

# Operation & Maintenance Manual

# WB97S-2

## BACKHOE-LOADER

SERIAL NUMBER

**WB97S-2 97SF11205** and up



### WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine.

This manual should be kept inside the cab for reference and periodically reviewed by all personnel who will come into contact with the machine.



Product: KOMATSU WB97S-2 Backhoe Loader Operation & Maintenance Manual  
Full Download: <https://www.arepairmanual.com/downloads/komatsu-wb97s-2-backhoe-loader-operation-maintenance-manual/>

Sample of manual. Download All 296 pages at:  
<https://www.arepairmanual.com/downloads/komatsu-wb97s-2-backhoe-loader-operation-maintenance-manual/>

## 1.1 FOREWORD

- This manual has been carried out by Komatsu Utility in order to supply their customers with all the necessary information on the machine and the safety regulations related to it, together with the use and maintenance instructions that enable the operator to exploit the capacity of the machine with optimal results and to keep the machine efficient over time.
- The operation manual, together with the spare parts catalogue, is an integral part of the machine and must accompany it, even when it is resold, until its final disposal.
- The manual must be handled with the greatest care and always kept on board the machine, so that it can be consulted at any moment; it must be placed in the appropriate compartment behind the seat, where also the ownership documents and the logbook are usually kept (see “3.5.10 TECHNICAL DOCUMENTATION”).
- This manual must be given to the persons who have to use the machine and carry out the routine maintenance operations; they must read the contents carefully more than once, in such a way as to clearly understand what are the correct operating conditions and the dangerous conditions that must be avoided.  
In case of loss or damage, request a new copy to Komatsu Utility or your Komatsu Utility Dealer.
- The illustrations contained in this manual may represent machine configurations available upon request.  
Komatsu Utility machines are constantly improved in order to increase their efficiency and reliability; this manual sums up all the information regarding the most recent techniques applied at the moment in which the machine is marketed.  
For any further and/or updated information, contact your Komatsu Utility Dealer.
- For the various maintenance phases it is advisable to consult the hour meter and in particular the maintenance plan set on the electronic unit of the machine frequently. The display of the maintenance plan can be obtained by means of an appropriate screen positioned on the upper part of the front dashboard. In any case, the maintenance plan can be also consulted on the relevant manual provided. Keep to the various maintenance intervals indicated on the screen and on the use and maintenance manual.
- Over the years Komatsu Utility Dealers have gathered considerable experience in customer service.  
If more information is needed, do not hesitate to contact your Komatsu Utility Dealer: he always knows how to get the best performance from the machine, he can suggest the use of the equipment that is most suitable for specific needs and can provide the technical assistance necessary for any change that may be required to conform the machine to the safety standards and traffic rules.  
Furthermore, Komatsu Utility Dealers also ensure their assistance for the supply of Komatsu Utility genuine spare parts, which alone guarantee safety and interchangeability.
- The table included in this manual must be filled in with the machine data, which are the data that must always be indicated to the Dealer when requiring assistance and ordering spare parts.



### CAUTION

- **The incorrect use of the machine and inappropriate maintenance operations may cause serious injuries and even death.**
- **Operators and maintenance personnel must carefully read this manual before using the machine or performing maintenance operations.**
- **Any serious accident that may occur during the use of the machine or during maintenance operations is due to failure to comply with the instructions given herein.**
- **The procedures and precautions described in this manual are valid for application to the machine only when it is used correctly.**  
**If the machine is used for any purpose or in any way other than those described herein, the operator shall be responsible for his own safety and for the safety of any other person involved.**

## 1.2 INFORMATION ON SAFETY

Many accidents are caused by insufficient knowledge of and failure to comply with the safety regulations prescribed for the maintenance operations that must be performed on the machine.

In order to avoid accidents, before starting work and before carrying out any maintenance operation, carefully read and be sure to understand all the information and warnings contained in this manual and given on the plates applied onto the machine, so that you can follow the instructions without making mistakes.

To identify the messages regarding safety that are included in this manual and written on the machine plates, the following words have been used.



### **DANGER**

- This word is used in the safety warnings in the manual and on the plates when the situation is dangerous and it may possibly result in serious injuries or even death.

These messages describe the safety precautions to be taken in order to avoid any risk. Non-compliance with these instructions may also result in serious damage to the machine.

---



### **CAUTION**

- This word is used in the safety warnings in the manual and on the plates to signal risks that may cause moderate damage or injuries.

The message can be used even to indicate the risk of damage to the machine only.

---



### **IMPORTANT**

- This word is used when precautions are indicated, which must be taken to avoid actions that may shorten the life of the machine.
- 

Komatsu Utility cannot reasonably predict every circumstance that might involve a potential hazard during the operation or maintenance of the machine; for this reason, the safety messages included in this manual and applied onto the machine may not include all possible safety precautions.

If all the procedures and operations prescribed for this machine are kept to, you can be sure that the operator and the persons in the vicinity can work in total safety, with no risk of damaging the machine. In case of doubt regarding the safety measures necessary for some procedures, contact Komatsu Utility or your local Dealer.



### **DANGER**

- Before starting any maintenance operation, position the machine on firm and level ground, engage the safety locks of the equipment and controls, stop the engine and apply the parking brake.
- 



### **DANGER**

- To make the information clearer, some illustrations in this manual represent the machine without safety guards. Do not use the machine without guards and do not start the engine when the engine protection casing is open, if this is not expressly prescribed for some specific maintenance operations.
-



**DANGER**

- It is strictly forbidden to modify the setting of the hydraulic system safety valves; Komatsu Utility cannot be held liable for any damage to persons, property or the machine, if this has been tampered with by modifying the standard setting of the hydraulic system.
- 



**DANGER**

- Before carrying out any electrical welding, disconnect the battery, the alternator and the connector of the gearshift unit installed under the steering wheel (see “2.8.13 PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR” - “2.8.15 PRECAUTIONS CONCERNING THE GEARSHIFT”).
- 



**DANGER**

- Install only authorized additional equipment (see “6.1 AUTHORIZED OPTIONAL EQUIPMENT”).
- 



**DANGER**

- The machine can travel on roads only if provided with homologated equipment; before travelling on roads, make sure that the equipment with which the machine is provided is homologated and that the safety locks are correctly connected.
-

## 1.3 INTRODUCTION

### 1.3.1 INTENDED USES

The Komatsu Utility BACKHOE LOADERS described in this manual have been designed and constructed to be used mainly for the following functions:

- LOADER
- EXCAVATOR

Through the installation of optional equipment, the machine can also be used for the following applications:

- HANDLING OF MATERIALS (4IN1 BUCKET - PALLET FORKS)
- SNOWPLOUGH (ANGLED OZER BLADE - SNOWPLOUGH)
- DEMOLITION (HAND HAMMER - HAMMER ON THE BACKHOE)
- DITCH CLEANING AND DIGGING (SPECIAL BUCKETS)

### 1.3.2 IMPROPER OR UNAUTHORIZED USES



#### CAUTION

- This paragraph describes some of the improper or unauthorized uses of the machine; since it is impossible to predict all the possible improper uses, if the machine happens to be used for particular applications, contact your Komatsu Utility Dealer before carrying out the work.
- 



#### IMPORTANT

- The instructions regarding the authorized optional equipment are given in the relevant operation and maintenance manuals; if the equipment is supplied by Komatsu Utility, these publications are enclosed to this manual.
  - The instructions regarding the assembly of the authorized equipment, the controls requiring special arrangement on the machine and the hydraulic couplings necessary for the operation of the equipment are grouped in the final section of this manual.
- 

Komatsu Utility backhoe loaders are constructed exclusively for the handling, excavation and treatment of inert materials; therefore, the following uses are absolutely forbidden:

- USE OF THE MACHINE BY MINORS OR INEXPERIENCED PERSONS.
- USE OF THE MACHINE FOR LIFTING PERSONS OR OBJECTS.
- TRANSPORTATION OF PERSONS even if they are in the operator's cab.
- TRANSPORTATION OF CONTAINERS with fluids, flammable fluids, loose material, without the appropriate slinging equipment.
- TRANSPORTATION AND LIFTING (EVEN IF IN EXCEPTIONAL CASES) OF EQUIPMENT OR MATERIALS THAT PROTRUDE FROM THE BUCKET OR ARE NOT SECURED TO THE BUCKET BY MEANS OF ROPES OR CHAINS.
- USE OF THE BUCKET FOR DRIVING OR EXTRACTING PILES.
- USE OF THE MACHINE FOR TOWING DAMAGED VEHICLES ON ROADS.
- USE OF THE MACHINE FOR LIFTING DAMAGED VEHICLES.

### 1.3.3 MAIN CHARACTERISTICS

- Simple and easy operation.
- Servo-assisted steering with priority hydraulic system.
- Three steering modes that can be selected with a push button:
  - Two-wheel steering
  - All-wheel steering
  - Crab steering
- Gearshift with electronic gear selection through solenoid valve actuators and transmission with hydraulic converter; reversal and gear shifting with controls on a single lever.
- Loader control through a single lever ensuring also combined movements that can be modulated proportionally and continually.
- Backhoe controls with two levers ensuring also combined movements that can be modulated proportionally and continually.
- Complete series of instruments visible from the two operating positions (loader or backhoe).
- Separate accelerator controls for the two operating positions.
- Foot brake control.
- Easy maintenance with simplified intervals.
- Automatic engagement and disconnection of the differential locking on both axles (front and rear).

### 1.3.4 RUNNING-IN

Every machine is scrupulously adjusted and tested before delivery.

A new machine, however, must be used carefully for the first 100 hours, in order to ensure proper running-in of the various components.

If the machine is subjected to excessive work load at the beginning of operation, its potential yield and its functionality will be shortly and untimely reduced.

Every new machine must be used carefully, paying special attention to the following indications:

- After the start, let the engine idle for 5 minutes, in such a way as to warm it up gradually before actual operation.
- Avoid operating the machine with the limit loads allowed or at high speed.
- Avoid abrupt starts or accelerations, useless sudden decelerations and abrupt reversals.
- After the first 250 hours, carry out the following operations, in addition to those to be performed every 250 hours:
  - 1 - Change the hydraulic transmission oil and filter.
  - 2 - Change the differential unit oil (front and rear axle).
  - 3 - Change the oil in the final reduction gears (front and rear axle).
  - 4 - Check and adjust the engine valve clearance.
  - 5 - Change the hydraulic circuit oil filter.

#### SYNTHETIC BIODEGRADABLE OIL TYPE HEES

On machines in which the synthetic biodegradable oil type HEES is used, the following operations are to be performed besides the standard maintenance operations:

- After the first 50 hours of operation, change the hydraulic circuit drain filter.
- After the first 500 hours of operation, change the hydraulic circuit oil.



#### IMPORTANT

- **When changing the oil filters (cartridges), check their inner part to make sure that there are no deposits.**  
If considerable deposits are observed, find out what may have caused them before starting the machine.
- **The number of operation hours is indicated by the hour meter, while the partial service hours for the various maintenance operations to be carried out on the machine are stored and displayed on the electronic screen positioned on the front dashboard.**

# 1.4 PRODUCT IDENTIFICATION

The Komatsu Utility backhoe loader and its main components are identified by serial numbers stamped on the identification plates.

The serial number and the identification numbers of the components are the only numbers that must be indicated to the Dealer when requiring assistance and ordering spare parts.

## 1.4.1 MACHINE SERIAL NUMBER

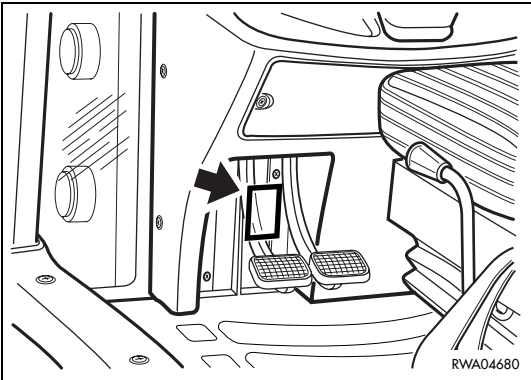
The machine serial number is stamped on the front part of the main frame, on the right side.



## 1.4.2 MACHINE IDENTIFICATION PLATE

The Komatsu Utility backhoe loaders described in this manual are provided with the CE mark, which certifies that they are in compliance with the CE harmonized standards.

The plate with the mark is applied inside the operator's cab, on the left vertical wall of the frame, in correspondence with the brake pedals.



CE

KOMATSU

MODELLO TYP	- MODEL - MODELE	
MATRICOLA N° FABR. NR.	- SERIAL N° - SERIE NR.	
ANNO BAUJAHR	- YEAR - ANNEE	
MASSA TOTALE MAX ZUL. GESAMTGEWICHT	- TOTAL MAX WEIGHT - POIDS TOTAL MAX	kg
POTENZA MOTORE LEISTUNG	- ENGINE POWER - PUISSANCE MOTEUR	kw
MASSA MAX ASSE ANT. ZUL. ACHSLAST VORN	- MAX WEIGHT FRONT AXLE - POIDS MAX ESSIEU AV	kg
MASSA MAX ASSE POST. ZUL. ACHSLAST HINTEN	- MAX WEIGHT REAR AXLE - POIDS MAX ESSIEU AR	kg
MANUFACTURED BY KOMATSU UTILITY EUROPE S.p.A. 36025 NOVENTA VICENTINA (VI) ITALY		

21D-98-12580

CE

KOMATSU

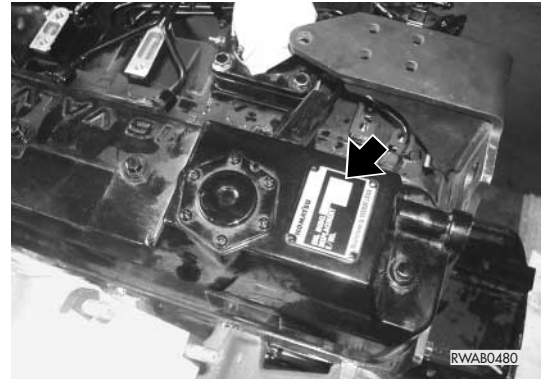
MODEL	
SERIAL N	
YEAR	
TOTAL MAX WEIGHT	kg
ENGINE POWER	kw
MAX WEIGHT FRONT AXLE	kg
MAX WEIGHT REAR AXLE	kg
MANUFACTURED BY KOMATSU UTILITY EUROPE S.p.A. 36025 NOVENTA VICENTINA (VI) ITALY	

RWA34270

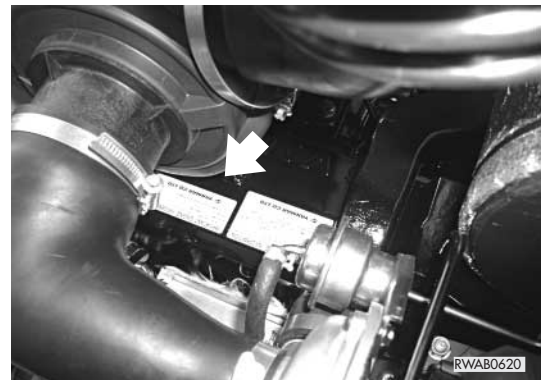


### 1.4.3 ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE

The engine serial number is stamped on the plate positioned on the rear side of the tappet cover.

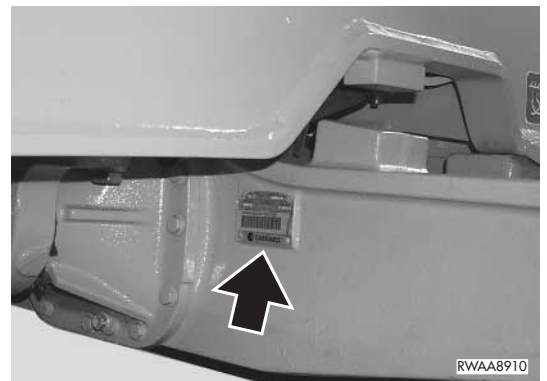


The plate regarding the exhaust emission regulations is applied to the front side of the tappet cover.



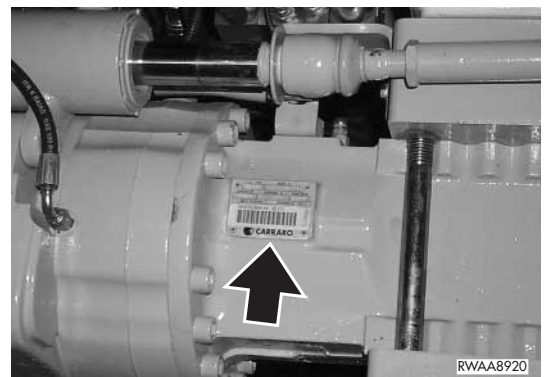
### 1.4.4 FRONT AXLE SERIAL NUMBER

The serial number of the front axle is stamped on the plate positioned on the right side of the axle body.



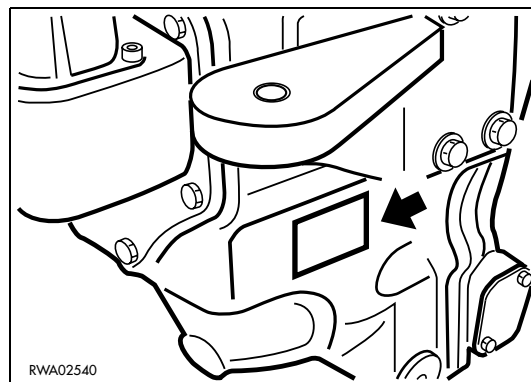
### 1.4.5 REAR AXLE SERIAL NUMBER

The serial number of the rear axle is stamped on the plate positioned on the left side of the axle body.



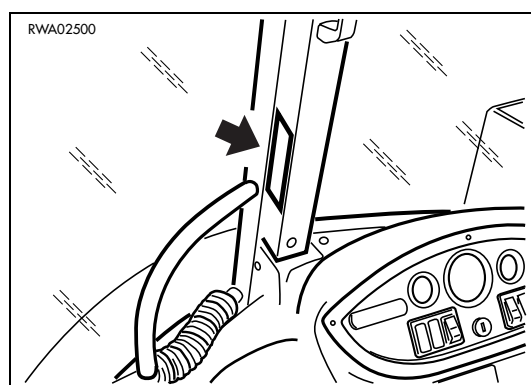
### 1.4.6 TRANSMISSION SERIAL NUMBER

The transmission serial number is stamped on the plate positioned on the right side of the transmission case.



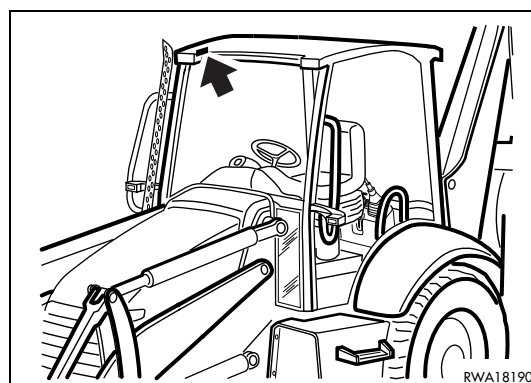
### 1.4.7 CAB SERIAL NUMBER

The cab serial number is stamped on the plate positioned on the right center pillar.



### 1.4.8 CANOPY SERIAL NUMBER (if provided)

The serial number is stamped on the plate positioned inside the canopy, on the front right part.



#### 1.4.9 SERIAL NUMBERS AND DEALER'S ADDRESS

Machine n. \_\_\_\_\_ Model \_\_\_\_\_

Engine n. \_\_\_\_\_

Front axle n. \_\_\_\_\_

Rear axle n. \_\_\_\_\_

Transmission n. \_\_\_\_\_

Cab n. \_\_\_\_\_

Canopy n. \_\_\_\_\_

Dealer:

---

---

---

Address: \_\_\_\_\_

\_\_\_\_\_ Tel. \_\_\_\_\_

Person to contact: \_\_\_\_\_

NOTES: \_\_\_\_\_

---

---

---

---

---

**THIS PAGE WAS INTENTIONALLY LEFT EMPTY**

# TABLE OF CONTENTS

<b>1.1</b>	<b>FOREWORD</b>	<b>1</b>
<b>1.2</b>	<b>INFORMATION ON SAFETY</b>	<b>2</b>
<b>1.3</b>	<b>INTRODUCTION</b>	<b>4</b>
1.3.1	INTENDED USES	4
1.3.2	IMPROPER OR UNAUTHORIZED USES	4
1.3.3	MAIN CHARACTERISTICS	5
1.3.4	RUNNING-IN	5
<b>1.4</b>	<b>PRODUCT IDENTIFICATION</b>	<b>6</b>
1.4.1	MACHINE SERIAL NUMBER	6
1.4.2	MACHINE IDENTIFICATION PLATE	6
1.4.3	ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE	7
1.4.4	FRONT AXLE SERIAL NUMBER	7
1.4.5	REAR AXLE SERIAL NUMBER	8
1.4.6	TRANSMISSION SERIAL NUMBER	8
1.4.7	CAB SERIAL NUMBER	8
1.4.8	CANOPY SERIAL NUMBER (if provided)	8
1.4.9	SERIAL NUMBERS AND DEALER'S ADDRESS	9
 <b>SAFETY AND ACCIDENT PREVENTION</b>		
<b>2.1</b>	<b>SAFETY, NOISE AND VIBRATION PLATES</b>	<b>20</b>
2.1.1	POSITION OF THE SAFETY PLATES	20
2.1.2	PICTOGRAMS AND RELEVANT MEANINGS	22
2.1.3	POSITION OF THE NOISE PLATES ON MACHINES WITH CAB	26
2.1.4	VIBRATIONS TO WHICH THE OPERATOR IS SUBJECTED	27
<b>2.2</b>	<b>GENERAL PRECAUTIONS</b>	<b>28</b>
2.2.1	GENERAL SAFETY RULES	28
2.2.2	SAFETY DEVICES AND GUARDS	28
2.2.3	CLOTHING AND PERSONAL PROTECTION ITEMS	28
2.2.4	UNAUTHORIZED MODIFICATIONS	29
2.2.5	LEAVING THE OPERATOR'S SEAT	29
2.2.6	GETTING ON AND OFF THE MACHINE	30
2.2.7	CHECKING THE REAR-VIEW MIRRORS	30
2.2.8	PREVENTING FIRES DUE TO FUEL AND OIL	30
2.2.9	PREVENTING BURNS	31
2.2.10	PREVENTING DAMAGE DUE TO ASBESTOS POWDER	31
2.2.11	PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT	32
2.2.12	FIRE EXTINGUISHERS AND FIRST AID KIT	32
2.2.13	PRECAUTIONS CONCERNING THE CAB STRUCTURE	32
2.2.14	PRECAUTIONS CONCERNING THE EQUIPMENT	32
<b>2.3</b>	<b>PRECAUTIONS TO BE TAKEN BEFORE STARTING THE ENGINE</b>	<b>33</b>
2.3.1	SAFETY ON THE WORK SITE	33
2.3.2	FIRE PREVENTION	33
2.3.3	PRECAUTIONS TO BE TAKEN FOR THE OPERATOR'S CAB	33
2.3.4	ROOM VENTILATION	34
2.3.5	CLEANING WINDOWS, MIRRORS AND LIGHTS - CHECKING THE WINDSHIELD WIPER BLADES AND THE BULBS	34

	Page
<b>2.4 PRECAUTIONS TO BE TAKEN WHEN WORKING</b>	<b>35</b>
2.4.1 STARTING THE ENGINE	35
2.4.2 RULES FOR ROAD TRAVEL	35
2.4.3 CHECKS FOR TRAVELLING IN REVERSE	36
2.4.4 MOVING THE MACHINE	36
2.4.5 WORKING ON SLOPES	37
2.4.6 PREVENTING ELECTROCUTION	38
2.4.7 VISIBILITY	39
2.4.8 WORKING ON ICY OR SNOW-COVERED SURFACES	39
2.4.9 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT	39
2.4.10 WORKING ON LOOSE GROUND	39
2.4.11 PARKING THE MACHINE	40
<b>2.5 TRANSPORTING THE MACHINE ON OTHER VEHICLES</b>	<b>41</b>
2.5.1 LOADING AND UNLOADING THE MACHINE	41
2.5.2 THE ROUTE	41
<b>2.6 BATTERY</b>	<b>42</b>
2.6.1 SAFETY PRECAUTIONS FOR WORK ON BATTERIES	42
2.6.2 STARTING WITH BOOSTER CABLES	42
<b>2.7 PRECAUTIONS FOR EMERGENCY RECOVERY</b>	<b>43</b>
<b>2.8 PRECAUTIONS TO BE TAKEN DURING MAINTENANCE</b>	<b>44</b>
2.8.1 WARNING PLATES	44
2.8.2 TOOLS	44
2.8.3 PERSONNEL	44
2.8.4 EQUIPMENT	45
2.8.5 WORKING UNDER THE MACHINE	45
2.8.6 KEEPING THE MACHINE CLEAN	45
2.8.7 USE OF THE ENGINE DURING MAINTENANCE	46
2.8.8 PERIODICAL CHANGE OF THE PARTS THAT ARE CRITICAL FOR SAFETY	46
2.8.9 STOP THE ENGINE BEFORE CARRYING OUT ANY MAINTENANCE OPERATION OR INSPECTION	47
2.8.10 RULES FOR REFUELLING AND ADDING OIL	48
2.8.11 CHECKING THE COOLANT LEVEL IN THE RADIATOR	48
2.8.12 USING LAMPS	48
2.8.13 PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR	49
2.8.14 PRECAUTIONS CONCERNING THE STARTER	49
2.8.15 PRECAUTIONS CONCERNING THE GEARSHIFT	50
2.8.16 HANDLING HIGH-PRESSURE PIPES	50
2.8.17 PRECAUTIONS TO BE TAKEN WHEN HANDLING HIGH-PRESSURE OIL	50
2.8.18 PRECAUTIONS FOR MAINTENANCE WORK INVOLVING HIGH TEMPERATURES AND PRESSURES	51
2.8.19 COOLING FAN AND FAN BELT	51
2.8.20 WASTE MATERIALS	51
2.8.21 PRECAUTIONS TO BE TAKEN WHEN INFLATING TYRES	52
2.8.22 PRECAUTIONS FOR THE INSTALLATION OF THE EXHAUST SYSTEM TAILPIPE	52
2.8.23 PRECAUTIONS FOR THE USE OF THE SYNTHETIC BIODEGRADABLE OIL TYPE HEES	53

**DESCRIPTION AND USE OF THE MACHINE**

<b>3.1</b>	<b>SAFETY LOCKS</b>	<b>56</b>
3.1.1	FRONT LOADER LOCKS	56
3.1.2	BACKHOE LOCKS	58
<b>3.2</b>	<b>GENERAL VIEWS</b>	<b>59</b>
3.2.1	FRONT GENERAL VIEW	59
3.2.2	BACKHOE GENERAL VIEW	60
3.2.3	CAB INSIDE GENERAL VIEW	61
3.2.3.1	CAB INSIDE GENERAL VIEW (Standard version)	61
3.2.3.2	CAB INSIDE GENERAL VIEW (Version with servcontrols available on request)	62
<b>3.3</b>	<b>INSTRUMENTS AND CONTROLS</b>	<b>63</b>
3.3.1	FRONT INSTRUMENTS	63
3.3.2	SIDE INSTRUMENTS	75
3.3.2.1	SIDE INSTRUMENTS (Standard version)	75
3.3.2.2	SIDE INSTRUMENTS (Version with servo controls available on request)	76
3.3.3	PUSH BUTTONS ON THE FRONT LOADER CONTROL LEVER	84
3.3.4	ELECTRICAL ACCESSORIES	85
3.3.5	MACHINE CONTROLS	86
3.3.5.1	MACHINE CONTROLS (Standard version)	86
3.3.5.2	MACHINE CONTROLS (Version with servo controls available upon request)	87
<b>3.4</b>	<b>FUSES AND RELAYS</b>	<b>127</b>
3.4.1	EQUIPMENT FUSES AND RELAYS	127
3.4.1.1	FUSES	128
3.4.1.2	RELAYS	129
3.4.2	ENGINE LINE FUSES AND RELAYS	129
3.4.2.1	FUSES	130
3.4.2.2	RELAYS	130
3.4.3	SIDE DASHBOARD RELAYS	131
3.4.4	SIDE DASHBOARD RELAYS AND FUSES (Only with servo controls)	131
3.4.4.1	RELAYS	131
3.4.4.2	FUSES	131
<b>3.5</b>	<b>GUARDS, CAB AND DRIVER'S SEAT</b>	<b>132</b>
3.5.1	ENGINE HOOD	132
3.5.2	CANOPY (if provided)	132
3.5.3	CAB	133
3.5.4	VENTILATION AND HEATING	136
3.5.5	AIR CONDITIONER (if installed)	137
3.5.6	SEAT	139
3.5.6.1	SEAT (STANDARD)	139
3.5.6.2	SEAT (OPTIONAL)	140
3.5.7	SAFETY BELT	141
3.5.8	FIRE EXTINGUISHER	141
3.5.9	FIRST AID KIT	141
3.5.10	TECHNICAL DOCUMENTATION	141
3.5.11	ADDITIONAL TOOL BOX (if provided)	142
<b>3.6</b>	<b>USE OF THE MACHINE</b>	<b>143</b>
3.6.1	CHECKS BEFORE STARTING THE ENGINE	143
3.6.1.1	VISUAL CHECKS	143
3.6.1.2	DAILY CHECKS	143
3.6.1.3	OPERATIONAL CHECKS	144

	Page
3.6.2 STARTING THE ENGINE .....	145
3.6.2.1 STARTING WITH WARM ENGINE OR IN TEMPERATE CLIMATES .....	145
3.6.2.2 STARTING WITH COLD ENGINE OR IN COLD CLIMATES .....	146
3.6.3 WARMING THE ENGINE .....	147
3.6.4 HEATING THE HYDRAULIC OIL .....	147
3.6.5 HOW TO MOVE THE MACHINE .....	148
3.6.5.1 ENGAGING THE FOUR-WHEEL DRIVE .....	149
3.6.5.2 MOVING ON SLOPES .....	150
3.6.5.3 MAXIMUM IMMERSION DEPTH .....	151
<b>3.7 PARKING THE MACHINE .....</b>	<b>152</b>
3.7.1 PARKING ON LEVEL GROUND .....	152
3.7.2 PARKING ON SLOPES .....	153
<b>3.8 STOPPING THE ENGINE .....</b>	<b>154</b>
<b>3.9 TRANSPORTING THE MACHINE ON OTHER VEHICLES .....</b>	<b>155</b>
3.9.1 LOADING AND UNLOADING THE MACHINE .....	155
3.9.2 TRANSPORT .....	156
<b>3.10 PRECAUTIONS TO BE TAKEN IN THE COLD SEASON .....</b>	<b>157</b>
3.10.1 FUEL AND LUBRICANTS .....	157
3.10.2 COOLANT .....	157
3.10.3 BATTERY .....	157
3.10.4 OTHER PRECAUTIONS .....	158
3.10.5 PRECAUTIONS TO BE TAKEN AT THE END OF WORK .....	158
<b>3.11 PRECAUTIONS TO BE TAKEN IN THE WARM SEASON .....</b>	<b>159</b>
<b>3.12 USING THE MACHINE AS A LOADER .....</b>	<b>160</b>
3.12.1 BUCKET POSITION INDICATOR .....	160
3.12.2 ORGANIZING THE WORK AREA .....	160
3.12.2.1 LOADING HEAPED AND LEVEL MATERIAL .....	161
3.12.2.2 LOADING OPERATIONS ON SLOPES .....	162
3.12.3 CHANGING THE STANDARD FRONT BUCKET .....	162
<b>3.13 USING THE MACHINE AS AN EXCAVATOR .....</b>	<b>163</b>
3.13.1 POSITIONING THE BUCKET ACCORDING TO THE WORK TO BE CARRIED OUT .....	163
3.13.2 POSITIONING THE MACHINE FOR DIGGING OPERATIONS .....	164
3.13.3 SLIDING THE BACKHOE UNIT SIDEWARDS .....	165
3.13.4 DIGGING METHOD .....	166
3.13.5 CHANGING THE BACKHOE BUCKET .....	167
<b>3.14 LONG PERIODS OF INACTIVITY .....</b>	<b>168</b>
3.14.1 BEFORE THE PERIOD OF INACTIVITY .....	168
3.14.2 DURING THE PERIOD OF INACTIVITY .....	170
3.14.3 AFTER THE PERIOD OF INACTIVITY .....	170
<b>3.15 TROUBLESHOOTING .....</b>	<b>171</b>
3.15.1 HOW TO REMOVE THE MACHINE .....	171
3.15.2 IF THE FUEL HAS BEEN COMPLETELY DEPLETED .....	171
3.15.3 IF THE BATTERY IS DEPLETED .....	172
3.15.3.1 STARTING WITH BOOSTER CABLES .....	173
3.15.4 OTHER TROUBLES .....	174
3.15.4.1 ELECTRICAL CIRCUIT .....	174
3.15.4.2 HYDRAULIC SYSTEM .....	174
3.15.4.3 BRAKING SYSTEM .....	175
3.15.4.4 CONVERTER .....	175
3.15.4.5 ENGINE .....	176



**MAINTENANCE**

<b>4.1</b>	<b>GUIDE TO MAINTENANCE</b>	<b>178</b>
<b>4.2</b>	<b>MAINTENANCE NOTES</b>	<b>180</b>
4.2.1	NOTES REGARDING THE ENGINE	180
4.2.1.1	ENGINE OIL	180
4.2.1.2	COOLANT	180
4.2.1.3	FUEL	181
4.2.2	NOTES REGARDING THE HYDRAULIC SYSTEM	181
4.2.3	NOTES REGARDING THE ELECTRICAL SYSTEM	182
4.2.4	NOTES REGARDING LUBRICATION	182
4.2.5	PARTS SUBJECT TO WEAR THAT PERIODICALLY NEED CHANGING	183
<b>4.3</b>	<b>FUEL, COOLANT AND LUBRICANTS</b>	<b>184</b>
4.3.1	HOMOLOGATED HEES SYNTHETIC BIODEGRADABLE LUBRICANTS	186
<b>4.4</b>	<b>DRIVING TORQUES FOR SCREWS AND NUTS</b>	<b>187</b>
4.4.1	STANDARD DRIVING TORQUES	187
4.4.2	SPECIFIC DRIVING TORQUES	187
<b>4.5</b>	<b>LUBRICATION</b>	<b>188</b>
4.5.1	LUBRICATION DIAGRAM	188
4.5.2	LUBRICATION DIAGRAM (4in1 bucket and pallet forks)	189
4.5.3	LUBRICATION DIAGRAM (Front bucket rapid couplings)	190
4.5.4	LUBRICATION DIAGRAM (Telescopic arm)	191
4.5.5	LUBRICATION DIAGRAM (Offset device)	192
<b>4.6</b>	<b>PERIODICAL CHANGE OF THE COMPONENTS CONNECTED WITH SAFETY</b>	<b>193</b>
4.6.1	CRITICAL PARTS FOR SAFETY	194
<b>4.7</b>	<b>MAINTENANCE PLAN</b>	<b>198</b>
4.7.1	WHEN REQUIRED	202
4.7.1.a	CHECKING, CLEANING OR CHANGING THE AIR CLEANER CARTRIDGE	202
4.7.1.b	CHECKING AND CLEANING THE CAB AIR FILTER	203
4.7.1.c	CHECKING AND CLEANING THE RECIRCULATING AIR FILTER (only for machines with air conditioner)	204
4.7.1.d	BLEEDING THE BRAKING CIRCUIT	205
4.7.1.e	CLEANING THE WATER SEPARATOR	206
4.7.1.f	CHECKING AND ADJUSTING THE WHEEL TOE-IN	206
4.7.1.g	CHECKING AND ADJUSTING THE PARKING BRAKE	207
4.7.1.h	CHECKING THE BRAKING EFFICIENCY	208
4.7.1.j	CHECKING AND ADJUSTING THE BRAKE PEDAL STROKE	209
4.7.1.k	ADJUSTING THE AUTOMATIC RETURN-TO-DIG DEVICE OF THE FRONT BUCKET (if installed)	209
4.7.1.l	CHECKING AND ADJUSTING THE STABILIZER SLACK	210
4.7.2	MAINTENANCE INTERVALS IN CASE OF USE OF THE DEMOLITION HAMMER	211
4.7.2.a	CHANGING THE HYDRAULIC OIL FILTER	211
4.7.2.b	CHANGING THE HYDRAULIC OIL	211
4.7.3	CHECKS BEFORE STARTING	212
4.7.3.a	VARIOUS CHECKS	212
4.7.3.b	CHECKING THE COOLANT LEVEL	212
4.7.3.c	CHECKING THE FUEL LEVEL	213
4.7.3.d	CHECKING THE ENGINE OIL LEVEL	213
4.7.3.e	CHECKING THE HYDRAULIC CIRCUIT OIL LEVEL	214
4.7.3.f	DRAINING THE WATER SEPARATOR	215
4.7.4	MAINTENANCE EVERY 10 HOURS OF OPERATION	216
4.7.4.a	LUBRICATING THE JOINTS	216

	<b>Page</b>
4.7.5 MAINTENANCE AFTER THE FIRST 50 HOURS OF OPERATION (Only for machines in which the synthetic biodegradable oil type HEES is used) . . . . .	218
4.7.6 MAINTENANCE EVERY 50 HOURS OF OPERATION . . . . .	218
4.7.6.a CHECKING THE RADIATOR FLUID LEVEL . . . . .	218
4.7.6.b CHECKING THE BRAKING SYSTEM OIL LEVEL . . . . .	218
4.7.6.c LUBRICATING THE PROPELLER SHAFTS . . . . .	219
4.7.6.d LUBRICATING THE FRONT AXLE JOINTS AND CENTRAL COUPLING AND THE REAR AXLE JOINTS . . . . .	220
4.7.6.e CHECKING THE TYRE PRESSURE . . . . .	220
4.7.6.f CHECKING THE ELECTRICAL SYSTEM . . . . .	221
4.7.7 MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION . . . . .	222
4.7.8 MAINTENANCE EVERY 250 HOURS OF OPERATION . . . . .	223
4.7.8.a ADJUSTING THE FAN BELT TENSION . . . . .	223
4.7.8.b ADJUSTING THE A/C COMPRESSOR BELT TENSION (Only for machines with air conditioner) . . . . .	224
4.7.8.c CHECKING THE BATTERY ELECTROLYTE LEVEL . . . . .	225
4.7.8.d CHECKING THE FRONT AXLE OIL LEVELS . . . . .	226
4.7.8.e CHECKING THE REAR AXLE OIL LEVELS . . . . .	226
4.7.8.f CHECKING THE HYDRAULIC TRANSMISSION OIL LEVEL . . . . .	227
4.7.8.g CHECKING THE WHEEL NUT DRIVING TORQUE . . . . .	227
4.7.9 MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION (Only for machines in which the synthetic biodegradable oil type HEES is used) . . . . .	228
4.7.10 MAINTENANCE EVERY 500 HOURS OF OPERATION . . . . .	229
4.7.10.a CHANGING THE ENGINE OIL . . . . .	229
4.7.10.b CHANGING THE ENGINE OIL FILTER . . . . .	230
4.7.10.c CHANGING THE HYDRAULIC SYSTEM OIL FILTER . . . . .	230
4.7.10.d CHANGING THE FUEL FILTER . . . . .	233
4.7.10.e DRAINING THE FUEL TANK . . . . .	234
4.7.10.f DRAINING THE HYDRAULIC OIL TANK (Only for machines in which the synthetic biodegradable oil type HEES is used) . . . . .	235
4.7.10.g CLEANING THE OUTSIDE OF THE RADIATORS . . . . .	236
4.7.10.h CLEANING THE OUTSIDE OF THE A/C CONDENSER (Only for machines with air conditioner) . . . . .	237
4.7.11 MAINTENANCE EVERY 1000 HOURS OF OPERATION . . . . .	238
4.7.11.a CHANGING THE FRONT AXLE OIL . . . . .	238
4.7.11.b CHANGING THE REAR AXLE OIL . . . . .	239
4.7.11.c CHANGING THE HYDRAULIC TRANSMISSION OIL . . . . .	240
4.7.11.d CHANGING THE HYDRAULIC TRANSMISSION FILTER . . . . .	241
4.7.11.e CHECKING AND ADJUSTING THE ENGINE VALVE CLEARANCE . . . . .	241
4.7.12 MAINTENANCE EVERY 2000 HOURS OF OPERATION . . . . .	242
4.7.12.a CHANGING THE HYDRAULIC SYSTEM OIL AND CLEANING THE SUCTION FILTER . . . . .	242
4.7.12.b CHANGING THE COOLANT . . . . .	244
4.7.12.c CHANGING THE BRAKING SYSTEM OIL . . . . .	246
4.7.12.d CHECKING THE ALTERNATOR AND THE STARTER . . . . .	246
4.7.12.e CHECKING THE QUANTITY OF COOLANT IN THE A/C SYSTEM (Only for machines with air conditioner) . . . . .	247
4.7.13 MAINTENANCE EVERY 4000 HOURS OF OPERATION . . . . .	248
4.7.13.a CHANGING THE A/C DEHYDRATING FILTER (Only for machines with air conditioner) . . . . .	248
4.7.13.b CHECKING THE OPERATING CONDITIONS OF THE A/C COMPRESSOR (Only for machines with air conditioner) . . . . .	248

**TECHNICAL SPECIFICATIONS**

<b>5.1</b>	<b>TECHNICAL DATA</b>	<b>250</b>
5.1.1	STANDARD OVERALL DIMENSIONS WITH CENTERED BACKHOE	250
5.1.2	STANDARD OVERALL DIMENSIONS WITH FOLDED BACKHOE	250
5.1.3	TECHNICAL CHARACTERISTICS	251
5.1.4	LIFTING CAPACITIES	252
5.1.4.1	SYMBOL TABLE	252
5.1.4.2	LIFTING CAPACITY (STANDARD BOOM)	253
5.1.4.3	LIFTING CAPACITY (OFFSET BOOM)	254

**AUTHORIZED OPTIONAL EQUIPMENT**

<b>6.1</b>	<b>AUTHORIZED OPTIONAL EQUIPMENT</b>	<b>256</b>
6.1.1	CHARACTERISTICS OF THE OPTIONAL EQUIPMENT	256
<b>6.2</b>	<b>FRONT EQUIPMENT QUICK COUPLING DEVICES</b>	<b>257</b>
6.2.1	MANUAL CONTROL QUICK COUPLING	257
6.2.2	HYDRAULIC CONTROL QUICK COUPLING FOR STANDARD BUCKET	258
6.2.3	HYDRAULIC CONTROL QUICK COUPLING FOR 4IN1 BUCKET AND OPTIONAL EQUIPMENT WITH UNIDIRECTIONAL OIL FLOW	258
<b>6.3</b>	<b>4in1 BUCKET</b>	<b>259</b>
6.3.1	DESCRIPTION AND CONTROLS	259
6.3.2	SAFETY DEVICES	259
6.3.3	INSTALLING THE 4in1 BUCKET	260
6.3.4	USING THE 4in1 BUCKET	261
6.3.5	MAINTENANCE	261
<b>6.4</b>	<b>PALLET FORKS</b>	<b>262</b>
6.4.1	DESCRIPTION	262
6.4.2	SAFETY DEVICES	262
6.4.3	USING THE FORKS	263
6.4.3.1	PREPARING THE PALLET FORKS FOR USE	263
6.4.3.2	OVERTURNING THE FORKS FOR TRAVEL ON ROADS	264
6.4.4	REMOVING THE FORKS	265
6.4.5	INSTALLING THE FORKS	265
6.4.6	MAINTENANCE	265
<b>6.5</b>	<b>BACKHOE TELESCOPIC ARM</b>	<b>266</b>
6.5.1	DESCRIPTION AND CONTROL	266
6.5.1.1	VERSION WITH STANDARD CONTROLS	266
6.5.1.2	VERSION WITH SERVO CONTROLS (if installed)	266
6.5.2	SAFETY DEVICES	267
6.5.3	USING THE TELESCOPIC ARM	267
6.5.4	MAINTENANCE	268
6.5.4.1	ADJUSTING THE GUIDE SLACK	268

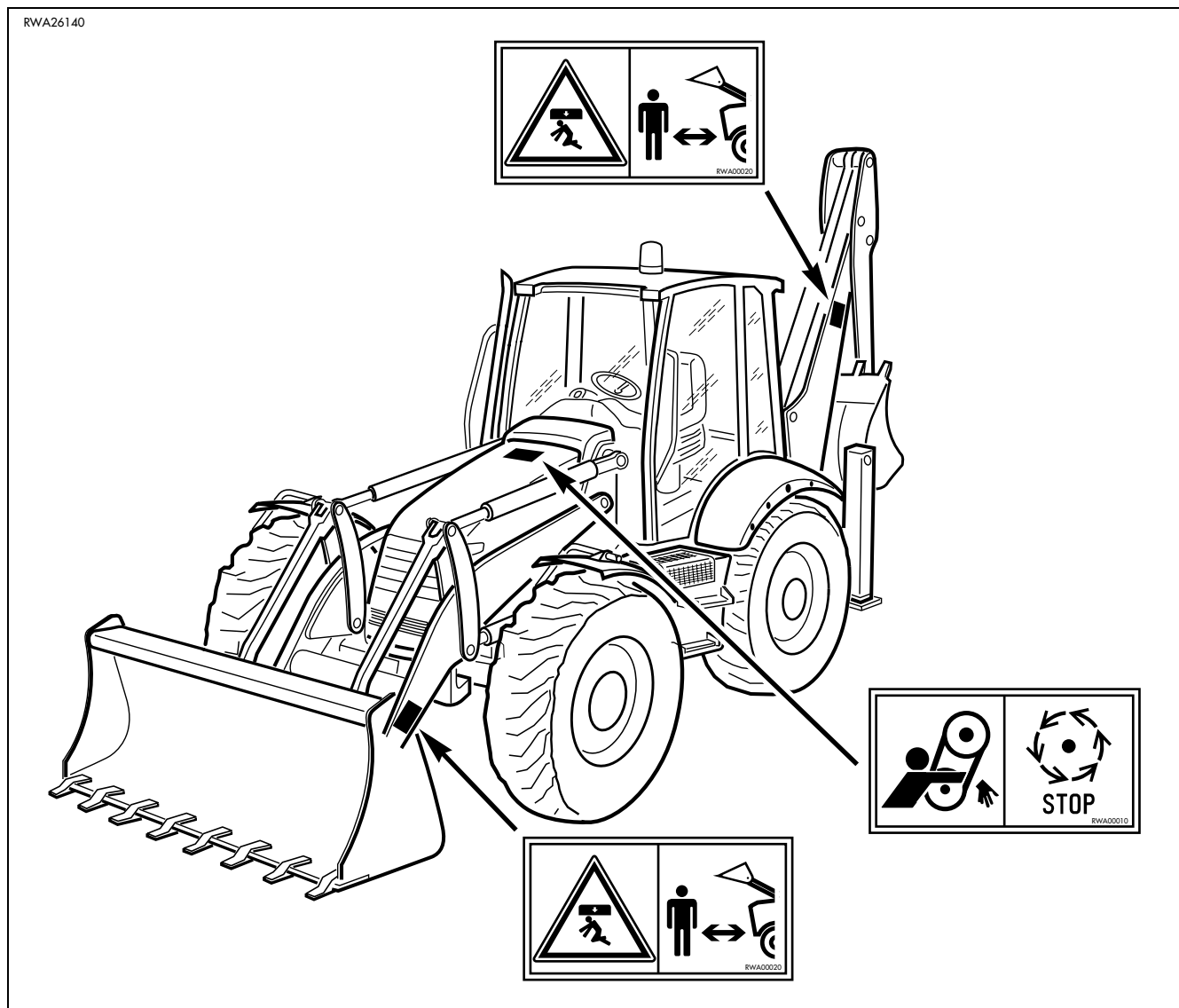
	<b>Page</b>
<b>6.6 ARRANGEMENT FOR THE INSTALLATION OF THE DEMOLITION HAMMER .....</b>	<b>270</b>
6.6.1 DESCRIPTION AND CONTROL .....	270
6.6.1.1 VERSION WITH STANDARD CONTROLS .....	270
6.6.1.2 VERSION WITH SERVO CONTROLS (if installed) .....	270
6.6.2 USE OF THE DEMOLITION HAMMER AND RULES TO BE OBSERVED.....	271
6.6.3 INSTALLING AND REMOVING THE DEMOLITION HAMMER .....	275
6.6.3.1 INSTALLING THE HAMMER .....	275
6.6.3.2 REMOVING THE HAMMER.....	277
6.6.4 USING THE HAMMER .....	277
6.6.5 MAINTENANCE .....	277
<b>6.7 APPLICATION OF THE OFFSET DEVICE .....</b>	<b>278</b>
6.7.1 DESCRIPTION AND CONTROL.....	278
6.7.1.1 VERSION WITH STANDARD CONTROLS .....	278
6.7.1.2 VERSION WITH SERVO CONTROLS (if installed) .....	279
6.7.2 MAINTENANCE.....	279
<b>6.8 ARRANGEMENT FOR THE OPERATION OF OPTIONAL EQUIPMENT WITH UNIDIRECTIONAL OIL FLOW.....</b>	<b>280</b>
6.8.1 DESCRIPTION AND CONTROL.....	280
6.8.1.1 VERSION WITH STANDARD CONTROLS .....	280
6.8.1.2 VERSION WITH SERVO CONTROLS (if installed) .....	280
6.8.2 INSTALLING AND CONNECTING THE EQUIPMENT .....	281
6.8.3 MAINTENANCE.....	281
<b>6.9 ARRANGEMENT FOR THE INSTALLATION OF THE CLAMSHELL BUCKET .....</b>	<b>282</b>
6.9.1 DESCRIPTION AND CONTROL .....	282
6.9.1.1 VERSION WITH STANDARD CONTROLS .....	282
6.9.1.2 VERSION WITH SERVO CONTROLS (if installed) .....	283
6.9.2 INSTALLING THE CLAMSHELL BUCKET .....	284
6.9.3 USING THE CLAMSHELL BUCKET .....	285
6.9.4 MAINTENANCE.....	285
<b>6.10 ARRANGEMENT FOR THE INSTALLATION OF THE MANUAL HYDRAULIC HAMMER .....</b>	<b>286</b>
6.10.1 DESCRIPTION AND CONTROL .....	286
6.10.2 CONNECTING AND REMOVING THE HAMMER .....	287
6.10.2.1 CONNECTING THE HAMMER .....	287
6.10.2.2 REMOVING THE CONNECTIONS .....	287
6.10.3 USING THE HAMMER .....	288
6.10.4 MAINTENANCE .....	288
<b>6.11 LOAD STABILIZER SYSTEM (LSS) (Optional) .....</b>	<b>289</b>
6.11.1 ACCUMULATOR OF THE LOAD STABILIZER SYSTEM (LSS) .....	289
<b>6.12 REAR EQUIPMENT RAPID COUPLING DEVICE .....</b>	<b>290</b>
6.12.1 EQUIPMENT COUPLING AND RELEASE PROCEDURE .....	291
6.12.2 MAINTENANCE.....	293

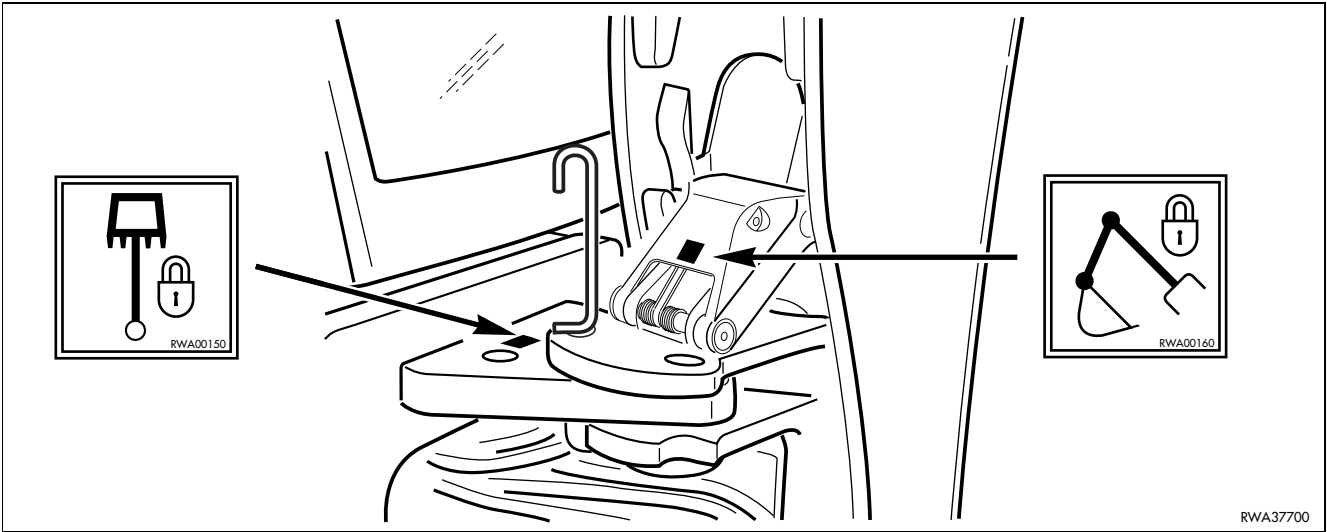
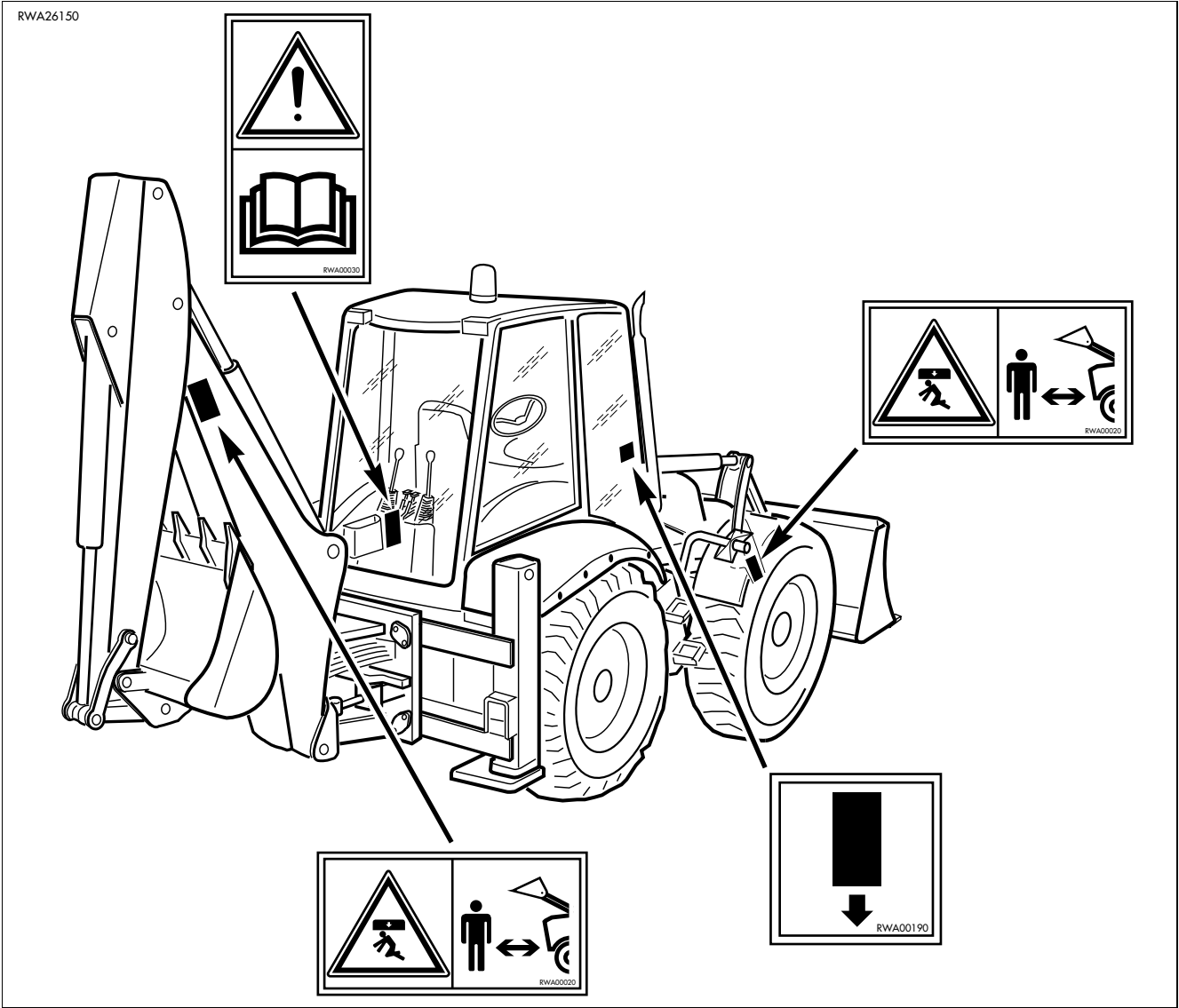
# **SAFETY AND ACCIDENT PREVENTION**

## 2.1 SAFETY, NOISE AND VIBRATION PLATES

### 2.1.1 POSITION OF THE SAFETY PLATES

- The safety plates must always be legible and in good conditions; for this reason, if they are dirty with dust, oil or grease, it is necessary to clean them with a solution made of water and detergent. Do not use fuel, petrol or solvents.
- If the plates are damaged, ask for new ones to Komatsu Utility or to your Komatsu Utility Dealer.
- In case of replacement of a component provided with a safety plate, make sure that this plate is applied also on the new piece.
- The machine can be provided with other plates in addition to those indicated below; keep also to the instructions given in the additional plates, in any case.



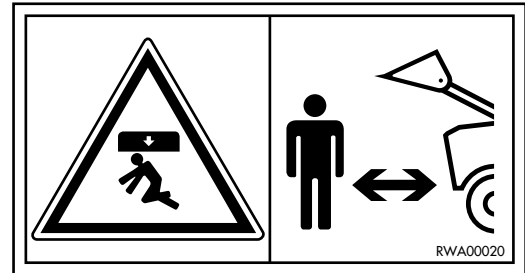


## 2.1.2 PICTOGRAMS AND RELEVANT MEANINGS

The warning and danger plates applied onto the machine are accompanied or represented by pictograms. The personnel in charge with the operation and maintenance of the machine must know the symbols contained in the pictograms perfectly; the following description illustrates what they look like and their respective meanings.

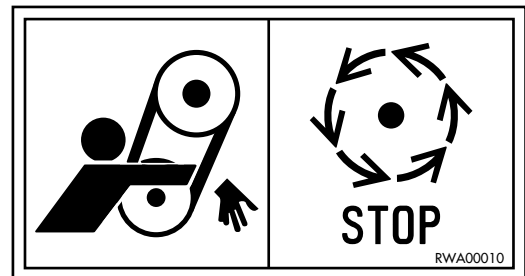
### DANGER IN THE WORK AREA

- Do not approach or stand in the equipment operating radius when the boom and the bucket are raised.



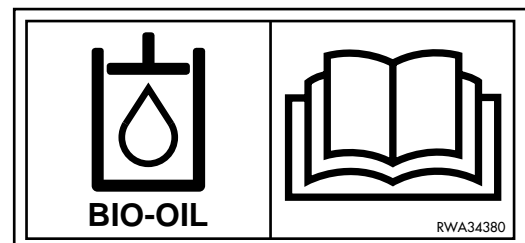
### DO NOT OPEN THE HOOD

- Do not open or remove the hood when the engine is running.



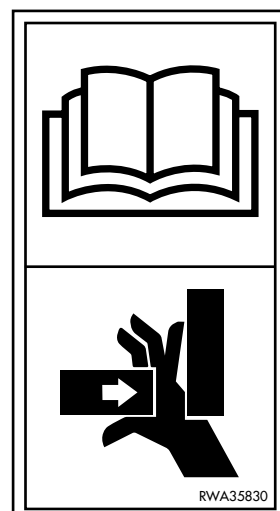
### FILLING THE HYDRAULIC SYSTEM WITH OIL

(Only for machines in which the synthetic biodegradable oil type HEES is used)



### OVERTURNING THE FORKS

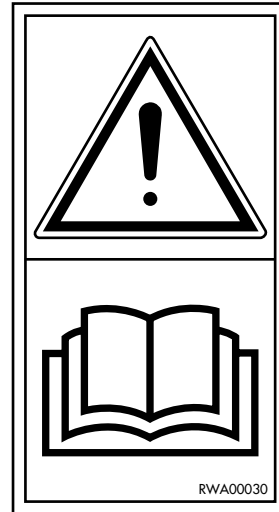
- When the forks are overturned for use or storage, be careful to the grasping points, since hands and feet may be injured and even cut.



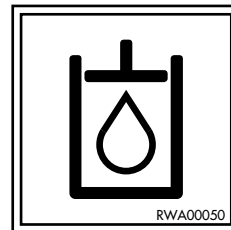


## CONSULT THE MANUAL

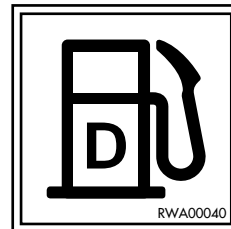
- Carefully read the contents of the manual before using the machine or performing maintenance operations.



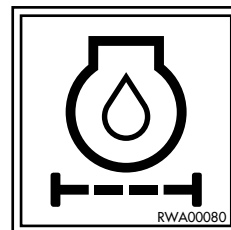
## HYDRAULIC OIL TOPPING UP



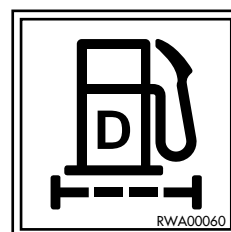
## REFUELLING



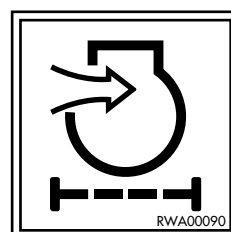
## ENGINE LUBRICATING OIL FILTER



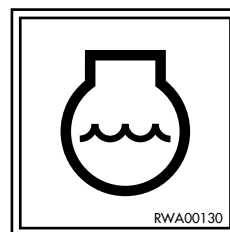
## FUEL FILTER



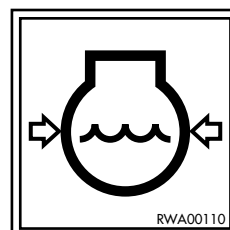
## ENGINE AIR SUCTION FILTER



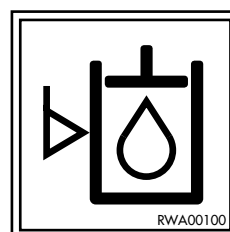
## ENGINE COOLANT



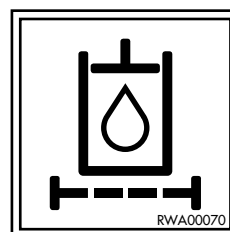
## ENGINE COOLANT PRESSURE



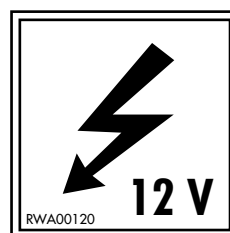
## HYDRAULIC OIL LEVEL



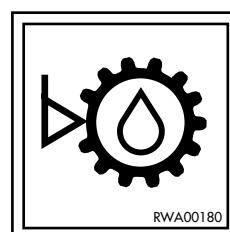
## HYDRAULIC OIL FILTER



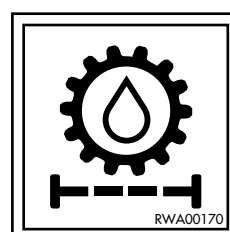
## ELECTRIC OUTLET



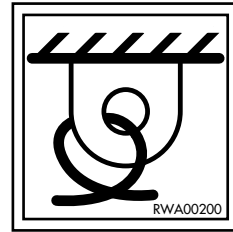
## TRANSMISSION OIL LEVEL



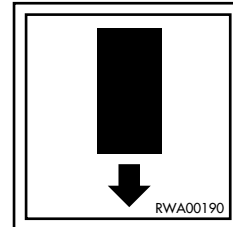
## HYDRAULIC TRANSMISSION OIL FILTER



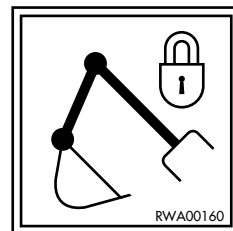
## ANCHORAGE POINT



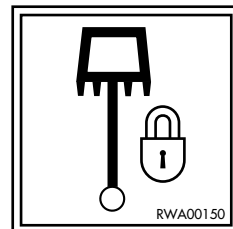
## EMERGENCY EXIT



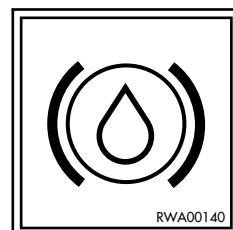
## BOOM LOCK



## SWING LOCK



## BRAKE OIL

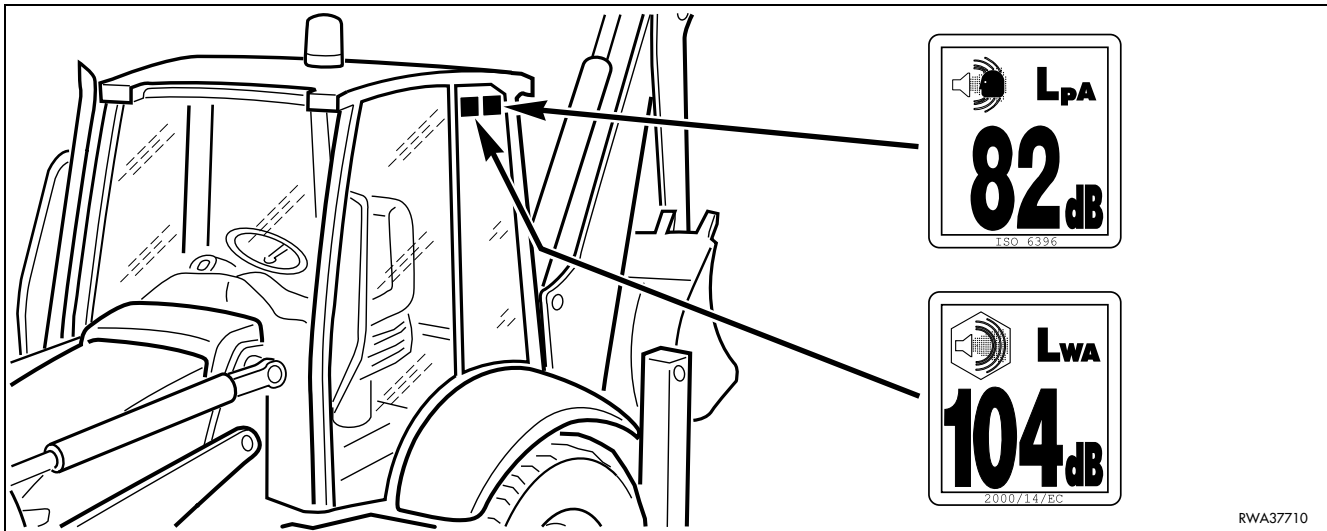


## DO NOT LIFT MORE THAN 1000 kg



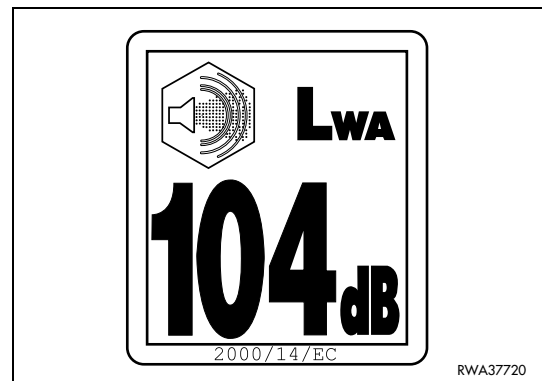
### 2.1.3 POSITION OF THE NOISE PLATES ON MACHINES WITH CAB

- The noise plates must always be legible and in good conditions; for this reason, if they are dirty with dust, oil or grease, it is necessary to clean them with a solution made of water and detergent.  
Do not use fuel, petrol or solvents.
- If the plates are damaged, ask for new ones to Komatsu Utility or to your Komatsu Utility Dealer.
- In case of replacement of a component provided with a noise plate, make sure that this plate is applied also on the new piece.



### NOISE OUTSIDE THE CAB

- This value indicates the noise level outside the machine and refers to the noise perceived by persons in the vicinity of the work area.



### NOISE INSIDE THE CAB

- This value indicates the maximum noise level perceived by the operator's ears inside the cab when this is completely closed.



#### **2.1.4 VIBRATIONS TO WHICH THE OPERATOR IS SUBJECTED**

- According to the results of the tests carried out to determine the vibrations transmitted to the operator by the machine, the upper limbs are subjected to vibrations lower than 2.5 m/sq.sec., while the seated part of the body is subject to vibrations lower than 0.5 m/sq.sec.

## 2.2 GENERAL PRECAUTIONS

### 2.2.1 GENERAL SAFETY RULES

- Only trained and authorized personnel can use the machine and perform maintenance operations.
- Follow all the safety rules, precautions and instructions when using the machine or performing maintenance operations.
- When working with other operators or when the work site is often occupied by other operators, make sure that everyone knows and understands all the signals described above and, in any case, that everyone works in such a way as to be able to see the machine and to be visible to the operator.

### 2.2.2 SAFETY DEVICES AND GUARDS

- Make sure that all the guards and covers are in the correct position. Have guards and covers changed or repaired if damaged. Neither use the machine without guards, nor remove the guards when the engine is running.
- Always use the proper safety devices to lock the machine when parking and fasten the safety belt.
- For the safety devices, see “3.1 SAFETY LOCKS”.
- For the safety belt, see “3.5.7 SAFETY BELT”.
- Do not remove the safety devices and always keep them in good operating conditions.
- Any improper use of the safety devices may result in serious injuries or even death.

### 2.2.3 CLOTHING AND PERSONAL PROTECTION ITEMS

- Do not wear large or loose clothes, rings and watches and do not approach the machine with loose long hair, since they can get entangled in the moving parts of the machine and cause serious injuries or damage.  
Avoid also wearing clothes dirty with oil or fuel, since they are flammable.
- Wear a hard hat, goggles, safety shoes, mask, gloves and headphones when operating the machine or performing maintenance operations.
- Always wear safety goggles, a hard hat and heavy gloves if your job involves scattering metal chips or minute materials; these precautions are particularly useful when driving the equipment connection pins with a hammer and when blowing compressed air into the air filter and the radiator to clean them. During these operations, make also sure that no one is standing or working near the machine without the necessary protections.
- When working for 8 hours with a noise level exceeding 90 dBA, it is necessary to use headphones or ear plugs and be particularly careful, especially at the end of the work shift.

