

# Operator's Manual

# ZAXIS

## 125US

## 135US

## 135USK

## 135USL

## 225US

## 225USLC

# Excavator

Serial No.

ZAXIS125US 010570 and up

ZAXIS135US, 135USK, 135USL 062955 and up

ZAXIS225US, 225USLC 104640 and up

# HITACHI

# INTRODUCTION

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**Read this manual** carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or machine damage.

**This manual should be considered** a permanent part of your machine and should remain with the machine when you sell it.

**This standard specification machine** can be operated under the following conditions without being modified.

Atmospheric Temperature: -20°C to 40°C (-4°F to 104°F)

Altitude: 0 m to 2000 m (0 ft to 6600 ft)

In case the machine is used under conditions other than described above, consult your nearest Hitachi dealer.

**This machine is of metric** design. Measurements in this manual are metric. Use only metric hardware and tools as specified.

**Right-hand and left-hand** sides are determined by facing in the direction of forward travel.

**Write product identification numbers** in the Machine Numbers section. Accurately record all the numbers to help in tracing the machine should it be stolen. Your dealer also needs these numbers when you order parts. If this manual is kept on the machine, also file the identification numbers in a secure place off the machine.

**Warranty** is provided as a part of Hitachi's support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate which you should have received from your dealer.

This warranty provides you the assurance that Hitachi will back its products where defects appear within the warranty period. In some circumstances, Hitachi also provides field improvements, often without charge to the customer, even if the product is out of warranty.

**Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied.**

Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

Only qualified, experienced operators officially licensed (according to local law) should be allowed to operate the machine. Moreover, only officially licensed personnel should be allowed to inspect and service the machine.

Prior to operating this machine in a country other than a country of its intended use, it may be necessary to make modifications to it so that it complies with the local standards (including safety standards) and requirements of that particular country. Please do not operate this machine outside of the country of its intended use until such compliance has been confirmed. Please contact Hitachi Construction Machinery Co., Ltd. or any of our authorized distributor or dealer if you have any questions concerning compliance.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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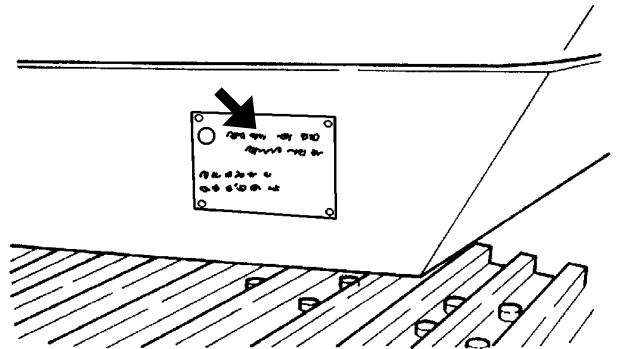
# MACHINE NUMBERS

The manufacturing Nos. explained in this group is the individual number (serial No.) given to each machine and hydraulic components. These numbers are requested when inquiring any information on the machine and/or components. Fill these serial Nos. in the blank spaces in this group to immediately make them available upon request.

## MACHINE

<b>CE</b>	
Model/type	<input type="text"/>
Product	Hydraulic Excavator
Identification Number	<input type="text"/>
Year of Manufacturing	<input type="text"/>
Engine Power(kw)	<input type="text"/>
Mass(kg)	<input type="text"/>
<small>Hitachi Construction Machinery Co.,Ltd. 650, Kondatsu-machi, Tsuchiura-shi, Ibaraki-ken, 300-0013 Japan</small>	

SS3097499



1. MODEL/TYPE
2. Product Identification Number
3. Year of Manufacturing
4. Operating mass (standard version)
5. Engine power in kW according to ISO9249

M157-00-001

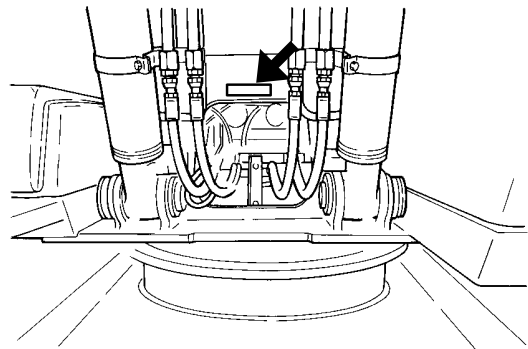
## PRODUCT IDENTIFICATION NUMBER

PRODUCT IDENTIFICATION NUMBER: \_\_\_\_\_

NOTE:

\*HCM1SE00000010570\*      Marks to indicate the start and end of the PIN

PRODUCT IDENTIFICATION NUMBER (PIN)

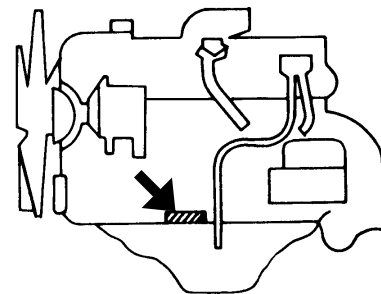


M157-12-008

## ENGINE

TYPE: \_\_\_\_\_

MFG. NO.: \_\_\_\_\_



M178-00-001

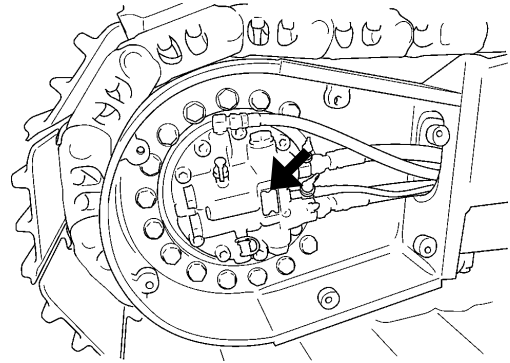
# MACHINE NUMBERS

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## TRAVEL MOTOR

TYPE: \_\_\_\_\_

MFG. NO.: \_\_\_\_\_

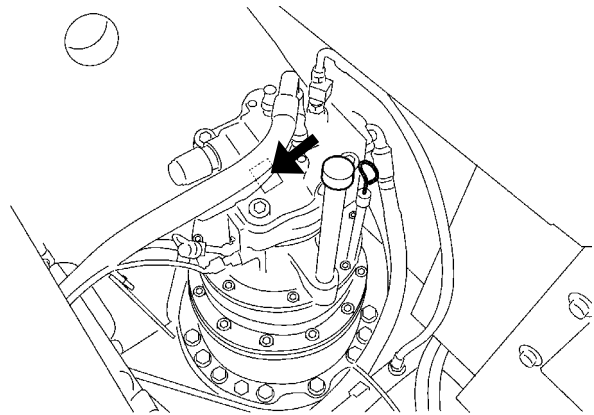


M178-07-047

## SWING MOTOR

TYPE: \_\_\_\_\_

MFG. NO.: \_\_\_\_\_

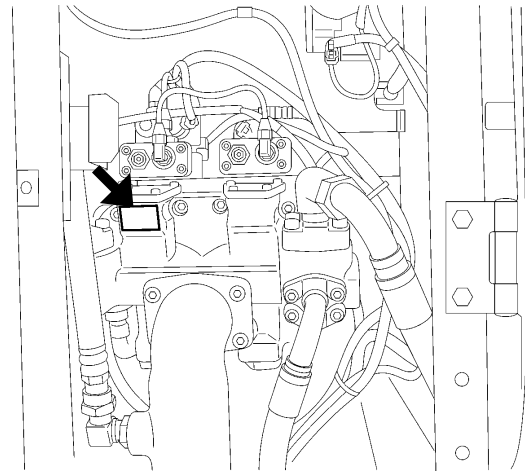


M1GF-07-002

## HYDRAULIC PUMP

TYPE: \_\_\_\_\_

MFG. NO.: \_\_\_\_\_



M1GF-07-006

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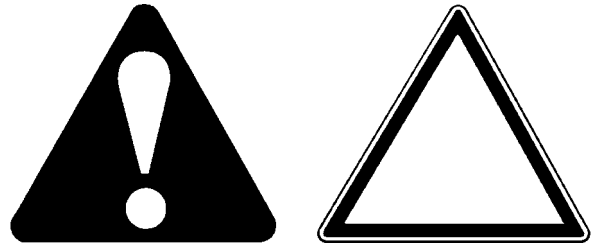
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# SAFETY

## RECOGNIZE SAFETY INFORMATION

- These are the **SAFETY ALERT SYMBOLS**.
  - When you see these symbols on your machine or in this manual, be alert to the potential for personal injury.
  - Follow recommended precautions and safe operating practices.



SA-688

001-E01A-0001

## UNDERSTAND SIGNAL WORDS


- On machine safety signs, signal words designating the degree or level of hazard - **DANGER**, **WARNING**, or **CAUTION** - are used with the safety alert symbol.
  - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
  - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
  - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
  - **DANGER** or **WARNING** safety signs are located near specific hazards. General precautions are listed on **CAUTION** safety signs.
  - Some safety signs don't use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.



**IMPORTANT**



SA-1223

- **CAUTION** also calls attention to safety messages in this manual.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
-  **NOTE** indicates an additional explanation for an element of information.

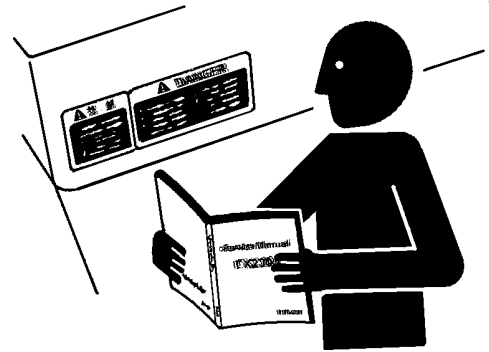
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# SAFETY

## FOLLOW SAFETY INSTRUCTIONS

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
  - If a safety sign or this manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
  - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

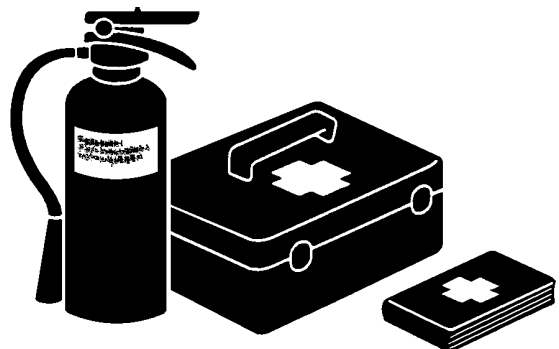
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SA-003

## PREPARE FOR EMERGENCIES

- Be prepared if a fire starts or if an accident occurs.
  - Keep a first aid kit and fire extinguisher on hand.
  - Thoroughly read and understand the label attached on the fire extinguisher to use it properly.
  - To ensure that a fire-extinguisher can be always used when necessary, check and service the fire-extinguisher at the recommended intervals as specified in the fire-extinguisher manual.
- Establish emergency procedure guidelines to cope with fires and accidents.
- Keep emergency numbers for doctors, ambulance service, hospital, and fire department posted near your telephone.



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## SAFETY

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### WEAR PROTECTIVE CLOTHING

- Wear close fitting clothing and safety equipment appropriate to the job.

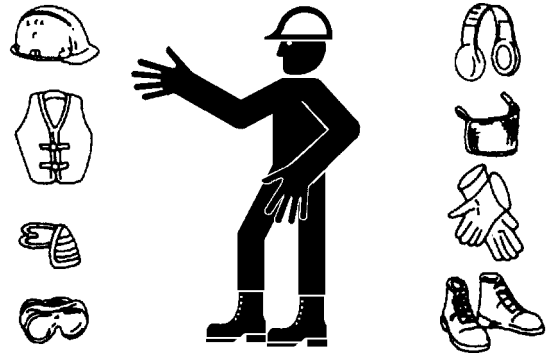
You may need:

- A hard hat
- Safety shoes
- Safety glasses, goggles, or face shield
- Heavy gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask.

Be sure to wear the correct equipment and clothing for the job. Do not take any chances.

- Avoid wearing loose clothing, jewelry, or other items that can catch on control levers or other parts of the machine.
- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.

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SA-438

### PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortably loud noises.



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SA-434

### INSPECT MACHINE

- Inspect your machine carefully each day or shift by walking around it before you start it to avoid personal injury.
- In the walk-around inspection, be sure to cover all points described in the “PRE-START INSPECTION” chapter in the operator’s manual.



007-E01A-0435

SA-435

# SAFETY

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## GENERAL PRECAUTIONS FOR CAB

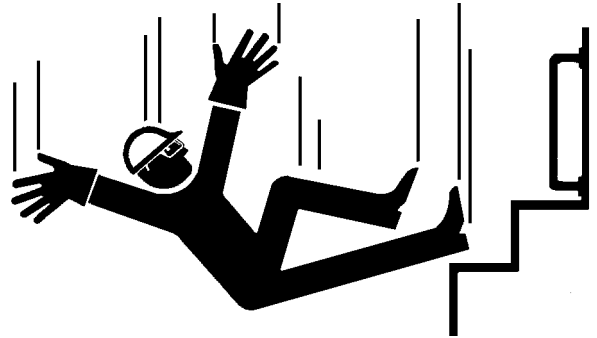
- Before entering the cab, thoroughly remove all dirt and/or oil from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Don't leave parts and/or tools lying around the operator's seat. Store them in their specified locations.
- Avoid storing transparent bottles in the cab. Don't attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Don't leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.

524-E01A-0000

## SAFETY

### USE HANDHOLDS AND STEPS

- Falling is one of the major causes of personal injury.
- When you get on and off the machine, always face the machine and maintain a three-point contact with the steps and handrails.
- Do not use any controls as handholds.
- Never jump on or off the machine. Never mount or dismount a moving machine.
- Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



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### ADJUST THE OPERATOR'S SEAT

- A poorly adjusted seat for either the operator or for the work at hand may quickly fatigue the operator leading to misoperations.
- The seat should be adjusted whenever changing the operator for the machine.
- The operator should be able to fully depress the pedals and to correctly operate the control levers with his back against the seat back.
- If not, move the seat forward or backward, and check again.



SA-378

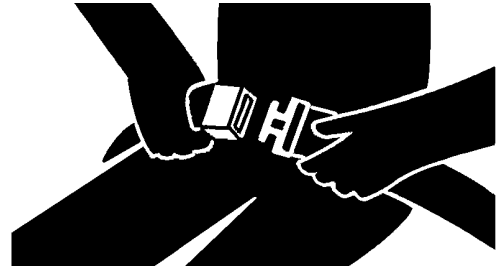
009-E01A-0378

## SAFETY

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### FASTEN YOUR SEAT BELT

- If the machine should overturn, the operator may become injured and/or thrown from the cab. Additionally the operator may be crushed by the overturning machine, resulting in serious injury or death.
- Prior to operating the machine, thoroughly examine webbing, buckle and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine.
- Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimize the chance of injury from an accident.
- We recommend that the seat belt be replaced every three years regardless of its apparent condition.

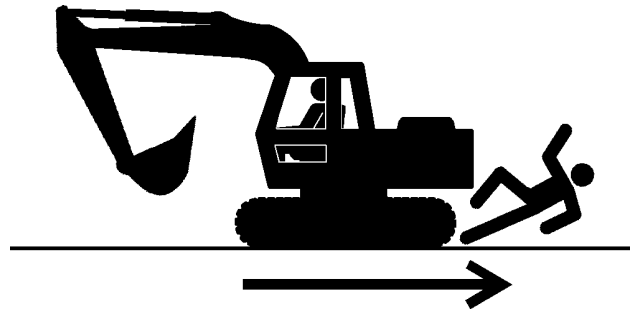


SA-237

010-E01A-0237

### MOVE AND OPERATE MACHINE SAFELY

- Bystanders can be run over.
- Take extra care not to run over bystanders. Confirm the location of bystanders before moving, swinging, or operating the machine.
- Always keep the travel alarm and horn in working condition (if equipped). It warns people when the machine starts to move.
- Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the machine.



SA-426

011-E01A-0426

## SAFETY

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### OPERATE ONLY FROM OPERATOR'S SEAT

- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
- Start the engine only from the operator's seat.
- NEVER start the engine while standing on the track or on ground.
- Do not start engine by shorting across starter terminals.
- Before starting the engine, confirm that all control levers are in neutral.



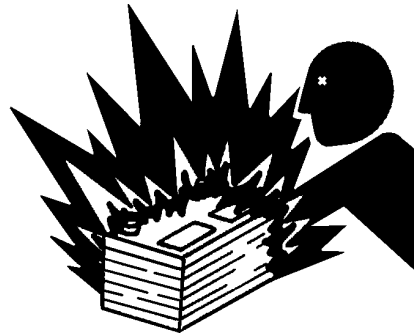
SA-444

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### JUMP STARTING

- Battery gas can explode, resulting in serious injury.
- If the engine must be jump started, be sure to follow the instructions shown in the "OPERATING THE ENGINE" chapter.
- The operator must be in the operator's seat so that the machine will be under control when the engine starts. Jump starting is a two-person operation.
- Never use a frozen battery.
- Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.



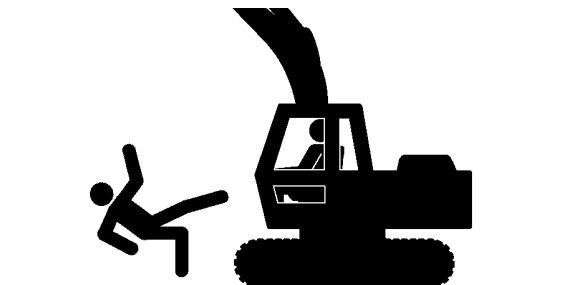
SA-032

S013-E01A-0032

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### KEEP RIDERS OFF MACHINE

- Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine.
- Only allow the operator on the machine. Keep riders off.
- Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.



SA-379

014-E01B-0379



# SAFETY

## INVESTIGATE JOB SITE BEFOREHAND

- When working at the edge of an excavation or on a road shoulder, the machine could tip over, possibly resulting in serious injury or death.
- Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from falling and to prevent the ground, stockpiles, or banks from collapsing.
- Make a work plan. Use machines appropriate to the work and job site.
- Reinforce ground, edges, and road shoulders as necessary. Keep the machine well back from the edges of excavations and road shoulders.
- When working on an incline or on a road shoulder, employ a signal person as required.
- Confirm that your machine is equipped a FOPS cab before working in areas where the possibility of falling stones or debris exist.
- When the footing is weak, reinforce the ground before starting work.
- When working on frozen ground, be extremely alert. As ambient temperatures rise, footing becomes loose and slippery.
- Beware the possibility of fire when operating the machine near flammable objects such as dry grass.

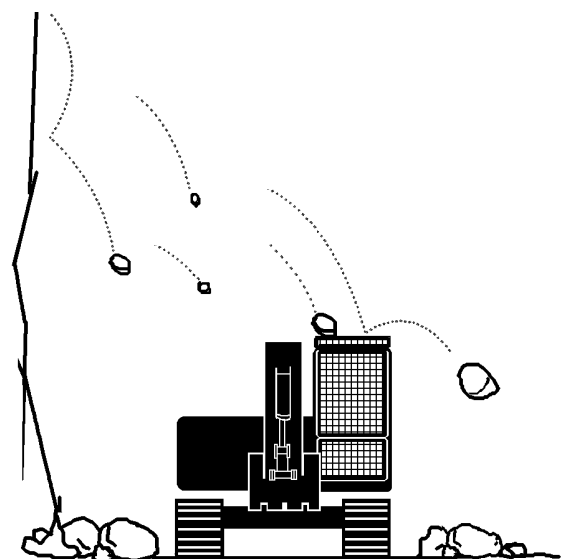


SA-380

015-E01A-0380

## PROTECT AGAINST FALLING STONES AND DEBRIS

- Confirm that your machine is FOPS cab equipped before working in areas where the possibility of falling stones or debris exist.



SA-490

015-E01A-0380

## SAFETY

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### PROVIDE SIGNALS FOR JOBS INVOLVING MULTIPLE NUMBERS OF MACHINES

- For jobs involving multiple numbers of machines, provide signals commonly known by all personnel involved. Also, appoint a signal person to coordinate the job site. Make sure that all personnel obey the signal person's directions.

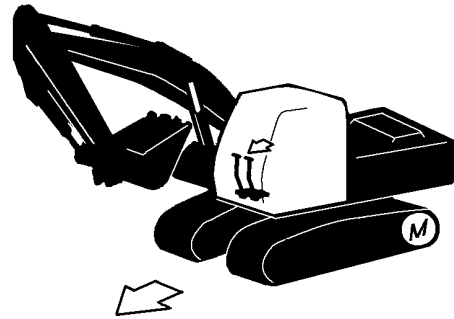


018-E01A-0481

SA-481

### CONFIRM DIRECTION OF MACHINE TO BE DRIVEN

- Incorrect travel pedal/lever operation may result in serious injury death.
- Before driving the machine, confirm the position of the undercarriage in relation to the operator's position. If the travel motors are located in front of the cab, the machine will move in reverse when travel pedals/levers are operated to the front.



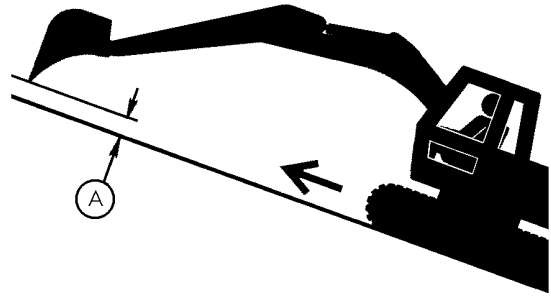
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SA-491

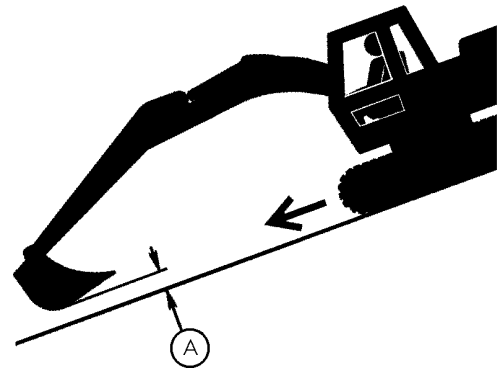
# SAFETY

## DRIVE MACHINE SAFELY

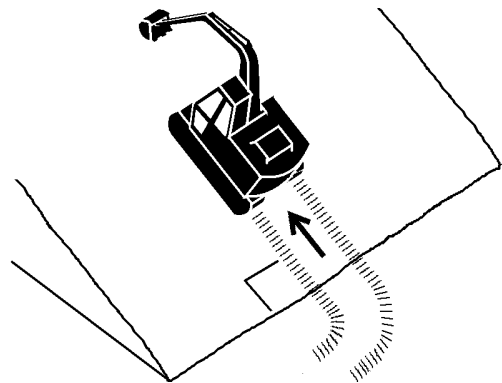
- Before driving the machine, always confirm that the travel levers/pedals direction corresponds to the direction you wish to drive.
- Be sure to detour around any obstructions.
- Avoid traveling over obstructions. Soil, fragments of rocks, and/or metal pieces may scatter around the machine. Don't allow personnel to stay around the machine while traveling.
- Driving on a slope may cause the machine to slip or overturn, possibly resulting in serious injury or death.
- When driving up or down a slope, keep the bucket facing the direction of travel, approximately 0.5 to 1.0 m (1 ft 8 in to 3 ft 3 in) (A) above the ground.
- If the machine starts to skid or becomes unstable, immediately lower the bucket to the ground and stop.



SA-387

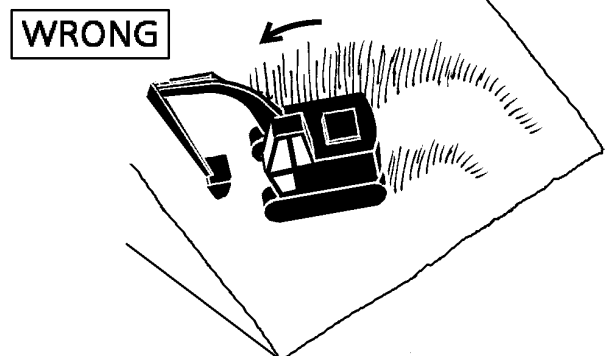


SA-388



SA-441

- Driving across the face of a slope or steering on a slope may cause the machine to skid or turnover. If the direction must be changed, move the machine to level ground, then, change the direction to ensure safe operation.



SA-589

## SAFETY

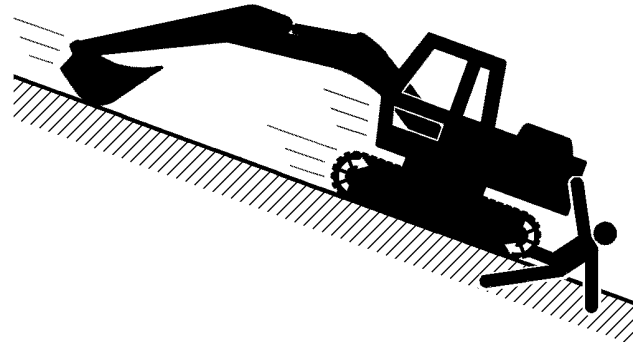
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### AVOID INJURY FROM ROLLAWAY ACCIDENTS

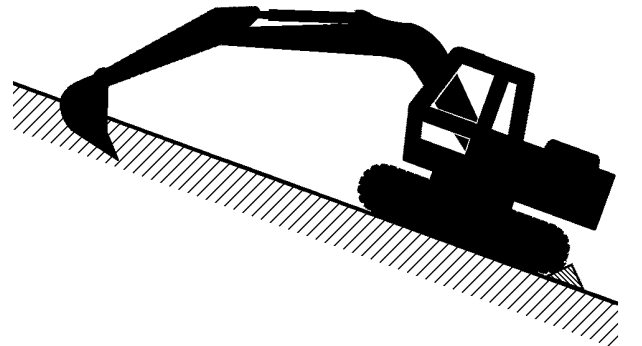
- Death or serious injury may result if you attempt to mount or stop a moving machine.

To avoid rollaways:

- Select level ground when possible to park machine.
- Do not park the machine on a grade.
- Lower the bucket and/or other work tools to the ground.
- Turn the auto-idle switch and the H/P mode switch off.
- Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
- Stop the engine and remove the key from the key switch.
- Pull the pilot control shut-off lever to LOCK position.
- Block both tracks and lower the bucket to the ground. Thrust the bucket teeth into the ground if you must park on a grade.
- Position the machine to prevent rolling.
- Park a reasonable distance from other machines.



SA-391



SA-392

020-E02A-0493

## SAFETY

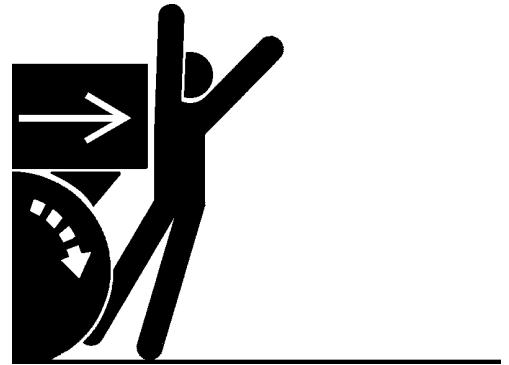
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### AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

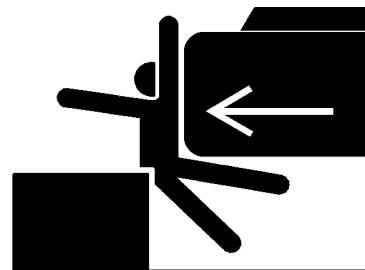
- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.

To avoid back-over and swing accidents:

- Always look around **BEFORE YOU BACK UP AND SWING THE MACHINE**. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
- Keep the travel alarm in working condition (if equipped).  
ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.
- USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.  
Use hand signals, which conform to your local regulations, when work conditions require a signal person.
- No machine motions shall be made unless signals are clearly understood by both signalman and operator.
- Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
- Keep windows, mirrors, and lights clean and in good condition.
- Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
- Read and understand all operating instructions in the operator's manual.



SA-383



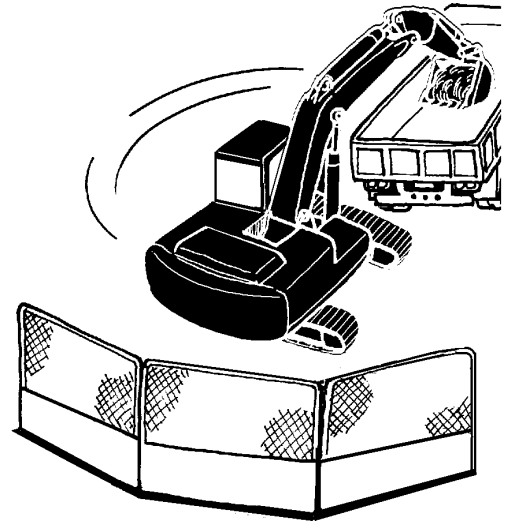
SA-384

021-E01A-0494

## SAFETY

### KEEP PERSON CLEAR FROM WORKING AREA

- A person may be hit severely by the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
- Keep all persons clear from the area of operation and machine movement.
- Before operating the machine, set up barriers to the sides and rear area of the bucket swing radius to prevent anyone from entering the work area.



022-E01A-0386

SA-386

### NEVER POSITION BUCKET OVER ANYONE

- Never lift, move, or swing bucket above anyone or a truck cab. Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.

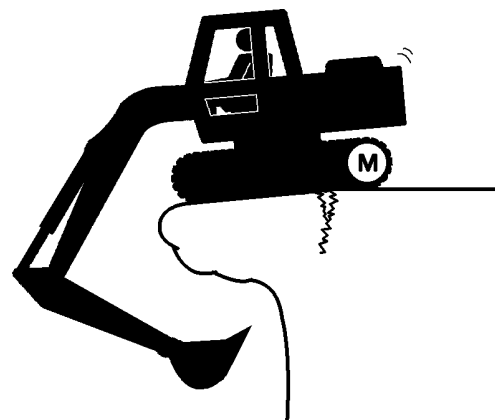


023-E01A-0487

SA-487

### AVOID UNDERCUTTING

- In order to retreat from the edge of an excavation if the footing should collapse, always position the undercarriage perpendicular to the edge of the excavation with the travel motors at the rear.
- If the footing starts to collapse and if retreat is not possible, do not panic. Often, the machine can be secured by lowering the front attachment, in such cases.



024-E01A-0488

SA-488

# SAFETY

## AVOID TIPPING

**DO NOT ATTEMPT TO JUMP CLEAR OF TIPPING MACHINE --- SERIOUS OR FATAL CRUSHING INJURIES WILL RESULT**

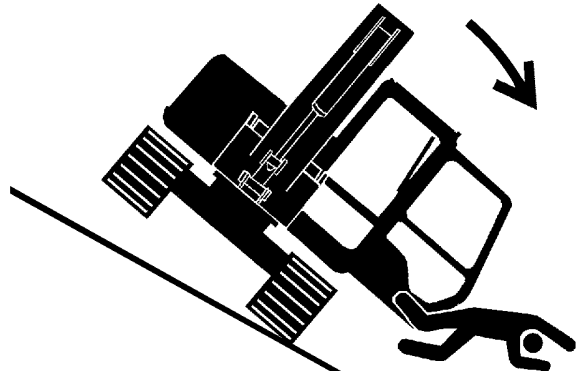
**MACHINE WILL TIP OVER FASTER THAN YOU CAN JUMP FREE**

**FASTEN YOUR SEAT BELT**

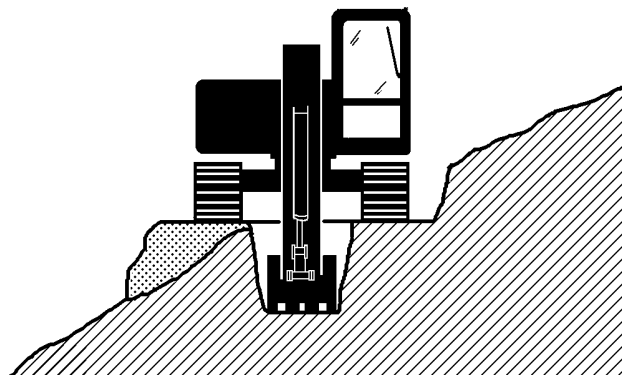
- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.

To avoid tipping:

- Be extra careful before operating on a grade.
  - Prepare machine operating area flat.
  - Keep the bucket low to the ground and close to the machine.
  - Reduce operating speeds to avoid tipping or slipping.
  - Avoid changing direction when traveling on grades.
  - NEVER attempt to travel across a grade steeper than 15 degrees if crossing the grade is unavoidable.
  - Reduce swing speed as necessary when swinging loads.
- Be careful when working on frozen ground.
  - Temperature increases will cause the ground to become soft and make ground travel unstable.



SA-012



SA-440

025-E01B-0495

## NEVER UNDERCUT A HIGH BANK

- The edges could collapse or a land slide could occur causing serious injury or death.



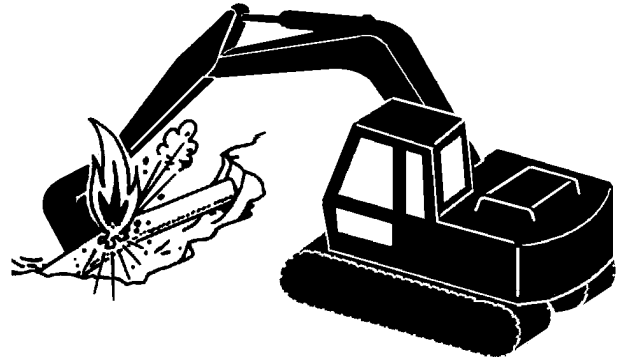
SA-489

026-E01A-0489

## SAFETY

### DIG WITH CAUTION

- Accidental severing of underground cables or gas lines may cause an explosion and/or fire, possibly resulting in serious injury or death.
  - Before digging check the location of cables, gas lines, and water lines.
  - Keep the minimum distance required, by law, from cables, gas lines, and water lines.
  - If a fiber optic cable should be accidentally severed, do not look into the end. Doing so may result in serious eye injury.
  - Contact your local “diggers hot line” if available in your area, and/or the utility companies directly. Have them mark all underground utilities.

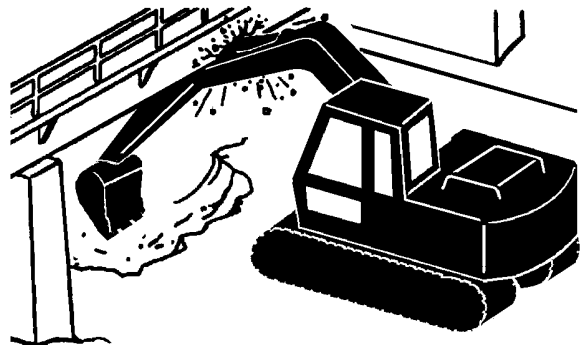


SA-382

027-E01A-0382

### OPERATE WITH CAUTION

- If the front attachment or any other part of the machine hits against an overhead obstacle, such as a bridge, both the machine and the overhead obstacle will be damaged, and personal injury may result as well.
  - Take care to avoid hitting overhead obstacles with the boom or arm.



028-E01A-0389

SA-389

### AVOID POWER LINES

- Serious injury or death can result if the machine or front attachments are not kept a safe distance from electric lines.
  - When operating near an electric line, NEVER move any part of the machine or load closer than 3 m plus twice the line insulator length.
  - Check and comply with any local regulations that may apply.
  - Wet ground will expand the area that could cause any person on it to be affected by electric shock. Keep all bystanders or co-workers away from the site.



SA-381

029-E01A-0381

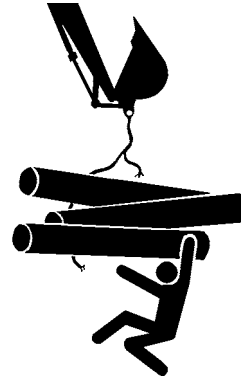


# SAFETY

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## OBJECT HANDLING

- If a lifted load should fall, any person nearby may be struck by the falling load or may be crushed underneath it, resulting in serious injury or death.
- When using the machine for craning operations, be sure to comply with all local regulations.
- Do not use damaged chains or frayed cables, cables, slings, or ropes.
- Before craning, position the upperstructure with the travel motors at the rear.
- Move the load slowly and carefully. Never move it suddenly.
- Keep all persons well away from the load.
- Never move a load over a person's head.
- Do not allow anyone to approach the load until it is safely and securely situated on supporting blocks or on the ground.
- Never attach a sling or chain to the bucket teeth. They may come off, causing the load to fall.



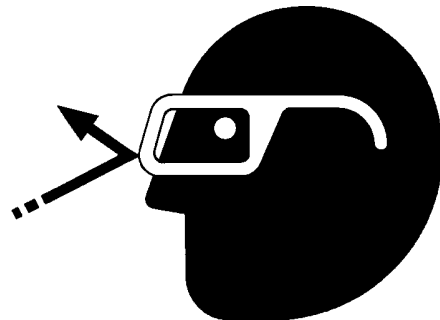
SA-014

030-E01A-0014

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## PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
- Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
- Keep bystanders away from the working area before striking any object.



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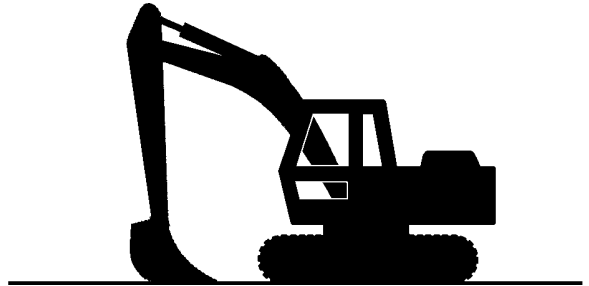
SA-432

# SAFETY

## PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle / acceleration selector off.
- Run engine at slow idle speed without load for 5 minutes.
- Turn key switch to OFF to stop engine.
- Remove the key from the key switch.
- Pull the pilot control shut-off lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.



SA-390

033-E08B-0390

## HANDLE FLUIDS SAFELY—AVOID FIRES

- Handle fuel with care; it is highly flammable. If fuel ignites, an explosion and/or a fire may occur, possibly resulting in serious injury or death.
  - Do not refuel the machine while smoking or when near open flame or sparks.
  - Always stop the engine before refueling the machine.
  - Fill the fuel tank outdoors.
- All fuels, most lubricants, and some coolants are flammable.
  - Store flammable fluids well away from fire hazards.
  - Do not incinerate or puncture pressurized containers.
  - Do not store oily rags; they can ignite and burn spontaneously.
  - Securely tighten the fuel and oil filler cap.



SA-018



SA-019

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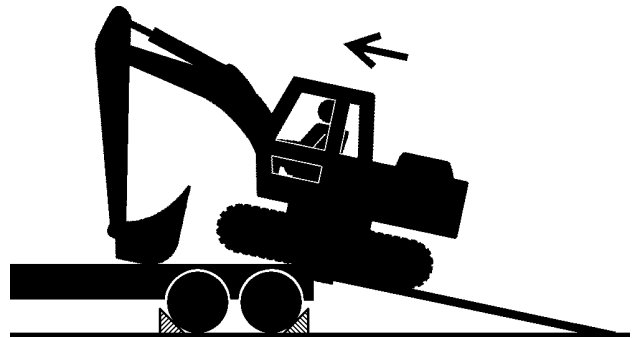
# SAFETY

## SAFETY TRANSPORTING

- The danger of tipping is present when loading/unloading the machine onto/from a truck or trailer bed.
- Be sure to observe local regulations when transporting the machine on public roads.
- Provide an appropriate truck or trailer for transporting the machine.

Take the following precautions when loading/unloading the machine:

- 1) Select firm level ground.
- 2) Be sure to use a loading dock or ramp.
- 3) Be sure to have a signal person when loading/unloading the machine.
- 4) Always turn the auto-idle/acceleration selection OFF when loading or unloading the machine, to avoid unexpected speed increase due to unintentional operation of a control lever.
- 5) Always select the slow speed mode with the travel mode switches. In the high speed mode, travel speed may automatically increase.
- 6) Avoid steering while driving up or down the ramp as it is extremely dangerous. If steering is unavoidable, first move back to the ground or flatbed, modify traveling direction, and begin to drive again.
- 7) Do not operate any levers besides the travel levers when driving up or down the ramp.
- 8) The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
- 9) Prevent possible injury from machine tipping while the upperstructure is rotating.
- 10) Keep the arm tucked under and rotate the upperstructure slowly for best stability.
- 11) Securely fasten chain or cables to the machine frame. Refer to “transporting” chapter in this manual for details.



SA-395

S035-E08A-0395

# SAFETY

## PRACTICE SAFE MAINTENANCE

To avoid accidents:

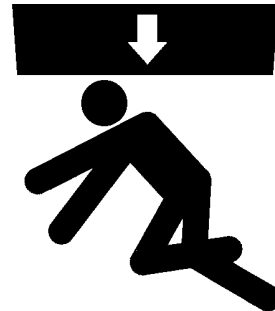
- Understand service procedures before doing work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

Before servicing the machine:

1. Park the machine on a level surface.
  2. Lower the bucket to the ground.
  3. Turn the auto-idle/acceleration selector off.
  4. Run the engine at slow idle speed without load for 5 minutes.
  5. Turn the key switch to OFF to stop engine.
  6. Relieve the pressure in the hydraulic system by moving the control levers several times.
  7. Remove the key from the switch.
  8. Attach a "Do Not Operate" tag on the control lever.
  9. Pull the pilot control shut-off lever to the LOCK position.
  10. Allow the engine to cool.
- If a maintenance procedure must be performed with the engine running, do not leave machine unattended.
  - If the machine must be raised, maintain a 90 to 110° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
  - Never work under a machine raised by the boom.
  - Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of this manual.
  - Keep all parts in good condition and properly installed.
  - Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
  - When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
  - Disconnect battery ground cable (-) before making adjustments to electrical systems or before performing welding on the machine.



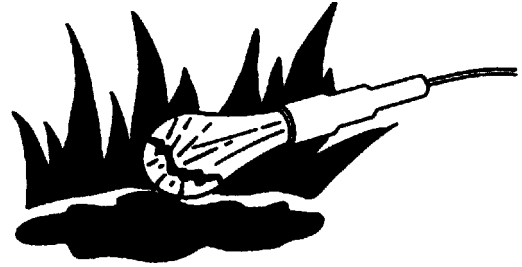
SA-028



SA-527

## SAFETY

- Sufficiently illuminate the work site. Use a maintenance work light when working under or inside the machine.
- Always use a work light protected with a guard. In case the light bulb is broken, spilled fuel, oil, anti-freeze fluid, or window washer fluid may catch fire.



SA-037

### WARN OTHERS OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attach a "Do Not Operate" tag on the control lever. This tag is available from your authorized dealer.



501-E01A-0287

SA-287



SS2045102

### SUPPORT MACHINE PROPERLY

- Never attempt to work on the machine without securing the machine first.
- Always lower the attachment to the ground before you work on the machine.
- If you must work on a lifted machine or attachment, securely support the machine or attachment. Do not support the machine on cinder blocks, hollow tires, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack.

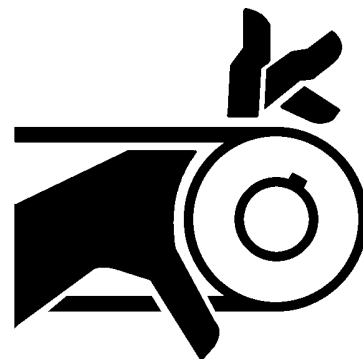


SA-527

519-E01A-0527

### STAY CLEAR OF MOVING PARTS

- Entanglement in moving parts can cause serious injury.
- To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.



502-E01A-0026

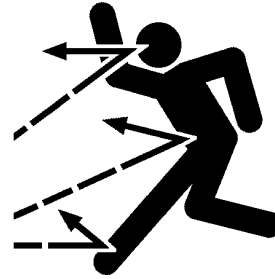
SA-026

## SAFETY

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### PREVENT PARTS FROM FLYING

- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
  - Do not attempt to remove GREASE FITTING or VALVE ASSEMBLY.
  - As pieces may fly off, be sure to keep body and face away from valve.
- Travel reduction gears are under pressure.
  - As pieces may fly off, be sure to keep body and face away from AIR RELEASE PLUG to avoid injury. GEAR OIL is hot.
  - Wait for GEAR OIL to cool, then gradually loosen AIR RELEASE PLUG to release pressure.



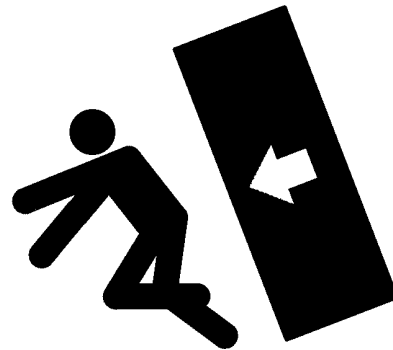
SA-344

503-E01B-0344

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### STORE ATTACHMENTS SAFELY

- Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.
  - Securely store attachments and implements to prevent falling. Keep children and bystanders away from storage areas.



SA-034

504-E01A-0034

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