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.
- If you have any questions or comments, at if you found any errors regarding the contents of this manual, please contact using "Service Manual Revision Request Form" at the end of this manual.

(Note: Do not tear off the form. Copy it for usage.):

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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
- · Hitachi Training Material

MANUAL COMPOSITION

- This manual consists of two portions: the Technical Manual and the Workshop Manual. Use the manuals according to purpose.
 - Information included in the Technical Manual: technical information needed for redelivery and delivery, operation and activation of all devices and systems, operational performance tests, and troubleshooting procedures.
- Information included in the Workshop Manual: technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

PAGE NUMBER

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

Example: T 1-3-5

Consecutive Page Number for Each Group

Group Number

Section Number

T: Technical Manual W: Workshop Manual

INTRODUCTION

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.

• A 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.

• Ø 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/cm², 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				

SAFETY

RECOGNIZE SAFETY INFORMATION

- This is the SAFETY ALERT SYMBOL.
 - 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.



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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.
- 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.

A WARNING
A CAUTION
IMPORTANT

NOTE

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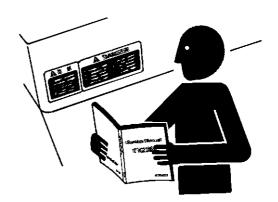
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SAFETY

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 operator's manual is damaged or missing, replace it with new one.
- 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.

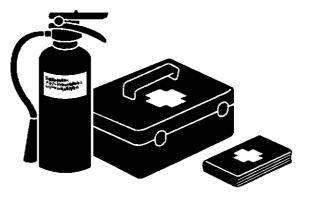
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SA-003

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.
 - 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

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.



SA-438

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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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