE 15W-40 API classification CD
Swing machinery case Final drive case	SAE 30 API classification CD
Hydraulic tank	SAE 10W API classification CD
Fuel tank	ASTM D975 No. 2
Radiator	Komatsu Supper Coolant (AF-ACLI 30% added to water

18.1 OUTLINE OF OIL, FUEL, COOLANT

18.1.1 OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use.
  Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual. Even if the oil is not dirty, always replace the oil after the specified interval.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
  The majority of problems with machine are caused by the entry of such impurities.
  Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.
  Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters at the same time.
- We recommend you to have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.

18.1.2 FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature when it is used (particularly in low temperature below –15°C (5°F)), so it is necessary to change to a fuel that matches the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

18.1.3 COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
  Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze is effective in preventing corrosion of the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is inflammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions, see "24.2 WHEN REQUIRED".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

18.1.4 GREASE

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

18.1.5 STORING OIL AND FUEL

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

18.1.6 FILTERS

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

18.2 RELATING TO ELECTRIC SYSTEM

- If the wiring gets wet or the insulation is damaged, the electric system leaks and this could result in hazardous malfunction of the machine.
- Services relating to the electric system are (1) check of fan belt tension ,(2) check of damage or wear in the fan belt and (3) check of battery fluid level.
- Never remove or disassemble any electric components installed in the machine.
- Never install any electric components other than these specified by Komatsu.
- Be careful to keep the electric system free of water when washing the machine or when it rains.
- Interference from electric waves may cause the 4-system controller to malfunction, so when installing any radio or similar device, please contact your Komatsu distributor.
- When working on the seashore, carefully clean the electric system to prevent corrosion.
- When installing a car cooler or any other electrical equipment, connect it to an independent power source connector. The optional power source must never be connected to the fuse, starting switch, or battery relay.

19. WEAR PARTS LIST

Wear parts such as the filter element, bucket tooth, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.
The wear parts should be changed correctly in order to use the machine economically.
For part change, Komatsu genuine parts of excellent quality should be used.

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

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	6732-51-6140	Cartridge	1	Every 500 hours
Fuel filter	6732-71-6111	Cartridge	1	Every 500 hours
Feed pump pre-filter	600-311-7410	Cartridge	1	-
Hydraulic filter	201-60-71180 (07000-02135)	Element (O-ring)	1 (1)	Every 500 hours
Air cleaner	600-181-6340	Element assembly	1	-
Bucket		Vertical pin type		
	20X-70-23160	Tooth	4	-
	(203-70-43212)	(Pin)	(4)	
	(203-70-43220)	(Pin)	(4)	
		Horizontal pin type		
	20X-70-14160	Tooth	4	-
	(20X-70-00100)	(Pin assembly)	(4)	
	20X-933-1110	Side cutter (Left)	1	-
	20X-933-1120	Side cutter (Right)	1	
	(21W-70-21810)	(Bolt)	(6)	
	(01803-02228)	(Nut)	(6)	
Electric heater	6732-11-4811	Gasket	2	-

20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE	CAPACITY	
		-22 -4 14 32 50 68 86 104 122°F -30 -20 -10 0 10 20 30 40 50°C	Specified	Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40	14.5 ℓ 3.8 US gal 3.2 UK gal	13.0 ℓ 3.4 US gal 2.9 UK gal
Swing machinery case			1.6 ℓ 0.42 US gal 0.35 UK gal	1.6 ℓ 0.42 US gal 0.35 UK gal
Final drive case		SAE 30	1.7 ℓ 0.45 US gal 0.37 UK gal (each)	1.7 ℓ 0.45 US gal 0.37 UK gal (each)
PTO gear case			0.5 ℓ 0.13 US gal 0.11 UK gal	0.5 ℓ 0.13 US gal 0.11 UK gal
Hydraulic system		SAE 10W SAE 10W-30 SAE 15W-40	100 ℓ 26.4 US gal 22.0 UK gal	57.0 ℓ 15.0 US gal 12.5 UK gal
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	80.0ℓ 21.1 US gal 17.6 UK gal	–
Cooling system	Water	Add antifreeze.	16.0 ℓ 4.2 US gal 3.5 UK gal	–

※ ASTM D975 No. 1

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
  Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C (32°F), be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C (50°F) more or less in the day time.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
API: American Petroleum Institute

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No. 2	Anti-freeze Coolant (Ethylene Glycol Base) Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S Super dieselmulti-grade *Sigma turbo	Rotra MP	GR MU/EP	–
3	AMOCO	*Amoco 300	Multi-purpose gear oil	RYKON prenium grease	–
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	–
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	–	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolent
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	–

No.	Supplier	**Engine Oil** [CD or CEI SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.I	**Gear Oil** [GL-4 or GL-5] SAE80, 90, 140	**Grease** [Lithium-Base] NLGI No. 2	**Anti-freeze Coolant** [Ethylene Glycol Base] Permanent Type
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White – bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimula X	Spirax EP Spirax heavy duty	Alvania EP grease	–
17	SUN	–	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Code 2066 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multis EP2	Antigel/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	–
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	–	Antifreeze

21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

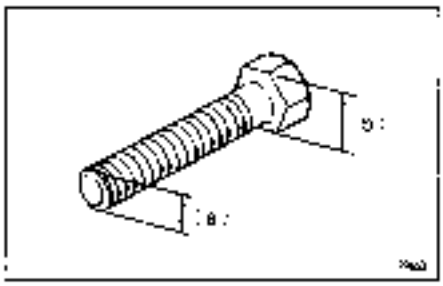
21.1 TORQUE LIST

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

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

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

Nm (newton meter): 1 Nm = 0.74 lbft



Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	kgm	Nm	lbft
6	10	1.35 ± 0.15	13.2 ± 1.4	9.73 ± 1.03
8	13	3.2 ± 0.3	31.4 ± 2.9	23.2 ± 2.1
10	17	6.7 ± 0.7	65.7 ± 6.8	48.5 ± 5.0
12	19	11.5 ± 1.0	112 ± 9.8	82.6 ± 7.2
14	22	18.0 ± 2.0	177 ± 19	131 ± 14
16	24	28.5 ± 3	279 ± 29	206 ± 21
18	27	39 ± 3	383 ± 39	282 ± 29
20	30	56 ± 6	549 ± 59	405 ± 43
22	32	76 ± 8	745 ± 78	549 ± 58
24	36	94.5 ± 10	927 ± 98	684 ± 72
27	41	135 ± 15	1320 ± 140	973 ± 100
30	46	175 ± 20	1720 ± 190	1270 ± 140
33	50	225 ± 25	2210 ± 240	1630 ± 180
36	55	280 ± 30	2750 ± 290	2030 ± 210
39	60	335 ± 35	3280 ± 340	2420 ± 250

NOTICE

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

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the user should also carry out periodic replacement of the parts given in the table. These parts are particularly closely connected to safety and fire prevention.

With these parts, the material changes as time passed, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses.

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

Ask your Komatsu distributor to replace the critical parts.

CRITICAL PARTS

No.	Critical parts for periodical replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank – stop valve)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (stop valve – feed pump pre-filter)	1	
3	Fuel hose (feed pump pre-filter – divider)	1	
4	Fuel hose (divider – feed pump)	1	
5	Fuel hose (divider – electric pump)	1	
6	Fuel hose (electric pump – fuel filter)	1	
7	Fuel return hose (fuel injection pump – fuel tank)	2	
8	Spill hose (nozzle – fuel tank)	1	
9	Fuel hose (fuel tank – filler port)	2	
10	Fuel hose (filler port – fuel tank)	1	
11	Hydraulic hose (main pump delivery)	2	
12	Hydraulic hose (main pump suction)	2	
13	Hydraulic hose (main pump branch hose)	1	
14	Hydraulic hose (boom cylinder – control valve)	4	
15	Hydraulic hose (arm cylinder – control valve)	4	
16	Hydraulic hose (bucket cylinder – control valve)	4	
17	Hydraulic hose (offset cylinder – control valve)	4	
18	Hydraulic hose (swing motor – control valve)	2	
19	Hydraulic hose (blade cylinder – control valve)	4	
20	Seat belt	1	Every 3 years

23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
EVERY 100 HOURS SERVICE	
Lubricating	3-52
• Blade cylinder foot pin (1 point)	3-52
• Blade cylinder rod end pin (1 point)	3-52
• Blade foot pin (2 points)	3-52
• First boom foot pin (2 points)	3-52
• Boom cylinder foot pin (1 point)	3-52
• First boom – Second boom coupling pin (2 points)	3-52
• Boom cylinder rod end pin (1 point)	3-53
• Offset cylinder foot pin (1 point)	3-53
• Offset cylinder rod end pin (1 point)	3-53
• Sub-link coupling pin (2 points)	3-53
• Second boom – Third bracket coupling pin (2 points)	3-53
• Arm cylinder foot pin (2 points)	3-53
• Arm cylinder rod end pin (1 point)	3-53
• Third bracket – Arm coupling pin (1 point)	3-53
• Bucket cylinder foot pin (1 point)	3-53
• Bucket cylinder rod end pin (1 point)	3-53
• Arm – Link coupling pin (1 point)	3-53
• Link coupling pin (2 points)	3-53
• Bucket – Link coupling pin (2 points)	3-53
• Arm – Bucket coupling pin (1 point)	3-53
EVERY 250 HOURS SERVICE	
Check oil level in final drive case, add oil	3-54
Check, adjust fan belt tension	3-55
Check, adjust car cooler compressor belt tension (Only machines equipped with car cooler)	3-55
EVERY 500 HOURS SERVICE	
Replace fuel filter cartridge	3-56
Change oil in engine oil pan, replace engine oil filter cartridge	3-58

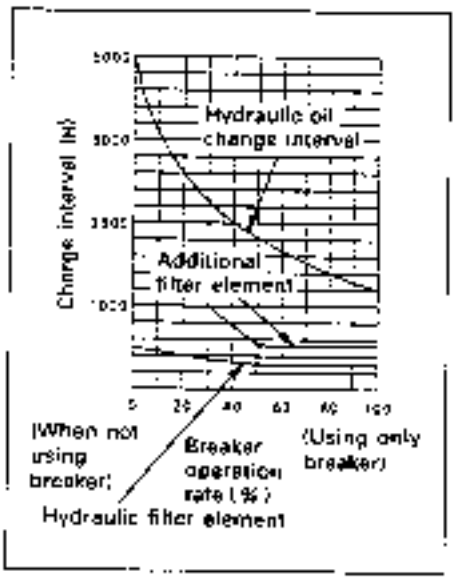
SERVICE ITEM	PAGE
(EVERY 500 HOURS SERVICE)	
Replace hydraulic filter element	3-60
Clean, check radiator fins	3-61
Lubricate swing circle (2 points)	3-61
Check swing pinion grease level, add grease	3-61
EVERY 1000 HOURS SERVICE	
Change oil in swing machinery case	3-62
Change oil in final drive case	3-63
EVERY 2000 HOURS SERVICE	
Check oil level in PTO gear case, add oil	3-64
Check alternator, starting motor	3-64
Check engine valve clearance, adjust	3-64
EVERY 4000 HOURS SERVICE	
Check water pump	3-64
EVERY 5000 HOURS SERVICE	
Change oil in hydraulic tank, clean strainer	3-65

23.2 MAINTENANCE INTERVAL WHEN USING HYDRAULIC BREAKER

If a hydraulic breaker is installed, the hydraulic oil deteriorates far more rapidly than when carrying out normal bucket operations, so set the maintenance interval as follows.

- Replacing hydraulic filter element
  On new machines, replace after the first 100 – 150 hours, and after that, replace the element at the interval shown on the graph on the right.

- Changing oil in hydraulic tank
  Change the oil at the interval shown on the graph on the right.



24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE

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

- **REPLACE FUEL FILTER ELEMENT**
- **CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE**
- **ENGINE VALVE CLEARANCE, CHECK AND ADJUST**

For details of the method of maintenance, see "24.7 EVERY 500 HOURS SERVICE" and "24. 9 EVERY 2000 HOURS SERVICE".

24.2 WHEN REQUIRED

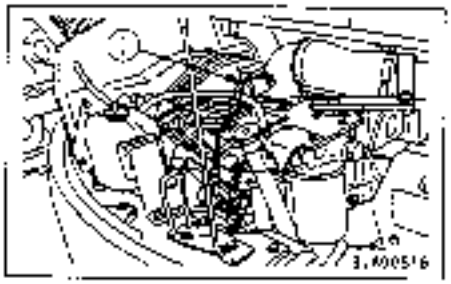
24.2.1 CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

⚠ WARNING

- **Never clean or replace the air cleaner element with the engine running.**
- **When using pressure air to clean the element wear safety glasses or goggles to protect the eyes.**

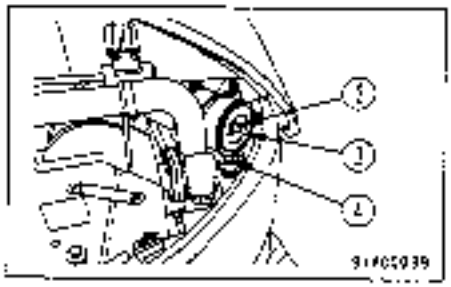
CHECKING

Whenever the red piston in dust indicator ① appears, clean the air cleaner element.



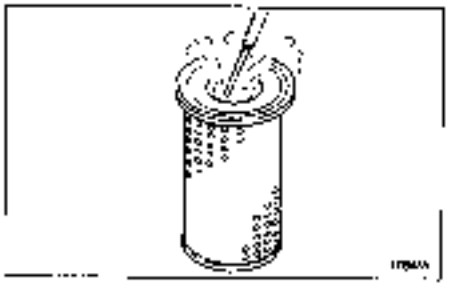
CLEANING OR REPLACING OUTER ELEMENT

1. Open the engine hood at the rear of the machine, remove wing nut ②, take out element ③, then use a clean cloth or tape to cover the air connector inside the air cleaner body to prevent dust from entering.



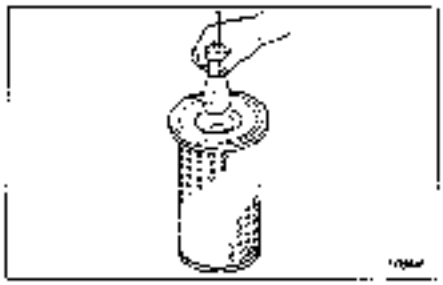
2. Clean the inside of the air cleaner body.

3. Direct dry compressed air (less than 700 kPa {7 kg/cm², 100 psi}) to the element from inside along its folds, then direct it from outside along its folds and again from inside.



{1} Replace the element which has been cleaned 5 times repeatedly or used throughout a year.
{2} Replace element when the dust indicator red piston appears soon after installing the cleaned element even though it has not been cleaned 5 times.

4. If small holes or thinner parts are found on the element when it is checked with an electric bulb after cleaning, replace the element.



NOTICE

Do not use an element whose folds or gasket or seal are damaged.

When cleaning the element, do not hit it or beat it against something.

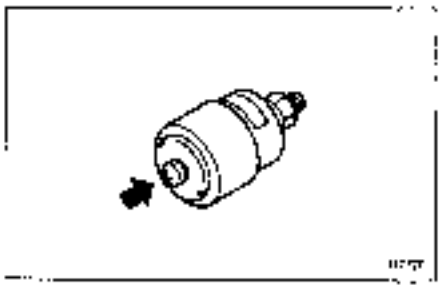
Wrap unused elements and store them in a dry place.

5. Remove the cloth or tape used as a cover in Step 1.

6. Set the cleaned element in position, and secure it with the wing nut.

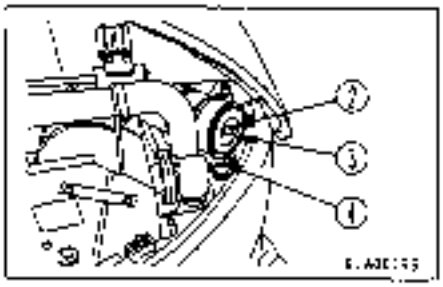
7. Remove evacuator valve ④ and clean it with compressed air.

8. Press the button of dust indicator ① to return the red piston to its original position.



REPLACING ELEMENT

1. Open the engine hood at the rear of the machine, release wing nut ②, and take out element ③, then use a clean cloth or tape to cover the air connector inside the air cleaner body to prevent dust from entering.



2. Clean the inside of the air cleaner body, then remove the cloth or tape used as a cover in Step 1.

3. Set the new element in position, and secure it with wing nut ②.

4. After replacing the element, return the red piston in the dust indicator to its original position.

24.2.2 CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Soon after the engine has been stopped, the coolant is hot and can cause personal injury. Allow the engine to cool before draining water.**
- **When the engine is running, never stand behind the machine. The cleaning is carried out with the engine running, so it is extremely dangerous if the machine moves when the operator is standing behind the machine.**
  There is also danger of touching the fan when the engine hood is open.
- **Never remove the radiator cap when the engine is at operating temperature. At operating temperature, the coolant is under pressure. Steam blowing up from the radiator could cause personal injury. Allow the engine to cool until the radiator filler cap is cool enough to touch with your hand. Remove the filler cap slowly to relieve pressure.**
- **Antifreeze is flammable, so keep it away from any flame.**
- **Flushing agents, neutralizing agents, and anti-corrosive agents are strong acids or alkalize, so be careful not to get them on your skin. If you should get any of these on your skin, wash off immediately with ample water.**
- **After using the agent, do not use the empty packet for keeping food, etc.**

- Clean the inside of the cooling system, change the coolant and add corrosion resistant KI-2 (powder) according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Adding corrosion resistant KI (in hard water areas)
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant
Non permanent type antifreeze containing ethylene glycol (Winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or ever 1000 hours whichever comes first	

- Use a permanent type of antifreeze.
  If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

- Stop the machine on level ground when cleaning or changing the coolant.

- To restrict the formation of rust and scale in hard water areas, add Komatsu genuine corrosion resistant KI-2 (powder) to the cooling water.
  Never use commercial available anti-corrosive agents (made by Fleetguard, etc.).

- When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.
  It is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	10	−15	−20	−25
	°F	14	5	−4	−13
Amount of antifreeze	ℓ	4.9	5.8	6.5	7.4
	US gal	1.29	1.53	1.72	1.96
	UK gal	1.08	1.28	1.43	1.63
Amount of water	ℓ	11.1	10.2	9.5	8.6
	US gal	2.93	2.69	2.61	2.27
	UK gal	2.44	2.24	2.09	1.89

⚠ WARNING

Antifreeze is flammable, so keep it away from any flame.

- We recommend use of an antifreeze density gauge to control the mixing proportions.

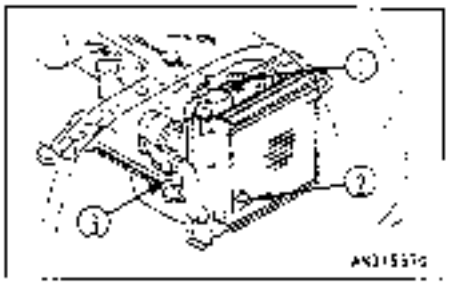
- Use city water for the cooling water.
  If river water, well water or other such water supply must be used, contact your Komatsu distributor.

⚠ WARNING

When removing drain plug, avoid pouring coolant on yourself.

Prepare the following.

- Container to catch drained coolant: Min 8 ℓ (2.1 US gal, 1.8 UK gal) capacity
- Water inlet hose



1. Turn radiator cap ① slowly to remove it.

2. Set a container to catch the coolant under drain valve ② and drain plug ③.

3. Open the engine food and open drain valve ② at the bottom of the radiator to drain the water.
   Remove drain plug ③ on the side face of cylinder block to drain the water.

4. After draining the water, close drain valve ② and drain plug ③, and fill with city water.

5. Open drain valve ② and drain plug ③, run the engine at low idling, and flush water through the system for 10 minutes.
   When doing this, adjust the speed of filling and draining the water so that the radiator is always full.
   While flushing water through the system, watch carefully that the water inlet hose does not come out of the radiator water filler.

6. After flushing, stop the engine, open drain valve ② and drain plug ③, then close it again after all the water has drained out.

7. After draining the water, clean with a flushing agent.

   We recommend use of a Komatsu genuine cleaning agent. For details of the cleaning method, see the instructions given with the cleaning agent.

8. After cleaning, open drain valve ② and drain plug ③ to drain all the cooling water, then close them, and fill slowly with clean water.

9. When the water comes up to near the water filler port, open drain valve ② and drain plug ③, run the engine at low idling, and continue to run water through the system until clean color less water comes out.
   When doing this, adjust the speed of filling and draining the water so that the radiator is always full.

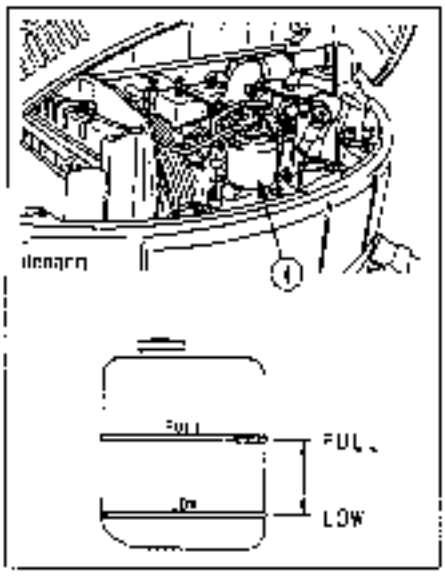
10. When the water is completely clean, stop the engine, close drain valve ② and drain plug ③.

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

12. To remove the air in the cooling water, run for five minutes at low idling, then for another five minutes at high idling.
    When doing this, leave radiator cap ① off.

13. After draining off the cooling water of sub-tank ④, clean the inside of the sub-tank and refill the water between FULL and LOW level.

14. Stop the engine, wait for about three minutes, add cooling water up to near the radiator water filler port, then tighten cap ①.

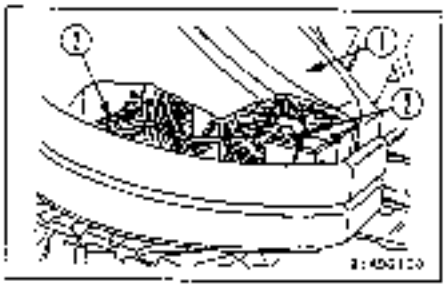


24.2.3 CHECK LEVEL OF BATTERY ELECTROLYTE

If the battery electrolyte level monitor lights up to warn that the electrolyte level is low, check as follows.

⚠ WARNING

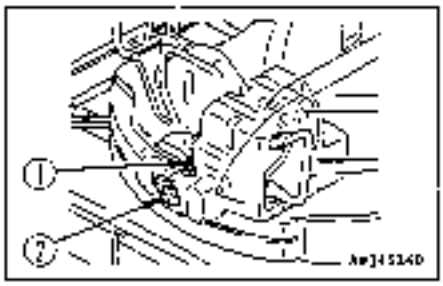
- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**



1. Remove cover ①.
2. Remove cap ②, and check that the electrolyte is at the specified level (10 to 12 mm (0.40 to 0.47 in) above the plate). If the electrolyte level is low, add distilled water to the specified level. If the battery electrolyte is spilled, have dilute sulphuric acid added.
3. Clean the air hole in the battery cap, then tighten the cap securely.

When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.2.4 WASH INSIDE OF FUEL TANK



NOTICE

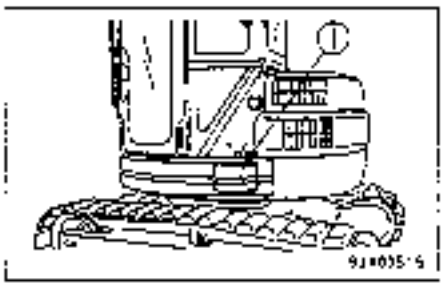
Never use trichloroethylene to wash the inside of the tank.

1. Open valve ① at the bottom of the tank and drain the fuel. When doing this, be careful not to get fuel on yourself.
2. Remove cover ② at the side of the tank.
3. Wash the inside of the tank.
4. After washing the tank, tighten valve ① and install cover ②.

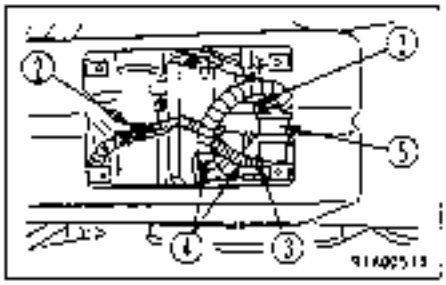
24.2.5 REPLACE FEED PUMP PRE-FILTER CARTRIDGE

⚠ WARNING

- **After replacing the pre-filter cartridge, install the fuel hose and check that there is no leakage of fuel.**
- **Do not bring any flame close.**

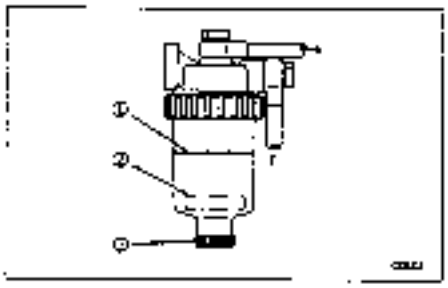


1. Remove cover ①.
2. Close stop valve ②.
3. Remove clip ③ and hose ④, then remove filter cartridge ⑤.
4. Install new filter cartridge ⑤, then connect hose ④ and install clip ③.
5. Open stop valve ②.
6. Install cover ①.



7. After completing the replacement of the feed pump pre- filter cartridge, bleed the air from the fuel line.
   For details of the procedure for bleeding the air, see "PROCEDURE FOR BLEEDING AIR".

24.2.6 CLEAN WATER SEPARATOR ELEMENT



When float ② is at or above red line ①, drain the water according to the following procedure:

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug ③.
3. If the air is sucked into the fuel line when draining the water, be sure to bleed the air in the same manner as or the fuel filter. (See Fuel Filter Cartridge in EVERY 500 HOURS SERVICE section.)

24.2.7 CHECK ELECTRIC WIRINGS

⚠ WARNING

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

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

- Battery
- Starting motor
- Alternator

Please contact your Komatsu distributor for investigation and correction of the cause.

⚠ WARNING

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

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

24.2.8 CHECK AND ADJUST TRACK TENSION (MACHINE EQUIPPED WITH STEEL SHOES)

⚠ WARNING

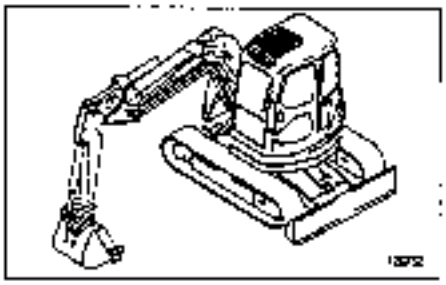
Carry out this operation with two workers. The operator must move the machine in accordance with the signals from the other worker. The track tension is checked with the chassis raised, so it is extremely dangerous if the machine is lowered by mistake during the inspection. Never move the machine while anyone is carrying out measurements.

The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

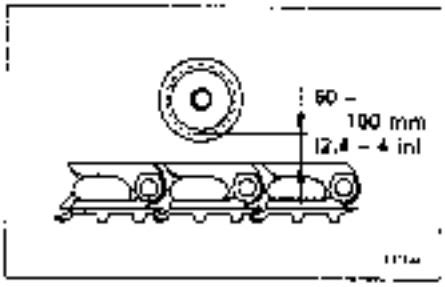
Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

INSPECTION

1. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.



2. The standard tension is a clearance of 60 – 100 mm (2.4 – 4 in) between the roller surface of the track shoe and the track roller tread at the 3rd track roller from the sprocket.

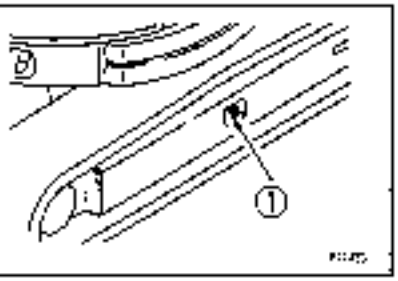


If the track tension is not at the standard value, adjust it in the following manner.

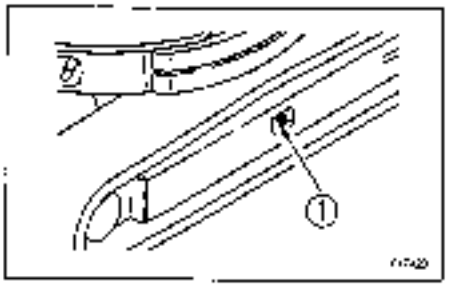
ADJUSTMENT

⚠ WARNING

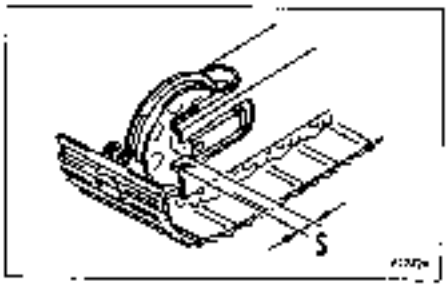
Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ① under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ① more than one turn. Do not loosen any part other than lubricator ①.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



- **When increasing tension**
- Prepare a grease gun



1. Pump in grease through lubricator ① with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards
3. Check the track tension again, and if the tension is not correct, adjust it again.

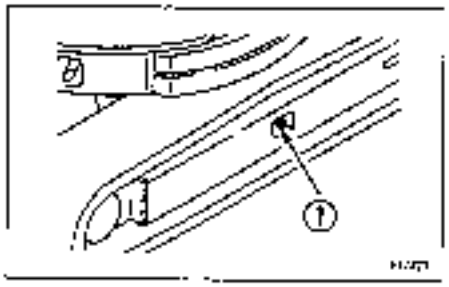


4. Continue to pump in grease until S becomes 0 mm (0.0 in). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.

- **When loosening tension**

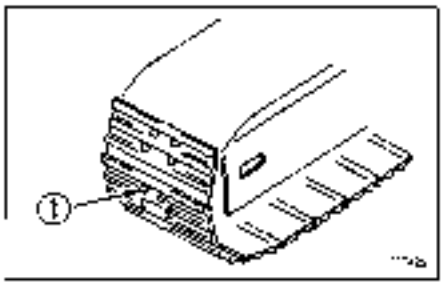
⚠ WARNING

It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



1. Loosen lubricator ① gradually to release the grease.
2. Turn lubricator ① a maximum of one turn.
3. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
4. Tighten lubricator ①.
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.

24.2.9 CHECK AND TIGHTEN TRACK SHOE BOLTS (MACHINE EQUIPPED WITH STEEL SHOES)



If the machine is used with track shoe bolts ① loose, they will break, so tighten any loose bolts immediately.

METHOD FOR TIGHTENING

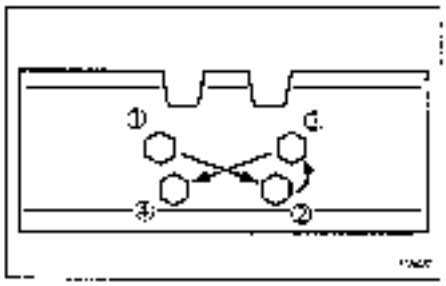
1. First tighten to a tightening torque of 118 ± 20 Nm (12 ± 2 kgm, 87 ± 15 lbft) then check that the nut and shoe are in close contact with the link contact surface.

2. After checking, tighten a further 90° ± 10°.

- **Order for tightening**

  Tighten the bolts in the order shown in the diagram on the right.

  After tightening, check that the nut and shoe are in close contact with the link mating surface.

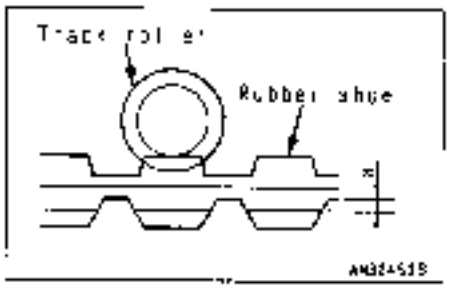


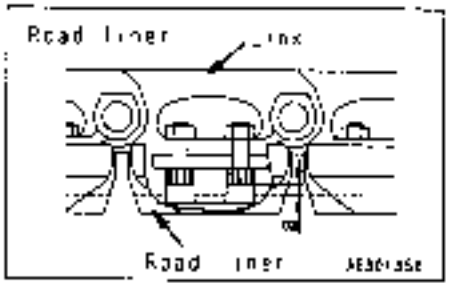
23.2.10 CHECK RUBBER SHOES, ROAD LINERS (MACHINE EQUIPPED WITH RUBBER SHOES, ROAD LINERS)

If rubber shoes or road liners are worn to the following levels, it must be repaired or replaced. Ask your Komatsu distributor for repair or replacemont.

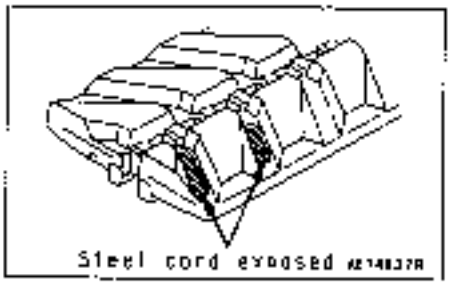
Height of lug

- If lug height "a" is reduced by wear, the drawbar pull will drop. If "a" is less than 5 mm (0.2 in), replace with a new part.



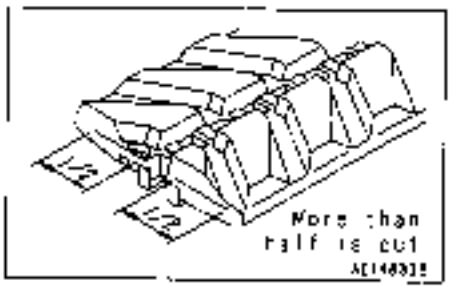


- If the lug wears and the steel cord inside the shoe is exposed for two links or more, replace with a new part.



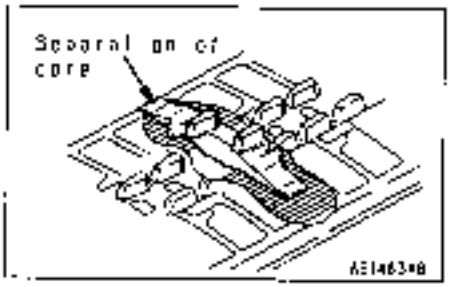
Cuts in rubber shoe steel cord

If more than half of the steel cord layer on one side is cut, replace with a new part.



Separation of rubber shoe core

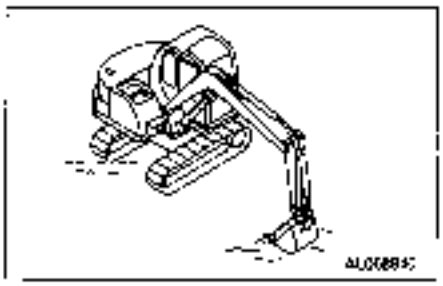
If the rubber core has separated at one place or more, replace with a new part.



Rubber shoe tension

If the rubber shoe is still slack even when grease is pumped in, replace with a new part or replace the seal inside the cylinder.

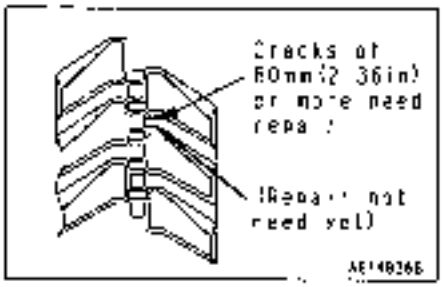
If the track tension can only be increased to a level where the rubber shoe may come off, there may be not only elongation of the rubber shoe but also damage to the grease cylinder.



Cracks in rubber shoe

If the cracks between the rubber shoe lugs increase to a size of approx. 60 mm (2.36 in) the rubber shoe must be repaired. Even if the track is small and short, if the steel cord can be seen inside, carry out repairs immediately.

If the length is less than 30 mm (1.18 in) or the depth of the crack is less than 10 mm (0.39 in), there is no particular need to carry out repairs.



Ask your Komatsu distributor to judge if the rubber shoes or road liners need to be replaced or repaired or if they can be reused.

When replacing road liner

When replacing all road liners of a machine, ask your Komatsu distrioutor.

If only a part of the road liners needs to be replaced, replace them by using the road liner replacing tool. Place an order for the tool from your Komatsu distributor.

24.2.11 CHECK AND ADJUST TRACK TENSION (MACHINE EQUIPPED WITH RUBBER SHOES)

⚠ WARNING

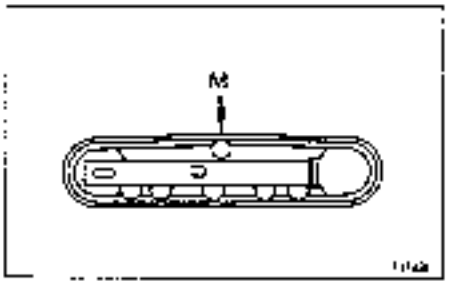
Carry out this operation with two workers. The operator must move the machine in accordance with the signals from the other worker. The track tension is checked with the chassis raised, so it is extremely dangerous if the machine is lowered by mistake during the inspection. Never move the machine while anyone is carrying out measurements.

The wear of the rubber shoe will vary with the working conditions and type of soil. Therefore, it is necessary to inspect the wear and track tension frequently.

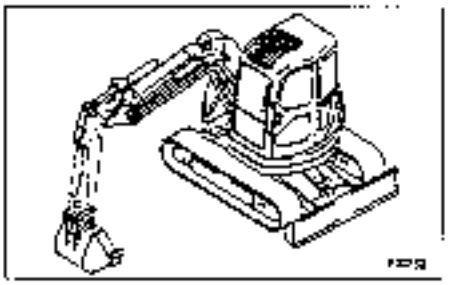
After fitting new parts, be sure to carry out the first inspection after 30 hours of use.

INSPECTION

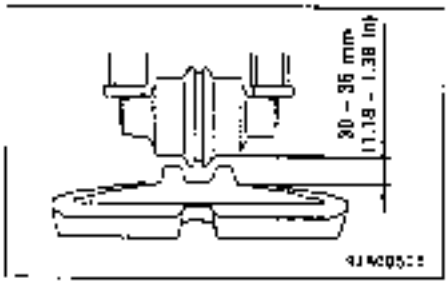
1. Set the connection (M mark) of the rubber shoe at the top midway between the two axles.



2. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.



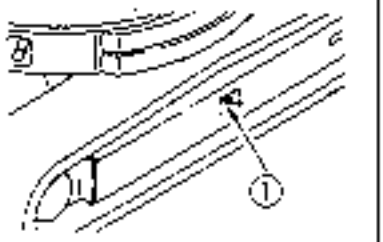
3. The standard tension is a clearance of 30 – 35 mm (1.18 – 1.38 in) between the roller surface of the track shoe and the track roller tread at the 3rd track roller from the sprocket.
   If the track tension is not at the standard value, adjust it in the following manner.
   If the rubber track is loose (if the clearance of the rubber shoes is more than 20 mm (0.79 in)) and the machine is operated, the track may come off, or there will be premature wear of the core.



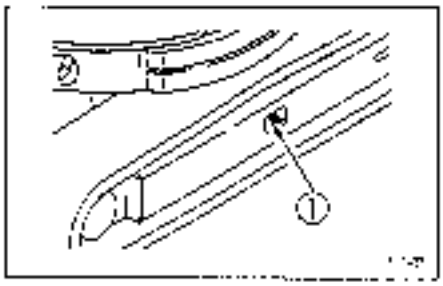
ADJUSTMENT

⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ① under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ① more than one turn. Do not loosen any part other than lubricator ①.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



- **When increasing tension**
- Prepare a grease gun



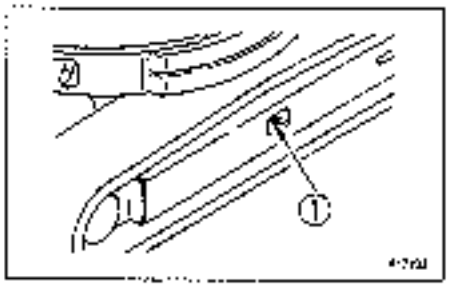
1. Pump in grease through lubricator ① with a grease gun.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. If the tension is yet loose after applying pressurized injection of grease, it is necessary to replace the rubber shoes or seal inside of cylinder. Consult your Komatsu distributor for repair.

- **When loosening tension**

⚠ WARNING

It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Loosen lubricator ① gradually to release the grease.
2. Turn lubricator ① a maximum of one turn.
3. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
4. Tighten lubricator ①.
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.



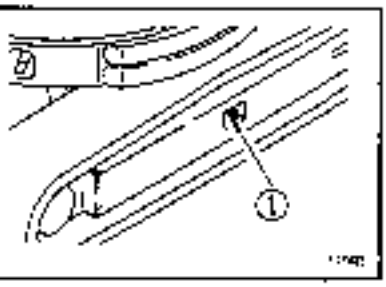
24.2.12 REPLACE RUBBER SHOES (MACHINE EQUIPPED WITH RUBBER SHOES)

⚠ WARNING

Carry out this operation with two workers. The operator must move the machine in accordance with the signals from the other worker. The track is replaced with the chassis raised, so it is extremely dangerous if the machine is lowered by mistake while the track is being replaced. During the replacement operation, operate only the track that is being replaced. Do not operate any other part.

⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ① under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ① more than one turn. Do not loosen any part other than lubricator ①.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



NOTICE

It is possible to replace rubber shoes with steel shoes, but this makes it necessary to remove and adjust the idler cushion, so please contact your Komatsu distributor.

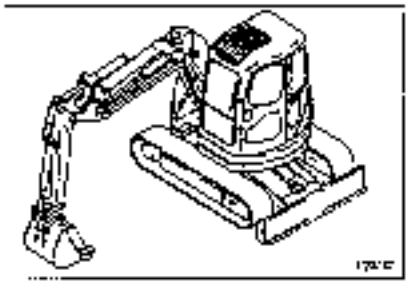
Prepare the following:
- Grease gun
- Steel pipe

REMOVAL OF RUBBER SHOE

⚠ WARNING

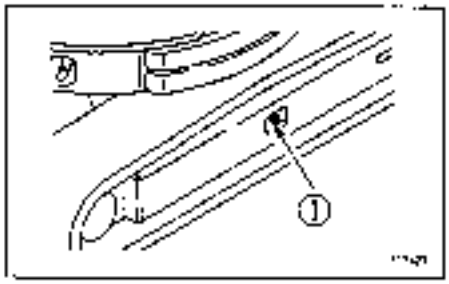
- **It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.**
- **Check that all the grease has been released before rotating the sprocket to remove the rubber shoe.**

1. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.

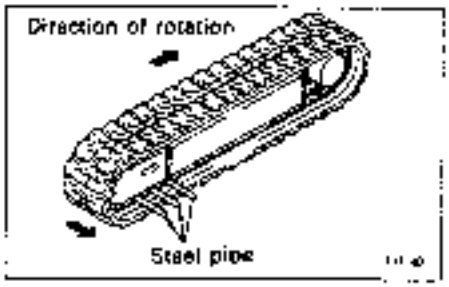


2. Loosen lubricator ① gradually to release the grease.

3. Turn lubricator ① a maximum of one turn.

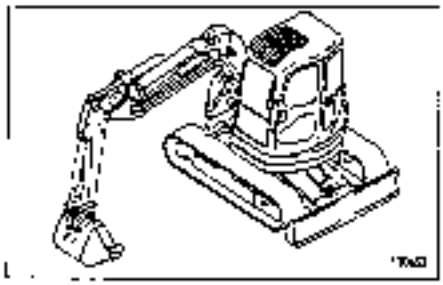


4. Fit the steel pipes inside the rubber shoe, rotate the sprocket in reverse, so that the steel pipes make the rubber shoe come up from the idler, then slide to the side to remove.



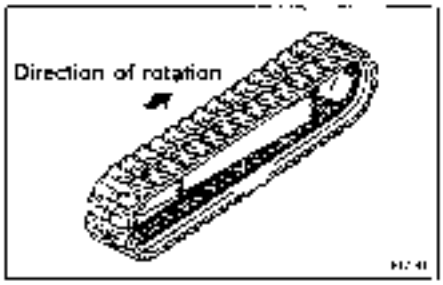
INSTALLATION OF RUBBER SHOE

1. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.

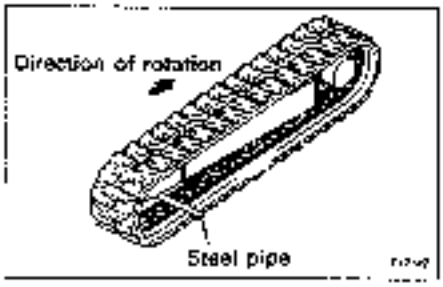


2. Mesh the rubber shoe with the sprocket and fit it over the idler.

3. Rotate the sprocket in reverse, then push in the rubber shoe and stop the rotation.



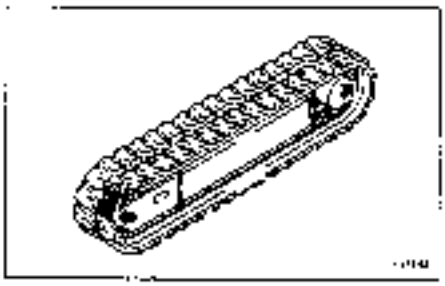
4. Mesh a steel pipe with the rubber shoe, then rotate the sprocket again and fit the rubber shoe securely on the idler.



5. Stop the rotation, and check that the rubber shoe is securely fitted to the sprocket and idler.

6. Adjust the tension of the rubber shoe.
   For details, see "24.2.11 CHECK AND ADJUST TRACK TENSION".

7. Check that the track tension is correct and that the rubber shoe is correctly meshed on the sprocket and idler, then lower the machine to the ground.

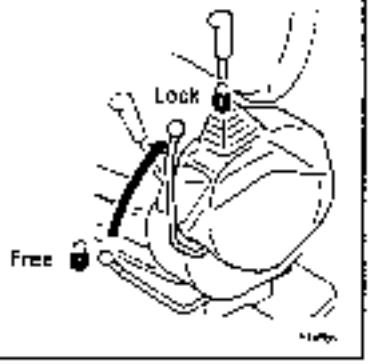


24.2.13 REPLACE BUCKET TEETH (VERTICAL PIN TYPE)

Replace the point before the adapter starts to wear.

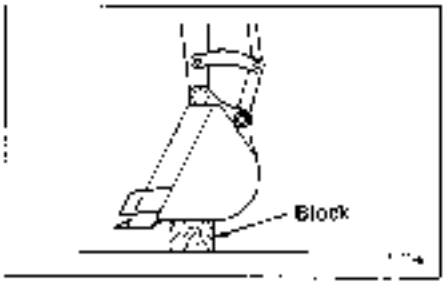
⚠ WARNING

It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the levers.



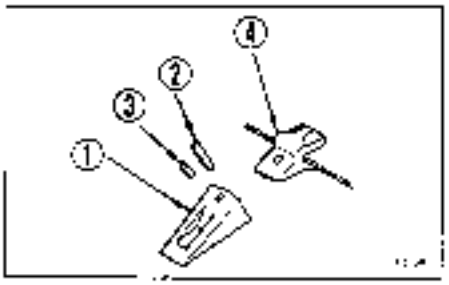
1. Set a block at the bottom of face of the bucket so that it is possible to knock out the pin tooth ①, then stop the engine and operate the control lever fully within 5 to 6 second. Check that the work equipment is stable, then place the lock lever at the LOCK position.

   Set the bucket so that its bottom is horizontal.



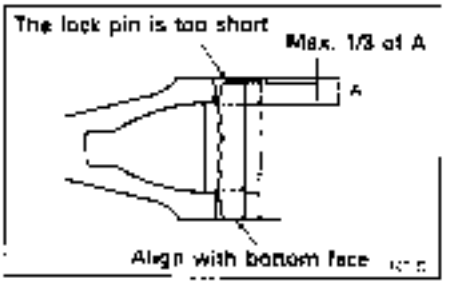
2. Use a hammer and drift to knock out lock pin ② (If the drift is set against rubber pin lock ③ when it is hit, the rubber pin lock may break. Set it against the back of the pin.)

3. After removing lock pin ② and rubber pin lock ③, check them.

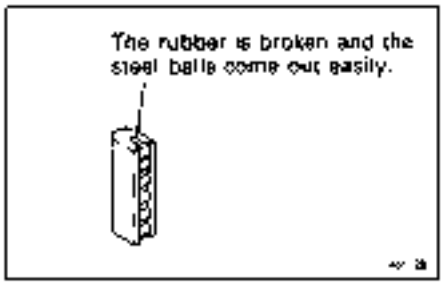


If lock pins and rubber pin locks with the following defects are used, the point may come off the bucket. Replace them with new ones.

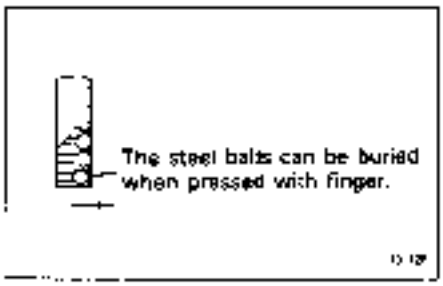
: The lock pin is too short.



- The rubber of the rubber pin lock is torn, and the steel balls may come out.

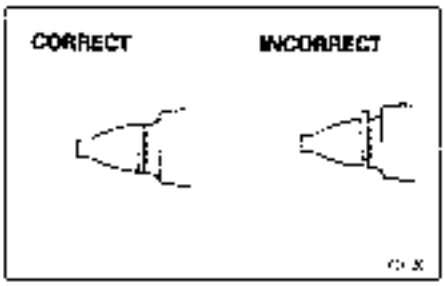


- The steel balls are buried when they are pressed by hand.

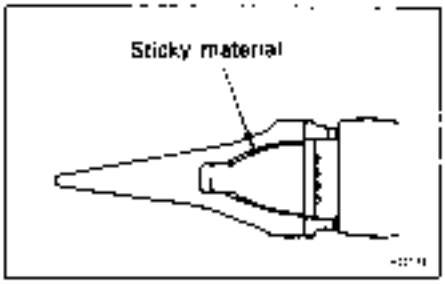


4. Clean the surface of adapter ④ and remove the soil from it with a knife.

5. Use your hand or a hammer to push rubber pin lock ⑤ into the hole of the adapter.
When doing this, be careful that the rubber pin lock does not fly out from the adapter surface.



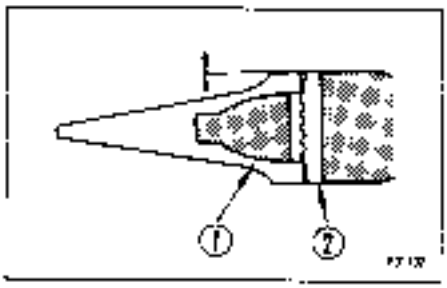
6. Clean the inside of point ①, then install it to adapter ④. If there is mud stuck to it or if there are protrusions, the point will not enter the adapter properly, and there will not be proper contact at the mating portion.



7. Fit point ① to adapter ④, and confirm that when the pointer is pressed strongly, the rear face of the hole for the pin of the point is at the same level as the rear face of the hole for the pin of the adapter.

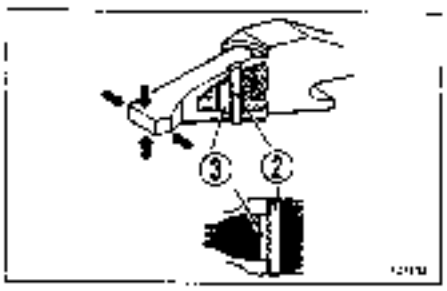
If the rear face of the hole for the pin of point ① is protruding to the front from the rear face of the pin hole for adapter ④, do not try to knock the pin in. There is something preventing point ① from entering adapter ④ fully, so remove the obstruction. When point ① enters adapter ④ fully, knock in lock pin ②.

8. Insert lock pin ② in the hole of the point and hit it until its top is the same level as the surface of point ①.



9. After replacing a bucket tooth, always check the following.
   1) After the lock pin has been knocked in completely, check that it is being secured by the point and surface.
   2) Lightly hit lock pin ② in the reverse direction from which it was hit in.
   3) Lightly hit the tip of the point from above and below, and hit its sides from right and left.

   4) Confirm that rubber pin lock ③ and lock pin ② are set as shown in the figure.



The life of the point can be lengthened and the frequency of its replacement can be reduced by turning it upside down so that it will wear evenly.

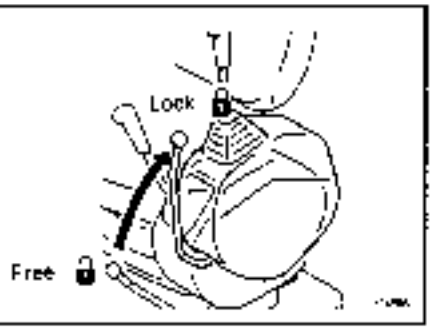
Replace the rubber pin and locking pin with new pins at the same time as replacing the point to prevent the point from falling.

24.2.14 REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE)

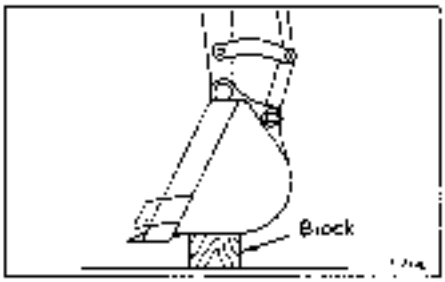
Replace the teeth before the wear reaches the adapter.

⚠ WARNING

It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the levers.



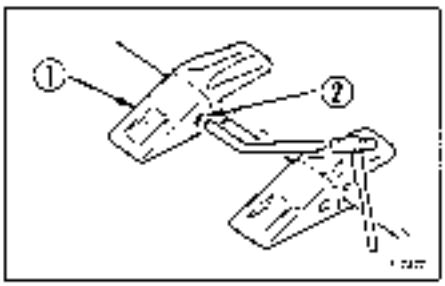
1. Set a block at the bottom face of the bucket so that it is possible to knock out the pin ② of tooth, then check that the work equipment is in a stable condition, and lock the safety lock lever. Set so that the bottom face of the bucket is horizontal.



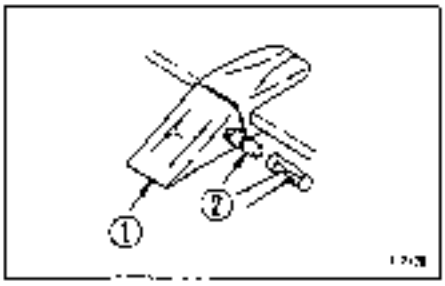
2 Place a bar on the pin head and strike the bar with a hammer to knock out pin ②. Remove tooth ①.

REMARK

Use a round bar with a smaller diameter than that of the pin.



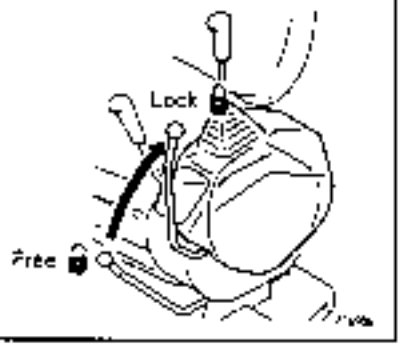
3. Clean the mounting face. Fit a new tooth ① in the adapter, push in pin ② partially by hand, then knock it with a hammer to install the tooth to the bucket.



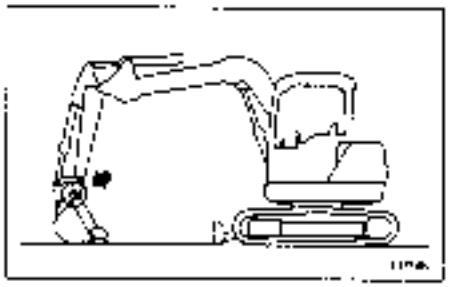
24.2.15 ADJUST BUCKET CLEARANCE

⚠ WARNING

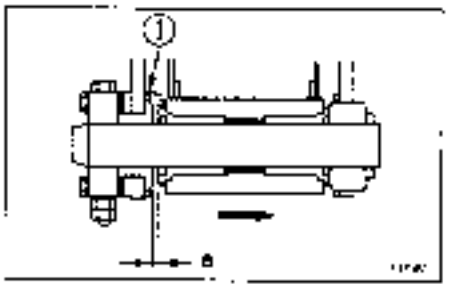
It is dangerous if the work equipment begins moving accidentally when the clearance is being adjusted.
Stabilize the work equipment, stop the engine and lock the lever securely.



1. Set the work equipment to the position shown in the diagram at right, stop the engine and set the lock lever to the locked position.

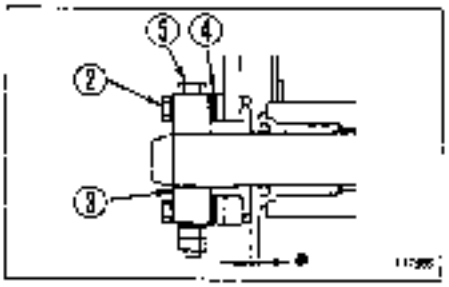


2. Shift O-ring ① of the linkage and measure the amount of play (a).
   Measurement is easier of you move the bucket to one side or the other so all the play can be measured in one place.
   (In the diagram this is on the right hand side).
   Use a gap (clearance) gauge for easy and accurate measurement.



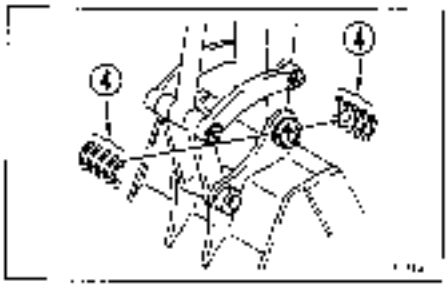
3. Loosen the four plate fixing bolts of ② and loosen plate ③.
   Because it uses split shims, you can carry out the operation without removing the bolts entirely.

4. Remove the shim(s) ④ corresponding to the amount of play (a) measured above.



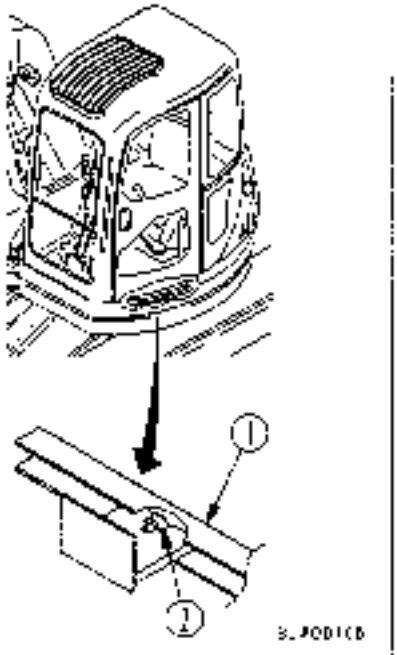
[Example]
If the play is 3 mm (0.12 in), remove 5 sets of 0.5 mm (0.02 in) shims (10 shims), and this will make the play 0.5 mm (0.02 in).
The thickness of shim ④ is 0.5 mm (0.02 in).
Two shims form one set.

If the amount of play (a) is less than the thickness of any shim, no adjustment should be made.



5 Tighten the four bolts ②.
If the bolts ② are too stiff to tighten, pull out pin stopper bolt ⑤ for easier tightening.

24.2.16 INSPECT, CLEAN, GREASE SLIDE DOOR RAIL (MACHINE EQUIPPED WITH CAB)



Inspection

If the slide door is clogged with mud and does not move properly when it is opened or closed, clean and grease rail ① and roller ② of the slide door.

Method of cleaning door rail

1. Open and close the door, and use a brush to remove the dust or dirt from rail ①.
2. Use a cloth or rug to clean rail ①.

Method of greasing door rail and roller

NOTICE

Do not use a high-viscosity oil to lubricate the rail and roller.

1. Spray rail ① and roller ② thoroughly with an oil spray.
2. After spraying with oil, slide the door and check that the door opens and closes smoothly.
   If it does not move smoothly, please contact your Komatsu distributor.

24.3 CHECK BEFORE STARTING

24.3.1 CHECK AND REFILL COOLANT

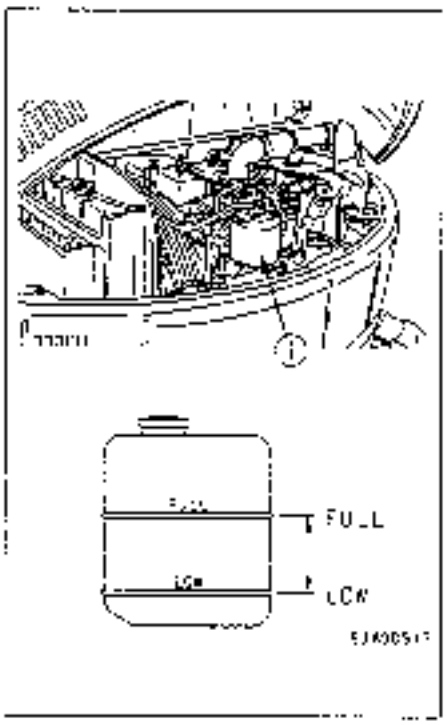
⚠ WARNING

Do not open the radiator cap unless necessary. When checking the coolant, always check the sub-tank when the engine is cold.

1. Open the engine hood and check that the cooling water level is between FULL and LOW on sub-tank ①: (shown in the diagram on the right).
   If the water level is low, add water through the water filler of sub-tank ① to the FULL level.

2. After adding water, tighten the cap securely.

3. If the sub-tank becomes empty, first inspect for water leaks and then fill the radiator and the sub-tank with water.



24.3.2 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Open the engine hood.

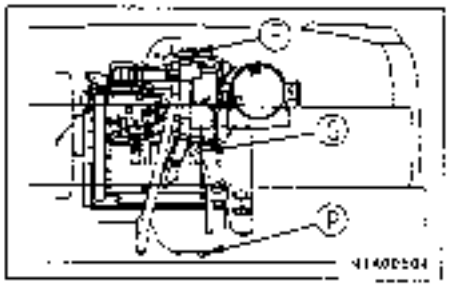
2. Remove dipstick ⑤ and wipe the oil off with a cloth.

3. Insert dipstick ⑤ fully in the oil filler pipe, then take it out again.

4. The oil level should be between the H and L marks on dipstick ⑤.
   If the oil level is below the L mark, add engine oil through oil filler ⑥.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

5. If the oil is above the H mark, drain the excess engine oil from drain plug ⑦, and check the oil level again.

6. If the oil level is correct, tighten the oil filler cap securely and close the engine hood.



REMARK

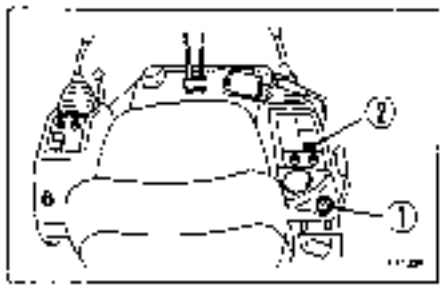
When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.

If the machine is at an angle, make it horizontal before checking.

24.3.3 CHECK FUEL LEVEL

⚠ WARNING

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

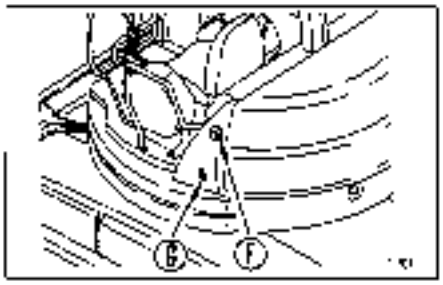


1. Insert the key in starting switch ①, and turn it to the ON position to light up the monitor.

2. Check the fuel level on fuel gauge ②. If the fuel level is low, add fuel through fuel filler port Ⓕ and check the level on sight gauge Ⓖ.

   Fuel capacity: 80 ℓ (21.1 US gal, 17.6 UK gal)

   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



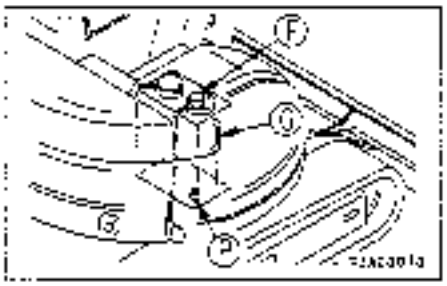
3. After adding fuel, tighten the cap securely.

24.3.4 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

When removing the oil filler cap, oil may spurt out, so turn the cap slowly to release the internal pressure before removing the cap.

1. If the work equipment is not in the condition shown in the diagram on the right, run the engine at low speed, lower the blade to the ground, retract the arm and bucket cylinders, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.

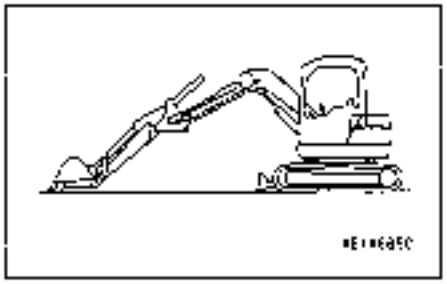


2. Check that the oil level is between H and L line on sight gauge G.

NOTICE

Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.

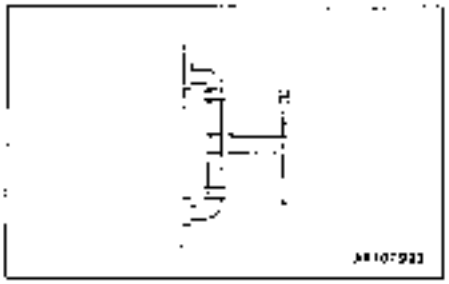
3. If the level is below the L mark, remove the upper cover of the hydraulic tank on the right side of the machine, add oil through oil filler F.



For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

⚠ WARNING

If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug P.

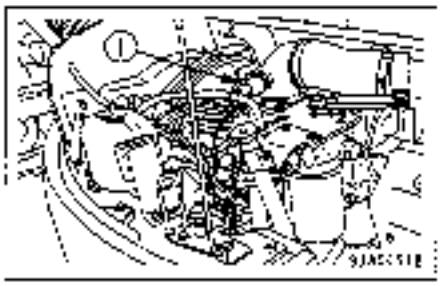


REMARK

The oil level will vary depending upon the oil temperature. Accordingly, use the following as a guide:

- When the oil temperature is close to the ambient temperature (10 to 30°C (50 to 86°F)), the level will be close to bottom line L on the sight gauge.
- When the oil temperature is the normal operating temperature (50 to 80°C (122 to 176°F)), the level will be close to top line H on the sight gauge.

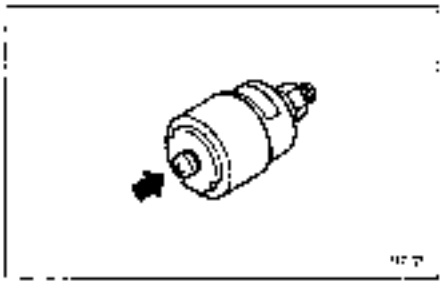
24.3.5 CHECK DUST INDICATOR



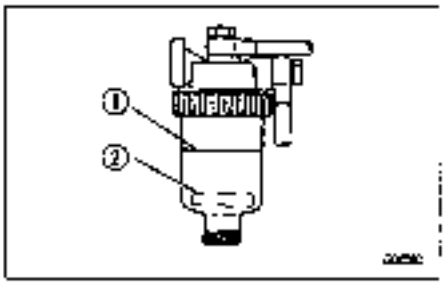
1. Open the engine hood and check that the red piston is not showing in dust indicator ①.

2. If the red piston is showing, clean or replace the element immediately. For details of the method of cleaning the element, see "24.2.1 CHECK, CLEAN, REPLACE AIR CLEANER".

3. After checking, cleaning, or replacing, press the knob of dust indicator ① to reset the red piston to its original position.



24.3.6 CHECK WATER SEPARATOR



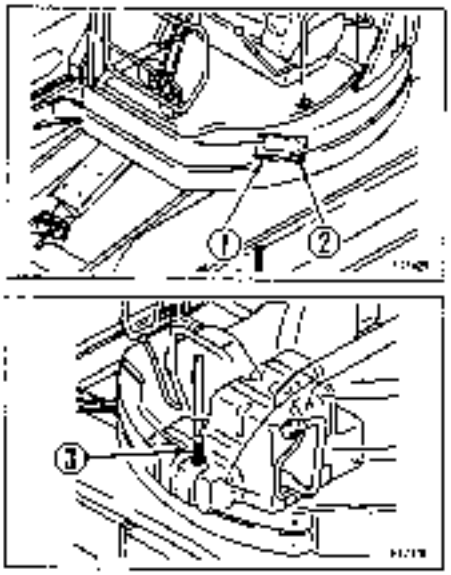
The water separator separates water mixed in the fuel. If float ② is at or above red line ①, drain the water. For the draining procedure, see section "WHEN REQUIRED".

Even if a water separator is installed, be sure to check the fuel tank to remove water and sediment in the fuel.

For details, see "24.2 WHEN REQUIRED".

24.4 EVERY 50 HOURS SERVICE

24.4.1 DRAIN WATER AND SEDIMENT FROM FUEL TANK



1. Carry out this procedure before operating the machine.
2. Prepare a container to catch the fuel that is drained.
3. Loosen bolts ② (2 bolts) and open cover ① under the body.
4. Open valve ③ at the bottom of the tank and drain the sediment and water that has accumulated at the bottom together with fuel. When doing this, be careful not to get fuel on yourself.
5. When only clean fuel comes out, close drain valve ③.

NOTICE

Never use trichlene for washing the inside of the tank.

24.5 EVERY 100 HOURS SERVICE

Maintenance for the every 50 hours service should be carried out at the same time.

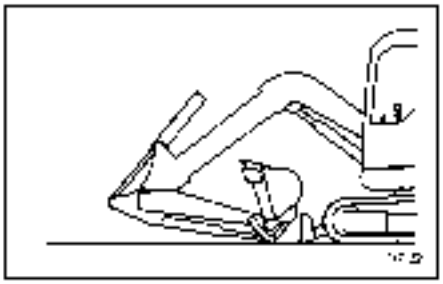
24.5.1 LUBRICATING

- Prepare a grease gun.

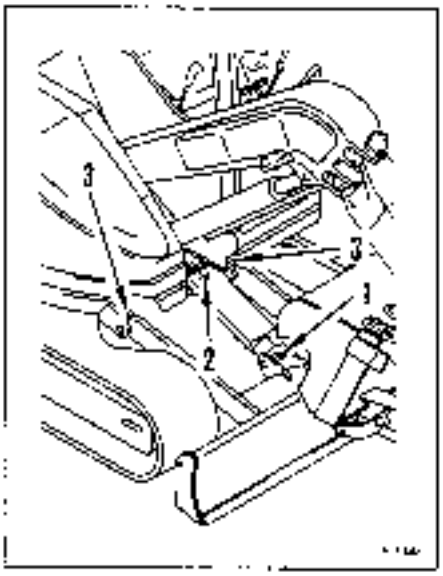
1. Set the work equipment in the greasing posture on the right, then lower the work equipment to the ground and stop the engine.

2. Using a grease gun, pump in grease through the grease fittings shown by arrows

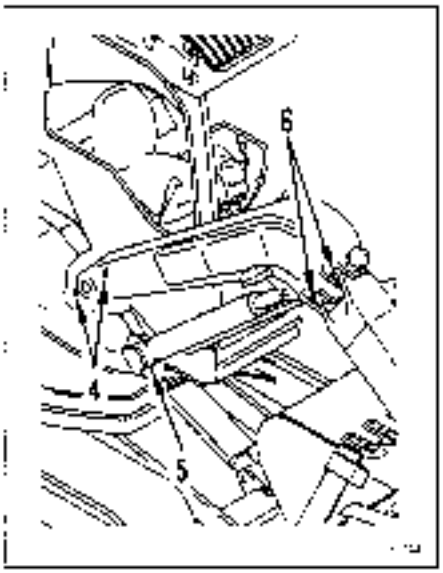
3. After greasing, wipe off any old grease that was pushed out.



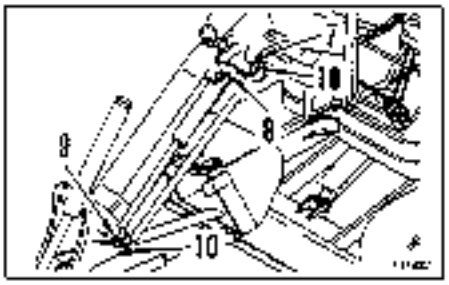
1. Blade cylinder foot pin (1 point)
2. Blade cylinder rod end pin (1 point)
3. Blade foot pin (2 points)



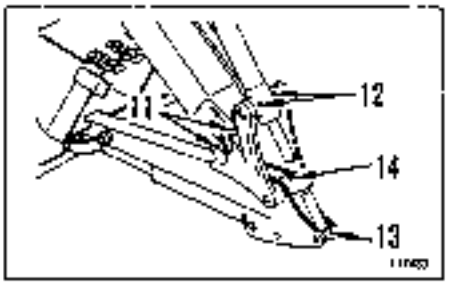
4. First boom foot pin (2 points)
5. Boom cylinder foot pin (1 point)
6. First boom - Second boom coupling pin (2 points)



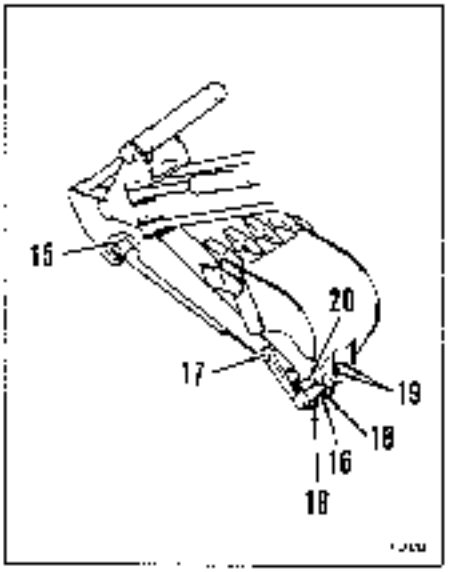
7. Boom cylinder rod end pin (1 point)
8. Offset cylinder foot pin (1 point)
9. Offset cylinder rod end pin (1 point)
10. Sub-link coupling pin (2 points)



11. Second boom – Third bracket coupling pin (2 points)
12. Arm cylinder foot pin (2 points)
13. Arm cylinder rod end pin (1 point)
14. Third bracket – Arm coupling pin (1 point)



15. Bucket cylinder foot pin (1 point)
16. Bucket cylinder rod end pin (1 point)
17. Arm-Link coupling pin (1 point)
18. Link coupling pin (2 points)
19. Bucket-Link coupling pin (2 points)
20. Arm-Bucket coupling pin (1 point)



4. After greasing, raise the boom to maximum and grease to the first boom foot pin (2 points) again.

24.6 EVERY 250 HOURS SERVICE

Maintenance for the every 50 and 100 hours service should be carried out at the same time.

24.6.1 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

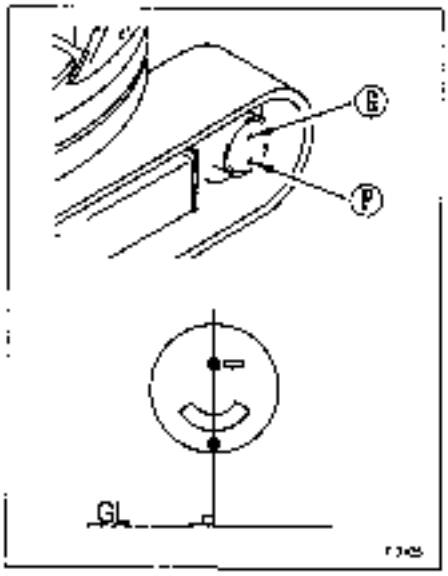
⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out.**
  Loosen the plug slowly to release the pressure.

Prepare the following.
- Container to catch drained oil
- Hexagon wrench

1. Set plug Ⓖ at the top, with plug Ⓖ and plug Ⓟ perpendicular to the ground surface.
2. Set a container under plug Ⓟ to catch the oil.
3. Using the hexagon wrench, remove plug Ⓖ, and check that the oil level is near the bottom of the plug hole.
4. If the oil level is low, use the hexagon wrench to remove plug Ⓖ, then add oil through the hole of plug Ⓖ.
   Add engine oil until the oil flows out from plug hole Ⓖ.

   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. After checking, install plug Ⓖ.



24.6.2 CHECK, ADJUST FAN BELT TENSION

A special tool is needed to check or replace the fan belt. Please contact your Komatsu distributor to have the check and replacement carried out.

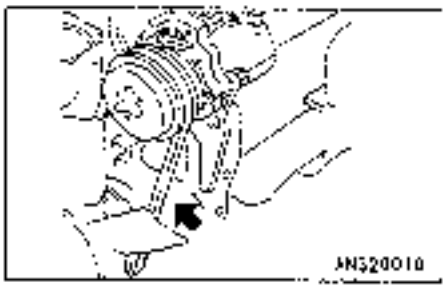
REMARK

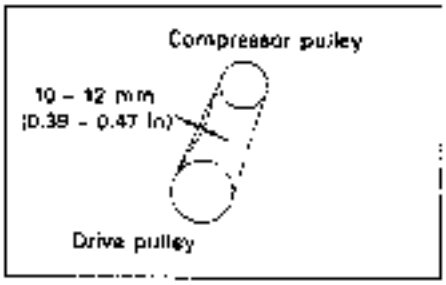
An auto-tensioner is installed, so there is no need to adjust the tension.

24.6.3 CHECK, ADJUST CAR COOLER COMPRESSOR BELT TENSION (ONLY MACHINES EQUIPPED WITH CAR COOLER)

Inspection

Check that the deflection is 10 – 12 mm (0.39 – 0.47 in) when pressed with a finger (approx. 58.8 N (6 kgf)) at the mid point between the drive pulley and compressor pulley.

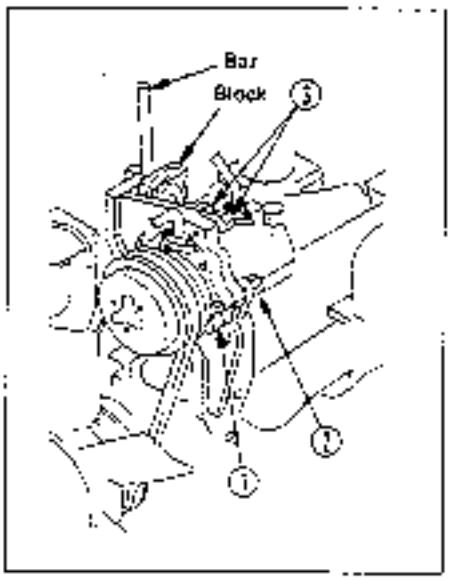




Adjustment

- Prepare a bar.
- Prepare a wooden block.

1. Insert a bar between compressor ① and the bracket to hold compressor ① in position. When doing this, put a wooden block between the bar and compressor ① to prevent damage to compressor ①.
2. Loosen bolts ② and ③.
3. Move compressor ① so that the deflection of the belt is approx. 10 – 12 mm (0.39 – 0.47 in) (approx. 58.8 N (6 kgf)).
4. Tighten bolts ② and ③ to hold compressor ① in position.
5. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. Be particularly careful to check that the V-belt is not contacting the bottom of the V-groove.
6. If the V-belt is elongated and there is no allowance for adjustment, or if it is cut or cracked, replace the V-belt.
7. After replacing the V-belt, adjust the tension again after operating for one hour.



24.7 EVERY 500 HOURS SERVICE

Maintenance for every 50, 100 and 250 hours service should be carried out at the same time.

24.7.1 REPLACE FUEL FILTER CARTRIDGE

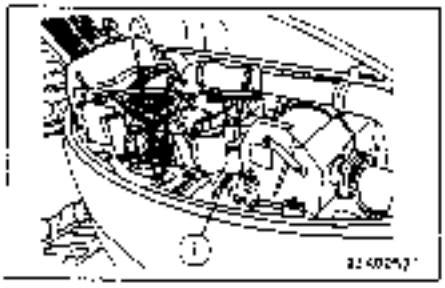
⚠ WARNING

- **Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

Prepare the following.
- Filter wrench for fuel filter element
- Container to catch drained oil

1. Set the container to catch the fuel under the filter element.

2. Using a filter wrench, turn filter cartridge ① counterclockwise to remove it.



3. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.

4. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 2/3 of a turn.

   If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filteer cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

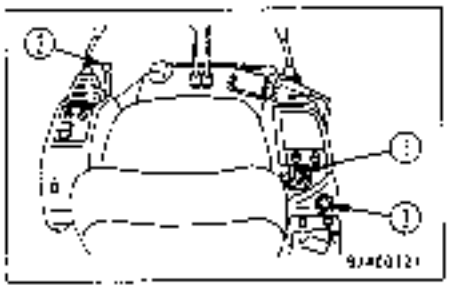
5. Set the fuel control lever to the low idling position.

6. After replacing the fuel filter element bleed the air.

PROCEDURE FOR BLEEDING AIR

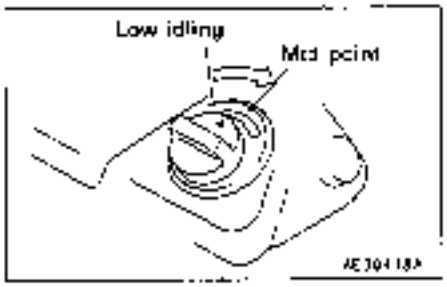
⚠ WARNING

The engine will start, so check carefully that the area around the engine is safe before starting to crank it.

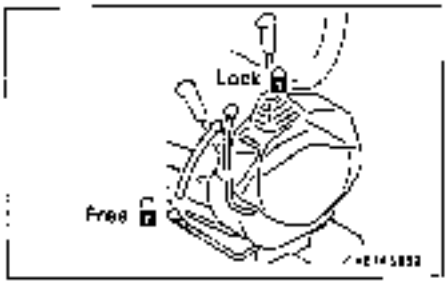


It is possible to bleed the air from the fuel circuit simply by using the starting switch to turn the starting motor.
Bleed the air as follows.

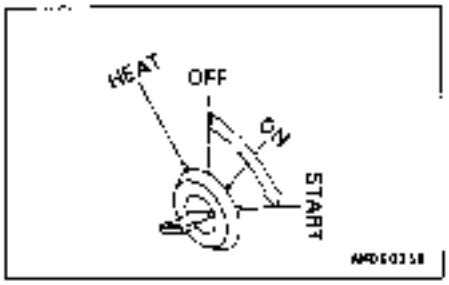
1) After replacing the filter cartridge, turn fuel control dial ① to a point midway between low idling and FULL.



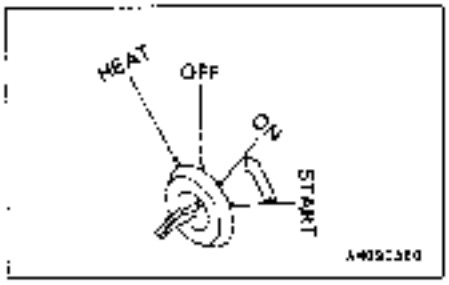
2) Set safety lock lever ② of the steering, directional, and speed lever to the LOCK position.



3) Turn the key in starting switch ③ to the START position and hold for 20 seconds.
When doing this, the starting motor will turn for approx. 2 seconds and then stop, but the electric pump for bleeding the air will continue to be actuated to bleed the air.
Keep the key in the starting switch at the START position for 20 seconds regardless of whether the engine turns or not.



4) Return the key in starting switch ③ to the ON position and leave for 30 seconds.



7. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. Whenever there is leakage of fuel, follow Steps 1 and 2 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the packing with a new part, then repeat Steps 3 – 7 to install the filter cartridge.

24.7.2 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

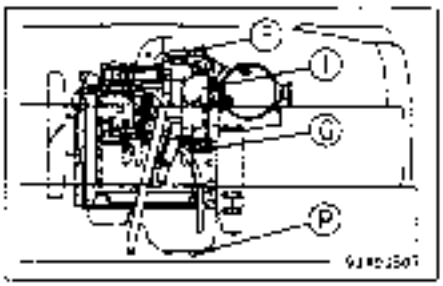
⚠ WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

Prepare the following.
- Container to catch drained oil: Min 13 ℓ (3.4 US gal, 2.9 UK gal) capacity
- Refill capacity: 13 ℓ (3.4 US gal, 2.9 UK gal)
- Filter wrench for engine oil filter cartridge

1. Set a container to catch the oil immediately under the drain plug at the bottom of the machine.

2. Remove drain plug (P) slowly to avoid getting oil on yourself, and drain the oil.



3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.

4. Install drain plug (P).

5. Using a filter wrench, turn filter cartridge (I) counterclockwise to remove it.
   In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.

6. Clean the filter holder, coat the packing surface of a new filter cartridge with engine oil (or coat it thinly with grease), then install it to the filter holder.

7. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 of a turn.

8. After replacing the filter cartridge, add engine oil through oil filler Ⓔ until the oil level is between the H and L marks on the dipstick Ⓖ.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

9. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "24.3 CHECK BEFORE STARTING".

NOTICE

Even if the machine has not been operated for 500 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

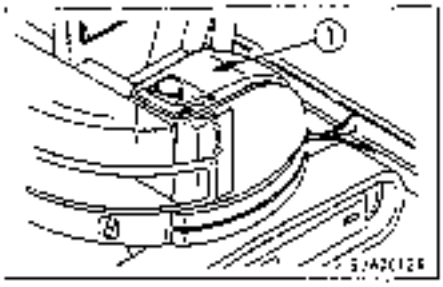
In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 500 hours.

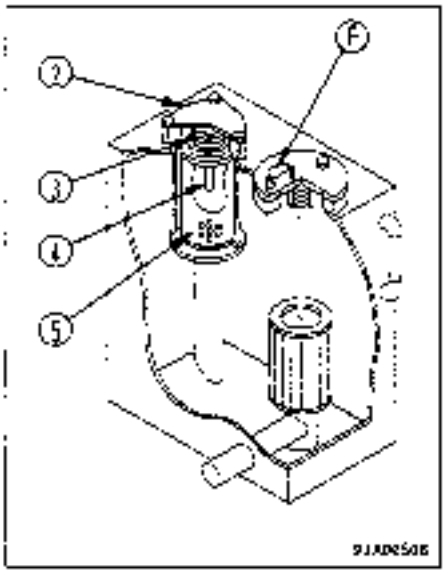
24.7.3 REPLACE HYDRAULIC FILTER ELEMENT

⚠ WARNING

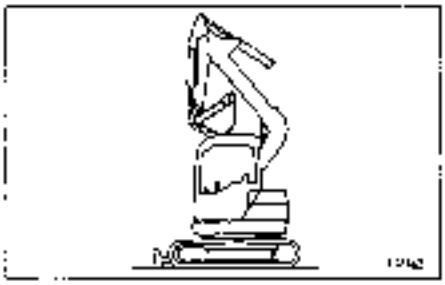
When removing the oil filler cap, turn it slowly to release the internal pressure before removing it.

1. Remove cover ① at the right side of the machine.
2. Remove the cap from oil filler Ⓕ, and release the internal pressure.
3. Loosen 3 bolts, then remove cover ②. When doing this, the cover may fly out under, the force of spring ⑤, so hold the cover down when removing the bolts.
4. After removing spring ③ and valve ④, take out element ⑤.
5. Clean the removed parts in diesel oil.
6. Install the new element in the place where old element ⑤ was installed.
7. Set valve ④ and spring ③ on top of the element.
8. Set cover ② in position, push it down by hand, and install the cover with the mounting bolts.



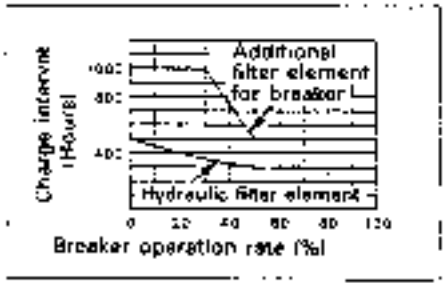


9. Pressurize hydraulic tank
   Extend the boom, arm, and bucket cylinders fully as shown in the diagram on the right, remove the oil filler cap, then install the cap and pressurize the inside of the tank.
10. Install cover ①.



If a hydraulic breaker is installed, the hydraulic oil deteriorates far more rapidly than when carrying out normal bucket operations, so set the maintenance interval as follows.

On new machines, replace after the first 100 - 150 hours, and after that, replace the element at the interval shown in the graph on the right.



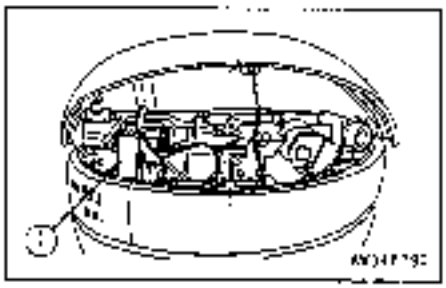
24.7.4 CLEAN, CHECK RADIATOR FINS

⚠ WARNING

If compressed air, steam, or water hit your body directly, there is danger of injury. Always wear protective glasses, mask, and safety shoes.

1. Open the engine food.

2. Use compressed air to blow off the mud, dirt, or leaves clogging radiator fins ①.

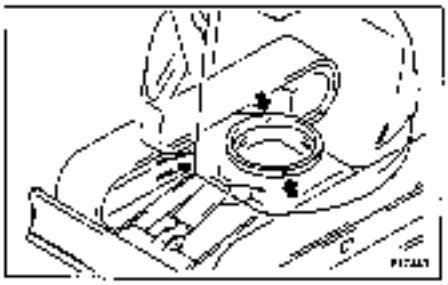


NOTICE

To prevent damage to the fins when using compressed air, do not bring the jet close to the radiator fins.
If the fins are damaged, this will lead to water leakage or overheating.

24.7.5 LUBRICATE SWING CIRCLE (2 points)

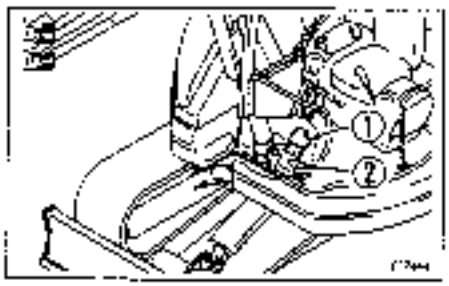
Using grease pump, pump in grease through the grease fittings shown by arrows.



24.7.6 CHECK SWING PINION GREASE LEVEL, ADD GREASE

- Prepare a scale.

1. Remove cover ② and remove the bolts (2 bolts) on the front of the revolving frame and remove cover ②.



2. Insert a scale into the grease and check that the height of the grease.

3. Check if the grease is milky white. If it is milky white, it is necessary to change the grease. Please contact your Komatsu distributor.

The total amount of grease is 5.5 ℓ (5.0 kg) (1.5 US gal, 1.2 UK gal [11.0 lb]).

4. Install cover ② with bolts ①.

24.8 EVERY 1000 HOURS SERVICE

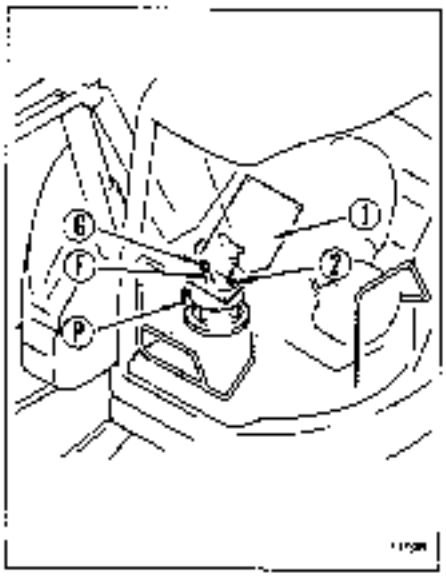
Maintenance for every 50, 100, 250 and 500 hours service should be carried out at the same time.

24.8.1 CHANGE OIL IN SWING MACHINERY CASE

⚠ WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

Prepare the following.
- Container to catch drained oil: Min. 1.6 ℓ (0.42 US gal, 0.35 UK gal) capacity
- Refill capacity: 1.6 ℓ (0.42 US gal, 0.35 UK gal)



1. Set a container to catch the oil under drain plug (P) at the bottom of the machine.
2. Remove drain plug (P) under the chassis, drain the oil, then tighten the plug again.

   Tightening torque of drain plug (P): 44.1 – 93.1 Nm (4.5 – 9.5 kgm, 32.5 – 68.7 lbft)
3. Remove cover (1) on the right side of the machine, then remove dipstick (G) and bleeding plug (6). Add the specified amount of engine oil through gauge hole (F).
4. Wipe off oil on the dipstick with a cloth.
5. Insert dipstick (G) into the gauge pipe thoroughly and then pull out it again.
6. When the oil level is between the H and L marks, on dipstick (G), it is normal. If the oil does not reach the L mark, add more oil through oil filler (F).

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

7. If the oil level exceeds the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.

REMARK

When checking the oil level after the engine has been operated, for at least 15 minutes after stopping the engine before checking.

If the machine is at angle, make it horizontal before checking.

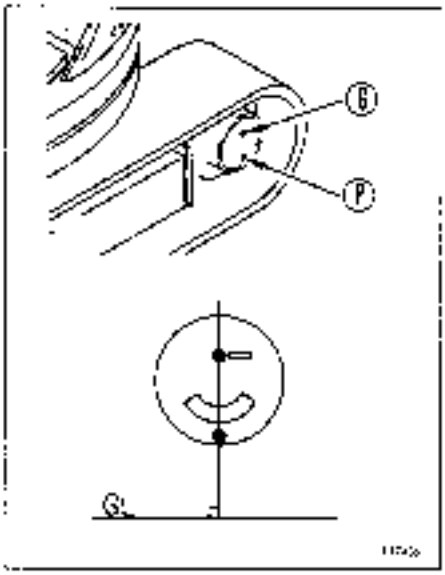
24.8.2 CHANGE OIL IN FINAL DRIVE CASE

⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out.**
  Loosen the plug slowly to release the pressure.

Prepare the following.
- Container to catch drained oil: Min. 1.7 ℓ (0.45 US gal, 0.37 UK gal) capacity
- Refill capacity: 1.7 ℓ (0.45 US gal, 0.37 UK gal)
- Hexagon wrench

1. Set plug ⑤ at the top, with plug ④ and plug ⑥ perpendicular to the ground surface.
2. Set a container under plug ⑥ to catch the oil.
3. Using the hexagon wrench, remove plugs ⑥ and ④, and drain the oil.
4. Tighten plug ⑥.
5. Refill the specified quantity of engine oil through oil filler ⑤. For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
6. When oil comes out from the hole of plug ④, install plug ④.



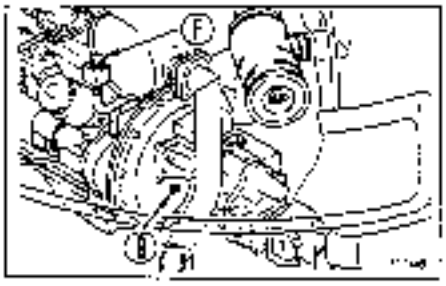
24.9 EVERY 2000 HOURS SERVICE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

24.9.1 CHECK OIL LEVEL IN PTO GEAR CASE, ADD OIL

⚠ WARNING

Immediately after operations, the oil is at a high temperature. Wait for the temperature to go down before starting this operation.



1. Remove plug ⓖ and check that the oil level is close to the bottom edge of the plug hole. If the oil level is low, remove breather ⓕ, and add oil through the hole of breather until it reaches the bottom of the hole of plug.

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

2. Install plug ⓖ.

24.9.2 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

24.9.3 CHECK ENGINE VALVE CLEARANCE, ADJUST

Contact your Komatsu distributor for inspection or adjustment.

24.10 EVERY 4000 HOURS SERVICE

Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

24.10.1 CHECK WATER PUMP

Check that there is oil leakage, water leakage, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.

24.11 EVERY 5000 HOURS SERVICE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

24.11.1 CHANGE OIL IN HYDRAULIC TANK, CLEAN STRAINER

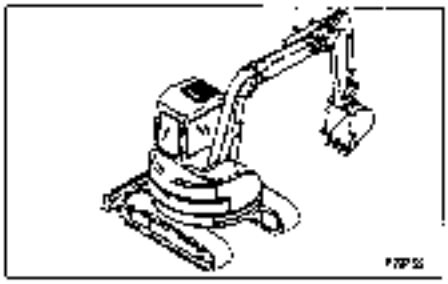
⚠ WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

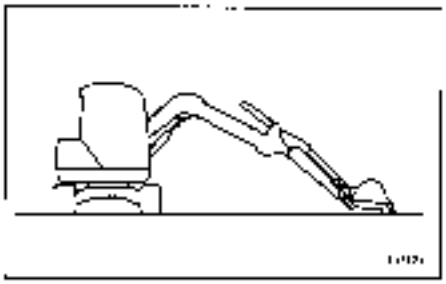
Prepare the followings.

- Container to catch drained oil: Min. 57 ℓ (15.0 US gal, 12.5 UK gal) capacity
- Refill capacity: 57 ℓ (15.0 US gal, 12.5 UK gal)
- Handle

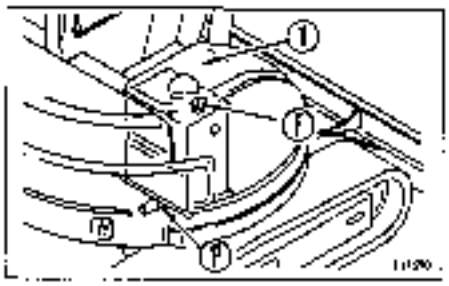
1. Swing the upper structure so that the drain plug under the hydraulic tank is between the left and right tracks.



2. Retract the arm and bucket cylinder to the stroke end, then lower the boom and put the bucket teeth in contact with the ground.
3. Lower the blade to the ground and stop the engine.



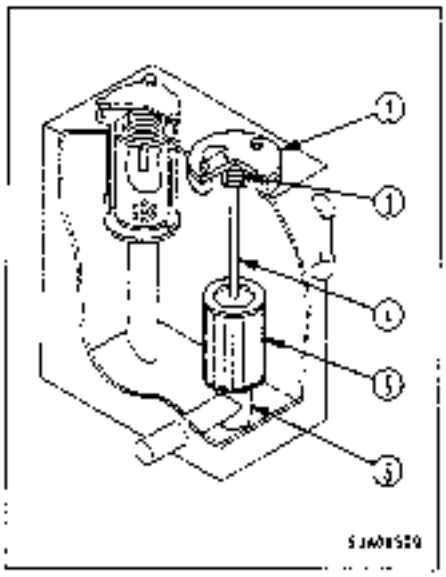
4. Remove cover (F) on the right side of the machine, then remove the cap of oil filler port (F).



5. Set the oil container under the drain plug under the machine. Using the handle, remove drain plug Ⓟ and drain the oil. Check the O-ring installed to plug Ⓟ, and if it is damaged, replace the O-ring. After draining the oil, tighten drain plug Ⓟ.

   Tightening torque: 68.6 ± 9.8 Nm (7 ± 1 kgm, 50.6 ± 7.2 lbft)

   When removing drain plug Ⓟ, be careful not to get oil on yourself.



6. Loosen bolt, remove flange, then remove strainer ⑤.

7. Loosen 4 bolts and remove cover ②. When doing this, the cover may fly off under the force of spring ③, so hold the cover down while removing the bolts.

8. Pull the top of rod ① up from the top, and remove spring ③ and strainer ⑤.

9. Remove any dirt stuck to strainer ⑤, then wash in clean diesel oil or flushing oil. If strainer ⑤ is damaged, replace it with a new part.

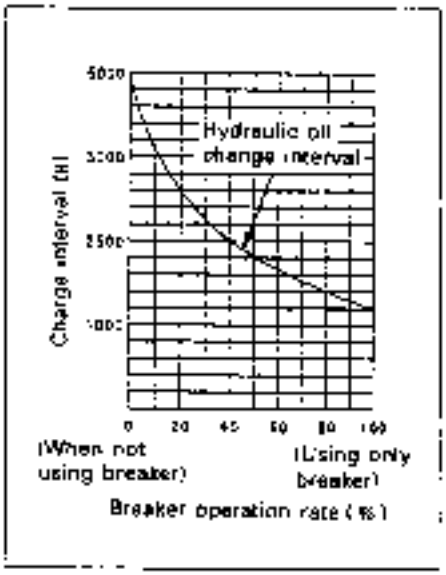
10. When installing, insert strainer ⑤ into protrusion ⑥ of the tank to assemble it.

11. Install cover ② with the bolts.
    Check the O-ring fitted to cover ②, and if it is scratched or damaged, replace it with a new O-ring.

12. Add oil engine through oil filler port (F) to the specified level. Check that the oil is between the H and L marks on the sight gauge.

NOTICE

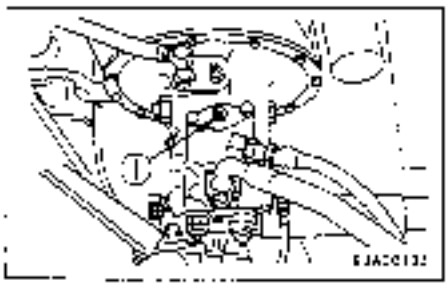
- **For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE.**
- **If a hydraulic breaker is installed, the deterioration of the hydraulic oil occurs more rapidly than with normal digging operations using a bucket, so change the oil at the intervals shown in the table on the right.**



13. After replacing or washing the hydraulic oil, filter element, and strainer, bleed the air from the circuit as follows.

PROCEDURE FOR BLEEDING AIR

Bleed the air as follows.



BLEEDING AIR FROM PUMP

NOTICE

If the pump is operated without filling the pump case with hydraulic oil, there will be abnormal generation of heat and this will lead to premature damage to the pump.

1. Loosen air bleed plug ① installed to the drain port, and check that oil oozes out (completion of air bleeding).
2. After completely bleeding the air, tighten the air bleed plug.

STARTING ENGINE

Start the engine. For details, see "12.2 STARTING ENGINE".

Run the engine at low idling for 10 minutes, then do as follows.

BLEEDING AIR FROM CYLINDER

NOTICE

If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder will damage the piston packing.

1. Run the engine at low idling and operate each cylinder 4 - 5 times to a point approx. 100 mm before the end of its stroke.
2. Next, operate each cylinder 3 – 4 times to the end of its stroke.
3. Finally, operate each cylinder 4 – 5 times to the end of its stroke to complete the air bleeding operation.

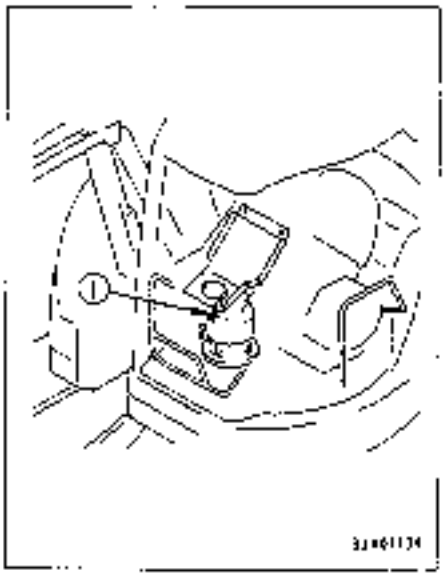
BLEEDING AIR FROM SWING MOTOR

(Carry out this operation only if the oil has been drained from the swing motor case.)

NOTICE

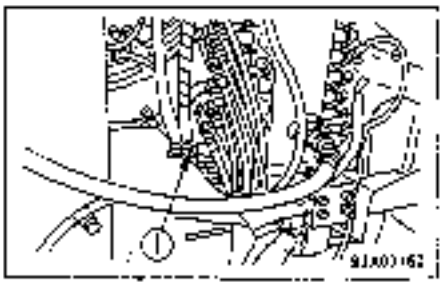
- **If the air is not bled from the swing motor, the motor bearing may be damaged.**
- **Do not operate the swing when carrying out Step 1.**

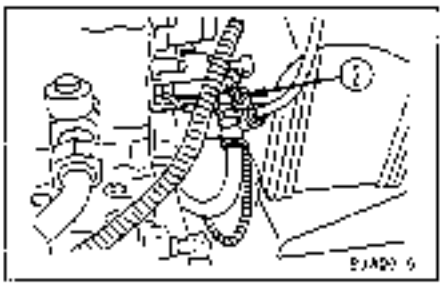
1. Run the engine at low idling, loosen air bleed plug ①, and check that oil oozes out from air bleed plug ①.
2. If oil does not ooze out, stop the engine, remove air bleed plug ①, and fill the inside of the motor case with hydraulic oil.
3. After completing the air bleeding operation, tighten air bleed plug ①.
4. Run the engine at low idling and swing it slowly and uniformly at least 2 times to the left and right.



BLEEDING AIR FROM SWING PPC CIRCUIT

1. Bleed the air from air bleed plugs ① and ② installed to the main valves inside the cover on the right side of the chassis.

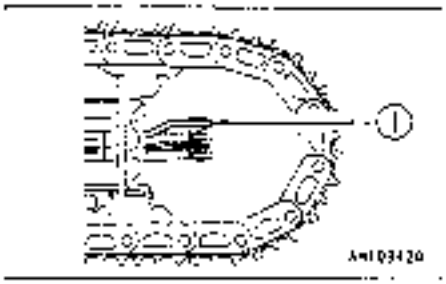


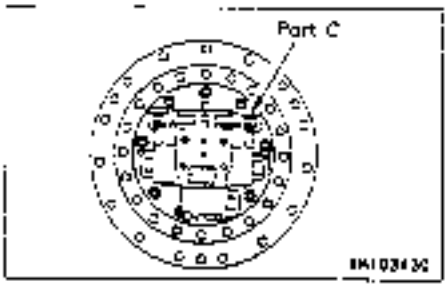


BLEEDING AIR FROM TRAVEL MOTOR

(Carry out this operation only if the oil has been drained from the travel motor case.)

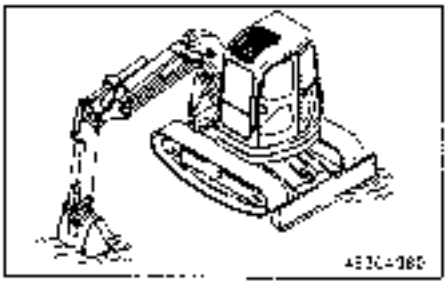
1. Run the engine at low idling, remove hose (1) from port C, then tighten it again when oil flows out.





2. Keep the engine running at low idling and swing the upper structure to set the work equipment at the side of the track shoe.

3. Push up the chassis slowly to raise the track shoe slightly off the ground, then run the track under no load for 2 minutes. Repeat this operation on both the left and right sides.
   When rotating the track under no load, rotate it uniformly in the forward and reverse directions.



BLEEDING AIR FROM ATTACHMENT
(When installed)

NOTICE

If the maker of the attachment specifies the procedure for bleeding the air, bleed the air according to the specified procedure. If a breaker or other attachment is installed, run the engine at low idling and operate the attachment pedal repeatedly (approx. 10 times) to bleed the air until the air is completely bled from the attachment and circuit.

Operation

1. After bleeding the air completely, stop the engine, then leave for 5 minutes before starting operations. This will release the bubbles in the oil inside the tank.
2. Check that there is no leakage of oil. If any oil has been spilled, wipe it up.

SPECIFICATIONS

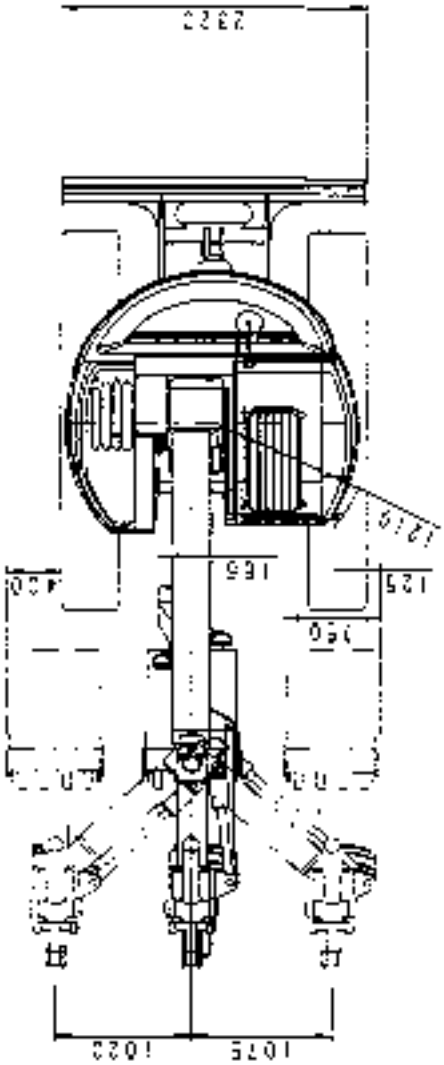
25. SPECIFICATIONS

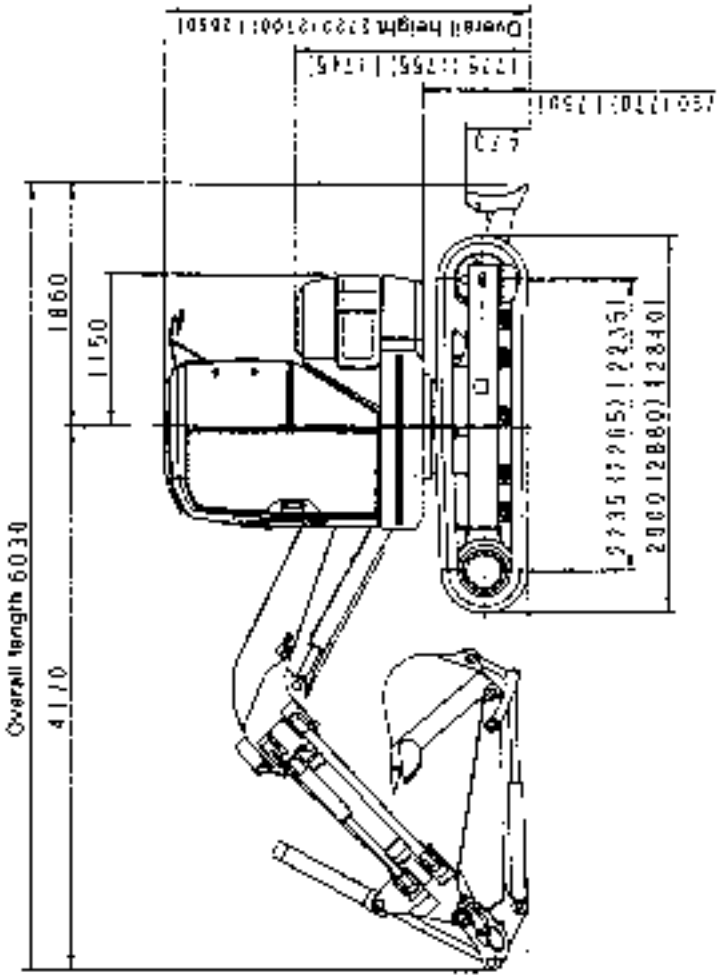
PC75UU-3

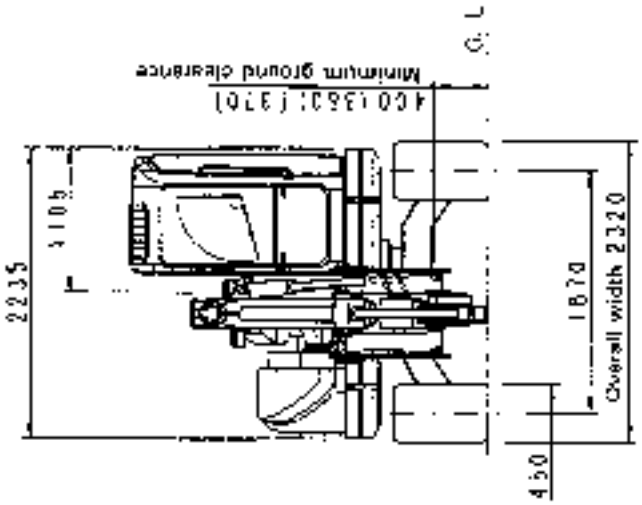
		Machine equipped with load liner	Machine equipped with rubber shoe	Machine equipped with steel shoe
WEIGHT				
• Operating weight (without operator)	Machine equipped with cab	7,625 kg (16,813 lb)	7,460 kg (16,449 lb)	7,610 kg (16,560 lb)
	Machine equipped with canopy	7,475 kg (16,482 lb)	7,310 kg (16,118 lb)	7,360 kg (16,229 lb)
PERFORMANCE				
• Bucket capacity (standard bucket)		0.28 m³ (0.37 cu.yd)		
• Width of opening	(Standard bucket)	650 mm (25.6 in)		
	(With side cutter)	750 mm (29.6 in)		
• Travel speed	(Low speed)	2.6 km/h (1.6 MPH)	2.8 km/h (1.8 MPH)	2.6 km/h (1.6 MPH)
	(High speed)	3.7 km/h (2.3 MPH)	4.0 km/h (2.5 MPH)	3.7 km/h (2.3 MPH)
• Swing speed		10.0 rpm		
TRACK SHOE				
• Road liner (standard)		Road liner 450 mm (17.7 in)	Rubber shoe 450 mm (17.7 in)	Triple grouser shoe 460 mm (17.7 in)
ENGINE				
• Model		Komatsu 4D102E-1 diesel engine		
• Flywheel horsepower		40.5 kW (54 HP)/1,750 rpm		
• Starting motor		24 V 4.5 kW		
• Alternator		24 V 25 A		
• Battery		12 V 70 Ah x 2 pieces (75D31R)		

Cab: road liner specification machine
Cab: rubber shoe specification machine
Cab: steel shoe specification machine

The values not in parentheses are the values for the road liner specification machine.
The values inside ( ) are the values for the rubber shoe specification machine.
The values inside [ ] are the values for the steel shoe specification machine.
The dimensions where there is no distinction using ( ) or [ ] are the same values as for the road liner specification machine.

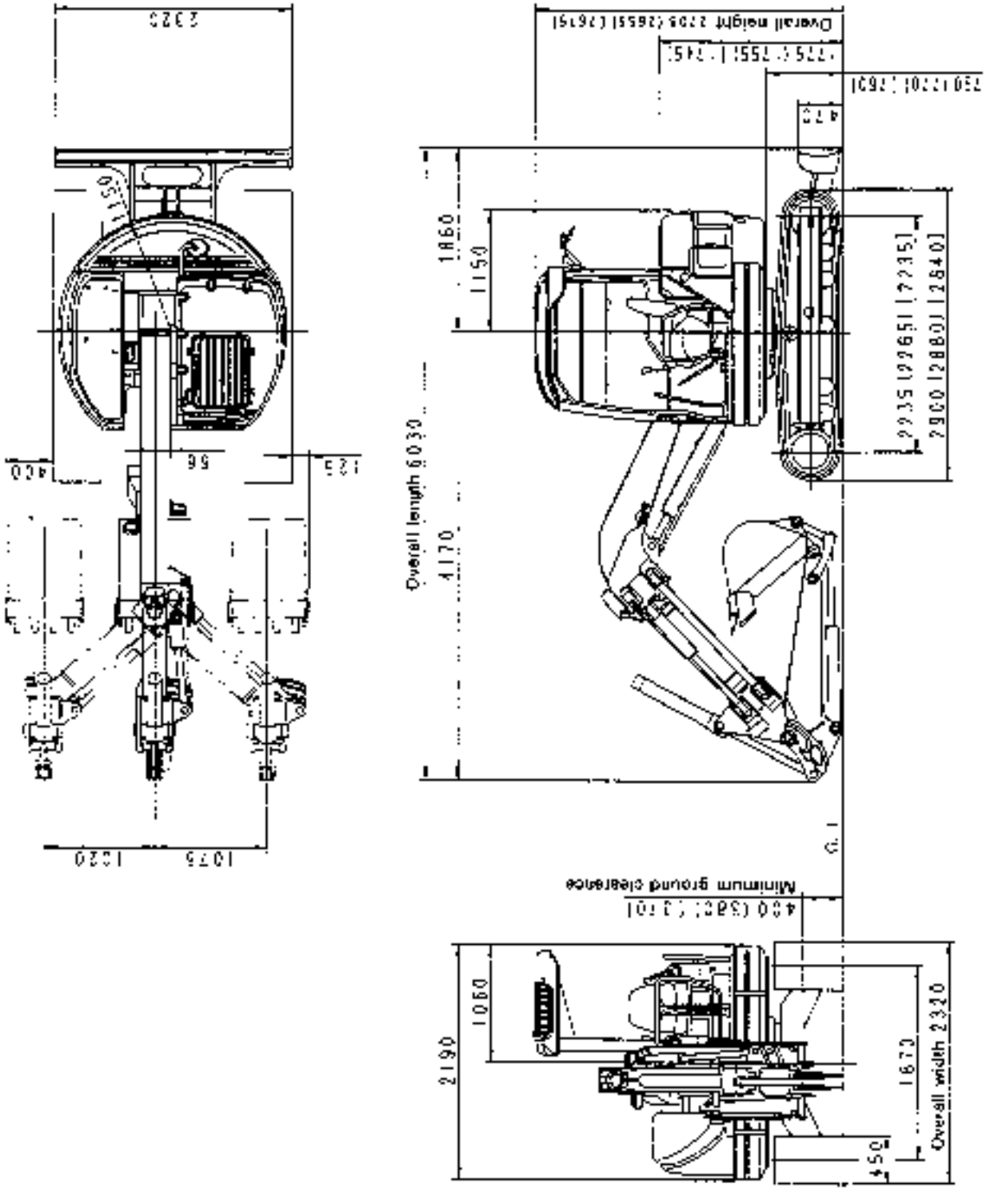




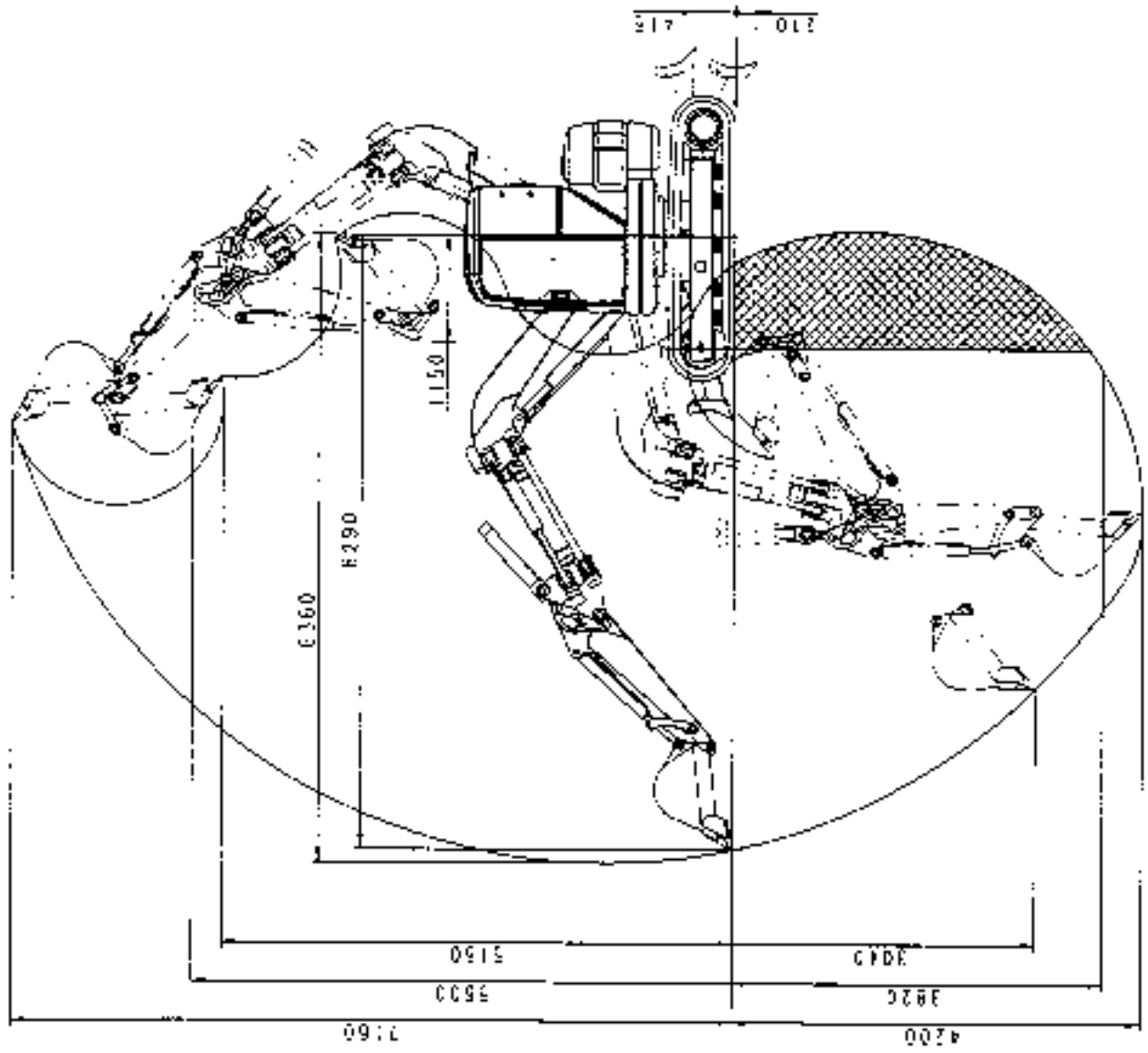


Canopy, road liner specification machine
Canopy, rubber shoe specification machine
Canopy, steel shoe specification machine

The values not in parentheses are the values for the road liner specification machine
The values inside ( ) are the values for the rubber shoe specification machine.
The values inside [ ] are the values for the steel shoe specification machine.
The dimensions where there is no distinction using ( ) or [ ] are the same values as for the road liner specification machine.



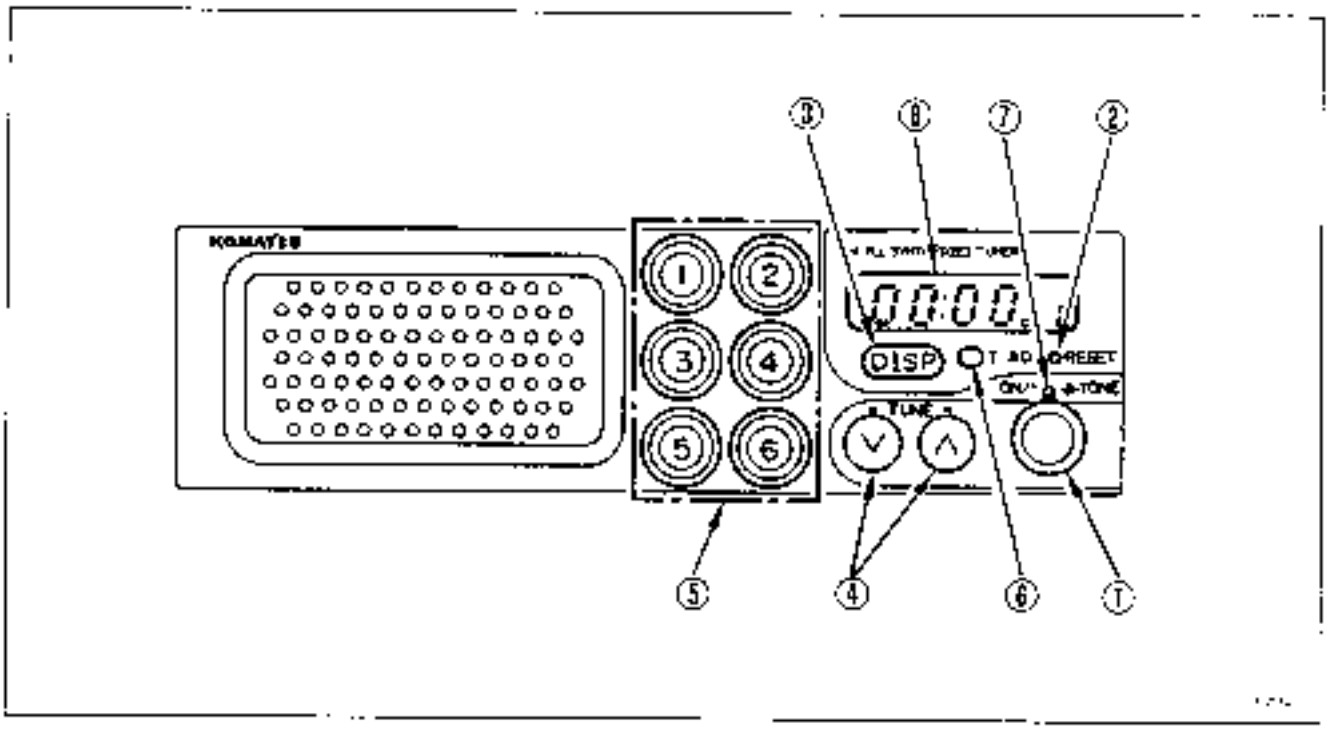
Cab, road liner specification machine
Cab, rubber shoe specification machine
Cab, steel shoe specification machine
Canopy, road liner specification machine
Canopy, rubber shoe specification machine
Canopy, steel shoe specification machine



OPTIONS, ATTACHMENTS

26. USING CAR RADIO

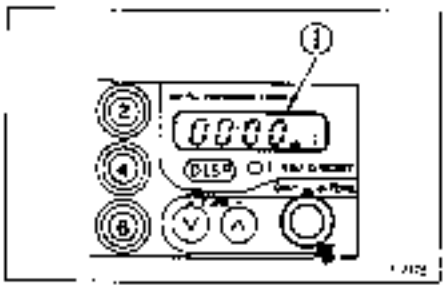
26.1 EXPLANATION OF PARTS



1. POWER SWITCH/VOLUME CONTROL KNOB (push ON/VOL)

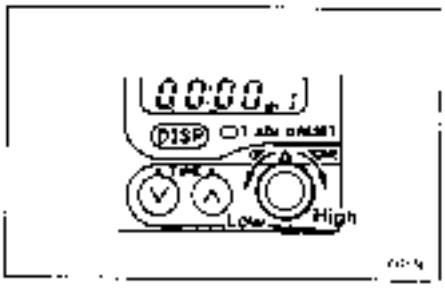
Push this knob to switch the radio on. The lighting in display area ① will light up and the frequency will be displayed. Press again to switch the power off.

Turn the knob clockwise to increase the volume, and counterclockwise to reduce it.



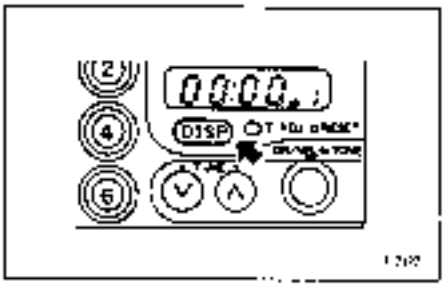
2. TONE CONTROL KNOB (TONE)

Turn this knob clockwise from the center position to emphasize the high sounds, and counterclockwise to emphasize the low sounds.

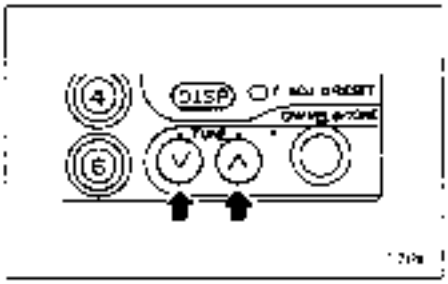


3. DISPLAY BUTTON (DISP)

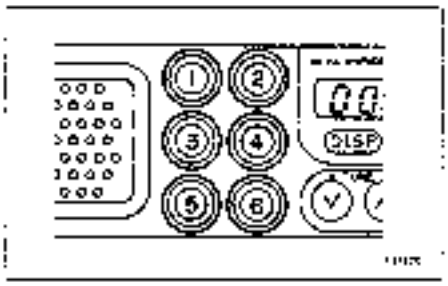
If the display button is pressed when the radio is being used, the frequency of the station being received is displayed for 5 seconds.



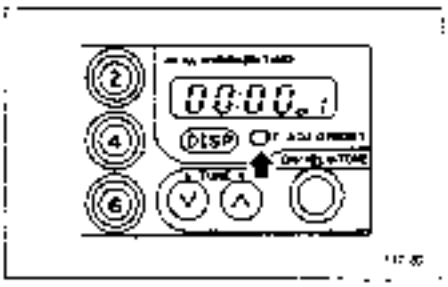
4. **TUNING/HOUR, MIN ADJUSTMENT BUTTON (TUNE)**
   This is used to select the station or change the frequency.
   If the station UP button ∧ is pressed, the frequency will go up by 9 kHz each time it is pressed; if the station DOWN button ∨ is pressed, the frequency will go down 9 kHz each time it is pressed.
   If these buttons are kept pressed for more than 2 seconds, the station will be selected automatically.
   When adjusting the time, these change the hour display and minute display.



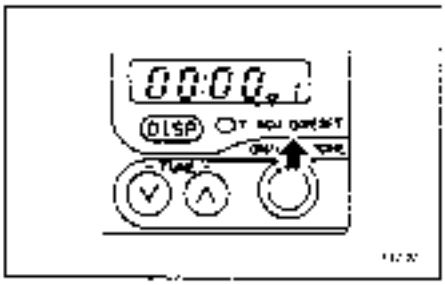
5. **PRESET BUTTONS (1, 2, 3, 4, 5, 6)**
   These buttons can be used to program the desired broadcasting stations. It is then possible to select the station at a touch.



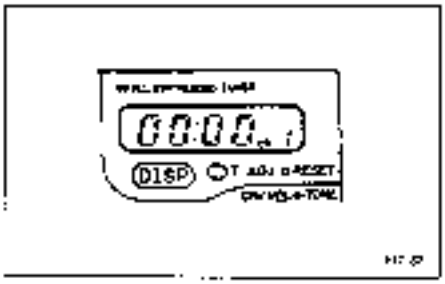
6. **TIME ADJUSTMENT BUTTON (T. ADJ)**
   Press this button to adjust the time.



7. **TIME RESET BUTTON (RESET)**
   Press this button to reset to the exact hour.

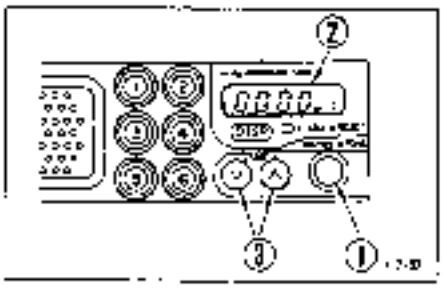


8. **DISPLAY**
   This display the frequency, time, and preset numbers.



26.2 METHOD OF USE

26.2.1 METHOD OF SETTING PRESET BUTTONS

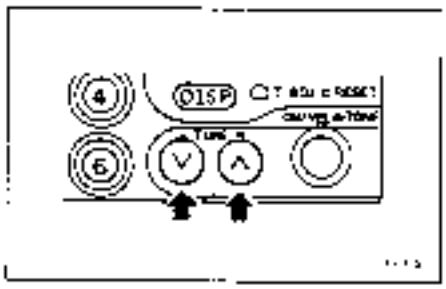


1. Press power switch ①. The frequency is displayed in display area ②.
2. Use selector button ③ (∧ or ∨) to adjust to the desired frequency.
3. Choose a preset button to use for this station, and keep it pressed for at least 2 seconds to program the button to that frequency.
   When the sound suddenly disappears and appears again, the button has been programmed, and the preset number is shown in display area ②.

After programming the button, press the preset button and release it within approx. 2 sec. The station programmed to that button will be selected for reception.

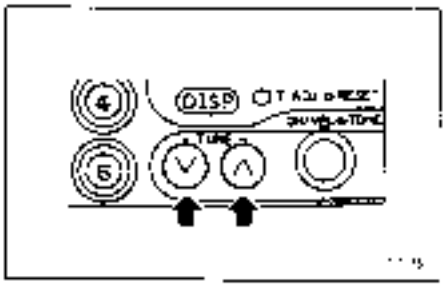
It is possible to program one station for each preset button.

26.2.2 METHOD FOR MANUAL TUNING



Press the tuning button lightly to adjust to the desired frequency. Each time the button is pressed, the frequency will change by 9 kHz.
∧ button: Select station at higher frequency
∨ button: Select station at lower frequency

26.2.3 METHOD FOR AUTOMATIC TUNING

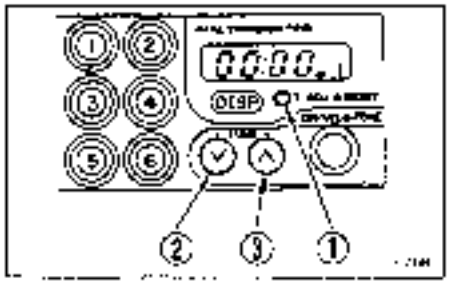


Keep the tuning button pressed for at least 2 seconds and then release it. When reception from a broadcasting station is picked up, the selector will automatically stop at that position.

When searching for the next station, keep the selector button pressed again for at least 2 seconds.
∧ button: Select station at higher frequency
∨ button: Select station at lower frequency

If the reception is week, and stations are not found, adjust the frequency manually to select the desired station.

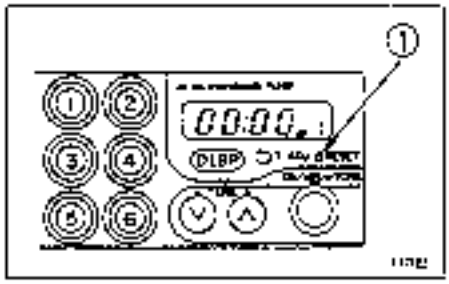
26.2.4 ADJUSTING TIME



1. Keep T.ADJ button ① pressed, and press hour adjustment button ②.
   The hour display will change, so when it reaches the correct hour, release the button.

2. Keep T.ADJ button ① pressed and press minute adjustment button ③.
   The minute display will change, so when it reaches the correct time, release the button.

26.2.5 METHOD OF USING RESET BUTTON



If RESET button ① is pressed at the same time as the time signal or standard time, the display will return immediately to the exact hour (: hour 00 min.).

If the display is 01 – 29 min, the display will go back to 0 min. for the same hour.

If the display is 30 – 59 min, the display will advance to 0 min. for the next hour.

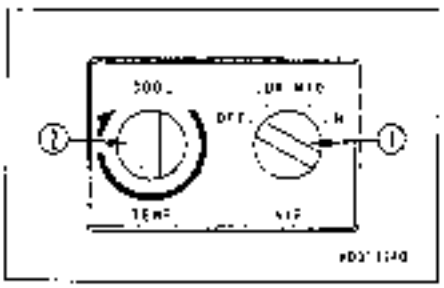
[Example]
10:29 → 10:00 (returns to exact hour)
10:30 → 11:00 (advances to next exact hour)

26.3 PRECAUTIONS FOR USE

- For safety reasons, set the volume during operation at a level which enables you to enjoy the radio but still allows you to hear sounds from outside the machine.
- If water gets into the speaker case or car radio (auto tuning), unexpected problems may occur, so be careful not to get water on the equipment.
- Do not wipe the scale or buttons with benzene, thinner, or other solvents. Always wipe with a dry soft cloth. If they are extremely dirty, use alcohol on the cloth.

27. USING CAR COOLER (MACHINE EQUIPPED WITH CAB)

27.1 OPERATION OF CONTROL PANEL



① Air flow control knob
② Temperature control knob

Air flow control knob

As the knob is turned L→M→H, the air flow becomes stronger.

Temperature control knob

As the knob is turned clockwise, the air temperature becomes colder.

27.2 PRECAUTIONS WHEN USING

To use the car cooler efficiently, pay attention to the following.

- If the machine has been left in the sun for a long time and the temperature inside the cab is high, open the windows and doors to cool the cab down before turning on the cooling.
- Keep the windows and doors closed when using the cooler.
- If dirt or mud accumulates on the condenser, the cooling efficiency will become poor. When washing or inspecting the machine, wash off all dirt and mud accumulated on the condenser to improve the air flow.
- Generally speaking, when using the cooler, for health reasons, the optimum setting is to have the temperature when entering the cab feel slightly cooler than the outside air (5 – 6°C below the outside temperature). Always keep this in consideration when adjusting the temperature.

27.3 INSPECTION AND MAINTENANCE OF CAR COOLER

⚠ WARNING

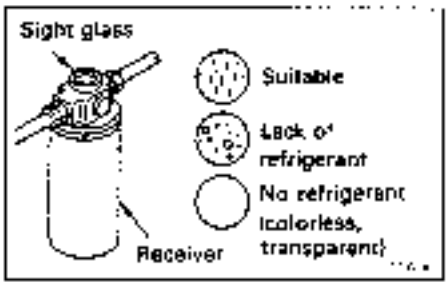
The refrigerant used in the cooler is colorless and odorless, and is harmless when released into the atmosphere. However if it gets in the eyes or on the hands, it will be cause of burn or loss of sight, so never loosen any part of the refrigerant circuit.

27.3.1 CHECK VOLUME OF REFRIGERANT (GAS)

If there is a lack of refrigerant, the cooling performance will be poor.

When operating the cooler at high speed, there should be no bubbles in the sight glass (inspection window) mounted on the condenser unit receiver in front of the oil cooler.

If there are any bubbles, there is a lack of gas, so have to add refrigerant at a shop.



27.3.2 CLOGGING OF CONDENSER

If there is mud or dirt stuck to the condenser fins, the cooling efficiency of the condenser will drop considerably, and this will also reduce the cooling capacity of the car cooler. Remove any mud or dirt stuck to the condenser and use a screwdriver to correct any crushed fins.

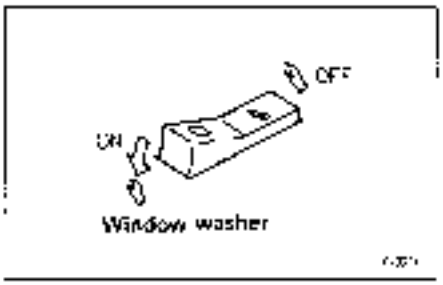
27.3.3 CHECK DURING OFF-SEASON

When the air conditioner is not being used, run the compressor at low speed for a few minutes every week to avoid loss of oil. (Run the engine at low speed, and turn the cooler temperature control knob fully to the left.)

In cold weather, do not run the compressor suddenly at high speed. This may cause failure in the compressor. When the temperature is below 2 to 6.5°C (35.6 to 43.7°F), the low pressure cut-off switch functions to stop the compressor from running even when the air conditioner switch is pressed.

28. HANDLING WINDOW WASHER

If a window washer is installed, use it as follows.



Window washer

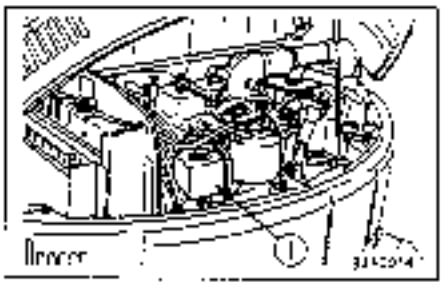
28.1 OPERATION OF WINDOW WASHER

Press the wiper switch to the ON position, then press it in further. Window washer fluid will spray out.

NOTICE

If the window washer switch is operated for more than 10 seconds continuously or it is operated when the window washer tank is empty, the motor may burn out.

28.2 CHECK WINDOW WASHER FLUID, ADD FLUID



If there is air in the window washer fluid, check the level of the fluid in window washer tank ①, and add automobile window washer fluid if necessary.

Be careful not to let dirt get in when adding the fluid.

- **Proportions for diluting washer fluid**

This depends on the ambient temperature, so use the washer fluid diluted to the proportions in the table below.

Area, season	Proportions	Freezing point
Normal	Fluid 1: Water 2	–10°C (14°F)
Winter in cold areas	Fluid 1: Water 1	–20°C (4°F)
Winter in extremely cold areas	Fluid only	–30°C (–22°F)

There are two types of fluid, distinguished by their freezing point: –10°C (14°F) (general use) and –30°C (–22°F) (cold area use), so use them according to the area and season.

29. HANDLING BUCKET WITH HOOK

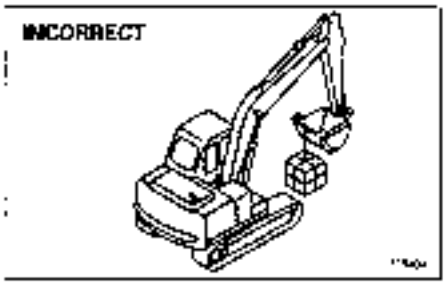
29.1 CHECKING FOR DAMAGE TO BUCKET WITH HOOK

Check that there is no damage to the hook, stopper, or hook mount. If any abnormality is found, please contact your Komatsu distributor.

29.2 PROHIBITED OPERATIONS

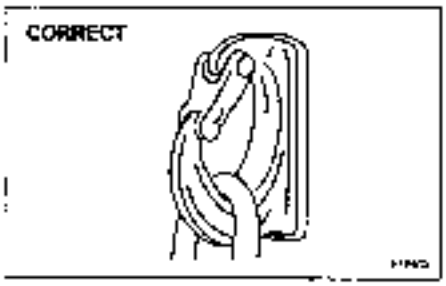
The standard work equipment must not be used for lifting loads.

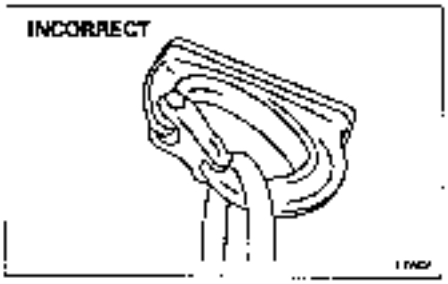
If this machine is to be used for lifting loads, it is necessary to install the special bucket with hook.



29.3 PRECAUTIONS DURING OPERATIONS

- When carrying out lifting operations, reduce the engine speed.
- Depending on the posture of the work equipment, there is danger that the wire or load may slip off the hook. Always be careful to maintain the correct hook angle to prevent this from happening.
- Never steer the machine while lifting a load.
- If the bucket with hook is turned and used for operations, it will hit the arm during dumping operations, so be careful when using it.
- Loads suspended must not exceed the limit indicated in the "LIFTING CAPACITY TABLE" stuck on the right-side lower portion of the driver's seat.
- If you wish to install a hook in the future, please contact your Komatsu distributor.





30. GENERAL PRECAUTIONS

30.1 PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, please contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accident or failure.

⚠ WARNING

Precautions for removal and installation operations
When removing or installing attachments, obey the following precautions and take care to ensure safety during the operation.

- **Carry out the removal and installation operations on a flat, firm ground surface.**
- **When the operation is carried out by two or more workers, determine signals and follow these during the operation.**
- **When carrying heavy objects (more than 25 kg (55.1 lb)), use a crane.**
- **When removing heavy parts, always support the part before removing it.**
  When lifting such heavy parts with a crane, always pay careful attention to the position of the center of gravity.
- **It is dangerous to carry out operations with the load kept suspended. Always set the load on a stand, and check that it is safe.**
- **When removing or installing attachments, make sure that they are in a stable condition and will not fall over.**
- **Never go under a load suspended from a crane.**
  Always stand in a position that is safe even if the load should fall.

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of the removal and installation operations, please contact your Komatsu distributor.

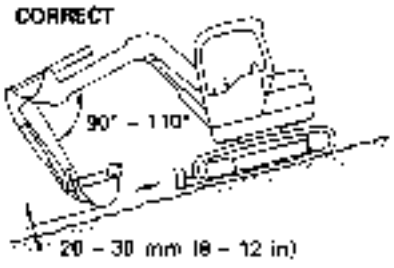
31. INTRODUCTION OF ATTACHMENTS

31.1 PRECAUTIONS WHEN INSTALLING ATTACHMENTS

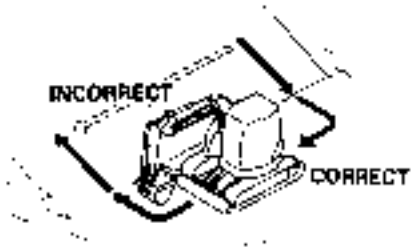
⚠ WARNING

Long work equipment reduces the stability of the chassis, so if the swing is operated on a slope, or when going down a steep hill, the machine may lose its balance and overturn.
The following operations are particularly dangerous, so never operate the machine in these ways.

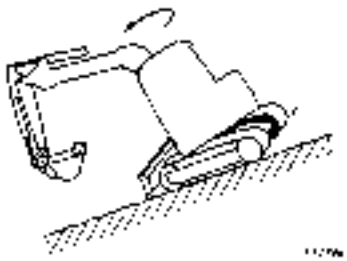
- **Going downhill with the work equipment raised**



- **Traveling across slopes**



- **Swinging the upper structure on slopes**



⚠ WARNING

- **If heavy work equipment is installed, the overrun of the swing becomes greater (the distance from the point where the operator operates the control levers to stop the swing to the point where the upper structure stops completely), so there is danger of mistaking the distance and hitting something.**
  Always operate so that there is an ample margin to the stopping point.
  Furthermore, the hydraulic drift also becomes larger (when the work equipment is stopped in mid-air, it will gradually move down under its own weight).

- **Always follow the correct procedure when installing the boom and arm. If the correct procedure is not followed, this may lead to serious damage or injury, so please consult your Komatsu distributor before carrying out installation.**

⚠ WARNING

If long work equipment is installed, the working range will suddenly become larger, so there is danger of mistaking the distance and hitting something.
Always operate the work equipment so that there is ample space from any obstacles in the area.

31.2 PRECAUTIONS WHEN USING HYDRAULIC BREAKER

Select the most suitable model to install the attachment.

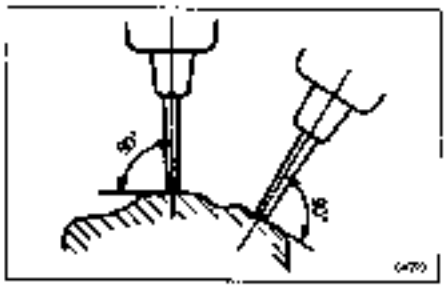
- Always use the attachments specified by Komatsu. Please consult your Komatsu distributor when selecting the machine model.

31.3.1 MAIN FIELDS OF APPLICATION

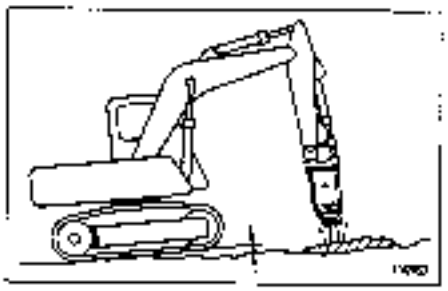
- Crushed rock
- Demolition work
- Road construction

This attachment can be used for a wide range of work including demolition of buildings, breaking up of road surfaces, tunnel work, breaking up slag, rock crushing, and breaking operations in quarries.

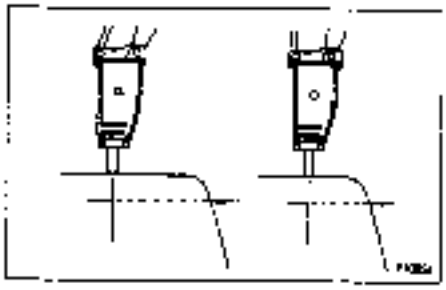
Keep the chisel pushed perpendicularly against the impact surface when carrying out breaking operations.



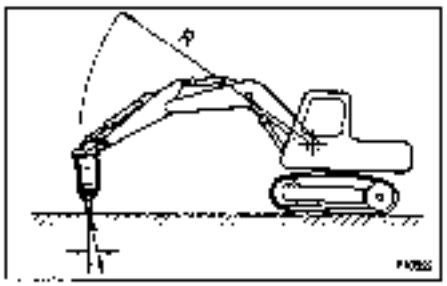
When applying impact, push the chisel against the impact surface and operate so that the chassis rises approx. 5 cm (2 in) off the ground. Do not let the machine come further off the ground than is necessary.



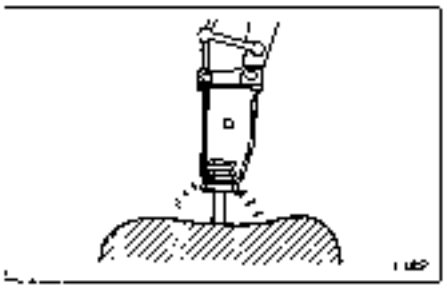
When applying continuous impact to the same impact surface, if the chisel does not penetrate or break the surface within 1 minute, change the point of impact and carry out breaking operations closer to the edge.



The direction of penetration of the chisel and the direction of the breaker body will gradually move out of line with each other, so always adjust the bucket cylinder to keep them aligned.



Always keep the chisel pressed against the impact surface properly to prevent using the impact force when there is no resistance.

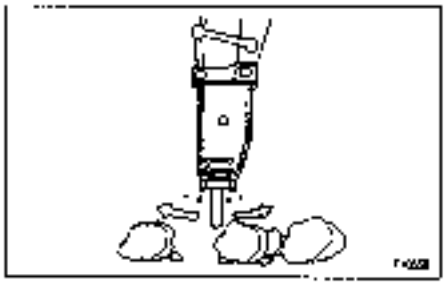


31.2.2 MISTAKEN METHODS OF USE

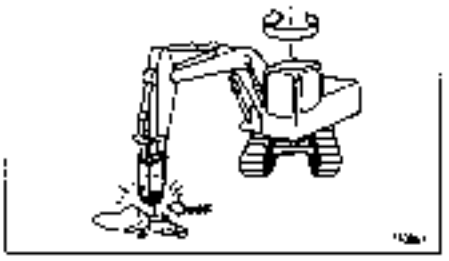
To ensure that the machine has a long life, and to ensure that operations are carried out in safety, do not operate the machine in any of the following ways.

Do not operate the cylinder to the end of its stroke.
Always leave approx. 5 cm (2 in) to spare.

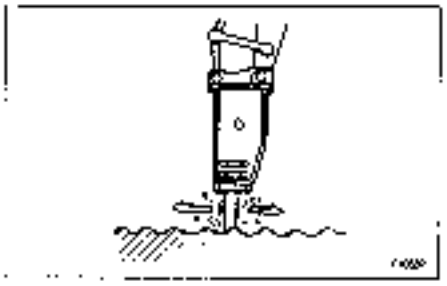
Using the mount to gather in pieces of rock



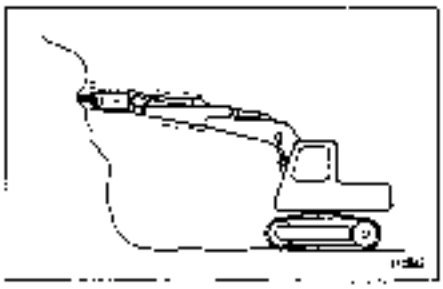
Operations using the swing force



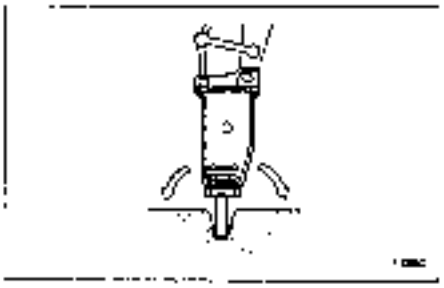
Moving the chisel while carrying out impacting operations



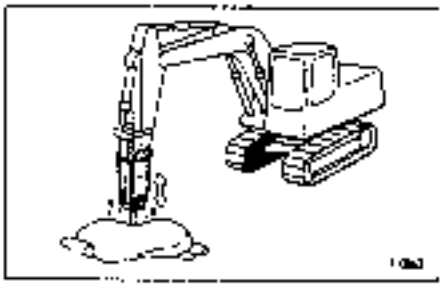
Holding the chisel horizontal or pointed up when carrying out impacting operations



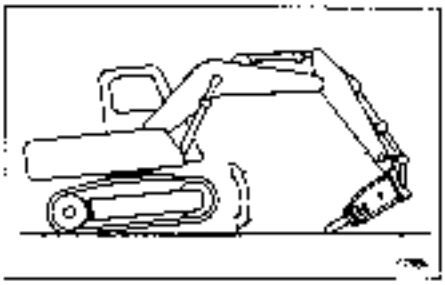
Twisting the chisel when it has penetrated the rock



Pecking operations



Extending the bucker cylinder fully and thrusting to raise the machine off the ground



PC75UU-3, HYDRAULIC EXCAVATOR

Form No. SEAM023200