

OPERATION MANUAL

SK250-6E

SK250LC-6E

SK250NLC-6E

APPLICABLE No.

SK250-6E LQ09-04801~

SK250LC-6E LL09-03501~

SK250NLC-6E LL09-03501~



READ, UNDERSTAND AND FOLLOW ALL SAFETY
PRECAUTIONS AND INSTRUCTIONS FOUND IN THIS
MANUAL BEFORE OPERATING THE MACHINE.

Book Code No. S2LQ00003ZE02

Printed in Japan 2003.09 (K·E)

FOREWORD

GENERAL

- This manual contains procedures to aid the operator gain peak performance through effective, economical machine operation and maintenance for the KOBELCO SK250(LC)-6E and SK250NLC-6E Hydraulic Excavators.
- Before operating the machine, operators must thoroughly read and understand all safety, Operation and Maintenance instructions found in this manual. Failure to follow the instructions given in this manual may lead to serious injury to persons and or equipment failure.
- Operators and persons working with this machine should continually study this manual until proper safety, Operation and Maintenance procedures are completely understood.
- This manual describes the basic operating techniques. Skill is gained as the operator utilizes these techniques and perfects them with an actual machine.
- Some illustrated pictures may be different from your machine, as technical improvement is continuous, manuals are periodically updated to reflect these changes.
- This manual may not contain attachments and optional equipment that are available in your area. Please contact an authorized KOBELCO Distributor for any optional attachments required.
- Materials and specifications are subject to change without notice.

PERIODIC INSPECTIONS

- After delivery of a machine, the Authorized KOBELCO Distributor will make periodic service inspections. These inspections will be free of charge to the owner of the machine and will be at time intervals set by KOBELCO. Contact an authorized KOBELCO Distributor for any service related questions not explained in this manual.

NOTICE

- The contents of this manual may not reflect the specifications of the machine delivered. Contact an authorized KOBELCO Distributor to obtain assistance in specifications for machines equipped with options not contained in this manual.
- Owing to the policy of continual improvement, changes may be made by KOBELCO CONSTRUCTION MACHINERY CO., LTD, to any of its products without any obligation on the part of KOBELCO CONSTRUCTION MACHINERY CO., LTD.
- The letter “E” of 6E in the machine model expresses that the engine mounted on this machine is approved by the new regulation established after the emission rate became more severe. Therefore the last letter “E” in the machine model, represents the “Emission” or “Ecology”.

TABLE OF CONTENTS

Section I – SAFETY PRECAUTIONS	1-0 ~ 1-27
Section II – MACHINE FAMILIARIZATION	2-0 ~ 2-39
Section III – BASIC MACHINE OPERATION	3-0 ~ 3-25
Section IV – MAINTENANCE	4-0 ~ 4-57
Section V – TRANSPORTATION	5-0 ~ 5-9
Section VI – SPECIFICATIONS	6-0 ~ 6-22
Section VII – TROUBLESHOOTING	7-0 ~ 7-3
Section VIII – SCHEMATICS	8-0 ~ 8-8
Section IX – OPTIONAL EQUIPMENT	9-0 ~ 9-18
Section X – SPECIAL PROCEDURES	10-0 ~ 10-9

Section I – SAFETY PRECAUTIONS

Table of Contents

GENERAL SAFETY INFORMATION	1-1
SAFETY PRECAUTIONS	1-1 ~ 1-3
PRE-START SAFETY	1-4 ~ 1-6
SAFETY DURING OPERATION	1-6 ~ 1-9
INSPECTION & MAINTENANCE SAFETY	1-9 ~ 1-11
BATTERY SAFETY	1-12
WARNING LABELS & DECALS (EU ONLY)	1-13 ~ 1-18
WARNING LABELS & DECALS (OCEANIA)	1-19 ~ 1-24
PROHIBITED MACHINE OPERATION	1-25 ~ 1-26
END OF WORK SHIFT SAFETY	1-26
USE FOPS AND FRONT GUARD	1-27
USE SAFETY VALVE AND OVERLOAD ALARM	1-27





WARNING



READ, UNDERSTAND AND FOLLOW ALL SAFETY PRECAUTIONS AND PROCEDURES FOUND IN THIS MANUAL BEFORE ATTEMPTING ANY OPERATION, INSPECTION OR MAINTENANCE OF THIS MACHINE, ATTACHMENT OR SYSTEMS. KOBELCO CANNOT ANTICIPATE EVERY POSSIBLE CIRCUMSTANCE THAT MIGHT INVOLVE A POTENTIAL HAZARD. THE WARNINGS IN THIS PUBLICATION AND ON THE PRODUCT ARE THEREFORE NOT ALL INCLUSIVE. IF A TOOL, PROCEDURE, WORK METHOD OR OPERATING TECHNIQUE NOT SPECIFICALLY RECOMMENDED BY KOBELCO IS USED, YOU MUST SATISFY YOURSELF THAT IT IS SAFE FOR YOU AND OTHERS. YOU SHOULD ALSO ENSURE THAT THE PRODUCT WILL NOT BE DAMAGED OR MADE UNSAFE BY THE OPERATION, LUBRICATION, MAINTENANCE AND/OR REPAIR PROCEDURES YOU CHOOSE.

Section I – SAFETY PRECAUTIONS

1.1 GENERAL SAFETY INFORMATION

 WARNING 
<p>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 THE OPERATOR'S SEAT POCKET. IF IT IS MISSING OR DAMAGED, PLACE AN ORDER WITH AN AUTHORIZED KOBELCO DISTRIBUTOR FOR A REPLACEMENT. IF YOU HAVE ANY QUESTIONS, PLEASE CONSULT AN AUTHORIZED KOBELCO DISTRIBUTOR.</p>

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. Messages of safety are indicated with marks. The safety information contained in this manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
3. Messages of safety appear in this manual and on the machine. All messages of safety are identified by the words "DANGER", "WARNING" and "CAUTION".
 - a. **DANGER** – Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury and is represented as follows:

 DANGER 

- b. **WARNING** – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and is represented as follows:



 WARNING 
--

- c. **CAUTION** – 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 and is represented as follows:

 CAUTION 
--

4. 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 by KOBELCO.
5. While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.
6. Continue studying this manual until all safety, operation and Maintenance procedures are completely understood by all persons working with the machine.

1.2 SAFETY PRECAUTIONS

 WARNING 
<p>THE PROPER AND SAFE LUBRICATION AND MAINTENANCE FOR THIS MACHINE, RECOMMENDED BY KOBELCO, IS OUTLINED IN THE OPERATOR'S MANUAL FOR THIS MACHINE.</p> <p>IMPROPER PERFORMANCE OF LUBRICATION OR MAINTENANCE PROCEDURES ARE DANGEROUS AND COULD RESULT IN INJURY OR DEATH. READ AND UNDERSTAND THE OPERATOR'S MANUAL BEFORE PERFORMING ANY LUBRICATION OR MAINTENANCE.</p>



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. A knowledge of the system and or components is important before the 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. Weight of components table is shown in Page 6-3 of SECTION VI – SPECIFICATIONS.

Section I – SAFETY PRECAUTIONS

THE FOLLOWING IS A LIST OF BASIC PRECAUTIONS THAT MUST ALWAYS BE OBSERVED.

1. Read and understand all warning plates and decals 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 ignition keys.
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.

 WARNING 
DO NOT OPERATE THIS MACHINE UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS IN THE OPERATOR’S MANUAL. IMPROPER MACHINE OPERATION IS DANGEROUS AND COULD RESULT IN INJURY OR DEATH.

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 or other attachments to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, blade 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. To 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 on machines which have just been stopped and hot fluids in lines, tubes and compartments.
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 equivalent at least to that of the parent metal. Make sure to disconnect battery before any welding procedures are attempted.

Section I – SAFETY PRECAUTIONS

16. Do not damage wiring during 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. Be 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. The maintenance and repair work while holding the bucket raised is dangerous due to the possibility of a falling attachment. Do not fail to lower the attachment and place the bucket to the ground before starting the work.
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 ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Very small (pin hole) 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 cardboard, wood or metal to locate pin hole 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. Chips can fly when removing or installing a track pin. Wear safety glasses and long sleeve protective clothing. Tracks can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks 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 KOBELCO 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 airborne dust which contains asbestos is not generated.

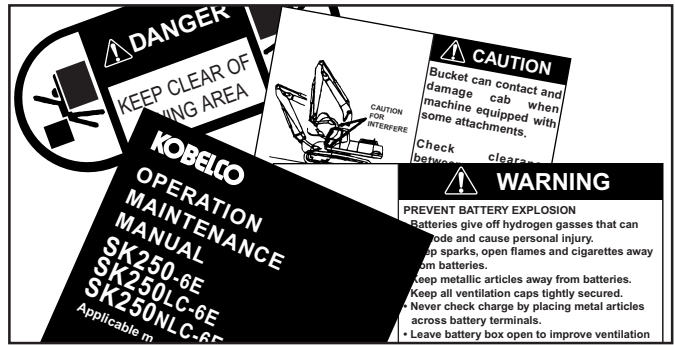
IF DUST WHICH MAY CONTAIN ASBESTOS IS PRESENT, THERE ARE SEVERAL COMMON SENSE GUIDELINES THAT SHOULD BE FOLLOWED.

- 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.

Section I – SAFETY PRECAUTIONS

1.3 PRE-START SAFETY

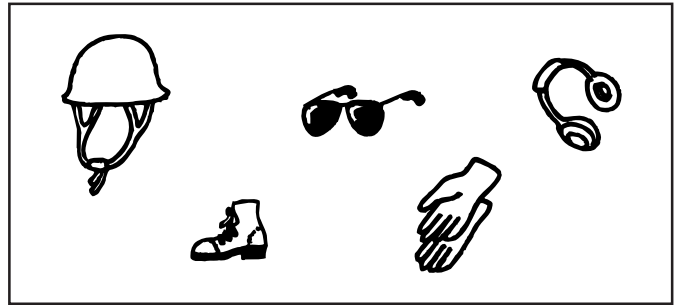
Many failures that occur during machine operation or servicing result from neglecting fundamental safety precautions. The following safety precautions are given to prevent such failures, but they are only a part of what you must follow. Read, understand and follow all safety precautions found in this manual and on the machine thoroughly before operating the machine.



OBSERVE ALL SAFETY PRECAUTIONS

A. OBSERVE SAFETY PRECAUTIONS

Follow all safety rules, precautions, and operating procedures. If there are other personnel and flagmen working in the area, have them observe the specified signs.



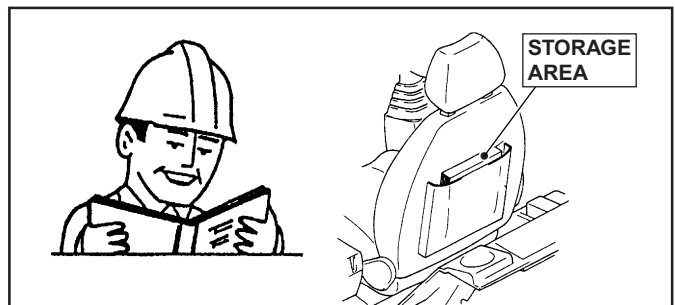
WEAR PROTECTIVE CLOTHING

B. WEAR PROTECTIVE CLOTHING

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.

C. READ AND UNDERSTAND THE OPERATOR'S MANUAL

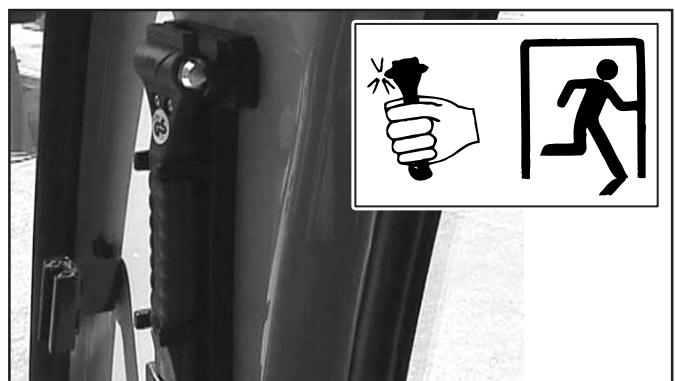
Before operating the machine, read and understand this operator's manual thoroughly in order to use the machine effectively and safely.



READ MANUAL / KEEP IN MACHINE CAB

D. KEEP OPERATOR'S MANUAL IN MACHINE CAB

Keep this manual in the specified storage area located behind the operator's seat for quick reference. Should the operator's manual become lost or damaged, contact an authorized KOBELCO distributor to order the operator's manual.



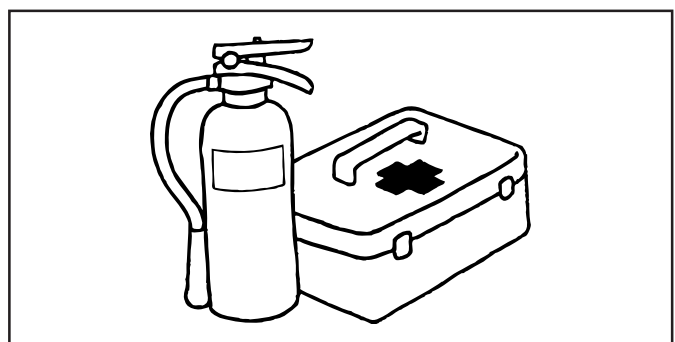
HOW TO HANDLE LIFE HAMMER

E. 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.

F. 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 FOR EMERGENCIES

Section I – SAFETY PRECAUTIONS

G. ENSURE SAFETY AT THE WORK SITE

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.

H. PERFORM PRE-START INSPECTION

Before starting the machine, perform a PRE-START inspection of the machine. 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, working lamps, and mirrors clean for good visibility.

I. 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.

Also 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 starter switch key.

J. SIGNS, SIGNALS & FLAGMEN

Install signs on soft shoulders and ground areas, 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.

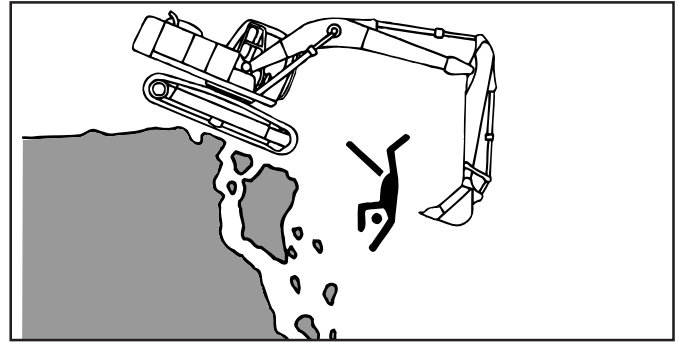
K. KEEP FIRE AWAY FROM FUEL AND OIL

Oil, antifreeze, and especially fuel are highly flammable. Never use fire near the machine.

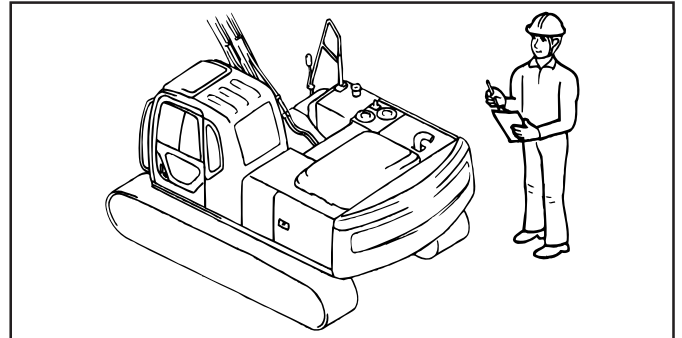
Securely tighten all fuel and oil caps. Keep fuel and oil in the designated storage areas. Promptly clean up any all spills and dispose of waste properly.

L. USE CAUTION NEAR NOISE

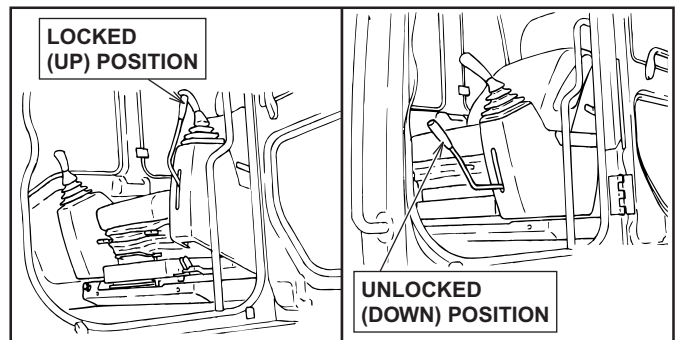
If noise is high during operation, hearing loss may result. Approved hearing protection should be used if personnel will be exposed to high noise levels for a long period of time.



WORKSITE SAFETY – KNOW THE AREA



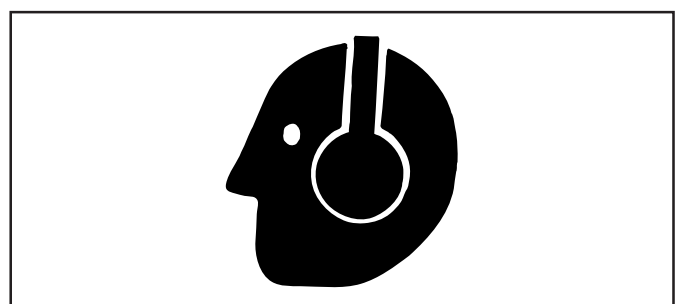
PRE-START INSPECTION OF MACHINE



SAFETY LOCK LEVER



KEEP FIRE AWAY FROM FUEL & OIL



USE CAUTION NEAR NOISE

Section I – SAFETY PRECAUTIONS

M. MOUNTING & DISMOUNTING MACHINE

When getting on and off the machine, always maintain three point contact by using the handrails and step. Inspect and clean handrails, step, and mounting parts. Remove slippery materials, such as lubricants, and mud. Always place the cab door entrance parallel to the tracks before stopping the engine for dismounting.

N. 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.

O. USE THE PROPER OPTIONAL ATTACHMENT

Use only optional attachments designed for and approved by KOBELCO. Read, understand and follow all instructions in the manual accompanying the optional attachment. Use of any optional attachment not approved by KOBELCO 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 KOBELCO distributor for optional attachments available for the machine.

P. PREVENT FIRES

Leaking or spilled fuel, lubricants and hydraulic oil are fire hazards. Clean and properly dispose of spills as they occur. Repair or replace all leaking components to prevent fire. Also, clean the machine regularly removing all debris to help prevent fires, pay particular attention to removal of leaves, sticks, paper etc. Keep fire extinguisher in an accessible area and know how to use the fire extinguisher should a fire occur.

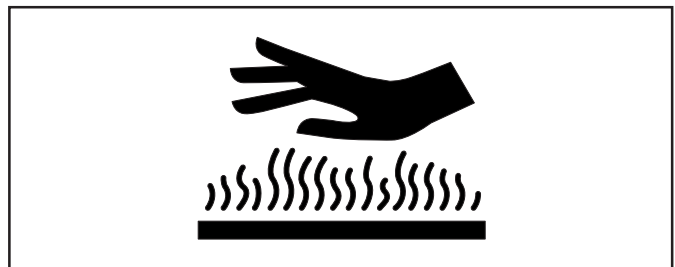
1.4 SAFETY DURING OPERATION

A. STARTING ENGINE

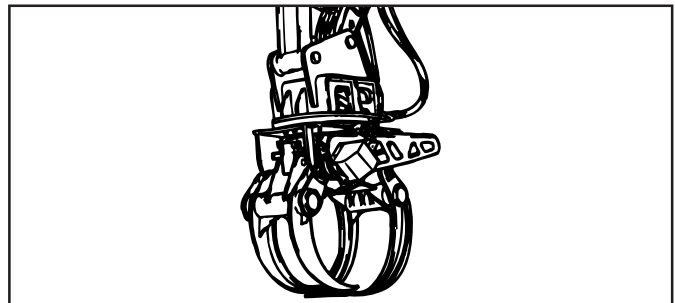
Sit in the operator's seat.
Sound the horn before starting the engine to alert people the machine is being started. Make sure no one is near the machine.
Do not short circuit the starter circuit or battery to start the machine. This may cause serious injury or cause damage the electrical system.



MOUNTING/DISMOUNTING MACHINE



HOT SURFACES



USE PROPER ATTACHMENT



PREVENT FIRES– CLEAN UP SPILLS



SOUND HORN BEFORE STARTING

Section I – SAFETY PRECAUTIONS

B. PASSENGERS

This equipment is not intended or designed for the transportation of persons. Never allow persons to ride on the machine. Serious injury or death can result from allowing passengers on or in the machine.

C. TRAVEL

Make certain of the location of the travel motors before operating travel controls. Sound horn before moving the machine to inform persons that the machine is travelling. Position the attachment as shown in illustration before beginning travel.

Move the machine at slow speeds. Do not turn suddenly on rough terrain. Avoid travelling over obstacles. Should it become necessary to travel over an obstacle, keep the attachment low to the ground and travel at extremely slow speed.

D. SWING

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

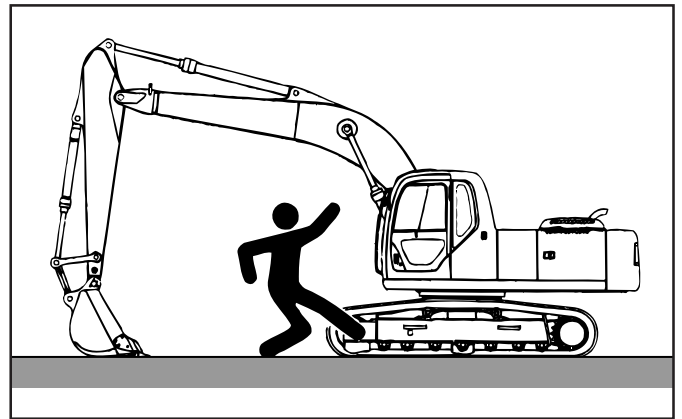
E. BOOM, ARM & ATTACHMENTS

Give the work you are doing your undivided attention. Make certain the attachment being used is suited for the job at hand. Make certain of obstacles in the work area and operate the machine within those limits. If necessary have a flagman signal the operator to prevent injury to persons or damage to the machine or obstacles in the work area.

ALWAYS PLACE ATTACHMENTS ON THE GROUND AND RAISE THE SAFETY LOCK LEVER BEFORE LEAVING THE CAB.

F. OPERATING ON INCLINES OR SLOPES

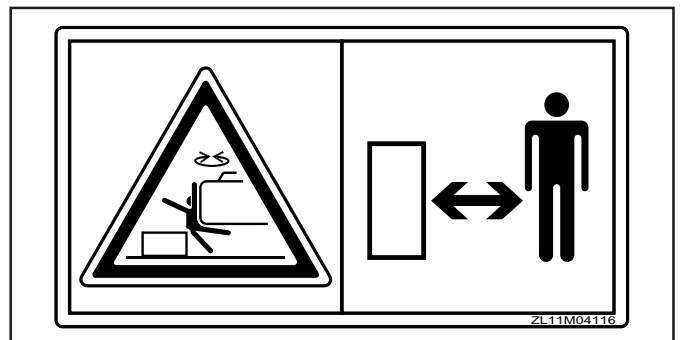
Operation of this machine on an incline or slope may cause the machine to become unstable or unbalanced. Work up and down inclines or slopes never across. Never swing or turn machine around on slopes. Build a level area for the machine to operate. Operate controls carefully to prevent sudden movements which may cause the machine to slide or tip over. Use a flagman to direct the operator.



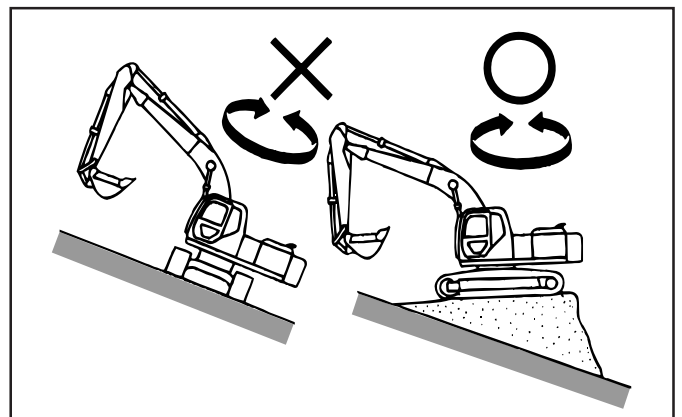
NO PASSENGERS



KNOW TRAVEL MOTOR POSITION



SWING SAFETY/USE SWING FLASHERS



BUILD BANKING FOR SLOPE OPERATION

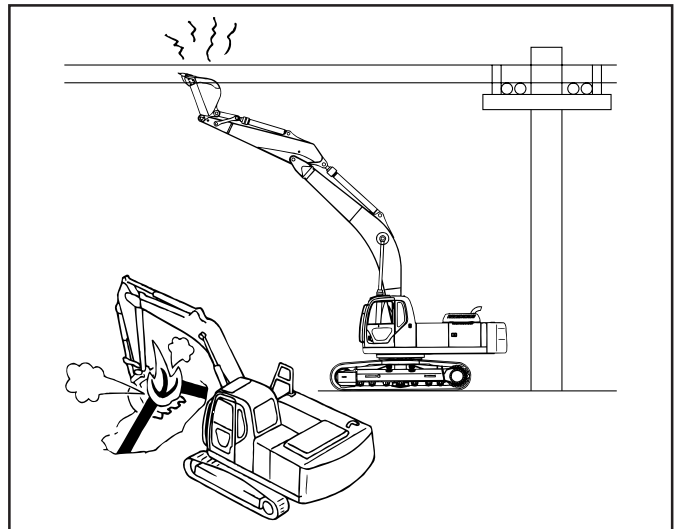
Section I – SAFETY PRECAUTIONS

G. 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	3.0M (10) OR MORE
50,000 ~ 200,000	4.5M (15) OR MORE
200,000 ~ 350,000	6.0M (20) OR MORE
350,000 ~ 500,000	7.5M (25) OR MORE
500,000 ~ 750,000	10.5M (35) OR MORE
750,000 ~ 1,000,000	13.5M (45) OR MORE



KEEP A SAFE DISTANCE FROM UTILITIES

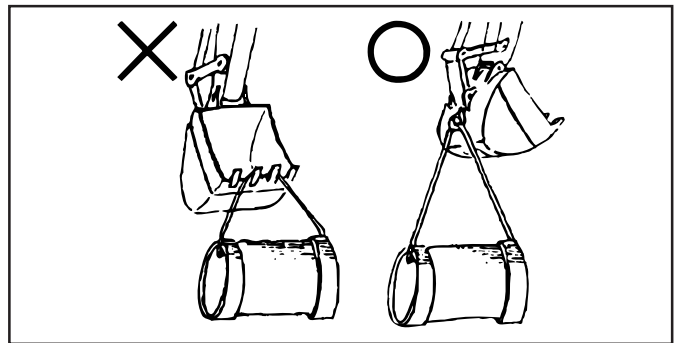
H. LIFTING

This machine is an excavator. Use extreme caution when lifting or moving heavy loads. Use proper lifting equipment rated at a capacity to handle the load. **NEVER USE BUCKET TEETH TO LIFT OR MOVE HEAVY LOADS.**

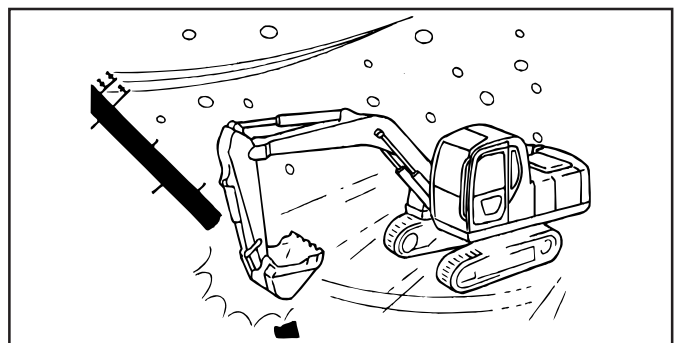
I. FROZEN OR SNOW COVERED WORK SITES

Use extreme caution when operating the machine on frozen or snow covered work sites. Operate all controls slowly and cautiously to prevent sudden movements 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.



USE PROPER LIFTING DEVICES

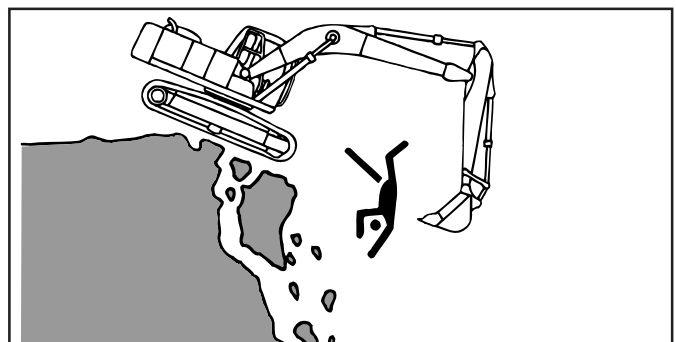


USE EXTREME CAUTION ON FROZEN OR SNOW

J. FILLED OR UNSTABLE GROUND

Be certain the condition of the work site is stable and capable of supporting the machine 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 travel motors to the rear of the machine, allowing for quick reversal, should the work area become unstable.



WORK ON STABLE GROUND

Section I – SAFETY PRECAUTIONS

K. RESTRICTED WORK AREAS

In work sites with limited height and swing areas such as tunnels, bridges, around electrical power lines, other utilities, or inside structures, use extreme caution in keeping the machine and its attachment a safe distance away to prevent personal injury and/or equipment or structure damage. Use a flagman to direct the operator.

L. PARKING THE MACHINE

Always park the machine on a firm, level surface. If no firm level surface is available, block the tracks and lower attachment to the ground to help prevent machine movement.

Should the machine be parked on a roadway, move the machine to the shoulder to allow passing of traffic. Also post reflective warning signs and markers at a distance from the machine to safely warn motorists. Refer to local code and regulations regarding the posting of work area warnings and markers.

M. STABILIZE ATTACHMENTS

Stabilize all attachments removed from the machine to prevent the attachment falling over.

1.5 INSPECTION & MAINTENANCE SAFETY

A. “TAG-OUT” MACHINE

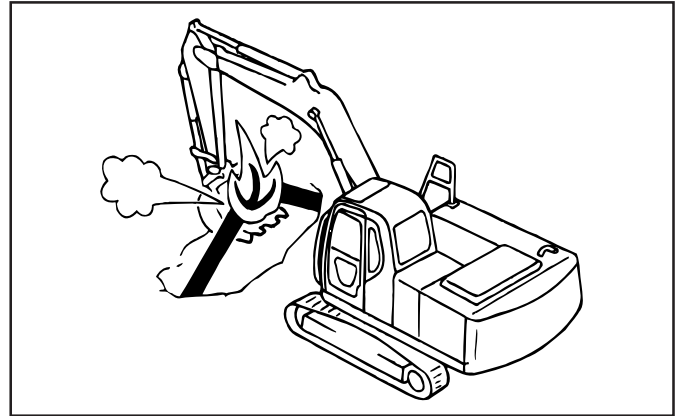
Before performing any inspection or maintenance procedures to the machine, fill out and post to the operator’s controls a “DO NOT OPERATE” tag to warn persons not to start the machine. Also inform the supervisor and all operators that the machine is under inspection or maintenance and they will be informed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

B. TOOLS & EQUIPMENT

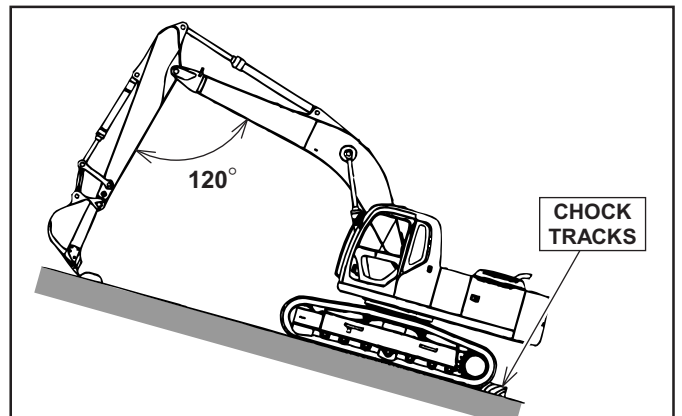
Use the proper tools and equipment for the task at hand. Know the proper use of the tools and equipment before starting any inspection or maintenance procedures.

C. PERSONAL EQUIPMENT

Wear well fitting work clothes, hard hat, safety shoes and gloves. Confine long hair, loose clothing and remove all jewelry before attempting any inspection or maintenance procedures to this machine or attachments.



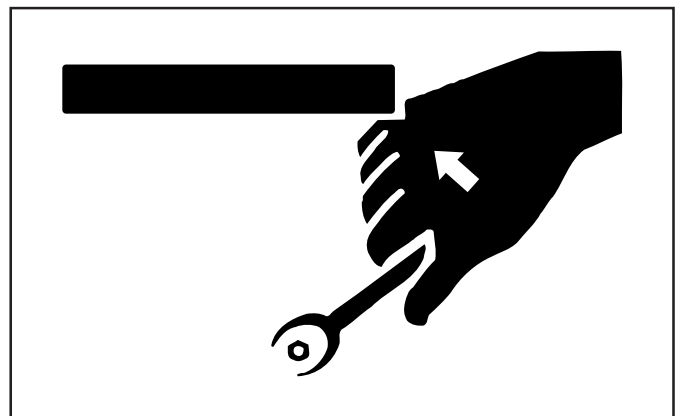
BE AWARE OF OBSTACLES



PARKING SAFETY



STABILIZE ATTACHMENTS WHEN REMOVED



USE PROPER TOOLS

Section I – SAFETY PRECAUTIONS

D. STOP THE ENGINE

BE CERTAIN TO TURN ENGINE OFF AND PLACE THE SAFETY LOCK LEVER IN THE “LOCKED” (UP) POSITION before attempting any inspection or maintenance procedures to the machine. Failure to stop engine could result in serious bodily injury or death.

E. SET THE ATTACHMENT

Always set the machine in the hydraulic oil check position on firm level ground before attempting any inspection or maintenance procedures to the machine. If it is not possible to put the machine in this position, secure the boom, arm and attachment to help prevent sudden movement. **ALWAYS PLACE ATTACHMENTS ON THE GROUND AND RAISE THE SAFETY LOCK LEVER BEFORE LEAVING THE CAB.**

F. 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.

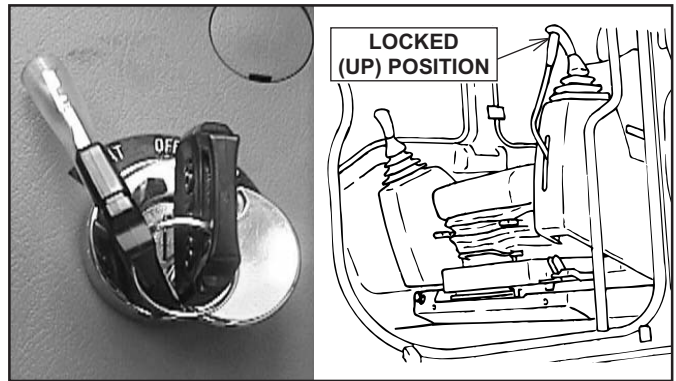
Be careful not to allow water to reach electrical components. Serious damage can occur to the electrical system by allowing water to reach the electrical components. Never clean inside of cab, or electrical components with pressurized water or steam.

G. PRESSURIZED FLUIDS & LUBRICANTS

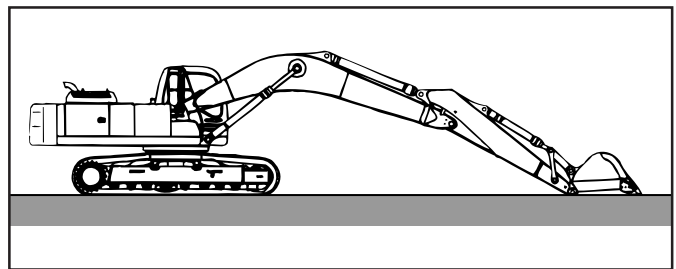
Always release pressure from hydraulic reservoir, engine coolant, fuel system and all systems containing pressure before removing any caps or components. **BE CAUTIOUS OF HOT FLUIDS AND GASSES FROM SYSTEMS ON MACHINES THAT HAVE JUST BEEN STOPPED. ALLOW SUFFICIENT TIME FOR SYSTEMS TO COOL BEFORE PERFORMING ANY INSPECTION OR MAINTENANCE PROCEDURES.**

H. SUPPORT THE MACHINE

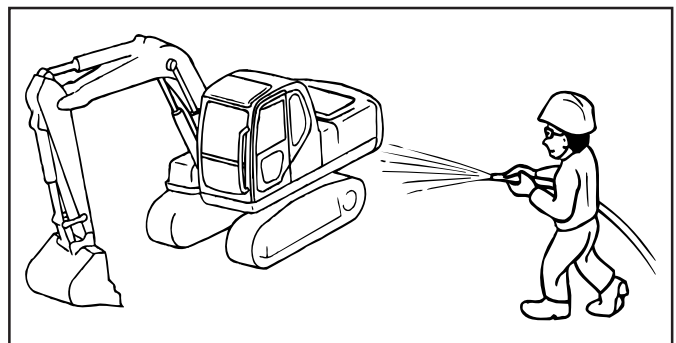
If it becomes necessary to raise the machine for inspection or maintenance, always support the machine by positioning the machine as shown in the illustration and use safety supports or blocks, with a sufficient capacity rating to support the machine, under the tracks. **NEVER INSPECT OR PERFORM MAINTENANCE PROCEDURES UNDER A RAISED MACHINE THAT IS NOT SUFFICIENTLY SUPPORTED.**



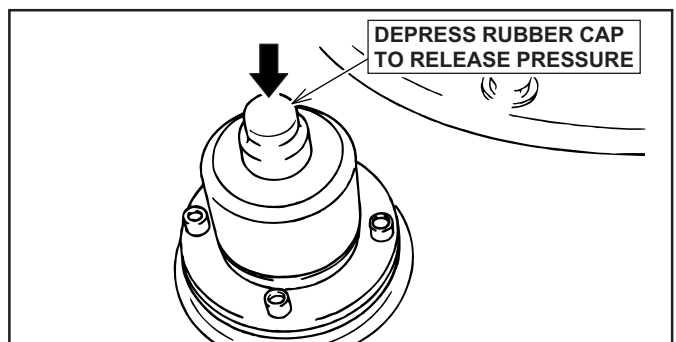
STOP ENGINE/ENGAGE SAFETY LOCK LEVER



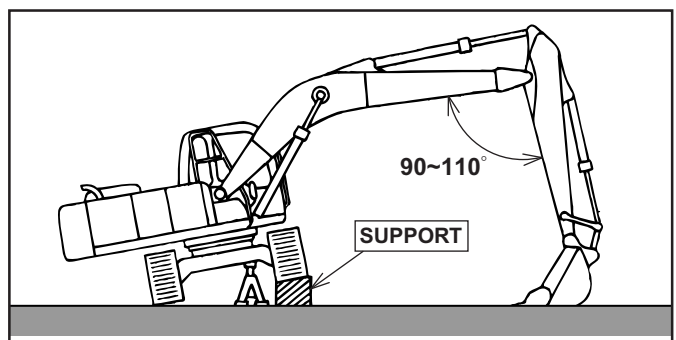
HYDRAULIC OIL CHECK POSITION



KEEP MACHINE CLEAN



RELEASE HYDRAULIC TANK PRESSURE



SUPPORT THE MACHINE

Section I – SAFETY PRECAUTIONS

I. REFUELING

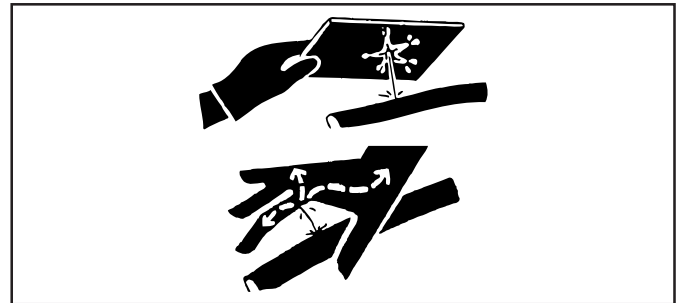
Move the machine to a well ventilated area for refueling. Use only specified fuel as described in the MAINTENANCE section of this operator's manual. Immediately clean up all spilled fuel and dispose of it properly. After refueling is complete, securely tighten fuel cap.



REFUELING

J. HYDRAULIC PRESSURE

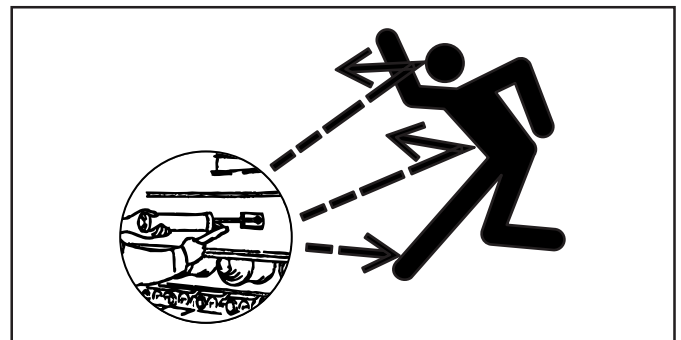
Under normal conditions, all circuits of the hydraulic system are under extreme pressure. When inspecting for leaks, use a small piece of cardboard, wood or metal to locate leaks. **SMALL (PINHOLE) LEAKS CAN BE DANGEROUS IF CONTACT WITH SKIN OR EYES IS MADE.** Wear approved safety glasses or face shield, gloves, hard hat, safety shoes and work clothes during all inspection and maintenance procedures.



CHECKING FOR HIGH PRESSURE LEAKS

K. TRACK SHOE TENSION

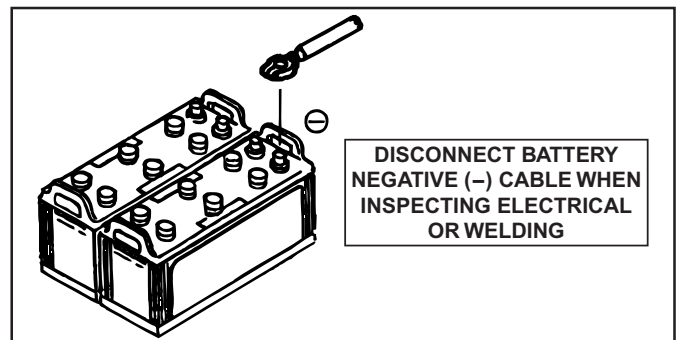
The grease used to adjust the track shoe tension is under extreme pressure in the cylinder. Use extreme caution when adjusting track shoe tension. **KEEP FACE, HANDS AND LEGS AWAY FROM THE GREASE NIPPLE AREA.** Carefully and slowly loosen the grease nipple when lessening track shoe tension. Never loosen grease nipple more than one complete turn.



USE CAUTION WHEN ADJUSTING TRACKS

L. ELECTRICAL SYSTEM

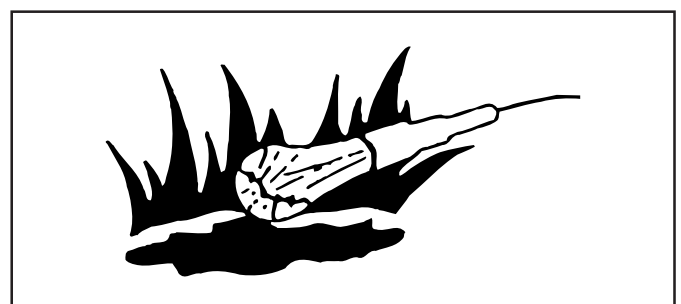
Before performing any inspection or maintenance to the electrical system, or performing any welding procedures, disconnect the negative (-) cables from the battery terminals. Not disconnecting the negative (-) cable could cause extensive damage to the electrical system.



ELECTRICAL SYSTEM PRECAUTION

M. 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.



USE PROPER LIGHTING

N. 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.

Section I – SAFETY PRECAUTIONS

1.6 BATTERY SAFETY

A. WEAR PROPER PROTECTIVE CLOTHES

Wear long sleeve shirt, gloves and approved safety glasses or face shield when working with or around batteries. Battery electrolyte (acid) will cause severe burns if allowed to make contact with clothing, skin or eyes.

Should electrolyte (acid) come in contact with clothes, skin or eyes, immediately remove effected clothing, flush area with clean water for 15 minutes and get prompt medical attention.

B. KEEP AWAY FROM FIRE OR FLAMES

Never allow batteries in the vicinity of fire or flames and do not smoke when working with batteries. Explosive hydrogen gas is produced by the electrolyte (acid) in the batteries. Always work with batteries in a well ventilated area.

C. CHARGING BATTERY

Charge battery off of and away from machine in a well ventilated area. When charging battery, remove cell covers to allow gasses to escape. Avoid breathing gasses from battery. Wear approved safety equipment when working with batteries.

D. USING BOOSTER CABLES

Wear proper safety equipment when working with batteries.

If using another machine or vehicle to boost batteries, make certain the machine or vehicle DOES NOT touch the disabled machine.

Make certain of the positive (+) and negative (-) terminals on the booster battery and the disabled machine before connecting booster cables.

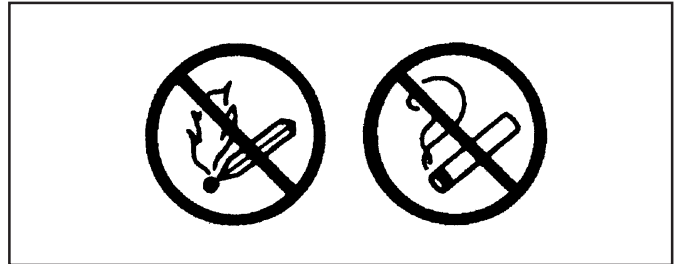
Connect the positive (+) cable first, then connect negative (-).

When disconnecting, disconnect the negative (-) cable first, then disconnect the positive (+) cable.

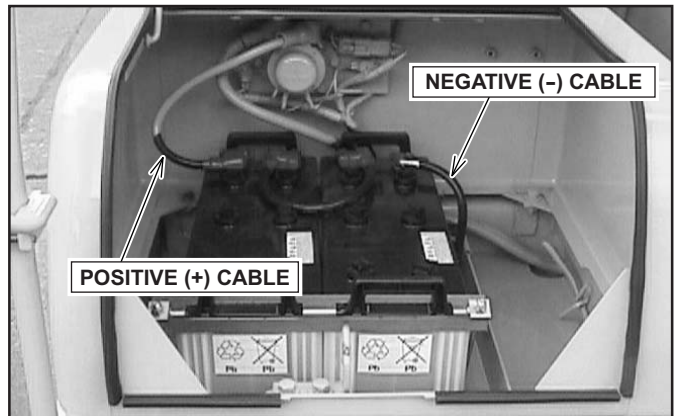
Refer to BASIC MACHINE OPERATION section of this manual for proper procedures for use of booster cables.




WEAR PROTECTIVE CLOTHES




KEEP AWAY FROM FIRE OR FLAMES



MAKE CERTAIN OF THE POSITIVE (+) AND NEGATIVE (-) TERMINALS



WARNING



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.**

Section I – SAFETY PRECAUTIONS

1.7 WARNING LABELS & DECALS (EU ONLY)

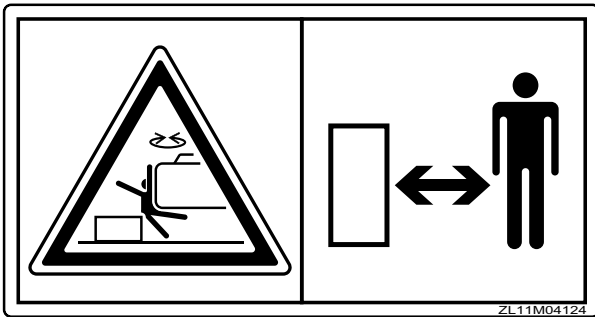
Warning labels and decals are affixed to the machine to remind operators and personnel specific safety precautions in certain areas of the machine. The following are illustrated examples of all warning labels and decals along with their locations.

SUPPLEMENTARY EXPLANATION

The content of pictograph in ISO warning labels is described on the foot of a label in detail, so read it with good understanding.

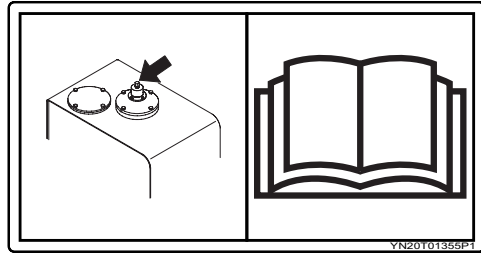
1. SWING-DANGER

Located on each side of the rear counterweight.
Part Number - ZL11M04124 (2-REQ'D)



2. PRESSURIZED HOT OIL-WARNING

Located on each hydraulic tank.
Part Number - YN20T01355P1



3. PRESSURIZED HOT OIL & COOLANT-WARNING

Located on top of engine radiator.
Part Number – ZL11N00404



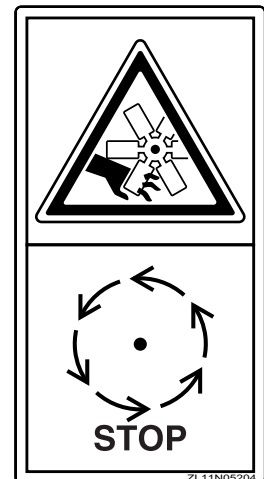
4. DO NOT CLIMB-WARNING

Located on fuel tank.
Part Number – ZL11N02604



5. STOP ENGINE-WARNING

Located on engine radiator.
Part Number – ZL11N05204

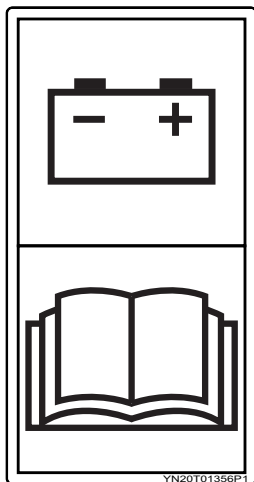


Section I – SAFETY PRECAUTIONS

6. HANDLING BATTERY–DANGER AND WARNING

Located on battery box access cover.

Part Number – YN20T01356P1



WARNING

AVOID ACID BURNS

- Electrolyte is an acid and can cause injury or blindness if it contacts with skin or eyes.
- Wear 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.

DANGER EXPLOSIVE GASES

Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without proper instruction and training.

KEEP VENT CAPS TIGHT AND LEVEL

POISON CAUSES SEVERE BURNS

Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.

KEEP OUT OF REACH OF CHILDREN

WARNING

PREVENT BATTERY EXPLOSION

- Batteries give off hydrogen gasses that can explode and cause personal injury.
- Keep sparks, open flames and cigarettes away from batteries.
- Keep metallic articles away from batteries.
- Keep all ventilation caps tightly secured.
- Never check charge by placing metal articles across battery terminals.
- Leave battery box open to improve ventilation when charging.

WARNING

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

Connect booster cables using following procedure.

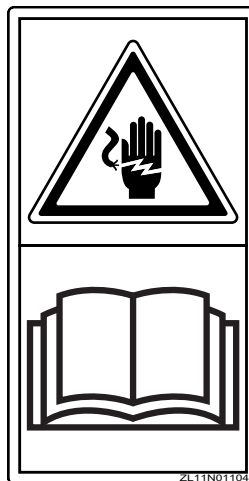
1. Connect booster cable to positive (+) battery terminal of discharged battery. Connect other end of booster cable to positive battery terminal of normal battery.
2. Connect other booster cable to negative(-) battery terminal of normal battery. Connect other end of booster cable to upper frame of troubled machine.
3. Start engine and remove booster cables in reverse order.

CONNECTING A BOOSTER CABLE (RED)
NORMAL BATTERY
DISCHARGED BATTERY
(BLACK) TO THE UPPER FRAME OF A TROUBLED MACHINE

7. BOOSTER CABLE–WARNING

Located on battery box access cover.

Part Number – ZL11N01104



WARNING

Electric hazard may cause injury when mishandling the cable.

Read operator manual for safe and proper handling.