**MODEL** 548
**BOOK No.** 1227
**SERIAL No.** _____

## CRANE SERIAL NUMBER

**The crane serial number is on the Crane Rating Manual inside the operator's cab. The serial number should always be furnished when ordering parts for the crane or when corresponding with the Link-Belt Distributor or Factory concerning the crane. Providing the serial number is the only way of ensuring the correct parts and/or information can be furnished.**

Link-Belt Construction Equipment Company

Notes:

## General Information and Manual Layout

This Shop Manual will be divided into 3 Sections, separated by Tabs when completed. Currently, only the Section for the Workshop Instruction portion is available. The other Sections will be added when available.

The first Section of this Shop Manual is the Workshop Instruction portion of the Manual. It contains the removal/installation (R&I) and the assembly/disassembly (Recondition) instructions for major crane components. These pages are coded with a "W" in front of the Section/Group/Page numbers. Example, the pages that are coded/numbered W2-1-1 through W2-1-6, contain the instructions for R&I of the cab. (Code W2-1-1 identifies a page in the Workshop Instruction Manual, Section 2, Group 1, and Page 1.) There are "Contents" pages at the beginning of each sub-section, in front of pages W1-1-1, W2-1-1, and W3-1-1.

The below mentioned 2nd and 3rd Sections are not yet available.

The 2nd and 3rd Sections are the Principles of Operation/Specifications and Troubleshooting portions of the Shop Manual. These pages are coded with a "T" in front of the Section/Group/Page numbers. Example, the pages coded/numbered T1-3-1 through T1-3-4, contain the specifications for the engine and engine accessories. The Section behind Tab 1 contains the specifications and how main components operate to perform their intended functions. (Code T1-3-1 identifies a page in the Principles of Operation/Specifications/Troubleshooting Manual, Section 1, Group 3, and Page 1.) There are "Contents" pages at the beginning of each sub-section, in front of pages T1-2-1, T2-1-1, and T3-1-1. The Section behind Tab 2 contains Performance Tests/Standards and Troubleshooting for major components. There are "Contents" pages at the beginning of each sub-section, in front of pages T4-1-1 and T5-1-1.

## Terms/Terminology, Nomenclature, and Abbreviations

The following terms/terminology, nomenclature, and abbreviations are given to help identify common terms/terminology, nomenclature, and abbreviations used in this manual that, due to language translations, may not be easily understood.

| | | |
|---|---|---|
| Auxiliary Hoisting Mechanism | = | Auxiliary Winch Assembly / Winch Drum |
| Boom Pendant Rope | = | Boom Pendants |
| Center Joint | = | Rotating Joint |
| Crawler Shoe | = | Track Shoe |
| Derricking | = | Boom Hoist |
| Derricking Drum | = | Boom Hoist Drum |
| Derricking Mechanism | = | Boom Hoist System |
| Derricking Motor | = | Boom Hoist Motor |
| Drive Tumbler | = | Travel Drive Sprocket |
| Hoisting Drum | = | Winch Drum |
| Hoisting Drum Control Valve | = | Winch Drum Control Valve |
| Hoisting Mechanism | = | Winch Assembly / Winch Drum |
| Hoisting Motor | = | Winch Motor |
| Pump Mechanism | = | Pump Assembly |
| Screwed-In Connection | = | Threaded Connection |
| Slewing | = | Swing |
| Slewing Frame | = | Upper Revolving Frame |
| Slewing Mechanism | = | Swing Reduction Unit |
| Slewing Motor | = | Swing Motor |
| Slewing Pump | = | Swing Pump |
| Slewing Ring | = | Turntable Bearing |
| Stopper | = | Plug |
| Take-Up Tumbler | = | Track Take-Up Idler |
| Travel Mechanism | = | Travel Motor and Reduction Gears |
| Upperstructure | = | Crane Upper |

# Conversion Tables

Length Conversion Table

| millimeter, mm | centimeter, cm | meter, m | inch, in., " | foot, ft., ' |
|---|---|---|---|---|
| 1 | 0.1 | 0.001 | 0.03937 | 0.00328 |
| 10 | 1 | 0.01 | 0.3937 | 0.03281 |
| 1000 | 100 | 1 | 39.37 | 3.281 |
| 25.40 | 2.540 | 0.0254 | 1 | 0.08333 |
| 304.8 | 30.48 | 0.3048 | 12 | 1 |

| mile, mi | kilometer, km |
|---|---|
| 1 | 1.6093 |
| 0.6214 | 1 |

Area Conversion Table

| square millimeter, $mm^2$ | square centimeter, $cm^2$ | square meter, $m^2$ | square inch, $in^2$ | square foot, $ft^2$ |
|---|---|---|---|---|
| 1 | 0.01 | 0.000001 | 0.00155 | |
| 100 | 1 | 0.0001 | 0.155 | 0.001076 |
| 1 000 000 | 1 0000 | 1 | 1550 | 10.764 |
| 645.2 | 6.452 | 0.000645 | 1 | 0.006944 |
| 92903.0 | 929.03 | 0.09290 | 144 | 1 |

Volume Conversion Table

| cubic centimeter, $cm^3$, cc | cubic meter, $m^3$ | cubic inch, $in^3$ | cubic foot, $ft^3$ |
|---|---|---|---|
| 1 | 0.000001 | 0.0610 | 0.0000353 |
| 1 000 000 | 1 | 61024 | 35.31 |
| 16.39 | 0.0000164 | 1 | 0.000579 |
| 28320 | 0.02832 | 1728 | 1 |

| gallon, gal. | cubic inch, $in^3$ | liter, lit., l |
|---|---|---|
| 1 | 231 | 3.785 |
| 0.004329 | 1 | 0.01639 |
| 0.2642 | 61.02 | 1 |

## **Conversion Tables –** (continued)

Weight Conversion Table

| gram, g | kilogram, kg | ounce, oz | pound, lb. | metric ton, t | short ton, s.t. |
|---|---|---|---|---|---|
| 1 | 0.001 | 0.03527 | 0.0022 | | |
| 1000 | 1 | 35.27 | 2.205 | 0.001 | 0.001102 |
| 28.349 | 0.02835 | 1 | 0.0625 | 0.00002835 | 0.00003125 |
| 453.592 | 0.4536 | 16 | 1 | 0.0004536 | 0.0005 |
| 1 000 000 | 1 000 | 35274 | 2205 | 1 | 1.102 |
| 907185 | 907.2 | 32 000 | 2000 | 0.9072 | 1 |

Pressure Conversion Table

| bar | $kg/cm^3$ | $lb./in^2$, PSI |
|---|---|---|
| 1 | 1.0197 | 14.50 |
| 0.9807 | 1 | 14.22 |
| 0.06895 | 0.07031 | 1 |

Work, Energy Conversion Table

| kg.cm | kg.m | foot-pound, ft.-lb. | inch-pound,.in-lb. |
|---|---|---|---|
| 1 | 0.01 | 0.0723 | 0.8681 |
| 100 | 1 | 7.233 | 86.81 |
| 13.83 | 0.1383 | 1 | 12 |
| 1.1525 | 0.01153 | 0.08333 | 1 |

Centigrade-Fahrenheit Conversion Table

| °F | °C | °F | °C | °F | °C | °F | °C |
|---|---|---|---|---|---|---|---|
| -450 | -267.78 | -200 | -128.89 | 5 | -15.00 | 30 | -1.11 |
| -400 | -240.00 | -150 | -101.11 | 10 | -12.22 | 35 | 1.67 |
| -350 | -212.22 | -100 | -73.33 | 15 | -9.44 | 40 | 4.44 |
| -300 | -184.44 | -50 | -45.56 | 20 | -6.67 | 45 | 7.22 |
| -250 | -156.67 | 0 | -17.78 | 25 | -3.89 | 50 | 10.00 |

| °F | °C | °F | °C | °F | °C | °F | °C |
|---|---|---|---|---|---|---|---|
| 55 | 12.78 | 80 | 26.67 | 150 | 65.56 | 400 | 204.44 |
| 60 | 15.56 | 85 | 29.44 | 200 | 93.33 | 450 | 232.22 |
| 65 | 18.33 | 90 | 32.22 | 250 | 121.11 | 500 | 260.00 |
| 70 | 21.11 | 95 | 35.00 | 300 | 148.89 | 550 | 287.78 |
| 75 | 23.89 | 100 | 37.78 | 350 | 176.67 | 600 | 315.56 |

# INTRODUCTION

## TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.
  - Be sure to thoroughly read this manual for correct product information and service procedures.

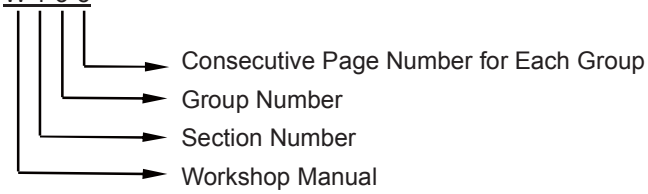
## ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.
  - The Operator's Manual
  - The Parts Catalog
  - Operation Manual of the Engine
  - Parts Catalog of the Engine

## PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:

Example : W 1-3-5



## SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

In this manual, the following safety alert symbol and signal words are used to alert the reader to the potential for personal injury of machine damage.

⚠ This is the safety alert symbol. When you see this symbol, be alert to the potential for personal injury.
Never fail to follow the safety instructions prescribed along with the safety alert symbol.
The safety alert symbol is also used to draw attention to component/part weights.
To avoid injury and damage, be sure to use appropriate lifting techniques and equipment when lifting heavy parts.

- ⚠ **CAUTION:**
  Indicated potentially hazardous situation which could, if not avoided, result in personal injury or death.

- **IMPORTANT:**
  Indicates a situation which, if not conformed to the instructions, could result in damage to the machine.

- *NOTE:*
  Indicates supplementary technical information or know-how.

## UNITS USED

- SI Units (International System of Units) are used in this manual.
  MKSA system units and English units are also indicated in parenthheses just behind SI units.

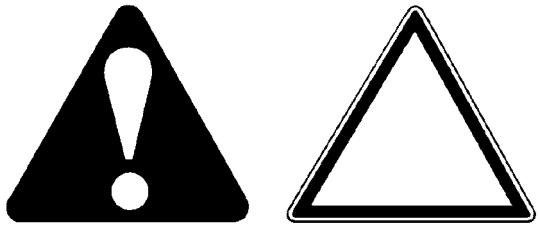
  Example : 24.5 MPa (250 kgf/cm$^2$, 3560 psi)

  A table for conversion from SI units to other system units is shown below for reference purposees.

| Quantity | To Convert From | Into | Multiply By | Quantity | To Convert From | Into | Multiply By |
|---|---|---|---|---|---|---|---|
| Length | mm | in | 0.03937 | Pressure | MPa | kgf/cm$^2$ | 10.197 |
| | mm | ft | 0.003281 | | MPa | psi | 145.0 |
| Volume | L | US gal | 0.2642 | Power | kW | PS | 1.360 |
| | L | US qt | 1.057 | | kW | HP | 1.341 |
| | m$^3$ | yd$^3$ | 1.308 | Temperature | °C | °F | °C×1.8+32 |
| Weight | kg | lb | 2.205 | Velocity | km/h | mph | 0.6214 |
| Force | N | kgf | 0.10197 | | min$^{-1}$ | rpm | 1.0 |
| | N | lbf | 0.2248 | Flow rate | L/min | US gpm | 0.2642 |
| Torque | N·m | kgf·m | 1.0197 | | mL/rev | cc/rev | 1.0 |
| | N·m | lbf·ft | 0.7375 | | | | |

## 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

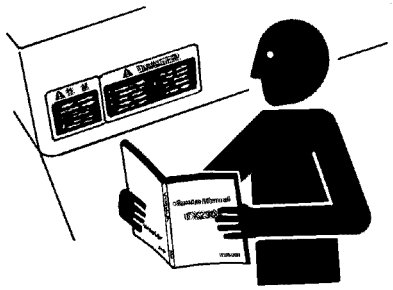
## UNDERSTAND SIGNAL WORDS


SA-1223

- 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.
- **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.

# 1 Basic Precautions

### 1.1 Follow Safety Instructions

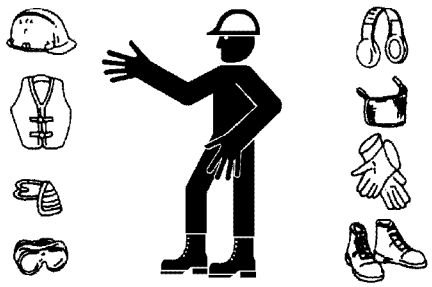


SA-003

- Read this operator's manual and the safety labels carefully to fully understand the instructions and operate the machine safely.
  - Always keep the safety labels clean. If you damage or lose this manual or the safety labels, order replacements immediately.
  - The prescribed qualifications are required for operating this crane.
  - Read and understand the correct operations, work methods, lubrication methods, and maintenance methods for this crane.
  - Always maintain the crane in good working condition.
  - Use the crane within the prescribed specification range.
  - Do not modify this crane. Doing so will impair safety, reduce functionality, and shorten the service life, as well as possibly void the crane warranty.
  - Descriptions marked with "⚠ Caution" are basic safety procedures. Pay thorough attention to safety even for items that are not included in this operator's manual.

### 1.2 Wear Safe Clothes And Protective Gear

If your clothes are loose fitting, they may catch on the control levers or crane protrusions, resulting in personal injury or death.
Wear clothes that are appropriate for work.
Do not wear clothes on which oil or other flammables are spilled, because they can ignite easily.
Wear protective gear that is appropriate for work. Check the function of the protective gear before using it.



SA-438

- Protective gear: Helmet, safety boots, protective goggles, anti-dust mask, heavy gloves, safety belt, etc. as required to perform the work.

### 1.3 Protect Against Noise

- Prolonged exposure to loud noise may lead to hearing loss or deafness.
  - When you will be exposed to noise for a long time, such as when performing engine maintenance, wear ear covers or earplugs.

SA-434

### 1.4 Do Not Operate The Crane In Bad Health

Operating the crane in bad health will impair your concentration and may result in personal injury or death. Do not operate the crane in a condition where you cannot operate it correctly, such as when you are tired or ill, when you are taking medication, or after drinking alcohol.


M25H-02-008

### 1.5 Coordinate With The Personnel Concerned

If you do not coordinate work with the personnel concerned, or you do not coordinate properly, it may result in an accident.
Before performing work, hold a meeting with the personnel concerned to coordinate the following items.

- Appoint a job site manager and decide on the command system
- Appoint a signal person and check the signal methods
- Appoint a sling person and check the slinging methods
- Check the positions and work methods of personnel involved in other work
- Check the setting position of the crane and the ground conditions, and any ground reinforcements
- Check the load and crane capacity
- Check the safety regulations for the job site, such as prohibitions and precautions
- Set up ropes or a fence as barriers around the areas into which people are not allowed to enter

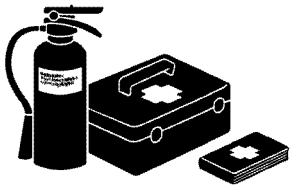
### 1.6 Always Signal Properly

If signals are not performed properly, it may result in personal injury or death.
Signal persons must be able to accurately communicate their signals and instructions to the personnel concerned. In addition to following the signal person's signals, the operator must also check the safety in the surrounding area and give signals such as sounding the alarm when starting the engine or moving the crane.

SA-481

### 1.7 Prepare For Emergencies

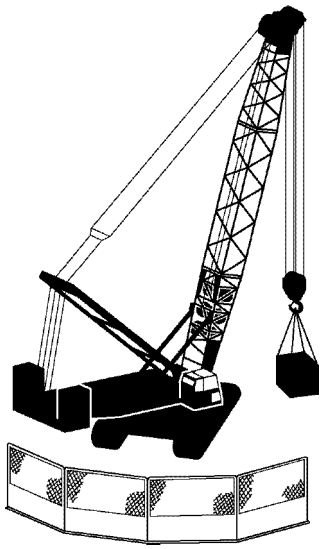
Decide in advance who to contact and what action to take in the event of an accident or fire. Learn in advance where the fire extinguishers and first-aid kits are stored and how to use them.



SA-437

### 1.8 Keep Personnel Clear Of The Working Range

If a person enters the working range, it may result in personal injury or death.
To make sure that nobody enters the working range at the job site, prohibit people from going into it. Take measures that will prevent people from going near the working range, prior to beginning work, make sure that there are no people or obstructions within the working range.



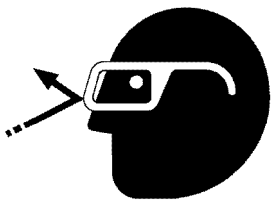
M2ZC-02-001

#### Protect Against Flying Objects

At job sites where there will be flying or falling pieces of gravel, rock, or metal, use protective gear such as helmets, goggles, and heavy gloves.

Pieces of gravel, rock, or metal may fly through the air or fall and strike a person in the eye or body, resulting in serious injury or death.

Make sure that there is no third party around the machine.



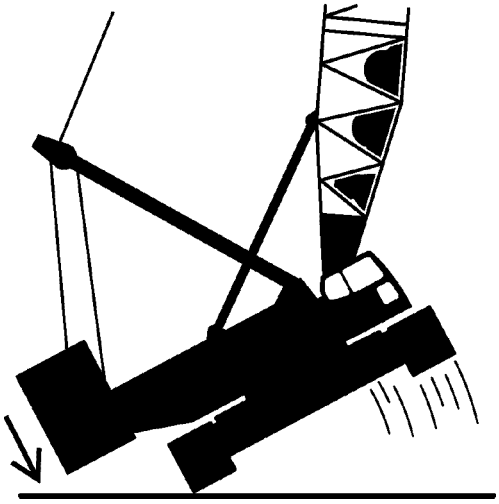
SA-432

### 1.9 Operate The Crane In The Correct Position

If you operate the crane in an incorrect position or modify it, it may be damaged or tip over, resulting in personal injury or death.
Operate the crane in a work position that is appropriate for the crane specifications. Never attempt to modify the crane. If you require any modifications, first contact your nearest Link-Belt distributor.

**Main Items Related To Crane Position**

- Weight of counterweight
- Live mast angle
- Configurations of boom, luffing boom, and luffing jib pendant rope
- Wire rope reeving locations (before raising the tower and jib/boom)
- Checking of the wire ropes for entanglement or detachment (after raising the boom and luffing jib/luffing boom)



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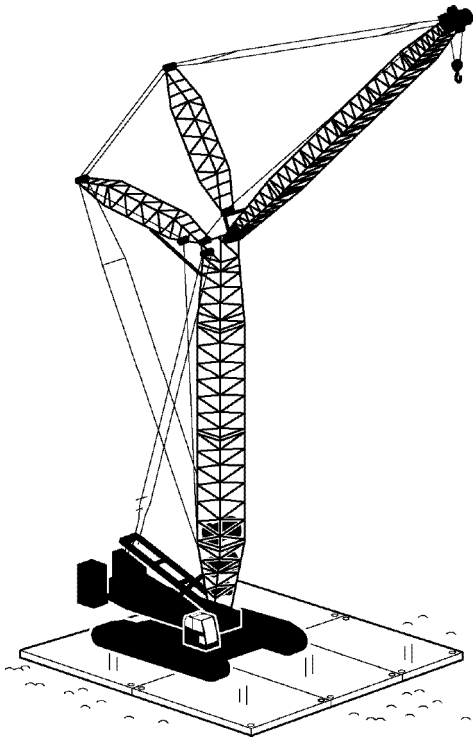
### 1.10 Setting The Machine

Crane must be setup on a firm, level surface. Failure to do so may result in major damage to the crane or serious personal injury. Check the strength of the ground and reinforce any soft ground by laying down sufficiently strong steel plates.



M2ZC-02-003

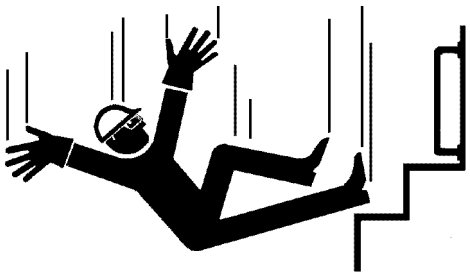
### 1.11 Do Not Remove The Safety Devices

Never remove the safety devices.
If you remove the safety devices or use them incorrectly, it may result in personal injury or death.
Learn the function and purpose of each safety device.
Maintain the safety devices so that they function correctly. Check that all the guards and covers are correctly installed, and that there are no missing parts or damage. Perform maintenance work if there are any problems.

- Safety Devices: For details on safety devices such as rated capacity limiters, hoisting limiters, luffing attachment or boom hoist limiters, secondary luffing attachment or boom hoist limiters (secondary overhoist preventive devices), alarm devices, and locking devices, refer to “3. Part Names” and “6. Safety Devices” in Section 1.

### 1.12 Mounting And Dismounting The Crane

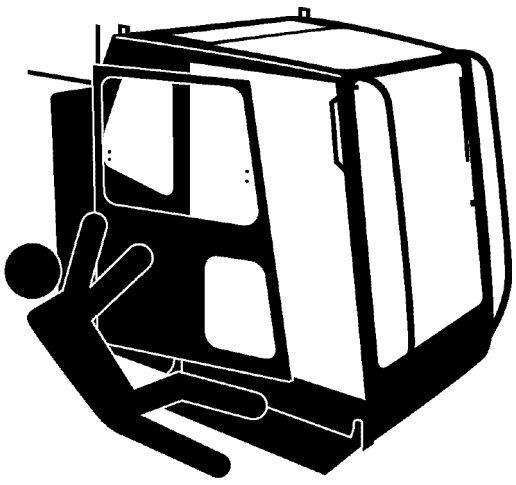
When mounting or dismounting the crane, always use the handrail and steps. Do not jump on or off the crane, because you may fall.
Always face the crane, use the steps and handrail, and maintain three point contact (both hands and one foot or both feet and a hand) with the crane.
Be careful not to accidentally grab any of the operating devices.
Use care - The steps and handrail may become slippery.



SA-439

### 1.13 Opening And Closing The Cab Door

The door of the operator's cab opens outward. Be careful not to fall off the steps when getting on or off the crane.
When you open the door, make sure that the door catch locks properly.
If the door catch does not lock properly, the door may close unexpectedly, trapping your fingers or hands.



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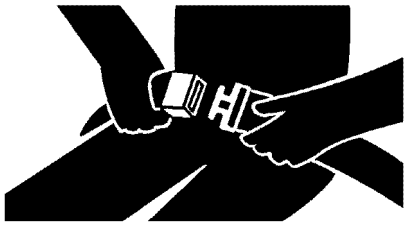
### 1.14 Operate The Crane Only From The Operator's Seat

Starting the engine or operating the crane from a position other than the operator's seat may result in an accidental operation and an accident.
Always sit in the operator's seat when starting the engine and operating the crane.

SA-444

### 1.15 Fasten Your Seat Belt

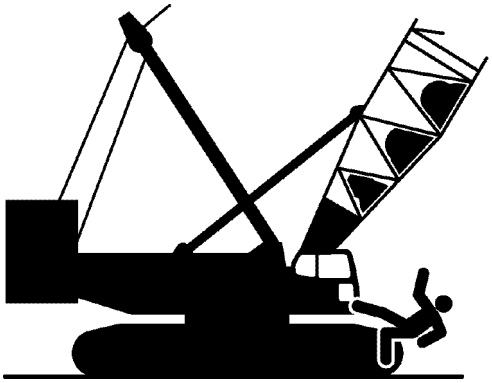
- If the crane tips over, the operator may be violently thrown against the sides of the cab, or thrown from the cab and end up under the crane. This may result in serious injury or death.
  - When operating the crane, sit in the operator's seat and fasten your seat belt.
  - Before using the seat belt, make sure that there are no problems in the belt, buckle, or metal fittings. Replace the seat belt if there are any problems.



SA-237

### 1.16 Do Not Allow Anyone To Ride The Crane

If there is anyone other than the operator on the crane, the operator's vision or operations may be obstructed, resulting in an accidental operation. In addition, the rider may fall off the crane or be trapped against an obstruction, resulting in a serious accident.
Do not operate the crane while someone is riding on it.



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