

1.1 GENERAL SAFETY INFORMATION



AVOID INJURY OR DEATH

Do not operate or perform any maintenance on this machine until all instructions found in this manual have been thoroughly read and understood. Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death. Always keep this manual in storage stored in the place provided on the machine.

If it is missing or damaged, place an order with an authorized dealer/distributor for a replacement.

If you have any questions, please consult an authorized dealer/distributor.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in this manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.
2. Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority. Safety messages are indicated using the following safety alert symbols and signal words. The safety information contained in this manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
3. It is very difficult to forecast every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended in this manual.
4. While operating the machine, be sure to perform work with great care to avoid damage to the machine, and accidents from occurring.
5. Continue studying this manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.
6. Symbols used in this manual;
X (symbol): This symbol indicates an unacceptable practice or unsafe condition.
O (symbol): This symbol indicates an acceptable practice or safe condition.
7. Messages of safety appear in this manual and on the machine. All messages of safety are identified by the words "DANGER", "WARNING" and "IMPORTANT".

- a. Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
- b. Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- c. Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components.
- d. Special instructions or procedures which, if not correctly followed, may result in serious machine damage.



AVOID INJURY OR DEATH



**AVOID INJURY OR DEATH**

The proper and safe lubrication and maintenance for this machine, recommended by manufacturer, is outlined in this operator's manual for this machine.

Improper performance of lubrication or maintenance procedures are dangerous and could result in injury or death. Read and understand this operator's manual before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. Knowledge of the systems and components is important before removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this manual. Use proper lifting procedures when removing any components.

The following is a list of basic precautions that must always be observed.

1. Read and understand all Warning plates and labels on the machine before Operating, Maintaining or Repairing this machine.
2. Always wear protective glasses and protective shoes when working around machines.
In particular, wear protective glasses when using hammers, punches or drifts on any part of the machine or attachments. Use welders gloves, hood/goggles, apron and the protective clothing appropriate to the welding job being performed. Do not wear loose fitting or torn clothing. Remove all rings from fingers, loose jewelry, confine long hair and loose clothing before working on this machinery.
3. Disconnect the battery and hang a "Do Not Operate" tag in the Operator's Compartment. Remove key from starter key switch.
4. If possible, make all repairs with the machine parked on a level, hard surface. Block the machine so it does not roll while working on or under the machine. Hang a "Do Not Operate" tag in the Operator's Compartment.
5. Do not work on any machine that is supported only by lift, jacks or a hoist. Always use blocks or jack stands, capable of supporting the machine, before performing any disassembly.
6. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
7. Lower the bucket, blade (if equipped), or other attachments to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, blade (if equipped) or other attachment is blocked correctly to prevent it from dropping unexpectedly.
8. Use steps and grab handles when mounting or dismounting a machine. Clean any mud, grease, oil or debris from steps, walkways or work platforms before using. Always face the machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work, platforms to perform safe repair operations.
9. Avoid back injury. Use a hoist when lifting components which weigh 23 kg (50 lb) or more. Make sure all chains, hooks, slings, etc., are in good condition and are the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.
10. To avoid burns, be alert for hot parts and surfaces immediately after stopping the machine such as hot fluids in lines, tubes and compartment covers.
11. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and carefully pry cover loose to relieve any spring or other pressure, before removing the last two bolts or nuts completely.

12. Be careful when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.
13. Always use the proper tools that are in good condition and that are suited for the job at hand. Be sure you understand how to use them before performing any service work.
14. Reinstall all fasteners with the same part number. Do not use a lesser quality fastener if replacements are necessary.
15. Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength at least equivalent to that of the parent metal. Disconnect battery before any welding procedures are attempted.
16. Do not damage wiring during repair/removal operations. Reinstall the wiring so it is not damaged nor will be damaged in operation of the machine by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.
17. Make sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution and replace the guard or shield after repair is complete.
18. Performing maintenance or repair work on the machine with the bucket/attachment raised is hazardous. The bucket/attachment and lift arm could fall and injure or kill a person. Be sure to lower the bucket or attachment to the ground before starting work on the machine.
19. Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install parts which are bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Very small (pinhole) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use a small piece of card-board, wood or metal to locate pinhole leaks.
20. Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure must be installed correctly.
21. Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.
22. Be careful when servicing or separating the tracks (crawlers). Chips can fly when removing or installing a track (crawlers) pin. Wear safety glasses and long sleeve protective clothing. Tracks (crawlers) can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks (crawlers) are disengaged from the sprockets. Block the machine to prevent it from moving.
23. Caution should be used to avoid breathing dust that may be generated when handling components containing asbestos fibers. If this dust is inhaled, it can be hazardous to your health. Components in Manufacture products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates and some gaskets. The asbestos used in these components is usually bound in a resin or sealed in some way. Normal handling is not hazardous as long as air-borne dust which contains asbestos is not generated.

**AVOID INJURY OR DEATH (In 5. Regard)**

Do not operate this machine unless you have read and understand the instructions in this operator's manual. Improper machine operation is dangerous and could result in injury or death.

If dust which may contain asbestos is present, there are several common sense guidelines that should be followed.

- a. Never use compressed air for cleaning.
- b. Avoid brushing or grinding of asbestos containing materials.
- c. For clean up, use wet methods or a vacuum equipped with a high efficiency particulate air (HEPA) filter.
- d. Use exhaust ventilation on permanent machining jobs
- e. Wear an approved respirator if there is no other way to control the dust.
- f. Comply with applicable rules and regulations for the work place.
- g. Follow environmental rules and regulations for disposal of asbestos.
- h. Avoid areas where asbestos particles may be in the air.

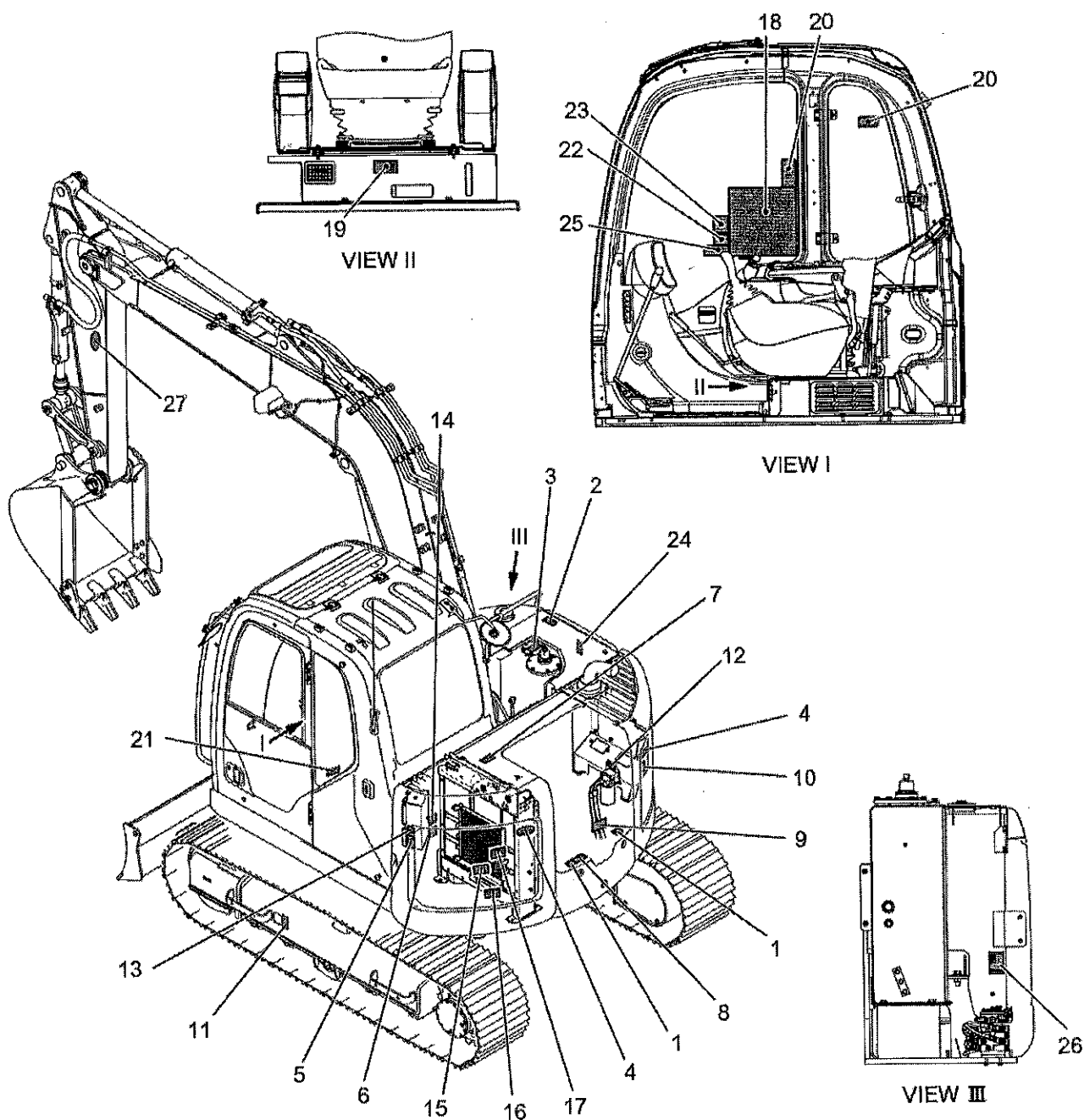
1.3 WARNING LABELS & DECALS

Warning labels and decals are affixed to the machine to remind operators and personnel of specific safety precautions in certain areas of the machine. The following are illustrated examples of all warning labels and decals along with their locations.

1.3.1 WARNING LABELS & DECALS MAINTENANCE

- Do not remove the attached warning labels and decals.
- Confirm whether labels can be easily read.
If words or illustrations are illegible, clean off or replace the labels.
- Use a cloth, water, and detergent to clean the labels. Never use organic solvents or gasoline.
- If labels are damaged, missing or illegible, replace them with new ones.
Contact our dealer/distributor for new labels.

1.3.2 LOCATION OF WARNING LABELS & DECALS



1. DO NOT USE COUNTERWEIGHT LIFTING

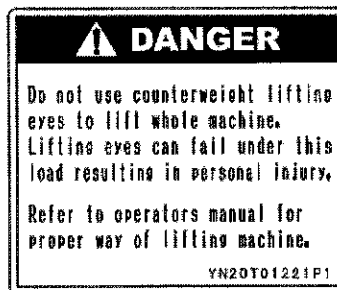
Located on counterweight.

Part Number - YN20T01221P1 (2REQ'D)

Do not use counterweight lifting eyes to lift whole machine.

Lifting eyes can fall under this load resulting in personal injury.

Refer to operators manual for proper way of lifting machine.

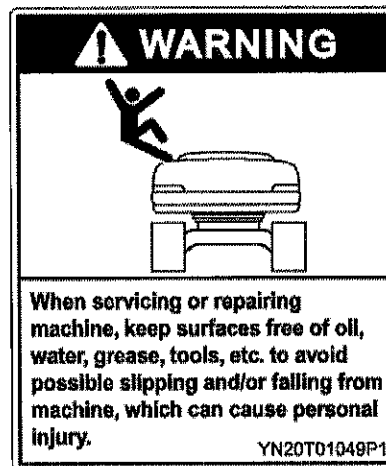


2. WORKING ABOVE GROUND

Located on hydraulic tank.

Part Number - YN20T01049P1

When servicing or repairing machine, keep surfaces free of oil, water, grease, tools, etc. to avoid possible slipping and/or falling from machine, which can cause personal injury.



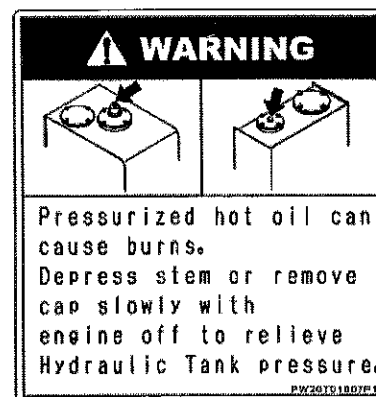
3. PRESSURIZED HOT OIL

Located on top of hydraulic tank.

Part Number - PW20T01007P1

Pressurized hot oil can cause burns.

Depress cap slowly with engine off to relieve hydraulic tank pressure.



4. SWING

Located on rear side door.

Part Number - PE20T01014P1 (2REQ'D)



5. BOOSTER CABLE

Located on battery relay cover.

Part Number - YN20T01015P2

Improper booster cable connections can cause an explosion resulting in personal injury.

Connect booster cables using following procedure.

1.

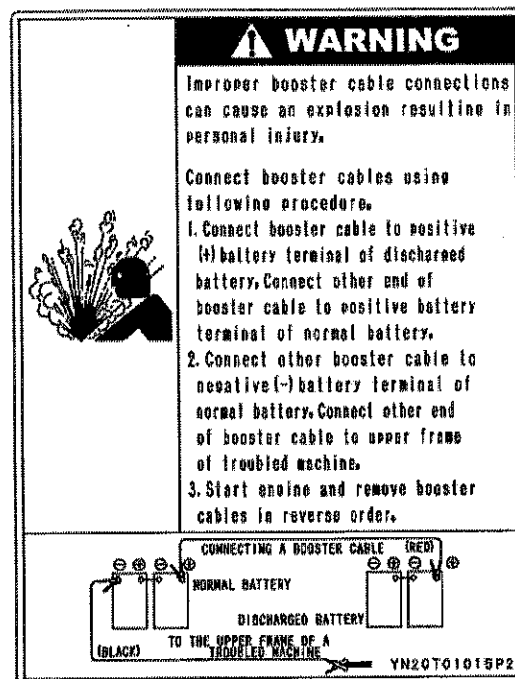
Connect booster cable to positive (+) battery terminal of discharged battery. Connect other end of booster cable to positive battery terminal of normal battery.

2.

Connect other booster cable to negative (-) battery terminal of normal battery. Connect other end of booster cable to upper frame of troubled machine.

3.

Start engine and remove booster cables in reverse order.



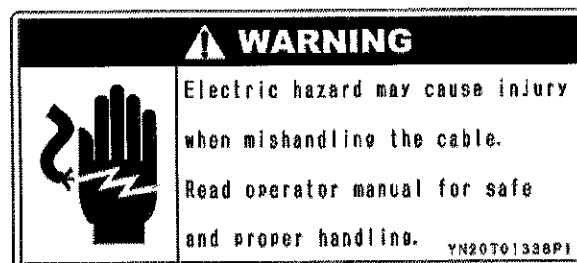
6. BATTERY CABLE

Located on battery relay cover.

Part Number - YN20T01338P1

Electric hazard may cause injury when mishandling the cable.

Read operator manual for safe and proper handling.



7. HOT COOLANT

Located on top of engine hood.

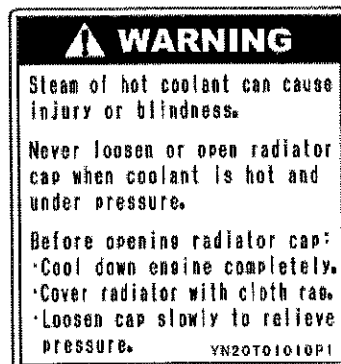
Part Number - YN20T01010P1

Steam of hot coolant can cause injury or blindness.

Never loosen or open radiator cap when coolant is hot and under pressure.

Before opening radiator cap:

- Cool down engine completely.
- Cover radiator with cloth rag.
- Loosen cap slowly to relieve pressure.



8. ENGINE STOP

Located on counterweight.

Part Number - YN20T01009P1

Rotating parts can cause personal injury.

Keep away from fan and belt when engine is running.

Stop engine before servicing.



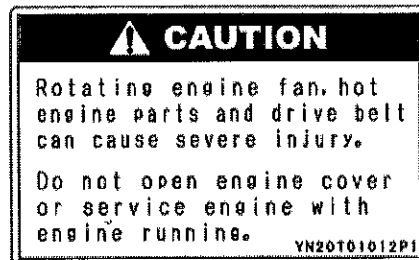
9. ROTATING & HOT PARTS

Located on engine hood.

Part Number - YN20T01012P1

Rotating engine fan, hot engine parts and drive belt can cause severe injury.

Do not open engine cover or service engine with engine running.



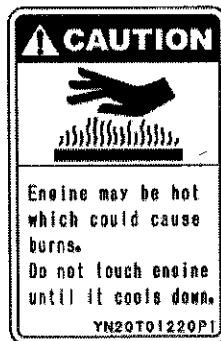
10. HOT PARTS

Located on right side door.

Part Number - YN20T01220P1

Engine may be hot which could cause burns.

Do not touch engine until it cools down.



11. ADJUSTING TRACK TENSION

Located on crawler frame.

Part Number - YN20T01813P1 (2REQ'D)

- This work must be done carefully by two people. The operator must operate the machine as instructed by the signals of the partner.
The crawler belt is changed by lifting one side of the machine at a time. Unexpected lowering or movement of the machine can result in serious injury or death.
Do not operate the boom, arm or bucket / attachment while removing or installing a crawler belt.
Follow the instructions provided.
- Grease in track tensioning mechanism is under extreme pressure and can penetrate skin causing severe injury. Keep face and body away from grease fitting area. Do not loosen grease fitting more than one turn. If grease does not release after one turn of the fitting, call our dealer/distributor for assistance.
- Before removing the rubber crawler belt, confirm that the pressure inside the track tensioning cylinder has been completely released. Then turn the sprocket.
- If the procedure on releasing the pressure in the track tensioning cylinder is not followed, grease can penetrate skin causing severe injury. If the tension of rubber crawler belt does not release, call the dealer/distributor for repair service.



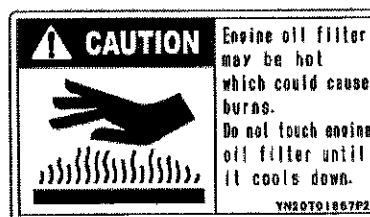
12. HOT PARTS

Located on engine bonnet support.

Part Number - YN20T01867P2

Engine oil filter may be hot which could cause burns.

Do not touch engine oil filter until it cools down.

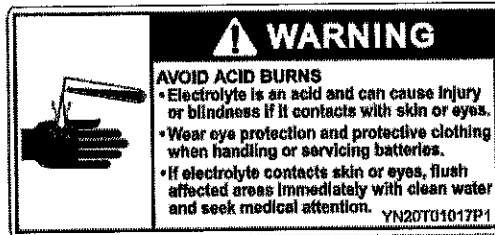


13. HANDLING BATTERY

Located on battery relay cover.

Part Number - YN20T01017P1

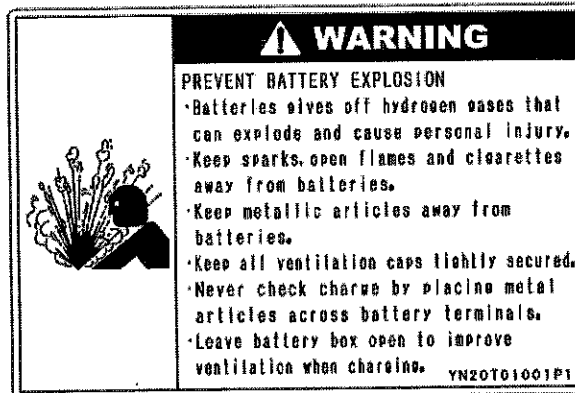
- Electrolyte is an acid and can cause injury or blindness if it contact with skin or eyes.
- When eye protection and protective clothing when handling or servicing batteries.
- If electrolyte contacts skin or eyes, flush affected areas immediately with clean water and seek medical attention.



14. PREVENT BATTERY EXPLOSIONS

Located on battery relay cover.

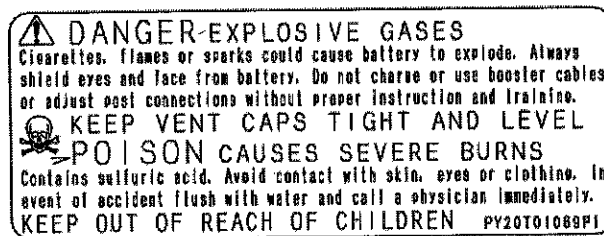
Part Number - YN20T01001P1



15. HANDLING BATTERY

Located on side of radiator duct.

Part Number - PY20T01069P1

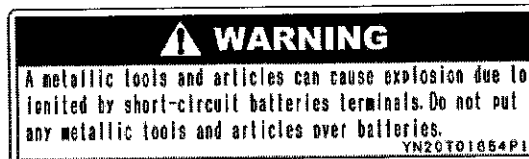


16. HANDLING BATTERY

Located on side of radiator duct.

Part Number - YN20T01854P1

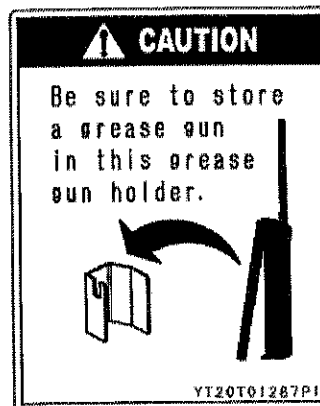
A metallic tools and articles can cause explosion due to ignited by short-circuit batteries terminals. Do not put any metallic tools and articles over batteries.



17. HANDLING GREASE GUN

Located on engine dust cover.

Part Number - YT20T01287P1



18. TRAVEL SPEED, ADJUSTING TRACK TENSION, LEAVING MACHINE, READ OPERATOR MANUAL, POWER BOOST SWITCH, ENGINE STOP, BUCKET TO CAB CONTACT, ELECTRICAL POWER LINES LEAVING MACHINE

Located inside cab R.H.

Part Number - LC20T01187P1

WARNING

Machine may move suddenly and cause serious personal injury if a control lever is accidentally touched. Be sure the safety lever is disengaged and in the locked position before exiting the cab.

NOTICE

Stopping engine without allowing it to cool can result in overheating and shortened engine life.

Before stopping engine, run at low idle for at least 5 minutes to allow engine and turbo charger to gradually cool down.

WARNING

Automatic two speed travel system changes travel speed automatically and can adversely affect machine control when descending a slope and loading or unloading on a trailer.

Personal injury can occur from sudden change in machine control.

Put travel speed select switch in LOW speed position when descending a slope and loading or unloading on a trailer.

WARNING

Read and understand operator manual before operating or performing maintenance on this machine.

Failure to follow or pay attention to instructions in operator manual can result in injury or death.

It is your responsibility to be aware of and follow all local laws and regulations.

Before starting machine, make sure hydraulic control lever is in lockout position and all control levers are in neutral.

Sound horn to alert people.

Ensure bystanders and obstacles are clear of machine before moving machine or its attachments.

Do not carry riders on machine.

Before leaving operators compartment, park on level ground, lower attachments to ground, make sure hydraulic control lever is in lockout position and stop engine.

CAUTION

Some type of attachment and the combination of attachment may cause an interference with operator's cab and other sections of machine during operation.

Before starting operation, make sure to check for the enough space for no interference between the attachment and operator's cab and the other sections.

Since it is more danger when the attachment is moved close to the cab and machine frame and so on, special attention must be paid.

WARNING

Extreme high pressure in track adjustment cylinder can cause personal injury when adjusting crawler tension.

Loosen grease nipple with care to relieve pressure gradually.

WARNING

Releasing power boost switch while lifting a load can cause unexpected lowering of load, resulting in severe injury or death.

Never use power boost switch for lifting a load.

DANGER

Contact with electrical power lines will result in severe injury or death.

Keep machine and attachment a safe distance from electrical power lines as per following instruction.

VOLTAGE (Volts)	SAFETY DISTANCE
50K or LESS	3.0M (10FT)
50K to 200K	4.5M (15FT)
200K to 350K	6.0M (20FT)
350K to 500K	7.5M (25FT)
500K to 750K	10.5M (35FT)
750K or OVER	13.5M (45FT)

19. DO NOT INSERT HAND IN THE MOVING PART

Located on seat stand.

Part Number - YN20T01339P1

Be careful not to pinch your hand(s) when operating the lever.



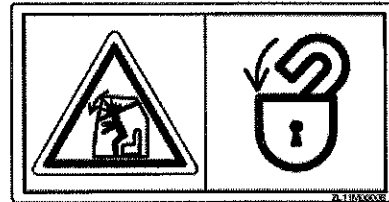
20. LOCK FRONT WINDOW AT THE HOUSED POSITION

Located inside cab R.H.

Part Number - ZL11M06008

Lock front window at the housed position.

There is always possibility of slipping down of the housed front window resulting in injury.

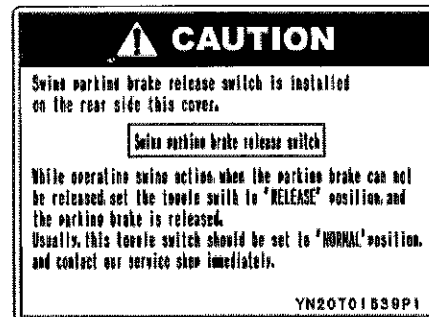


21. SWING BRAKE RELEASE SWITCH

Located on rear cover.

Part Number - YN20T01639P1

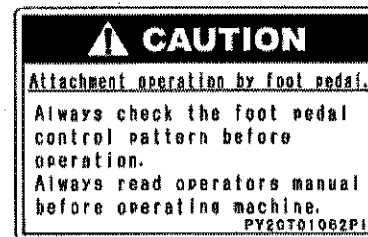
While operating swing action, when the parking brake can not be release, set the toggle switch to "RELEASE" position, and the parking brake is released. Usually, this toggle switch should be set to "NORMAL" position and contact our service shop immediately.



22. OPERATION BY FOOT PEDAL

Located inside cab R.H.

Part Number - PY20T01062P1 (OPT.)

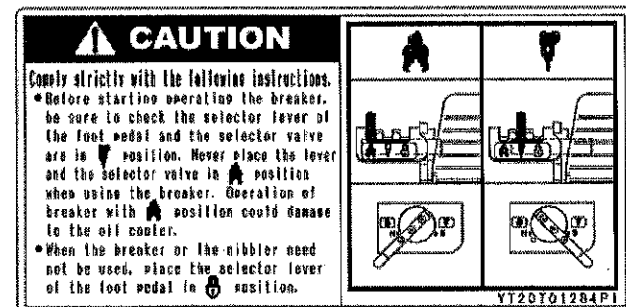


23. HANDLING CHANGE LEVER AND SELECTOR VALVE

(NIBBLER AND BREAKER)

Located on inside cab R.H.

Part Number - YT20T01284P1 (OPT.)

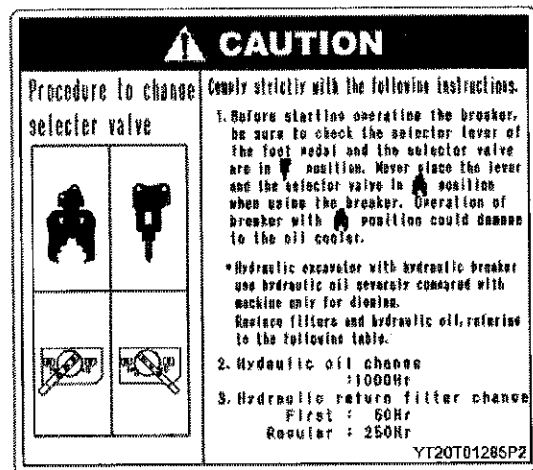


24. PROCEDURE TO CHANGE SELECTOR VALVE

(NIBBLER AND BREAKER)

Located on right side door.

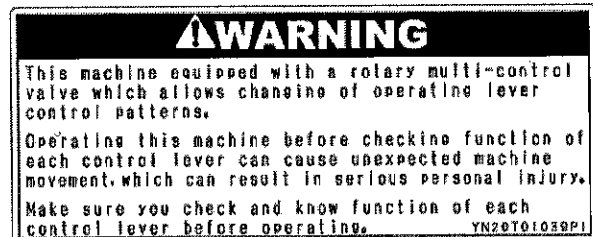
Part Number - YT20T01285P2 (OPT.)



25. ROTARY MULTI CONTROL VALVE

Located on inside cab R.H..

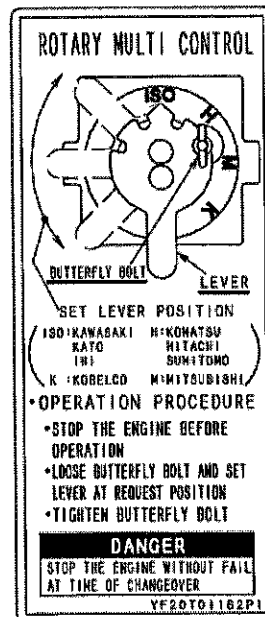
Part Number - YN20T01039P1 (OPT.)



26. ROTARY MULTI CONTROL VALVE

Located on fuel tank

Part Number - YF20T01182P1 (OPT.)



27. KEEP CLEAR WORKING AREA

Located on arm.

Part Number - YN20T01337P1 (2-REQ'D)

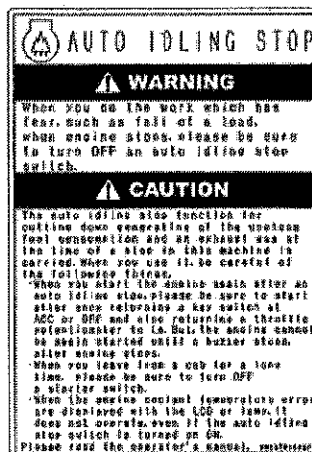
Make sure the area is clear of obstacles and persons before beginning the operation of the machine. Always look around before you start the swing operation. Make sure everyone is cleared in your worksite. Sound horn before beginning swing operation.



28. ENGINE AUTO IDLING STOP

Located inside cab R.H.

Part Number - YN20T01695P1



WARNING

When you stand up and or move over the control levers during operation, your body or hand may contact the levers and resulting unexpected movement of attachments or upper machinery.

Make sure to set the safety lock lever for inoperative position before you stand up and move from operators' seat.

Auto idle stop (AIS) system will stop engine and any motive power and may result accident if using machine for lifting work.

Make sure to turn off the AIS system when using machine for lifting work.

CAUTION

Make sure the following cautions when using Auto Idle Stop (AIS) system.

-After AIS system activates and stops engine, make sure to turn the starter key "ACC" or "OFF" position once, set accelerator dial to Lo speed range then start engine. If AIS system sounds alarm, engine will not be started till the sound will be stopped.

-Make sure to turn the starter key "OFF" position when you leave the machine for a while.

-AIS system will not activate when multi display monitor indicates an error of engine coolant temperature.

1.4 PRE-START SAFETY

A. FOLLOW THE RULE

- In operating, inspecting and serving the machine, follow the precaution and procedure for the safety described in this manual.
- Never operate machine when being in poor physical condition, having taken medicine (making sleepy), being under the influence of alcohol and being mentally unstable.
- When working in group and with instruction by flagman, make sufficient previous arrangement about the working contents and operate the machine according to the specified signal.

B. WHEN FAILURE WAS DETECTED

In operating or serving the machine, when the failure of machine (noise, vibration, smell, deviation of instrument, smoke, oil leaking and warning by warning device and multi-display) is detected, contact the person in charge immediately and take a proper measure. Do not operate the machine until the failure is removed.

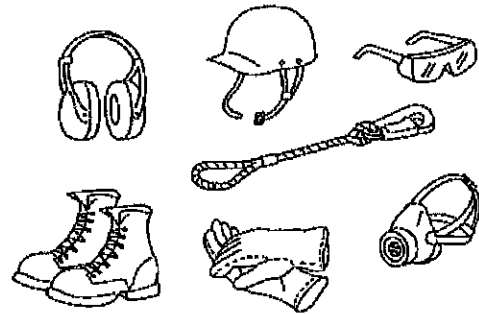
C. WEAR PROTECTIVE CLOTHING



Work clothing that has come in contact with oil could catch fire. Change clothes immediately.

Wear well fitting safety shoes, hard hat, and working clothes, and put on protective glasses, face shield, ear protection and gloves. When necessary, wear reflective vest.

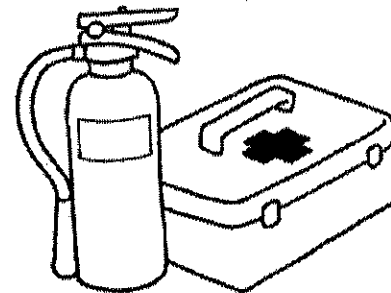
When operating attachments that produce flying debris, it is strongly recommended to purchase and install protective guards on the machine and close the all window to protect the operator from flying debris. Also the operator and all personnel in the area of the machine should wear protective gear such as safety shoes, hard hat, gloves and face shield or goggles.



D. PREPARE FOR EMERGENCIES

Have a fire extinguisher and First Aid Kit ready for emergencies. Know how to operate the fire extinguisher and know where the First Aid Kit is located for easy access in case of emergency.

Prepare beforehand the communication means in case of any emergency, and take note of telephone numbers for emergency contact.



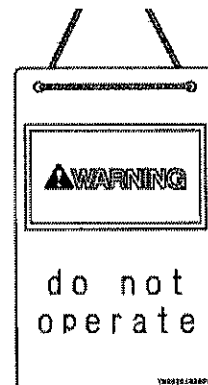
E. PRECAUTION TO BE TAKEN WITH DEVICES FOR SAFE

- Check that all protective guard and cover, and mirror are installed properly. If the failure is found, repair it immediately.
- Well understand how to use the device for safety.
- Never remove the device for safety and control it so that it always functions correctly.

F. TAG OUT MACHINE DURING MAINTENANCE

Before performing any inspection or maintenance procedures to the machine, post to the operators controls a "DO NOT OPERATE" tag to warn persons not to start the machine. Inform the supervisor and all operators that the machine is under inspection or maintenance and they will be informed when the machine is ready for normal operation.

Order tag P/No. YN20T01320P1



G. ENSURE SAFETY AT THE WORKSITE

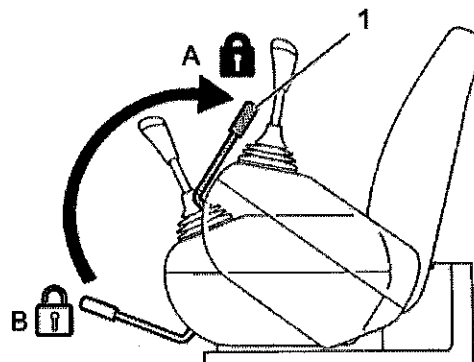
- Know the work area! Before operating the machine, carefully survey and record the land and worksite features to prevent the machine from falling or the soil from caving in.
- It is dangerous to allow other personnel to enter into the working area. Make the working area off-limits to other people by providing barricades. Provide a flagman in working areas with heavy traffic to avoid accidents.

H. ENGAGE SAFETY LOCK LEVER BEFORE LEAVING MACHINE

Before leaving the operator's seat, move the safety lock lever to the "LOCKED" (Up) position. This will not allow operation of any hydraulic controls should they be accidentally moved. If the lever is not set to the "LOCKED" position and hydraulic controls are touched accidentally, the machine may move suddenly resulting in serious injury or death. Before leaving the machine, lower the bucket to the ground, place the safety lock lever in the "LOCKED" (Up) position, stop the engine and remove the key from the starter key switch.

A. Locked position

B. Unlocked position

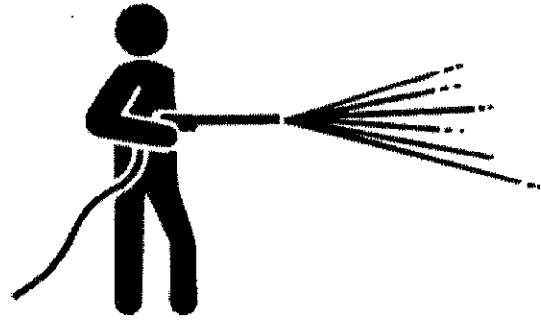


I. SIGNS, SIGNALS & FLAGMEN

Install signs on soft shoulders and ground areas, and have a flagman direct the operation if necessary. The operator should note marks and follow signals from the flagman. All personnel should know the meaning of the signs, marks, and signals. Only one flagman should give the signs and signals.

J. CLEAN THE MACHINE

Keep the machine clean and free of debris, excess or spilled lubricants, fuel and fluids. Use approved solvents, detergents and water to clean the machine and its components on a regular basis.



IMPORTANT

Be careful not to allow water to reach electrical components. Serious damage can occur to the electrical system by allowing water to reach the electrical components. Never clean inside of cab, or electrical components with pressurized water or steam.

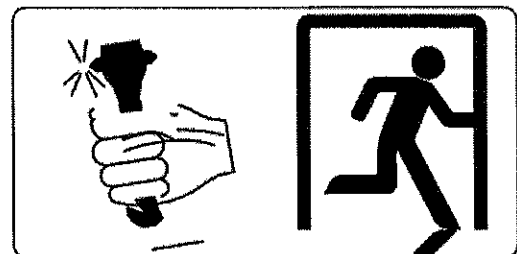
K. KEEP THE AREA AROUND THE OPERATOR SEAT CLEAN

- When taking the operator's seat, do not fail to remove mud, grease and oil, etc. on the sole of shoes. The sole with mud, grease and oil, etc. might slip on the pedal when operating resulting in accident.
Do not leave parts and tools in the area around the cab.
- Do not leave plastic bottle inside of the cab and put suction cup on the window glass. They may do the same job as lenses introducing the possibility of fire.
- Do not take dangerous substances like combustibles and explosive substances into the cab.
- Do not use radio and cellular phone in the cab in traveling operation and working operation.
- After using the ashtray, put out the fire of matches and cigarettes without fail and close the cover.
- Do not leave cigarette lighter inside of the cab. There is a possibility of fire due to high temperature.

L. HOW TO HANDLE LIFE HAMMER

A life hammer is provided on the right side of cab. In case of emergency, take the life hammer, break the cab glass, and escape from the cab.

In addition, the life hammer is equipped with a cutter on the lever side to cut the seat belt, etc.



IMPORTANT

For the emergency escape way, see "2.3.14 EMERGENCY ESCAPE FROM CAB" in Chapter 2.

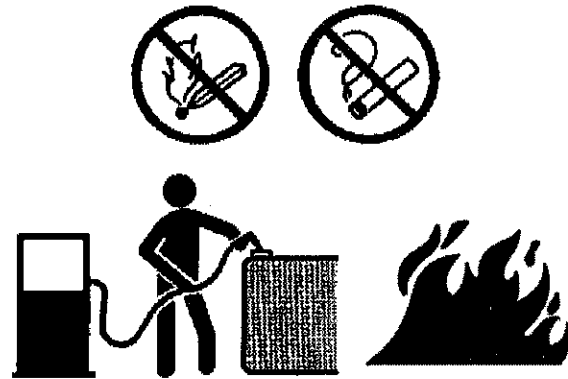
M. FIRE PREVENTION

Fire due to Fuel and Oil

There is a possibility of catching fire by bringing fire near inflammables like fuel, oil, antifreeze mixture, window washer, etc.

Follow precaution described below.

- Do not smoke close to the area and do not use the fire near the area.
- Make up shortage of fuel after stopping the engine.
- During making up shortage of fuel and oil, do not leave the place.
- Tighten caps for fuel and oil securely.
- Make sure not to spill out oil on the heated surface and the parts for electric system.
- Store fuel and oil in the specified place and keep out of the area excluding persons concerned.
- After refueling and lubrication, wipe off the spilled out fuel and oil, etc. immediately.
- Move the inflammables to the safe area before carrying out the grinding and welding works of machine.
- Use incombustible washing as wash oil for parts, etc. and do not use light oil and gasoline which might catch fire.
- Do not weld the pipes and tubes containing combustible liquid and do not employ gas cutting.



Fire due to Faulty Electric Wire

The fire may be caused by short-circuit of electric wire.

- Keep all connectors of electric wire clean and fix them securely.
- Check the wire for loosening and damage every day, and tighten loose connectors and clamps for wiring again and replace the damaged wire with new one.

Fire due to Faulty Piping

Check that the clamp, guard and cushion of hose and tube are securely fixed. The loosening may cause the damage of hose due to the vibration during operation and the scrubbing in contact to other parts and is in danger of fire and accident resulting in injury or death due to the spouting out of high pressure oil.

Use Approved Work Lights

Use only approved work lights when performing inspection and maintenance procedures to prevent possible fire or explosion. Certain types of work lights should not be used due to the possibility of ignition of certain flammable gasses and fluids from the machine.

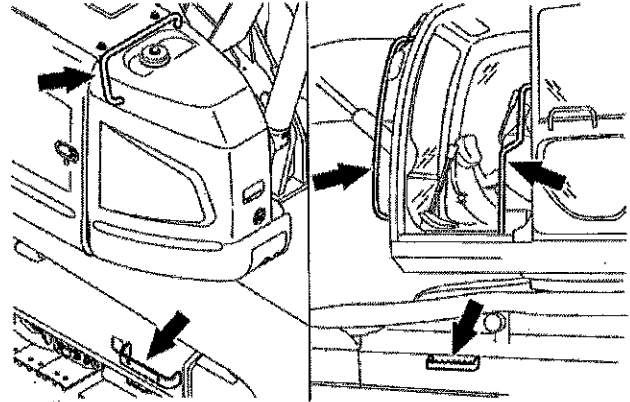
Measures to be Taken at the Time when Fire Occurred

When the fire occurred, escape from the machine according to the following way.

- Turn starter key switch off to stop engine.
- Carry out the early fire fighting with extinguisher if the spare time is left.
- Escape from the machine making use of hand rail and step.

N. PRECAUTION TO BE TAKEN AT THE TIME WHEN GETTING ON AND OFF MACHINE

- Getting on and off the machine from the side where the step and hand rail are provided.
- Before getting on and off the machine, check the step and hand rail for damage and loose bolts. If damage and loose bolts are found, repair them.
And if grease and oil, and mud adhered on the hand rail and step are found, remove them completely.
- When getting on and off the machine, do not fail to use the hand rail, step and crawler shoe faced to the machine and support the body at three points.
There are many people injured by jumping from the machine. Never jump from the machine.
- Do not get on and off the running machine.
- Do not use control lever and safety lock lever for getting on and off the machine.
- Do not get on and off the machine while holding tools by hand.



O. PERSON ON THE ATTACHMENT IS NOT ALLOWED

Do not ride person on the attachment. There is a possibility of serious injury or death like falling from the machine.

P. PAY ATTENTION TO THE NOISE

The large noise from the surrounding might cause hard hearing and deafness. If it is unavoidably necessary to enter in noisy area for long time, do not fail to wear protectors or earplugs.



Q. USE THE PROPER OPTIONAL ATTACHMENT

Use only optional attachments designed for and approved by manufacturer. Read, understand and follow all instructions in the manual accompanying the optional attachment. Use of any optional attachment not approved by manufacturer in writing, can cause serious injury to personnel, damage to the machine and its components and shorten the life of the machine.

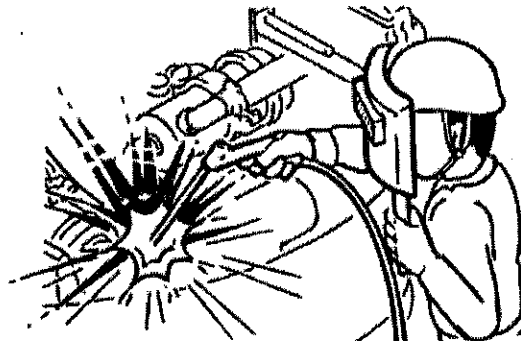
Contact an authorized our distributor for optional attachments available for the machine.

R. CAUTION TO MODIFICATION

Machine modification is allowed only when our distributor approves it. Unauthorized modification may cause injury or death.

Unauthorized modification voids the machine warranty.

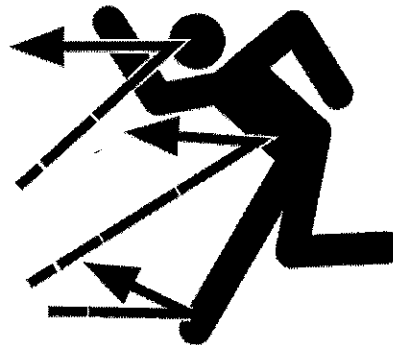
When any modification is intended, consult with the authorized dealer/distributor.



S. PAY ATTENTION TO FALLING MATERIALS AND FLYING DEBRIS

At the site where there is a possibility of falling material and flying debris, provide protective guard on it as required to protect operator from possible risks.

- Provide front guard (in option) on it at the time of hydraulic power breaker work, demolition work, and cutting work.
- In working operation, do not fail tot close the front window and door.
- At the sites like mine and quarry stone, etc. where there is a possibility of falling stone, do not fail to wear head guard (in option).
- When working at the site where there is a possibility of falling materials and flying debris, person other than operator must take enough distance from falling stone and flying debris.



T. PERFORM PRE-START INSPECTION

Walk around the machine before starting the machine, perform a PRESTART inspection of the machine and make note of any abnormality. If any problems are found, repair or replace defective components immediately. **DO NOT OPERATE THE MACHINE** until all problem areas are properly repaired. Always keep the windshield, work lamps, and mirrors clean for good visibility.

U. ADJUSTMENT OF OPERATOR'S SEAT

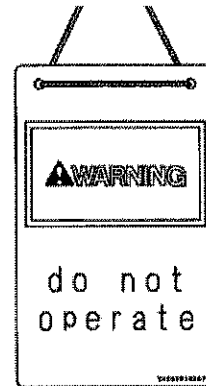
Adjust the operator's seat to the body of operator and the working contents, or operator might be tired causing accident.

- When operator changes, adjust the operator's seat without fail.
- In the condition where operator's back is fitted to the seat back, press pedal fully and check that the control lever, pedal and switch can be properly manipulated.



A. STARTING ENGINE

When the caution tag "Do not operate" or similar warning is indicated on the control lever or in the area around the cab, do not start engine and do not touch the control lever.

**B. PASSENGERS**

This equipment is not intended or designed for the transportation of persons. Do not allow persons to ride on the machine. Serious injury or death can result from allowing passengers on or in the machine.

C. SAFETY CHECK IN THE SURROUNDING BEFORE OPERATION

- Check that no one is in the area around the machine.
- Fix the door and window securely even though they are open or closed.
- Adjust the mirror to the position where the operator can see well the rear sight.
For the adjustment, refer to "Adjusting Mirror" in Chapter 3.
- Check that the alarm system like horn and travel alarm (if equipped) functions properly.

D. FASTEN SEAT BELT

Fasten seat belt so as to prevent receiving heavy blow inside of cab, being thrown out of the cab and being crushed under the machine at the time when the machine turned over. If not fastened, it causes serious injury or death.

Fasten seat belt without fail whenever taking the seat.

- Check the attaching bracket and attaching belt for possible failure before fastening the seat belt.
- Replace seat belt at least every 3 years even though no damage is found.

E. PRECAUTION TO BE TAKEN WHEN STARTING ENGINE

- Lock it with the safety lock lever.
- Sound the horn before starting the engine to alert people that the machine is being started.
- Start engine from the operator's seat.
- Do not short circuit the starter circuit or battery to start the engine. This may cause serious injury or cause damage to the electrical system.

F. CHECK AFTER STARTING ENGINE

Check the machine for proper operation after starting the engine. Slowly cycle attachments, swing, and travel functions in an area with sufficient space, without obstacles and personnel. Failure to do so could result in injury, death or machine damage. If any problems or damage is found on the machine, repair immediately.

G. WARM UP ENGINE AND HYDRAULIC OIL BEFORE OPERATION

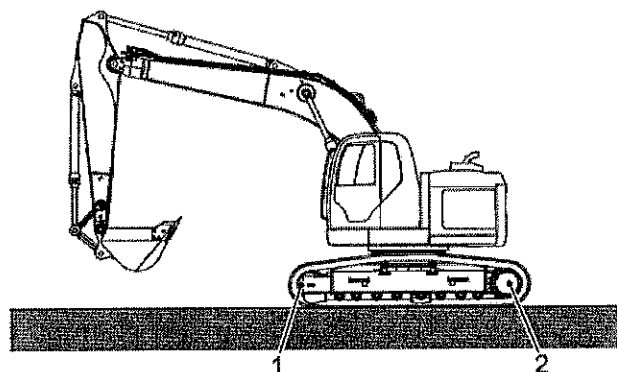
Take time to warm up the engine and hydraulic oil especially during cold season. In cold conditions, response of machine control is slow. This may cause injury, death or machine damage.

H. CONFIRM OPERATING CONTROL PATTERN

Slowly operate the control levers to confirm the operating patterns in advance. Make sure the operation control pattern is according to the indication plate.

I. CONFIRM TRAVEL DIRECTION

Before starting the machine, check the position of front idler (1). In the proper travel position, the front idler (1) is positioned on the front side and travel motor (2) is on the rear side.

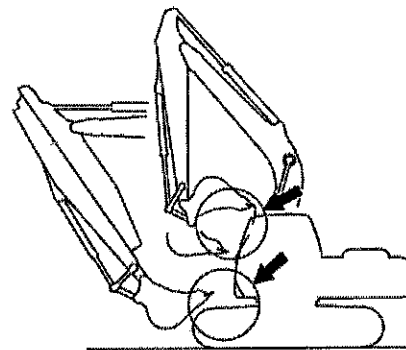


J. PROHIBIT RAPID LEVER OPERATION IN TRAVEL

- The rapid travel operation like urgent start is prohibited.
- The rapid lever change from forward to reverse (from reverse to forward) is not allowed.
- The rapid lever operation like urgent stop from the speed close to the maximum is not allowed.

K. DO NOT HIT CAB WITH ATTACHMENT

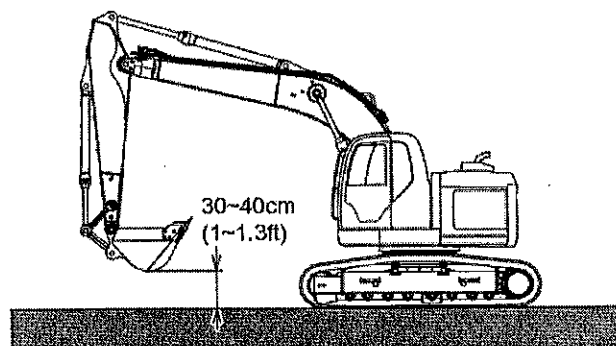
Check clearance between bucket and cab before operation. Slowly cycle bucket, check for interference with arm and cab, particularly if a lifting eye is welded on bucket bottom. Exercise care when operating the bucket near the cab.



L. PRECAUTION TO BE TAKEN IN TRAVEL

The firm and level ground must be used for traveling. And select the road in straight and large radius curve as much as possible, do not take sharp pivot turn and spin turn. In narrow area, swing the wheel in the opposite direction as many times as possible.

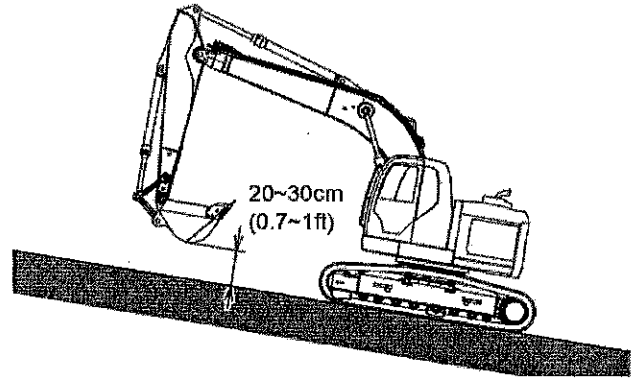
- When running, keep the attachment in the position the height from the ground is 30 to 40 cm (1 to 1.3 ft) as shown in the figure.
- The abrupt control lever operation and pedal operation are not allowed.
- When traveling on rough terrain, travel at slow speed.
- Travel the machine while keeping away from the obstruction as much as possible. If it is unavoidably necessary to get over the obstruction, travel at slow speed while keeping the position of attachment close to the ground.



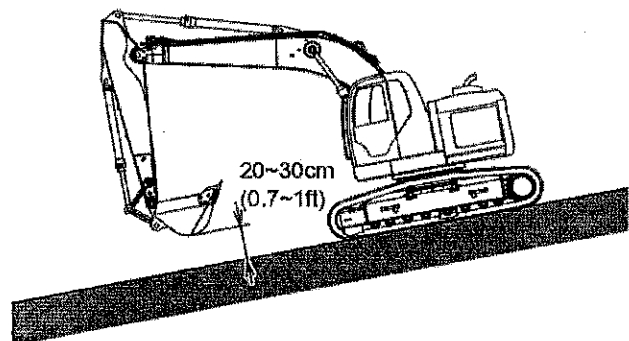
M. TRAVELING ON SLOPE

The traveling up and down on a slope 30 degree in angle or more is not allowed because there is a possibility of rollover.

- When traveling up and down on a slope, keep the attachment at the height of 20 to 30 cm (0.7 to 1 ft) from the ground so as to make the urgent stop possible at the time of emergency by putting the attachment down to the ground. And when traveling down the slope, travel at further slow speed.
- Reduce the speed when traveling on the grass and fallen leaves, and wet iron plate because it is easy to skid.

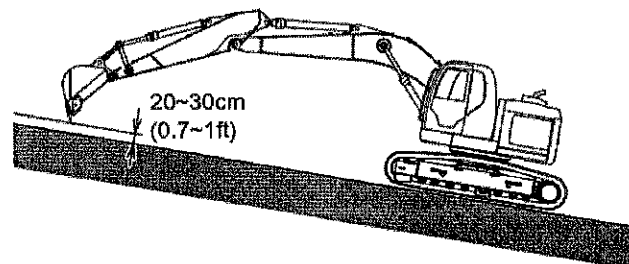


Traveling up on a slope



Traveling down on a slope

- When traveling up the slope, extend the front attachment to take the balance while keeping the height at 20 to 30 cm (0.7 to 1 ft) from the ground, and travel at slow speed.

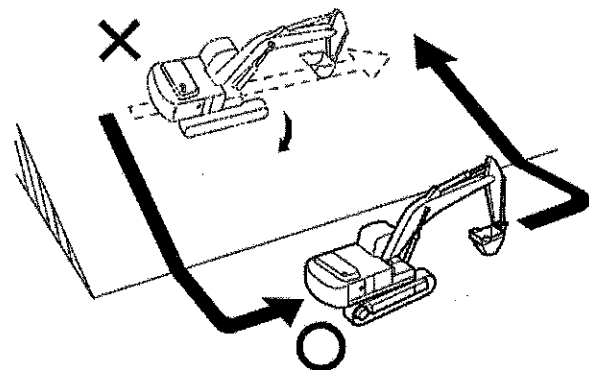


Traveling up on a slope

N. PRECAUTION TO BE TAKEN IN TRAVELING ON THE SLOPE

When traveling on a slope, be careful of turning over and skidding.

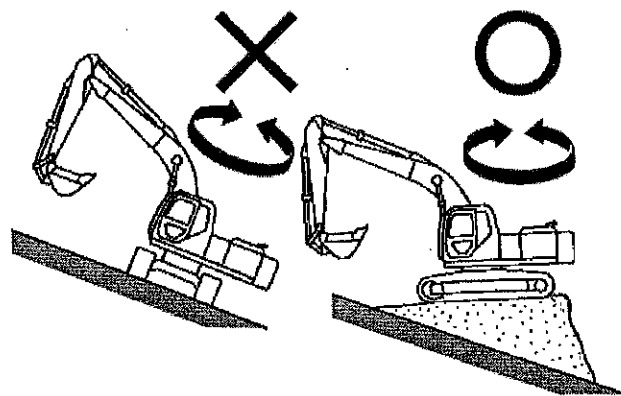
Keep the bucket at the height of 20 to 30 cm (0.7 to 1 ft) from the ground in order to make putting it down to the ground at emergency possible. Do not turn the direction and go across on a slope, but go down to the flat space and take a detour-route for safety.



- Do not travel on a slope that the slope angle is 30 degree or over. And do not traverse a slope that the slope angle is 15 degree or over.

O. OPERATING ON INCLINES OR SLOPES

- Operation of this machine on an incline or slope may cause the machine to become unstable or unbalanced. Work up and down inclines or slopes, do not across. Do not swing or turn machine around on a slope. Build a level area for the machine to operate. Operate controls carefully to prevent sudden movements which may cause the machine to slide or rollover.
- When the engine was stalled, put down the bucket on the ground and return every lever to the neutral position, then start the engine again.
- Even if the swing operation is stopped on a slope, the machine might swing by the machine's own weight.
Operate the machine carefully when you operate the machine on a slope.
Place the bucket to the ground when you park the machine by necessity on a slope.



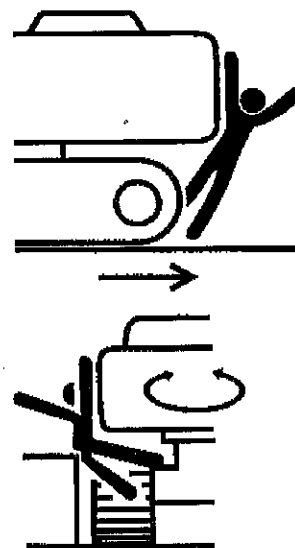
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P. FROZEN & SNOW COVERED WORK SITES

Use extreme caution when operating the machine on frozen or snow covered work sites. Operate all controls slowly and cautiously to prevent sudden movements such as start/stop/turn, that may cause the machine to unexpectedly shift, slide or move. Even on the slightest slope, when snow is present or work area is frozen can allow a machine to unexpectedly move. Snow on shoulders or snow drifts can be much deeper than expected. The machine can easily become buried under such conditions. Use extreme caution while operating the machine around or in snow. Be careful for frozen ground that becomes soft along with the increase of ambient temperature.

Q. SWING / TRAVEL FUNCTION

Make sure the swing and travel area of machine is clear of all persons and obstacles before operating swing/travel controls. Sound horn before operating swing/travel machine. If necessary, have a flagman signal operator during operation to prevent injury to persons or damage to obstacles and equipment.



R. WORKING AROUND UNDER GROUND UTILITY LINES

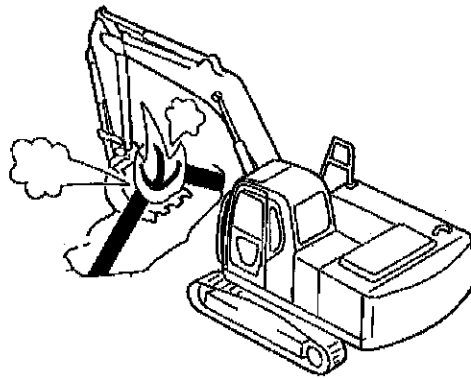
During operation it is likely that you will be working around or near buried utility lines which may include, but are not limited to:

- Electrical Power Line
- Gas Line
- Water Line
- Communication Line: Telephone or Cable Television

Before beginning any trenching, drilling or other construction work it is your responsibility to be aware of all such utility lines buried in the area of your project and to avoid them.

ALWAYS have all local utility companies mark the location of their lines.

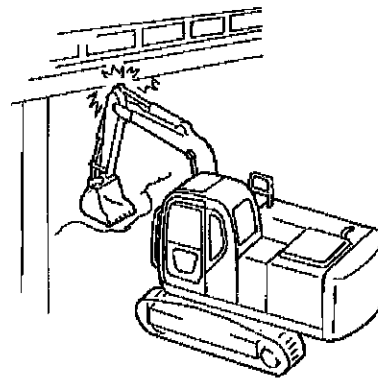
Check with local authorities for laws, regulations and/or strict penalties requiring you to locate and avoid existing utilities.



S. RESTRICTED WORK AREAS

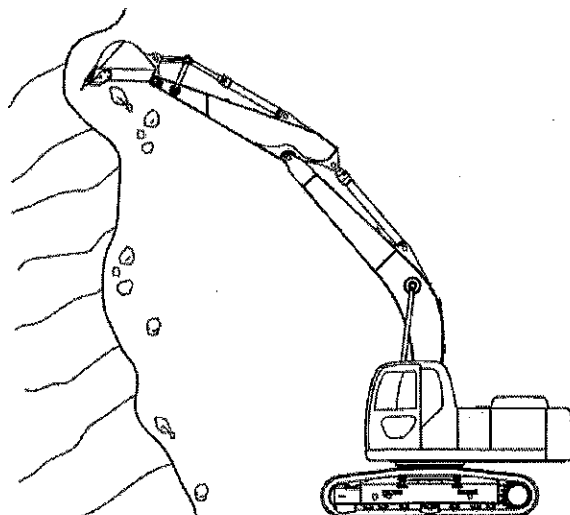
In work sites with limited height and swing / traveling areas such as tunnels, bridges, around electrical power lines, other utilities, or inside structures. Use extreme caution on work sites with limited height and swing/traveling areas such as tunnels, bridges, around electrical power lines, other utilities or inside structure. Keep the machine and its attachment a safe distance to prevent injury, death or damage on equipment or structure.

Use a flagman to guide the operators.



T. DO NOT WORK UNDER PRECIPICE / OVERHANG

Do not dig under the precipice. It may cause falling rocks or loosening of the precipice resulting in injury, death or machine damage.



U. CHECK THAT NO PERSON IS UNDER THE BUCKET

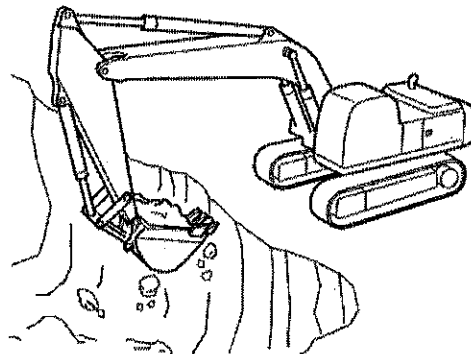
There is a possibility of accident resulting in injury or death and the damage of machine due to the fall of sand/earth and the direct contact with bucket when the bucket and attachment pass through over the worker and the driver's seat of dump truck. Do not pass the bucket through over person for safety.



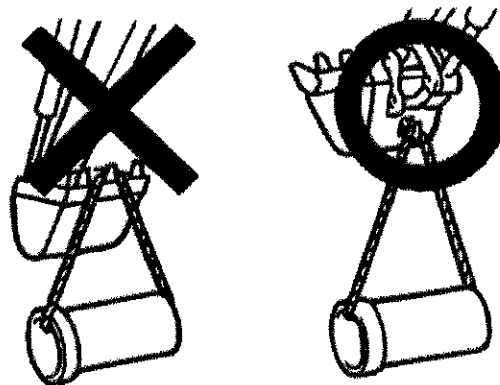
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V. GROUND STABILITY

Make sure the condition of the work site is stable and capable of supporting the machine weight during operation. Do not operate attachment too close to the machine. Operation of the machine on shoulders or filled areas could cause the machine to become unstable presenting a work hazard. Position the crawler at right angle to shoulder and the travel motors to the rear of the machine, allowing for quick reversal, should the work area become unstable.



W. LIFTING



Before operating the machine, make sure the job-site of machine is clear of all persons and obstacles. And park the machine on the hard and level ground. If the machine is equipped with the level gauge, confirm the inclination of the machine with the level gauge. Do not use the tooth of bucket for lifting load. Lift the load with a special lifting device such as hook.

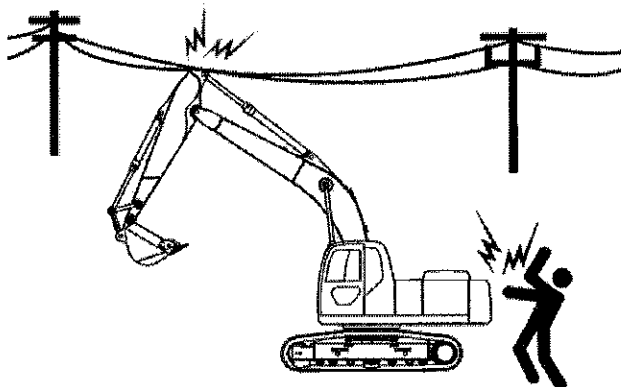
Note

The machine for Australia equips the level gauge as standard equipment.

X. WORKING AROUND UTILITIES

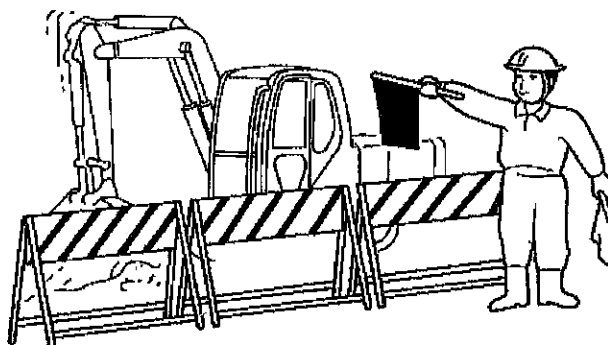
If it is suspected that utility lines such as, gas, water, phone or electrical power are in the work area, contact the local utility authority for line location BEFORE beginning work in the area. Use extreme caution around electrical power lines. Keep a sufficient distance away from electrical lines during operation. See chart below for minimum distances.

LINE VOLTAGE	MINIMUM DISTANCE-m (feet)
0 ~ 50,000	3.0 m (10) or more
50,000 ~ 200,000	4.5 m (15) or more
200,000 ~ 350,000	6.0 m (20) or more
350,000 ~ 500,000	7.5 m (25) or more
500,000 ~ 750,000	10.5 m (35) or more
750,000 ~ 1,000,000	13.5 m (45) or more



Y. SET LIMITS TO WORKING AREA

Set limits around the working area to avoid collision, injury or death. Check for obstacles and personnel while swinging. Use a flagman to guide the operator whenever necessary.



Z. CAUTION FOR WORK IN URBAN AREAS

It is dangerous to allow other personnel to enter into the working area. Make the working area off-limits to other people by providing barricades. Provide a flagman in working areas with heavy traffic to avoid accidents.

AA. WORK WITH SUFFICIENT LIGHTING

When working in dark places, turn on the work lamp. And if required, provide additional lighting facilities to assure good visibility.

Stop working when it is impossible to ensure the visual field due to fog, snow or rain.

BB. SLIPPERY OPERATION SURFACE

Use caution when operating machine on boards or steel plates. Boards and steel plates become very slippery when wet.

Pay special attention when working on inclined areas.

Provide a device to prevent skidding and operate with extra care. Piled up tree leaves or branches also may causes skidding.

CC. STRENGTHEN SOFT GROUND

When working on a soft ground or marshy area, the machine may sink.

Be aware that frozen ground becomes soft with the increase of ambient temperature.

Use logs or lumber positioned in the opposite direction of the track to prevent the machine from sinking.

DD. LOOSE / UNSTABLE GROUND AFTER RAIN

Be careful for the possibility of machine rollover after rain.

The vibration and weight of the machine could cause shoulder of road or pathway to become loose or unstable.

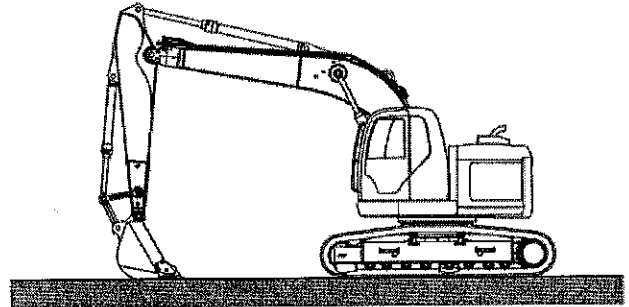
Inspect the areas where the machine will travel and operate on to assure safe operation is possible. Pay attention for possible loosened precipice/overhang or shoulder of road, and falling rocks. Always pay attention for unexploded dynamite on job sites where dynamite is used.

EE. SAFETY CHECK IN PARKING MACHINES

When the machine is not parked properly, there is a possibility of unexpected overrun, risks due to barbarous act and dangerous movement at the time of the coming start.

Park the machine following the safety parking procedure shown below.

- Park the machine on the firm and level ground to prevent overrun.
- Put the working equipment like bucket and dozer (if equipped) on the ground.
- Secure the safety lock lever to "LOCKED" position.
- Perform the cool-down operation of engine at low idling for 5 minutes.
- Stop the engine by switching the starter key switch off and then take out the key.
- When leaving from the machine, close the window, door of cab and all doors and covers and lock them.



A. READ CAREFULLY OPERATING/MAINTENANCE PROCEDURES

Incorrect maintenance may cause not only damages on the machine, but also injury.

Read and fully understand the maintenance procedures and safety precautions described in the operation and maintenance manual before performing any maintenance in this machine.

B. CONFIRM UNDERSTANDING OF HAND SIGNALS AND COMMUNICATION USED ON JOB SITE

Have a meeting before starting work on the job site. Confirm all workers understand all hand signals, flag signals and other means of communication used on the job site to avoid any accidents or injuries.

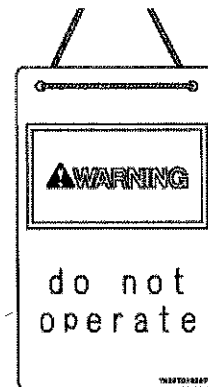
C. ORGANIZE AND CLEAN UP WORKING AREA

Organize and clean up the working area.

Remove any obstacles and also remove any grease, oil, paint, broken pieces, etc., from the working area to avoid injury.

D. "TAG-OUT" MACHINE

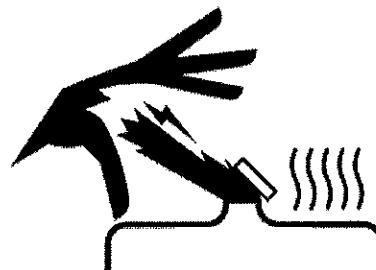
Before performing any inspection or maintenance procedures to the machine, fill out and post to the operator's controls a "DO NOT OPERATE" tag to warn persons not to start the machine. Also inform the supervisor and all operators that the machine is under inspection or maintenance and they will be informed when the machine is ready for normal operation.

**E. TOOLS & EQUIPMENT**

Use the proper tools and equipment for the task at hand. Know the proper use of the tools and equipment before starting any inspection or maintenance procedures.

F. PRESSURIZED FLUIDS & LUBRICANTS

Always release pressure from hydraulic reservoir, engine coolant, fuel system and all systems containing pressure before removing any caps or components. Be cautious of hot fluids and gasses from systems on machines that have just been stopped. Allow sufficient time for systems to cool before performing any inspection or maintenance procedures.

**G. AVOID HOT SURFACES & AREAS**

Immediately after the machine is operated, the temperature and pressure of the engine coolant, engine oil and hydraulic oil are very high. Burns may result if caps are removed, or oil, water, or filters are changed under these conditions.

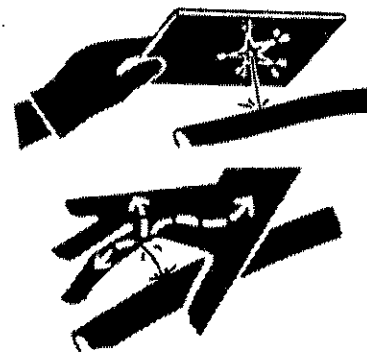
Wait until the temperature goes down, before attempting to check fluids or change filters.



H. HYDRAULIC PRESSURE

Under normal conditions, all circuits of the hydraulic system are under extreme pressure. When inspecting for leaks, use a small piece of cardboard, wood or metal to locate leaks. Small (pinhole) leaks can be dangerous if contact with skin or eyes is made.

Wear approved safety glasses or face shield, gloves, hard hat, safety shoes and work clothes during all inspection and maintenance procedures. Seek immediate medical assistance if injury occurs.



I. RELIEVE THE HIGH PRESSURE IN FUEL LINE

The engine fuel line generates high pressure in operation. In checking and servicing the fuel line, wait for 30 seconds to start checking and servicing until the internal pressure is released.

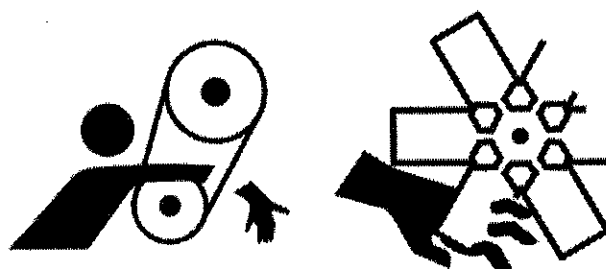
J. STOP ENGINE

Do not attempt any MAINTENANCE with engine running. Always stop the engine and allow machine to cool to avoid injury.

Otherwise, there is a possibility of danger that your hand may be caught in the cooling fan or fan belt resulting injury.

If it is unavoidable to operate the engine for inspection or maintenance, carry out the work with two people.

The person seated in the operator's seat should be ready to stop the engine at any time while watching for a signal from the other person.

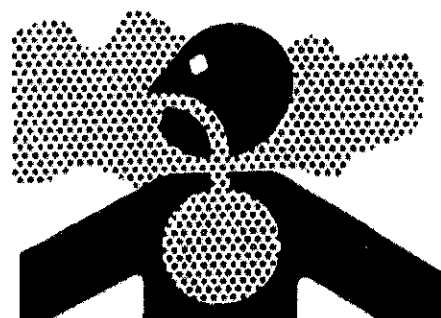


K. VENTILATION PRECAUTIONS

Operation of the machine indoor or in a place with poor ventilation may cause poisoning by gas.

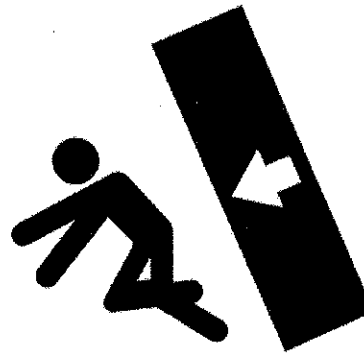
Ventilate any exhaust gas, fuel, cleaning oil, paint or similar articles.

Make sure there is proper ventilation in the working area when the machine is operated indoors. Provide a ventilating fan, if required.



L. REMOVING AND INSTALLING ATTACHMENTS, AND STORING ATTACHMENTS

- Remove and install attachments after appointing a man to supervisor in advance.
- The attachment in danger of falling should be stored in the stable condition where supported in order not be fallen. And entry into the stored area of person other than the person concerned is prohibited.



M. USE SUPPORT EQUIPMENT DURING SERVICE

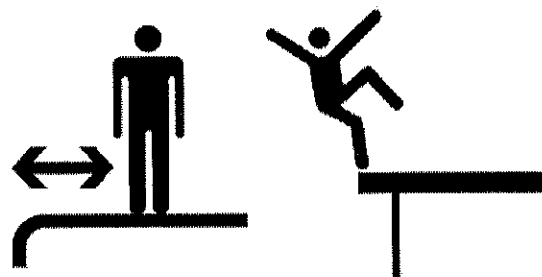
- When machine inspection or maintenance is done under the boom, arm or under the bucket/attachment use proper equipments or blocks to secure the attachment.
 - The work in the condition where the crawler is floated by arm and boom causes the danger of falling of the machine if the control lever is shifted unexpectedly or the piping is broken.
- No one is admitted to enter under the unstable machine.



N. WORKING ABOVE GROUND

There is a danger of falling when working on areas above ground.

- Do not approach edges.
- Use the appropriate equipment, such as ladders or platform when working above ground. In addition, strap yourself to the proper equipment accordingly.
- Avoid spillage of any oil or grease.
- Do not leave any tools around the working area.
- Use extreme caution to avoid slipping while walking.
- Do not jump on or from the machine. Use the steps and handrails and securely maintain a three point contact while mounting or dismounting at all times.



O. DO NOT DROP OFF TOOLS AND PARTS

Dropping of any tools and parts in the working area may cause injury or faulty machine operation. Do not leave any tools or articles in the working area or component compartment. Store all tools properly when the work is completed.

P. GENERAL GUIDELINES FOR WELDING

Welding work must be performed by a certified welder with sufficient experience. In addition, safety practices must be followed by any personnel involved in such work. Identify all cracks to be repaired or areas to be welded by thoroughly cleaning the suspected surface, remove paint, and check with dye penetrant or magnetic particle testing. The life expectancy of the welded area depends on the work quality and the attention given to details during welding.

- Turn starter key to "OFF" position.
- Remove negative (-) cable from battery terminal to turn off the current.
- Attach welder ground cable with 1 m {3.3 ft} from component being welded.
If grounding cable is attached near electric parts/connectors, these electric parts/connectors may cause damaging.
- Attach welder ground cable near the weld area. Furthermore, the cable attached are is to be positioned at the same welding area.
- Make sure that neither bearing nor seal are there between the welder ground and the weld area.
- Do not attach the welder ground cable to the near attachment pin and/or cylinder. It causes the damage of plating.
- Remove paint from any surface to be welded. Painted surfaces produce unhealthy gasses when welded.
- Always wear protective clothing appropriate to the welding, and use protective equipment for the welding job.
- Perform work in a well ventilated areas.
- Clear the flammable items and provide the fire extinguisher.

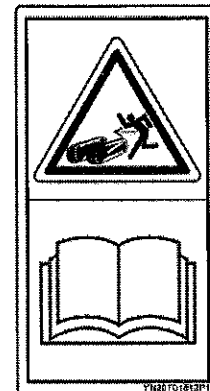


AVOID FIRE HAZARDS

- Provide a fully charged fire extinguisher at all times while performing grinding, heating, or welding.
 - Clean oil and/or flammable materials from any surface to be cut.
 - Protect all flammable parts and surfaces from sparks and/or flames
- Perform work in a well ventilated area.
- Keep sparks and flames away from paint and/or solvent.
 - Keep away sparks and flames from cylinder rods, seals, electrical wires, and/or hydraulic hoses.

Q. CRAWLER SHOE TENSION

- Grease in track tensioning mechanism is under extreme pressure and can penetrate skin causing severe injury.
Keep face and body away from grease fitting area.
- Do not loosen grease fitting more than one turn.
If grease does not release after one turn of the fitting, call our dealer/distributor for assistance.



R. CRAWLER BELT/TRACK TENSION

The grease used to adjust the crawler belt tension is under extreme pressure in the cylinder. Use extreme caution when adjusting crawler belt tension. **KEEP FACE, HANDS AND LEGS AWAY FROM THE GREASE FITTING AREA.**

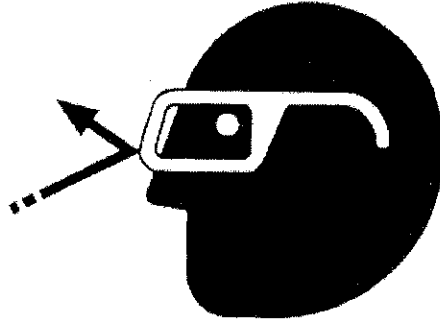
Carefully and slowly loosen the grease fitting when lessening crawler belt tension. Never loosen grease fitting more than one complete turn.

See 4-39 for the procedures to adjust the tension of the crawler belt/track.

S. PAYING ATTENTION TO BROKEN PIECES WHEN HAMMERING

Flying debris may cause injury when hammering hard metal parts, such as pin, edge, tooth, bearing, etc.

Wear protective clothes such as protective glasses, safety hat, etc. during maintenance.



T. PAY ATTENTION TO REFRIGERANT OF AIR-CONDITIONER

- When inhaled refrigerant of air-conditioner carelessly, it will exert deadly effect to the human body.
- Do not bring fire near the area where the air conditioner is serviced and gas is generated.
- Use recovery recycling system to prevent cooling medium from escaping into atmosphere.
- Do not loosen the parts for refrigerant circuit because there is a possibility of loss of eyesight and frostbite by getting refrigerant in eyes and by directly touching it by hand.

U. DO NOT HEAT HYDRAULIC EQUIPMENT OR PIPING

Do not apply heat to hydraulic equipment or piping, such as welding, soldering, heating with torch, etc. Heating of hydraulic components or piping will cause gas expansion, which can easily catch fire and/or explode.

- Do not heat the section close to the tube and hose contained pressurized oil or other flammable materials by welding, soldering and torch.
- If the pressurized tube and hose is heated directly, they may be suddenly cut. When carrying out the welding and soldering works, cover the tube, hose, and other flammable materials with fire-proofed cover for fire prevention.
- Before welding and gas cutting, remove flammable fluid completely with nonflammable solvent.



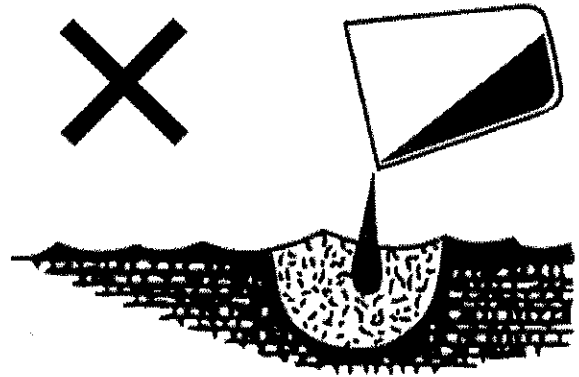
V. AFTER COMPLETION OF MAINTENANCE WORK

Check machine for proper functioning when any maintenance is completed:

- After any maintenance work is completed, operate the engine at low idle, and check for leakages and abnormalities.
- Slowly operate each machine function to confirm proper operation.
- Increase the engine speed gradually, and again check for leakages and abnormalities.
- Operate each control lever carefully for smooth operation.

W. DISPOSE OF WASTE PROPERLY

Dispose of oils, fuel, coolant, solvents, filters, batteries etc. according to federal, state and local codes and regulations regarding hazardous waste disposal. Contact local authorities for proper disposal methods of such materials.



A. BURN PREVENTION

Battery acid or battery explosion can cause serious injuries.

Before you service a battery, always wear face protection, protective gloves and protective clothing.

Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing.

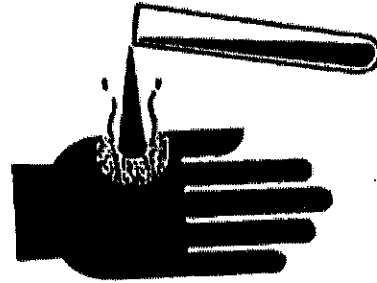
Antidote:

External: Flush with water.

Internal: Drink large quantity of water or milk.

Follow with milk of magnesia, beaten egg or vegetable oil. Call physician immediately.

Eyes: Flush with water for 15 minutes and get prompt medical attention.

**B. BATTERY EXPLOSION PREVENTION**

- Batteries give off explosive gases. Keep all open flames, sparks and cigarettes away.
- Always securely tighten cell caps.
- Always securely tighten batteries terminals.
- When batteries are charged, remove the batteries from a machine. And charge the batteries in a well ventilated area. At that time, remove cell caps to allow gasses to escape.



- When the battery electrolyte is frozen, the battery can explode, if you try to charge the battery, or you try to jump start and run the engine.
To prevent the explosion, warm the battery to 16 deg.C or higher.
- When the battery electrolyte is frozen, the battery can explode, if you try to charge the battery, or you try to jump start and run the engine.
To prevent the explosion, warm the battery to 16 deg.C or higher.

C. REPLACING THE BATTERIES

- Turn the engine start switch to OFF.
- When disconnecting the battery cables, always disconnect the negative (-) cable first. When reconnecting the battery cables, always connect the positive (+) cable first.
- If the metal items (Tools) bridge between the battery positive (+) terminal and the machine, the short circuit occurs and sparks. It causes fire and explosion. Do not place the metal items between the battery positive (+) terminal and the machine.
- Do not invert battery terminals. Connect positive cable ends to positive (+) terminals and negative cable ends to negative terminals (-).
Connect the negative (-) terminal to the upper-frame of the machine last.

D. USING BOOSTER CABLES TO START THE ENGINE

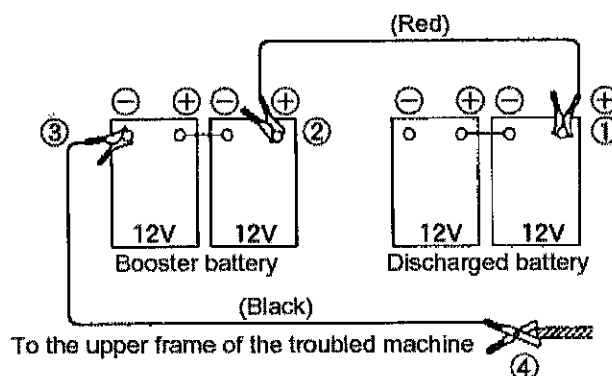
CAUTION

1. Use the same capacity battery of disabled battery for boosting battery.
2. Connect clip of booster cables securely.
3. Check that the safety lock lever is in the locked position.
4. Check that control lever was returned to neutral position.
5. Turn off both starter key switches of normal machine and troubled machine. When the machine is powered on, machine may unexpectedly start and it causes accident.

Procedure:

1. Put attachment on the ground, return all control levers to neutral position and then lock the safety lock lever.
2. Set the starter key switch to "OFF" for both boost vehicle and disabled machine.
3. Connect the booster cable (red) clip to the positive (+) terminal on the battery of disabled machine.
4. Connect the clip from the other end of the positive (+) booster cable (red) to the positive (+) terminal on the battery of boost vehicle.

Cable connecting order ①→②→③→④
Cable disconnecting order ④→③→②→①



5. Connect the booster cable (black) clip to the negative (-) terminal on the battery of boost vehicle.
6. Finally, connect the clip from the other end of the negative (-) booster cable (black) to the upper frame of disabled machine, away from the battery.
7. Start the engine of boost vehicle, and run it for about 10 minutes at high idle.
8. Start the engine of disabled machine.
9. After starting the engine of disabled machine, remove the booster cables in the reverse order of the above connection order.
10. Check and repair the cause of the problem of the charging system on the disabled machine.

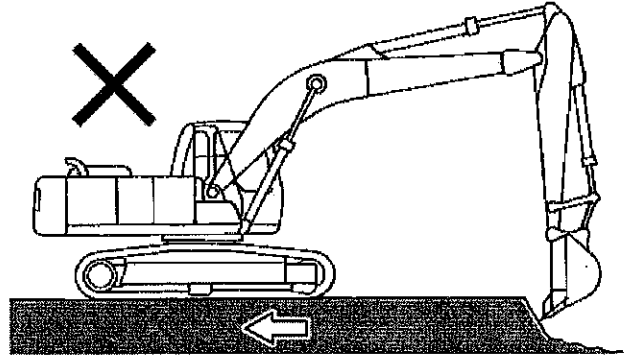
E. DISPOSE OF WASTE PROPERLY

- Turn the engine start switch to OFF.
- When disconnecting the battery cables, always disconnect the negative (-) cable first. When reconnecting the battery cables, always connect the positive (+) cable first.
- If the metal items (Tools) bridge between the battery positive (+) terminal and the machine, the short circuit occurs and sparks. It causes fire and explosion. Do not place the metal items between the battery positive (+) terminal and the machine.
- Do not invert battery terminals. Connect positive cable ends to positive (+) terminals and negative cable ends to negative terminals (-).
Connect the negative (-) terminal to the upper-frame of the machine last.

The following examples of machine abuse and misuse should never be attempted by even the most experienced operator. Such abuse and misuse of this machine and its attachments can result in serious injury, death, severe equipment damage and shortened service life of the machine. Under no circumstance should any of these operations be attempted. Use common sense and follow proper operation procedures found in this OPERATOR'S MANUAL while operating this equipment.

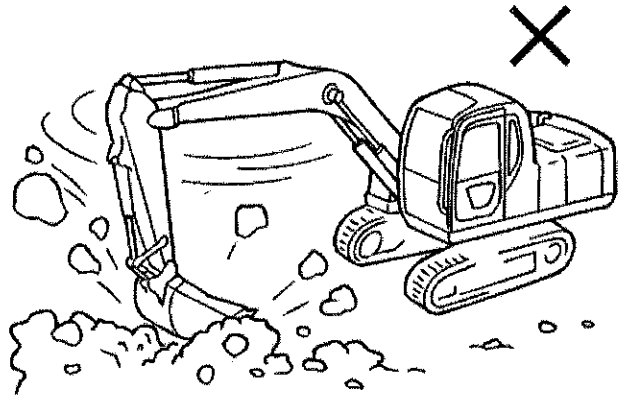
A. DO NOT USE TRACTIVE FORCE OF THE MACHINE FOR LOADING THE BUCKET ATTACHMENT

Doing so will exert excessive force on the machine structure, front end attachments and could cause severe equipment damage. Use crawlers for normal travel operations only.



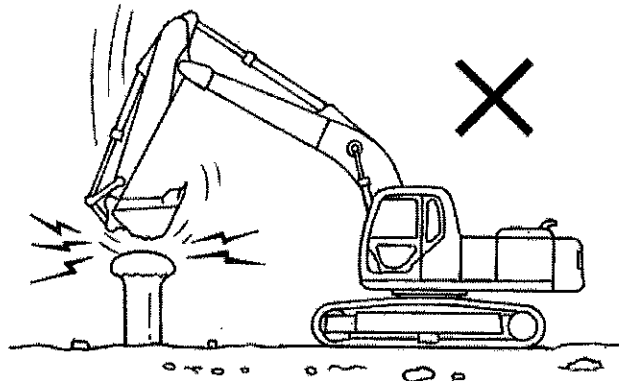
B. DO NOT USE SLEWING FORCE OF THE MACHINE FOR OPERATIONS

Doing so will exert excessive force to the machine structure, front end attachments and shorten life of the slewing system of the machine. Also, serious injury or death could result from such operations.



C. DO NOT PERFORM "HAMMERING" OPERATIONS WITH THE BUCKET

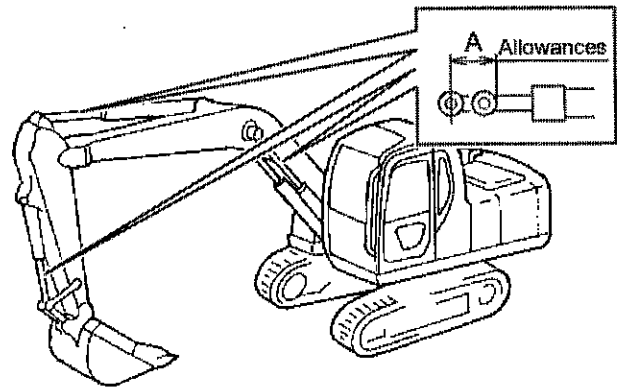
Performing operations such as hammering and piling will cause extensive damage to the machine and its components. These types of operations can also result in serious injury or death.



D. DO NOT OPERATE BUCKET AND ARM CYLINDERS TO STROKE END REPEATEDLY

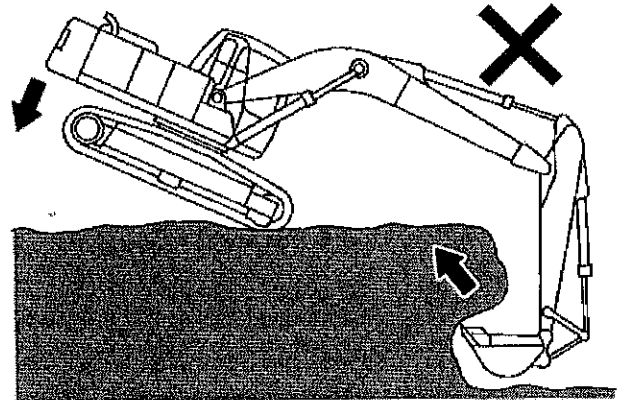
Extending the bucket and arm cylinders to stroke end to clean debris from the bucket, will cause impact to the bucket cylinder causing cylinder damage. Use high pressure water or manually remove stubborn material from the bucket.

A. ALLOWANCES



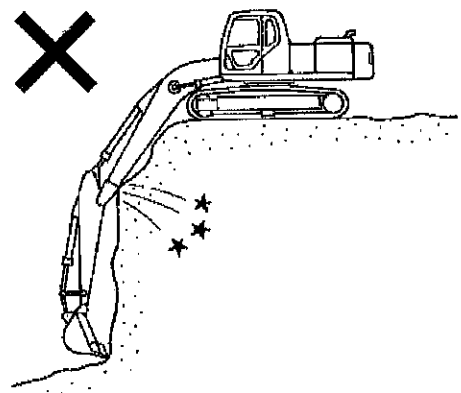
E. DO NOT OVER EXERT THE MACHINE'S CAPACITIES

Know the limitations of the machine and its attachments and operate the machine within those specifications. Do not exceed lift charts. Do not tip or raise the machine to obtain power to move material. This could cause extensive damage to the machine and its components as well as result in serious bodily injury or death.



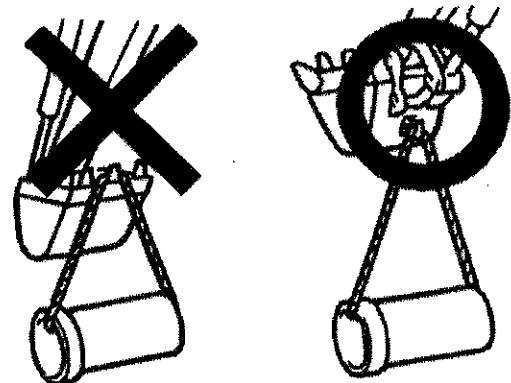
F. DEEP EXCAVATION OPERATION

During deep excavation, be careful in order that the belly sides of boom and bucket cylinder hose do not come into contact with ground. When lowering the boom to the lower limit, be careful in order that the boom does not interfere with crawler shoe.



G. DO NOT USE THIS MACHINE FOR ANYTHING OTHER THAN ITS INTENDED PURPOSE

This machine is designed and manufactured for digging, loading and ground leveling operations only. Any other use can exert excessive force to the machine, its components, its systems and result in serious injury or death to the operator and other personnel working in the area of the machine.



H. AVOID OBSTACLES WITH DOZER BLADE.

Do not strike any obstacles such as large rocks.
The dozer blade may be damaged.



I. ATTACHMENT TRAVEL POSITION.

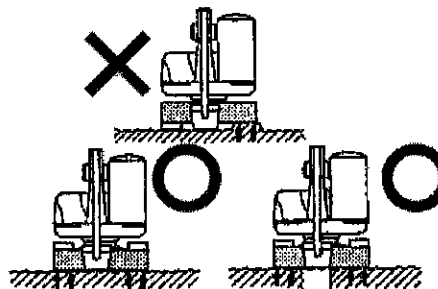
When moving the attachment into the travel position, do not hit the dozer blade with the bucket/attachment.



J. DO NOT SUPPORT MACHINE WITH DOZER BLADE AT ONE END.

When the dozer blade is used as an outrigger, do not support the machine at one end of the dozer blade.

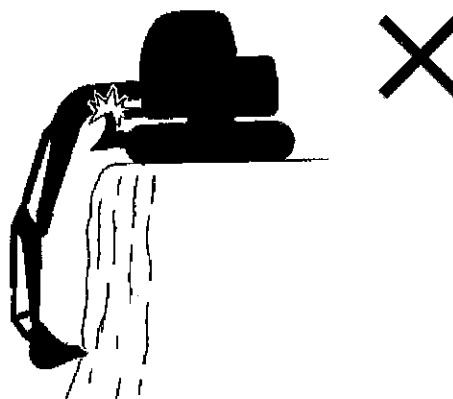
Make sure the support at both ends.



K. DEEP EXCAVATION OPERATION

During deep excavation with the dozer blade in front, the boom cylinder could come in contact with the dozer blade.

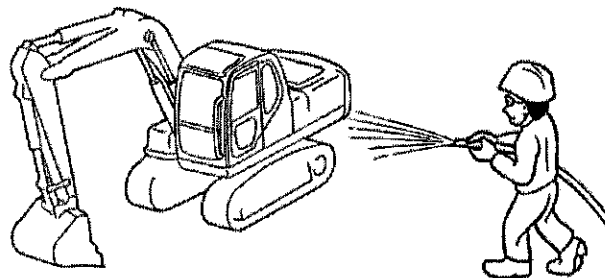
Place the dozer blade in the back of the machine for deep excavations, unless the working area does not permit it.



1.9 END OF WORK SHIFT SAFETY

Perform all of the following procedures after each shift is complete to insure the machine it in optimal operating condition for the next shift or job site.

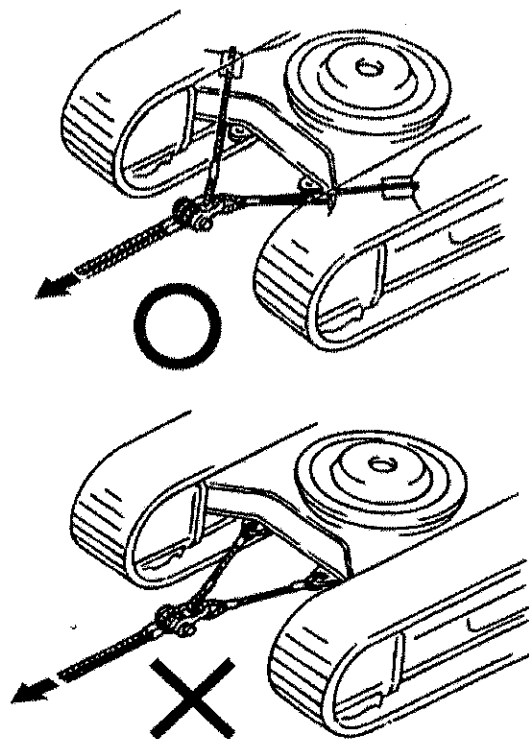
1. Move the machine to a firm, level surface.
2. Lower attachment to the ground.
3. Refill fuel tank to full mark to reduce air volume and condensation (moisture). This will decrease the possibility of freezing in the fuel tank rusting due to moisture and other problems associated with start up and operation.
4. Close and secure all windows in place to prevent water or moisture reaching the electrical components of the machine.
5. Thoroughly clean and inspect the machine. Perform lubrication maintenance and repair or replace any problem areas found before restarting the machine.
6. If performing the machine storage in cold climates, it may be necessary to remove the batteries from the machine and store in a warm well ventilated area. Install the batteries in the machine before next start up. This will help prevent premature battery deterioration.
7. Remove key from key switch and lock all doors and access panels.



END OF WORK SHIFT SAFETY

1.10 TOWING THE MACHINE

1. If the machine should become stuck in soft soil areas it may be necessary to tow the machine. Attach a wire rope or chain, with the capacity to pull the machine out, to the lower frame.
2. Attach other end to the vehicle used to pull the machine. Operate the machine's travel lever in the proper direction while pulling with the other vehicle.



WARNING AVOID INJURY

- While towing, do not enter area between the machine and towing vehicle.
- Do not apply a shock load onto the towing rope.
- Do not use eyes on machine lower frame to tow machine.
- Keep the wire rope horizontally, and perpendicular to the crawler frame.
- Tow the machine slowly in low speed mode.
- For the towing of the machine body, provide pads to be applied to the corner of crawler frame to prevent the wire rope and crawler frame from any damages.



Do not pull machine utilizing the brackets welded on the lower plates of the undercarriage. These brackets are provided for pulling lightweight objects. See figure for better reference.

1.11 ENSURING VISIBILITY

This machine is equipped with mirror and so on to ensure sufficient visibility, but there are areas where are outside the field of vision from the operator. Pay special attention to the invisible area and operate the machine.

When traveling and working in poor visibility area, there is a possibility of injuries and accidents resulting in death because it is hard for operator to see the conditions of obstructions and the work area around the machine. Follow the followings when traveling and working in poor visibility area.

- When right visibility is poor due to attachment, raise the attachment to ensure visibility.
- Clean and adjust mirror at the pre-start inspection to ensure the visibility.
- When rearward visibility monitoring camera (option) is equipped with, clean the lens for clear vision.
- When the visibility can not be ensured sufficiently, provide a flagman in the working areas. Follow the instructions of flagman and pay attention to the signal.
- The signal shall be given by one flagman.
- When working in dark places, turn on the work light. And if required, provide additional lighting facilities to ensure good visibility.
- Stop working when it is impossible to ensure the visual field due to fog, snow or rain.

WARNING

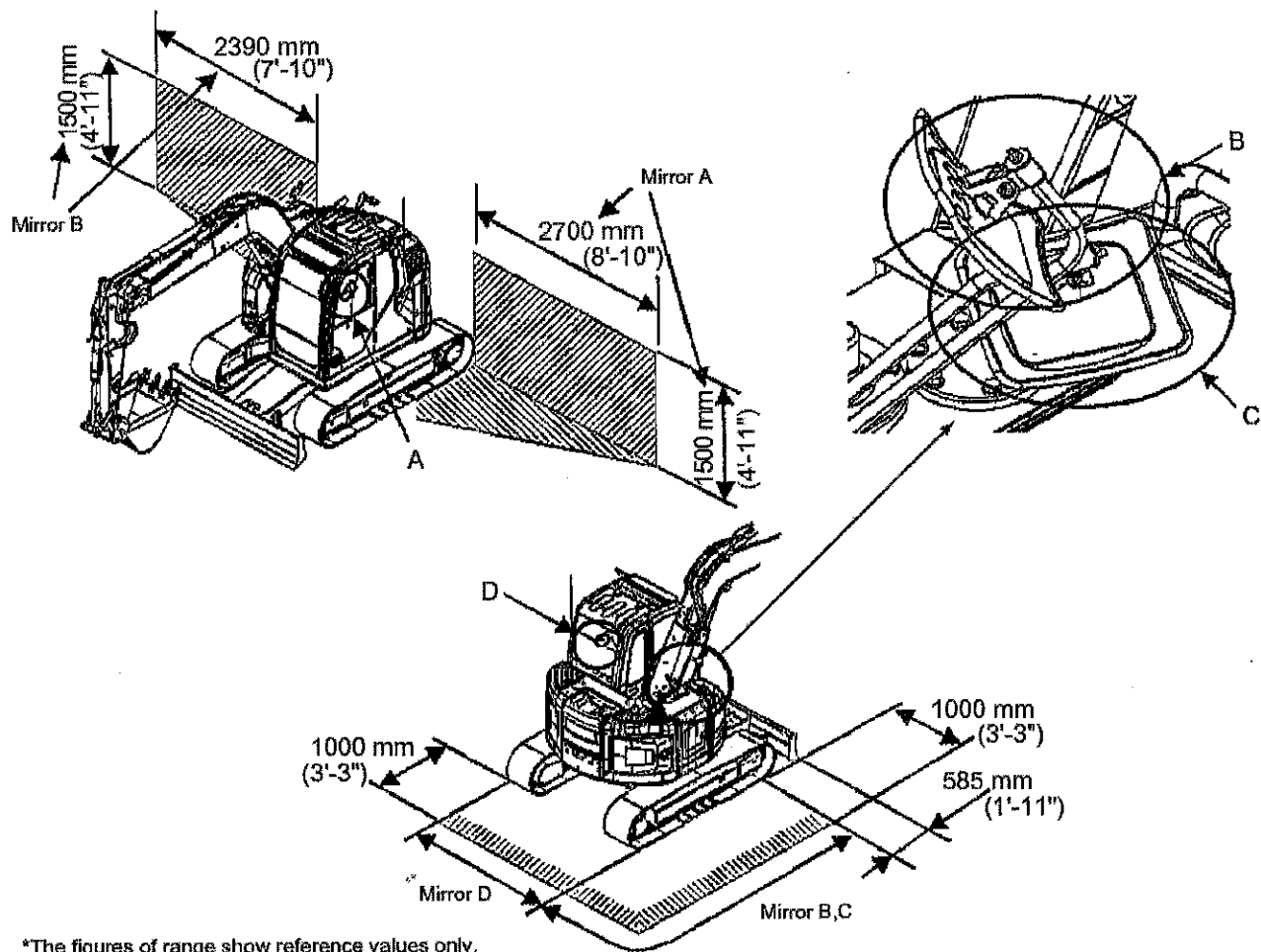
-Be sure to clean mirror before starting operation to ensure good visibility around machine.

If the visibility around machine is not secured sufficiently, it may cause collisions and accidents resulting in injury and death.

-To avoid the damage or break, do not install the mirror and so on to the handrail of cab entrance. If the mirror and so on is installed to the hand rail, the attaching part of handrail is stressed excessively.

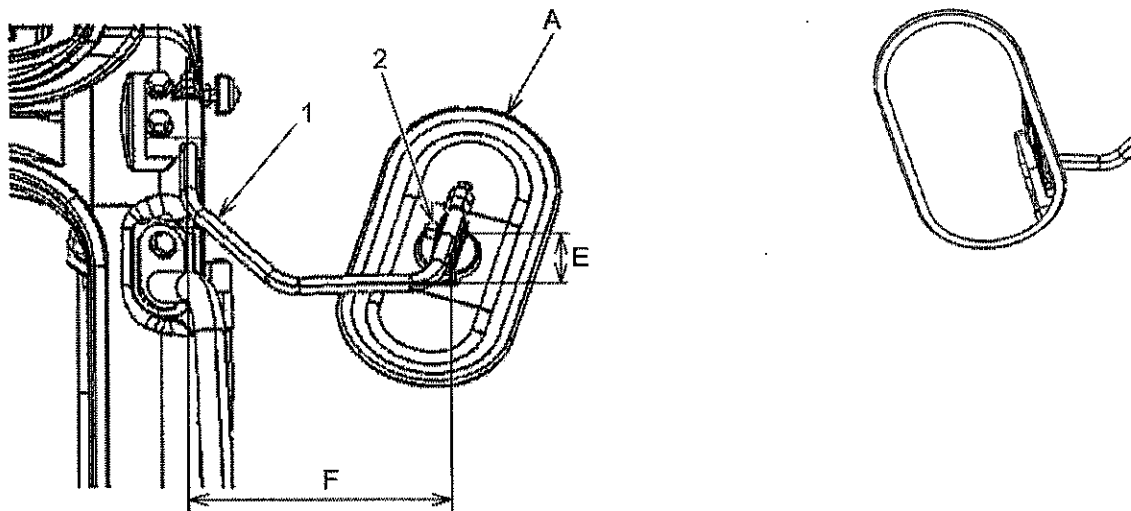
CAUTION

-Do not attach the mirrors except the genuine mirrors (A, B, C and D).



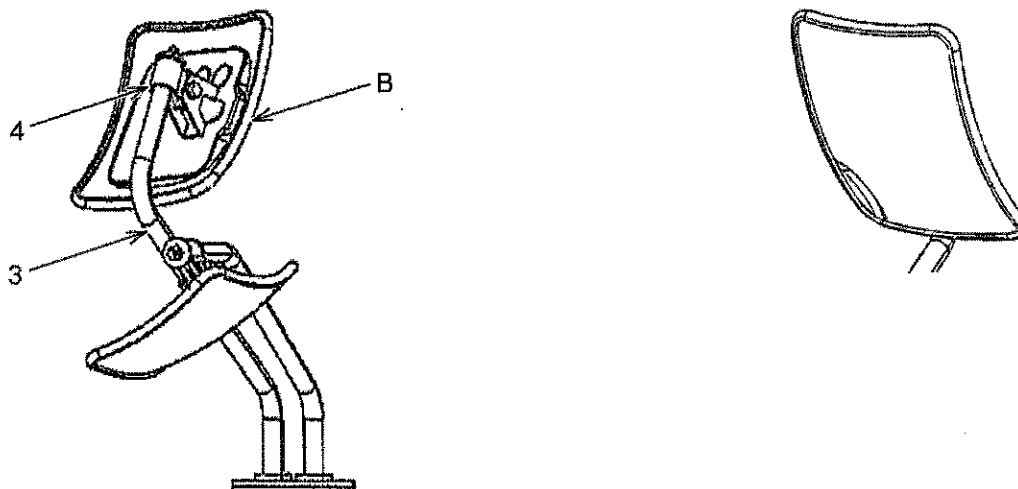
*The figures of range show reference values only.

Mirror A



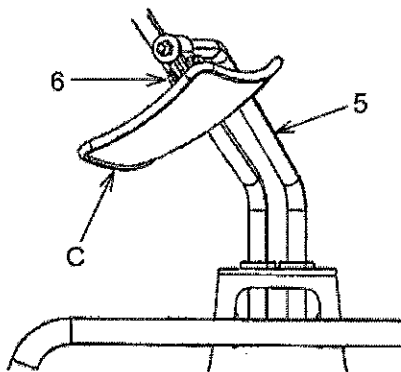
- Adjust mirror so that person who stands on the left rear ends of machine (or post of 1.5m high and 30cm in diameter) can be identified from operator.
- Install mirror on position shown in the figure.
E : 40 mm {1.6"} (Reference value)
F : 238 mm {9.4"} (Reference value)
- Install it so that the mirror (A) does not come in contact with the stay (1) of the mirror.
- If the movement of mirror (A) on adjusting is not smooth, loosen nut (2) of mirror and adjust it.
Tightening torque of nut (2) M10 : 18.6 ~ 25.5N.m {13.7 ~ 18.8lbf-ft}
- Adjust mirror so that the machine left side shown in the figure is reflected in mirror.
- Regarding visible area, refer to the shaded range on 1.11.

Mirror B



- Adjust the mirror so that person who stands on the right rear ends of machine (or post of 1.5m high and 30cm in diameter) can be identified from operator.
- Install mirror on position shown in the figure.
- Install it so that the mirror (B) does not come in contact with the stay (3) of the mirror.
- If the movement of mirror (B) on adjusting is not smooth, loosen nut (4) of mirror and adjust it.
Tightening torque of nut (4) M8 : 8.6 ~ 12.7N-m {6.3 ~ 9.4lbf-ft}
- Adjust the mirror so that the machine right side is reflected in the mirror as shown in the figure.
- Regarding visible area, refer to the shaded range on previous 1.11.

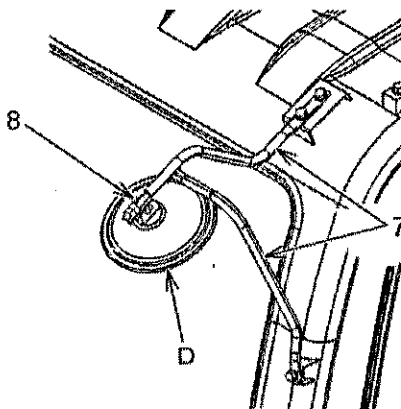
Mirror C



Adjust mirror so that person who stands on the right front of machine (or post of 1.5 m height and 30 cm in diameter) can be identified from operator's seat.

- Install mirror to the position shown in the figure.
H: 140mm {5.5"} (Reference value)
- Install mirror so that the mirror (C) does not come in contact with the mirror stay (5).
- If the movement of mirror (C) on adjusting is not smooth, loosen nut (6) of mirror and adjust it.
Tightening torque of nut (6) M8 : 8.6 ~ 12.7 Nm {6.3 ~ 9.4 lbf-ft}
- Regarding visible area, refer to the shaded range on previous 1.11.

Mirror D



Adjust the mirror so that the ground within the range of 1 m in surroundings behind the machine can be identified from the operator's seat.

- Install mirror to the position shown in the figure.
- Install mirror so that the mirror (D) does not come in contact with the mirror stay (7).
Tightening torque of nut (8) M10: 18.6 ~ 25.5 Nm {13.7 ~ 18.8 lbf-ft}
- If the movement of mirror (D) on adjusting is not smooth, loosen screw (9) of mirror and adjust it.
- Regarding visible area, refer to the shaded range on previous 1.11.