

Operation & Maintenance Manual

WH609-1 WH613-1
WH713-1 WH714-1
WH714H-1 WH716-1

TELESCOPIC HANDLERS

MODEL	SERIAL NUMBER
WH609-1	395F60001 and up
WH613-1	395F60003 and up
WH713-1	395F70001 and up
WH714-1	395F70002 and up
WH714H-1	395F70003 and up
WH716-1	395F70004 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.



1.1 FOREWORD

- This manual has been developed by Komatsu Utility in order to supply their customers with all the necessary information on the machine and the safety regulations related to it, as well as 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, so that it can be consulted at any moment; it must be placed in the appropriate compartment behind the seat, where also the owner's and registration documents are usually kept.
- This manual must be given to the personnel 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 on request.
The machines are constantly upgraded in order to increase their efficiency and reliability; this manual sums up all the information regarding the state of the art at the moment when the machine is launched on the market.
Consult your Komatsu Utility Dealer for any updated information.
- Punctual periodic annotations regarding the maintenance operations that have been carried out are important to have a clear prospect of the situation and to know exactly what has been done and what has to be done after the next maintenance interval.
Therefore, it is advisable to consult either the hour meter and the maintenance plan frequently.
- 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 must always be indicated to the Dealer when requiring assistance and ordering spare parts.

ATTENTION

- **Incorrect use and maintenance of the machine may be hazardous and cause serious injury and even death.**
 - **Operators and maintenance personnel must carefully read this manual before using the machine or performing maintenance operations.**
 - **Some actions involved in the operation and maintenance of the machine may cause serious injury or even death, if they are not performed in compliance 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.

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 safety messages and on safety labels where there is a high probability of serious injury or death if the hazard is not avoided.
These safety messages or labels usually describe the precautions that must be taken to avoid the hazard.
Failure to take these precautions may also result in serious damage to the machine.
-

WARNING

- This word is used in safety messages and on safety labels to signal a potentially dangerous situation which could result in serious injury or even death.
These safety messages or labels usually describe the precautions that must be taken to avoid the hazard.
Failure to take these precautions may also result in serious damage to the machine.
-

ATTENTION

- This word is used in safety messages and on safety labels to signal hazards which could result in minor or moderate injury or damage.
This kind of warning is used even to signal hazards which may cause damage only to the machine.
-

IMPORTANT

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

NOTE

- This word is used to indicate a useful piece of information.
-

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 will 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 a firm and level surface, engage the safety locks of the equipment and the controls, stop the engine and apply the parking brake.
 - For the sake of clarity, some illustrations contained in this manual may represent the machine without guards.
Do not use the machine without guards and do not start the engine when the engine hood is open, unless this is expressly required for some maintenance operations.
 - It is strictly forbidden to modify the setting of the hydraulic system safety valves; Komatsu cannot be held liable for any damage to persons, property, or the machine, if the machine has been tampered with by modifying the standard setting of the hydraulic system.
 - Before carrying out any electrical welding, disconnect the battery, the alternator and the connector of the gearshift unit installed under the steering wheel.
(See «2.8.12 PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR» and «2.8.14 PRECAUTIONS CONCERNING THE GEAR LEVER»).
 - Install only authorized additional equipment.
 - The machine can travel on roads only if fitted with homologated equipment; before travelling on roads, make sure that the equipment fitted is homologated and that the safety locks provided are correctly engaged.
 - Incorrect use of this machine may cause serious injury or death.
Operators and maintenance personnel must read this manual before operating or servicing the machine. This manual must be kept inside the cab for reference and periodically reviewed by the personnel using the machine.
-

1.3 INTRODUCTION

1.3.1 INTENDED USES

The Komatsu Utility TELESCOPIC HANDLERS described in this manual are suitable for operation at temperatures ranging from -16°C to $+45^{\circ}\text{C}$ and for use by operators skilled mainly in the following types of work:

- Lifting and handling of palletized or free loads on even or uneven ground.

NOTE

- **Free loads and loads with particular shapes must be secured to the forks or to the lifting equipment.**

Through the application of approved optional attachments, the machine can also be used for:

- loading work
- handling loose material (cereals, sand, gravel, etc.) with STANDARD BUCKET or 4 IN 1 BUCKET.
- handling piles, trees, etc. with specific forks.

1.3.2 IMPROPER OR UNAUTHORIZED USE

ATTENTION

- **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 machine configurations and the hydraulic couplings necessary for the operation of the equipment are grouped in the final section of this manual.**

The Komatsu Utility TELESCOPIC HANDLERS are designed and built exclusively for handling and transporting inert materials; the following applications are forbidden:

- Use of the machine at temperatures different from those indicated.
- Use of the machine by minors or unexperienced persons.
- Use of the machine by persons under the effect of alcohol, medicines that may affect attention levels, drugs.
- Use of the machine to lift persons or with forks, or pallets or equipment not approved from Komatsu Utility for this specific type of application.
- Use the machine for lifting operations in combination with other machines.
- Transport of people, even if they are in the operator's cab.
- Transport and lifting of containers containing flammable fluids or fluids that can be considered dangerous without using the apposite retaining equipment (harness).
- Transport and lifting (even if in exceptional cases) of equipment or loose materials that protrude from the forks and are not secured with cables or chains.
- Use of the bucket to drive or extract piles.
- Use of the machine to tow damaged or failed vehicles.
- Use of the machine to lift damaged or failed vehicles.

1.3.3 MAIN CHARACTERISTICS

- Simple and easy to use.
- Cab (ROPS/FOPS level 2).
- Servo steering through hydraulic system with priority to steering needs.
Three steering modes selected with push buttons:
 - Two-wheel steering (compulsory for travelling on roads)
 - Four-wheel steering (round steering)
 - Crab steering
- Selection of the machine operating mode (travel – travel + work - work).
- Gearshift with electronic selection of gears through solenoid actuators and transmission with hydraulic converter; reversal and speed change with controls on a single lever.
- Boom lifting and equipment swinging control with servo lever that makes it possible to modulate the movements in a proportional and continuous way.
- Boom extension with potentiometer acting on a proportional solenoid valve.
- Safety valves for each movement of the cylinders.
- Controls and instrumentation visible from the work position.
- Accelerator pedal.
- Service brakes with foot control acting on the two axles.
- Simplified maintenance with reduced intervals.
- Independent controls for the stabilizers (optional).
- Frame levelling controlled through a water level (spirit level) and a rocker switch control with automatic return to the central position (optional).
- SLI-Safe Load Indicator.
- Axle-frame lock that engages automatically when the boom inclination exceeds approximately 30° (optional).

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.

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.
- When warming the engine up, carry out some lifting cycles with an average load and extend the boom a few times, so that the hydraulic oil warms up more easily.
- Cover short distances at low speed to warm up the axles and transmission oil.
- Avoid operating the machine reaching the load limits allowed or at high speed.
- Avoid abrupt starts or accelerations, useless sudden decelerations and abrupt reversals, especially when travelling at the maximum speed allowed for each gear.
- After the first 250 hours of operation, besides the maintenance operations to be performed every 250 hours of operation, it is also necessary to:
 - 1 - Change the transmission filter.
 - 2 - Change the oil in the differential unit (front and rear axle).
 - 3 - Change the oil in the final reduction gears (front and rear axle).
 - 4 - Change the hydraulic circuit oil drain 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 together with the standard maintenance operations:

- After the first 250 hours of operation, change the hydraulic circuit drain filter.
- After the first 500 hours of operation, change the hydraulic circuit oil and the intake filter.

IMPORTANT

- **When changing the oil filters (cartridges), check their inner part to make sure that there are no deposits.**
If abundant deposits are observed, find out what may have caused their accumulation before starting the machine.
 - **The number of operating hours is indicated by the hour meter.**
-

1.4 PRODUCT IDENTIFICATION

The Komatsu Utility TELESCOPIC HANDLERS and their 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 IDENTIFICATION PLATE AND PRODUCT IDENTIFICATION NUMBER (PIN)

The machine bears the data required by the EC Directives, as well as the Product Identification Number (PIN) (1).

The PIN is:

a - stamped on the front right part of the machine.

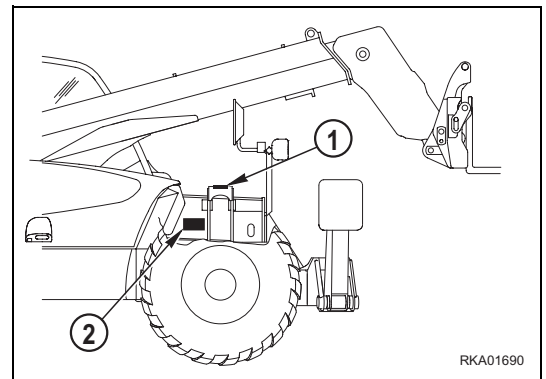


b - indicated on the identification plate as alphanumeric stamping and as a bar code.


The identification plate (2) is fixed to the front right part of the frame, in a protected place, in such a way as to prevent it from getting damaged and becoming illegible.

NOTE

- **If the serial number on the plate has been damaged, it can be obtained by separating the last 6 digits of the PIN.**



1.4.2 MACHINE IDENTIFICATION PLATE

 KOMATSU	TYPE		
	SERIAL No.		
	MANUFACTURING YEAR		
	MASS		kg
	RATED CAPACITY		kg
	ENGINE POWER		kW
	Product Identification Number PIN		
MANUFACTURED BY KOMATSU UTILITY EUROPE S.p.A. 36025 NOVENTA VICENTINA (VI) - ITALY -			
		395-93-11570	

RKA02031

1.4.3 ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE

The identification plate (1) is fixed to the timing case and indicates the engine model, total displacement and serial number.

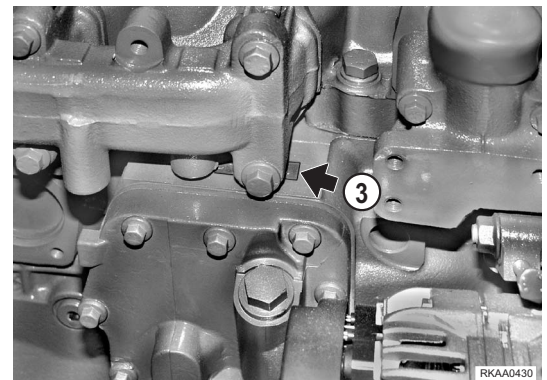
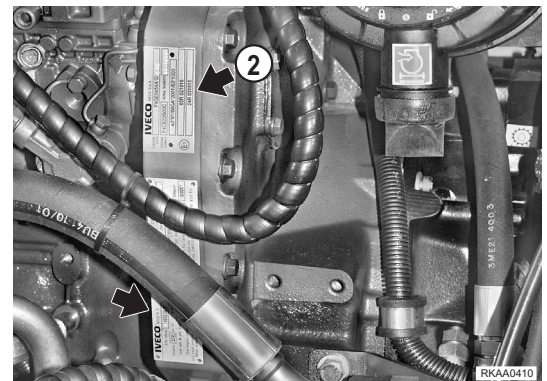
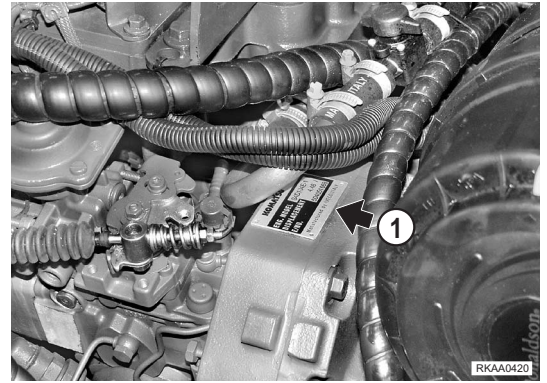
In addition to the Manufacturer's trademark, the identification plate (2) also indicates the following:

- 1 - Engine type
- 2 - Engine Family
- 3 - Serial no.
- 4 - EC Type Approval

The serial number (3) is also stamped on the right side of the cylinder block, on the upper part of the oil cooling heat exchanger.

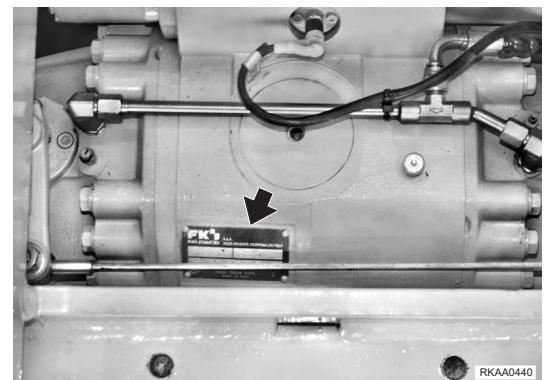
The engine class plate (4) and the engine details (EPA Family, engine model, engine displacement, engine power/RPM, idle speed, quantity of fuel/cycle, valve clearance and U.S.EPA CARB conformity) can be found on the plate positioned below the Manufacturer's plate.

Both plates (2) and (4) are applied to the left side of the timing case.



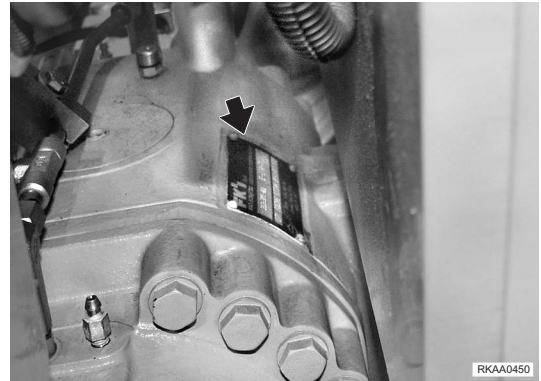
1.4.4 FRONT AXLE SERIAL NUMBER

The front axle serial number is stamped on the plate positioned on the central body.



1.4.5 REAR AXLE SERIAL NUMBER

The rear axle serial number is stamped on the plate positioned on the central body.



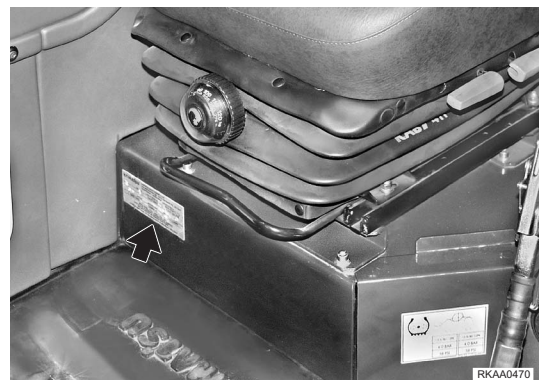
1.4.6 TRANSMISSION SERIAL NUMBER

The transmission serial number is stamped on the plate positioned on the transmission case, on the engine coupling side.



1.4.7 CAB SERIAL NUMBER

The cab serial number is stamped on the plate positioned on the front right base crosspiece.



1.4.8 SERIAL NUMBERS AND DEALER'S ADDRESS

Machine No. _____ Model _____

Product identification number (PIN) _____

Engine No. _____

Front axle No. _____

Rear axle No. _____

Transmission No. _____

Cab No. _____

Optional equipment: _____

Dealer:

Address: _____

_____ Tel. _____

Contact person: _____

NOTES: _____

TABLE OF CONTENTS

FOREWORD

1.1 FOREWORD	1
1.2 INFORMATION ON SAFETY	2
1.3 INTRODUCTION	4
1.3.1 INTENDED USES.....	4
1.3.2 IMPROPER OR UNAUTHORIZED USE	4
1.3.3 MAIN CHARACTERISTICS.....	5
1.3.4 RUNNING-IN	5
1.4 PRODUCT IDENTIFICATION	7
1.4.1 MACHINE IDENTIFICATION PLATE AND PRODUCT IDENTIFICATION NUMBER (PIN)	7
1.4.2 MACHINE IDENTIFICATION PLATE	8
1.4.3 ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE	9
1.4.4 FRONT AXLE SERIAL NUMBER.....	9
1.4.5 REAR AXLE SERIAL NUMBER	10
1.4.6 TRANSMISSION SERIAL NUMBER.....	10
1.4.7 CAB SERIAL NUMBER.....	10
1.4.8 SERIAL NUMBERS AND DEALER'S ADDRESS	11
TABLE OF CONTENTS	12

SAFETY DEVICES AND ACCIDENT-PREVENTION MEASURES

2.1 SAFETY, NOISE AND VIBRATION PLATES	20
2.1.1 POSITION OF THE SAFETY PLATES.....	20
2.1.2 PICTOGRAMS AND RELEVANT MEANINGS	24
2.1.3 POSITION OF THE NOISE PLATES	32
2.2 GENERAL PRECAUTIONS	33
2.2.1 GENERAL SAFETY RULES.....	33
2.2.2 SAFETY DEVICES AND GUARDS	33
2.2.3 CLOTHING AND PERSONAL PROTECTION ITEMS	33
2.2.4 UNAUTHORIZED MODIFICATIONS.....	34
2.2.5 LEAVING THE OPERATOR'S SEAT	34
2.2.6 GETTING ON AND OFF THE MACHINE.....	35
2.2.7 CHECKING THE REAR-VIEW MIRRORS	35
2.2.8 PREVENTING FIRES DUE TO FUEL AND OIL.....	36
2.2.9 PREVENTING BURNS.....	36
2.2.10 PREVENTING DAMAGE DUE TO ASBESTOS POWDER.....	37
2.2.11 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT	37
2.2.12 FIRE EXTINGUISHERS AND FIRST AID KIT.....	38
2.2.13 PRECAUTIONS CONCERNING THE CAB STRUCTURE	38
2.2.14 PRECAUTIONS CONCERNING THE EQUIPMENT.....	38
2.3 PRECAUTIONS TO BE TAKEN BEFORE STARTING WORK	39
2.3.1 SAFETY ON THE WORKSITE	39
2.3.2 FIRE PREVENTION	39
2.3.3 PRECAUTIONS CONCERNING THE DRIVING POSITION.....	39

2.3.4	ROOM VENTILATION	40
2.3.5	PRECAUTIONS CONCERNING THE LIGHTS	40
2.3.6	CLEANING THE WINDOWS AND THE REAR-VIEW MIRRORS- CHECKING THE WINDSHIELD WIPER BLADES	40
2.4	PRECAUTIONS TO BE TAKEN DURING WORK.....	41
2.4.1	WHEN STARTING THE ENGINE	41
2.4.2	RULES FOR TRAVELLING ON ROADS	41
2.4.3	CHECKS FOR TRAVELLING IN REVERSE	42
2.4.4	MOVING THE MACHINE	42
2.4.5	MOVING ON SLOPES	43
2.4.6	WORKING ON SLOPES	44
2.4.7	UNAUTHORIZED OPERATIONS	44
2.4.8	WORKING IN WINDY WEATHER CONDITIONS	45
2.4.9	MAIN OPERATING MODES	46
	2.4.9.1 LOADING THE MATERIAL	46
	2.4.9.2 UNLOADING THE MATERIAL	48
2.4.10	PREVENTING ELECTROCUTION	50
2.4.11	VISIBILITY	50
2.4.12	WORKING ON ICY OR SNOW-COVERED SURFACES	50
2.4.13	PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT	51
2.4.14	WORKING ON LOOSE GROUND	51
2.4.15	PARKING THE MACHINE	52
2.5	TRANSPORTING THE MACHINE ON OTHER VEHICLES	53
2.5.1	LOADING AND UNLOADING THE MACHINE	53
2.5.2	THE ROUTE	53
2.6	BATTERY	54
2.6.1	SAFETY PRECAUTIONS FOR WORK ON BATTERIES	54
2.6.2	STARTING WITH BOOSTER CABLES	54
2.7	PRECAUTIONS FOR EMERGENCY RECOVERY	55
2.8	PRECAUTIONS TO BE TAKEN DURING MAINTENANCE.....	56
2.8.1	WARNING PLATES	56
2.8.2	TOOLS	56
2.8.3	PERSONNEL	56
2.8.4	EQUIPMENT	57
2.8.5	WORKING UNDER THE MACHINE	57
2.8.6	KEEPING THE MACHINE CLEAN	57
2.8.7	USE OF THE ENGINE DURING MAINTENANCE	58
2.8.8	PERIODICAL CHANGE OF THE PARTS THAT ARE CRITICAL FOR SAFETY	58
2.8.9	RULES TO BE FOLLOWED WHEN REFUELLING OR ADDING OIL	58
2.8.10	CHECKING THE COOLANT LEVEL IN THE RADIATOR	59
2.8.11	USING LAMPS	59
2.8.12	PRECAUTIONS CONCERNING THE BATTERY AND THE ALTERNATOR	59
2.8.13	PRECAUTIONS CONCERNING THE STARTER	60
2.8.14	PRECAUTIONS CONCERNING THE GEAR LEVER	60
2.8.15	PRECAUTIONS CONCERNING HIGH-PRESSURE HOSES AND FUEL PIPES	61
2.8.16	PRECAUTIONS TO BE TAKEN WHEN WORKING ON HIGH- PRESSURE SYSTEMS	61
2.8.17	PRECAUTIONS FOR MAINTENANCE WORK INVOLVING HIGH TEMPERATURES AND PRESSURES	61
2.8.18	COOLING FAN AND FAN BELT	62
2.8.19	WASTE MATERIALS	62

2.8.20	PRECAUTIONS CONCERNING TECHNOPOLYMERS AND ELASTOMERS	62
2.8.21	PRECAUTIONS TO BE TAKEN WHEN INFLATING TYRES	63
2.8.22	PRECAUTIONS TO BE TAKEN WHEN USING SYNTHETIC BIODEGRADABLE OIL TYPE «HEES».....	63

DESCRIPTION AND OPERATION OF THE MACHINE

3.1	GENERAL VIEWS	66
3.1.1	RIGHT SIDE VIEW	66
3.1.2	LEFT SIDE VIEW	66
3.1.3	CAB INSIDE GENERAL VIEW	67
3.2	INSTRUMENTS AND CONTROLS	68
3.2.1	INSTRUMENTS	68
3.2.2	WARNING LIGHTS	70
3.2.3	SWITCHES AND PUSH BUTTONS	75
3.2.4	ELECTRIC ACCESSORIES	82
3.2.5	MACHINE CONTROLS	83
3.3	LIFTING LOADS	105
3.3.1	READING THE LOAD CHARTS.....	105
3.3.1.1	DESCRIPTION OF THE LOAD CHARTS	105
3.3.1.2	USING THE CHARTS	107
3.4	FUSES AND RELAYS.....	112
3.4.1	CENTRAL UNIT FUSES AND RELAYS.....	112
3.4.1.1	CENTRAL UNIT FUSES	113
3.4.1.2	CENTRAL UNIT RELAYS	115
3.4.2	ENGINE LINE FUSES AND RELAYS	116
3.4.2.1	ENGINE LINE FUSES	116
3.4.2.2	ENGINE LINE RELAYS	117
3.5	GUARDS, CAB AND DRIVER'S SEAT	118
3.5.1	ENGINE HOOD	118
3.5.2	CAB	119
3.5.3	EMERGENCY EXIT.....	120
3.5.4	VENTILATION AND HEATING.....	121
3.5.5	AIR CONDITIONER (optional).....	123
3.5.6	SEAT	124
3.5.6.1	STANDARD SEAT	124
3.5.6.2	OPTIONAL SEAT.....	125
3.5.7	STEERING WHEEL.....	126
3.5.8	SAFETY BELT	126
3.5.9	WINDOW SHADE.....	127
3.5.10	TECHNICAL DOCUMENTATION.....	127
3.5.11	FIRE EXTINGUISHER.....	128
3.6	USE OF THE MACHINE.....	129
3.6.1	CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE	129
3.6.1.1	VISUAL CHECKS.....	129
3.6.1.2	DAILY CHECKS	129
3.6.1.3	OPERATIONAL CHECKS.....	130
3.6.2	STARTING THE ENGINE.....	131
3.6.2.1	STARTING WITH WARM ENGINE OR IN TEMPERATE CLIMATES.....	131
3.6.2.2	STARTING WITH COLD ENGINE OR IN COLD CLIMATES	132
3.6.3	WARMING THE ENGINE	133

3.6.4	HEATING THE HYDRAULIC OIL	133
3.6.5	HOW TO MOVE THE MACHINE	134
3.6.5.1	MOVING ON SLOPES	135
3.6.5.2	MAXIMUM IMMERSION DEPTH	136
3.7	PARKING THE MACHINE	137
3.7.1	PARKING ON LEVEL GROUND	137
3.7.2	PARKING ON SLOPES	138
3.8	STOPPING THE ENGINE	139
3.9	TRANSPORTING THE MACHINE ON OTHER VEHICLES	140
3.9.1	LOADING AND UNLOADING THE MACHINE	140
3.9.2	TRANSPORT	141
3.9.3	LIFTING THE MACHINE	141
3.10	PRECAUTIONS TO BE TAKEN IN THE COLD SEASON AND IN COLD PLACES	142
3.10.1	FUEL AND LUBRICANTS	142
3.10.2	ENGINE COOLANT	142
3.10.3	BATTERY	142
3.10.4	OTHER PRECAUTIONS	143
3.10.5	PRECAUTIONS TO BE TAKEN AT THE END OF WORK	143
3.11	PRECAUTIONS TO BE TAKEN IN THE WARM SEASON	144
3.12	EQUIPMENT	145
3.12.1	INSTALLING EQUIPMENT WITH HYDRAULIC QUICK COUPLING	145
3.12.2	INSTALLING EQUIPMENT WITH MANUAL COUPLING	147
3.12.3	INSTALLING EQUIPMENT REQUIRING HYDRAULIC POWER (4X1 BUCKET - FORKS – ROUND BALE GRIPPERS, ETC.)	147
3.12.4	ORGANIZING THE WORK AREA	148
3.12.5	OPERATING THE EQUIPMENT	148
3.12.6	OPERATING THE MACHINE FITTED WITH FORKS	149
3.12.6.1	FORKING A LOAD	149
3.12.6.2	TRANSPORTING THE LOAD	151
3.12.6.3	STACKING THE LOAD	151
3.12.7	PREPARING THE MACHINE FOR TRAVELLING ON ROADS	153
3.12.8	USING THE MACHINE AS A LOADER	154
3.12.8.1	ORGANIZING THE WORK AREA	154
3.12.8.2	LOADING HEAPED AND LEVEL MATERIAL	154
3.13	LONG PERIODS OF INACTIVITY	156
3.13.1	PREPARING THE MACHINE FOR A LONG PERIOD OF INACTIVITY	156
3.13.2	PREPARING THE ENGINE FOR A LONG PERIOD OF INACTIVITY	157
3.13.3	MAINTENANCE DURING A PERIOD OF INACTIVITY	157
3.13.4	RESTARTING THE ENGINE	158
3.13.5	AFTER A LONG PERIOD OF INACTIVITY	158
3.14	OPERATIONS IN CASE OF FAILURE	159
3.14.1	IF THE ENGINE BREAKS DOWN WITH BOOM LOADED, LIFTED AND EXTENDED	159
3.14.2	REMOVING THE MACHINE IN CASE OF FAILURE	160
3.14.3	IF THE FUEL HAS RUN OUT	160
3.14.4	IF THE ENGINE FAILS TO START BECAUSE THE BATTERY HAS RUN DOWN	161
3.14.4.1	STARTING WITH BOOSTER CABLES	162
3.14.5	OTHER TROUBLES	163
3.14.5.1	ELECTRIC CIRCUIT	163
3.14.5.2	HYDRAULIC SYSTEM	163

3.14.5.3	BRAKING SYSTEM	164
3.14.5.4	CONVERTER.....	164
3.14.5.5	ENGINE.....	165

MAINTENANCE

4.1	GUIDE TO MAINTENANCE	168
4.2	MAINTENANCE NOTES	170
4.2.1	NOTES REGARDING THE ENGINE.....	170
4.2.1.1	ENGINE OIL.....	170
4.2.1.2	COOLANT	170
4.2.1.3	FUEL	171
4.2.2	NOTES REGARDING THE HYDRAULIC SYSTEM.....	171
4.2.3	NOTES REGARDING THE ELECTRIC SYSTEM.....	172
4.2.4	NOTES REGARDING LUBRICATION	172
4.2.5	PARTS SUBJECT TO WEAR THAT PERIODICALLY NEED CHANGING.....	173
4.3	FUEL, COOLANT AND LUBRICANTS.....	174
4.3	LUBRICATION WITH GREASE	174
4.3.1	HOMOLOGATED SYNTHETIC BIODEGRADABLE LUBRICANTS “HEES”	176
4.4	DRIVING TORQUES FOR SCREWS AND NUTS	177
4.4.1	STANDARD DRIVING TORQUES	177
4.4.2	SPECIFIC DRIVING TORQUES	177
4.5	LUBRICATION	178
4.5.1	LUBRICATION DIAGRAM (2-SECTION BOOM)	178
4.5.2	LUBRICATION DIAGRAM (3-SECTION BOOM)	179
4.6	PERIODICAL CHANGE OF THE SAFETY-RELATED COMPONENTS.....	180
4.6.1	CRITICAL PARTS FOR SAFETY.....	181
4.6.1.1	FUEL SUPPLY SYSTEM	181
4.6.1.2	DELIVERY HYDRAULIC SYSTEM	182
4.6.1.3	CONTROL VALVE HYDRAULIC SYSTEM.....	183
4.6.1.4	BOOM HYDRAULIC SYSTEM.....	184
4.7	MAINTENANCE PLAN.....	185
4.7.1	WHEN REQUIRED.....	189
4.7.1.a	CHECKING THE BATTERY ELECTROLYTE LEVEL – INSPECTING TERMINALS AND CABLES	189
4.7.1.b	CHECKING, CLEANING OR CHANGING THE ENGINE AIR CLEANERS	190
4.7.1.c	CHECKING AND CLEANING THE CAB AIR FILTER	192
4.7.1.d	FUSES AND RELAYS – CHECK AND CHANGE	193
4.7.1.e	CHECKING THE WINDSHIELD WASHER FLUID LEVEL	193
4.7.1.f	CHECKING THE WINDSHIELD WIPER BLADES.....	194
4.7.1.g	LUBRICATING THE CAB DOOR AND ENGINE HOOD HINGES	194
4.7.1.h	LUBRICATING THE FORK SUPPORT ROD.....	194
4.7.1.i	CHECKING THE FUEL LEVEL.....	194
4.7.1.j	TOPPING UP THE BRAKING SYSTEM OIL RESERVOIR	195
4.7.2	MAINTENANCE EVERY 10 HOURS OF OPERATION OR EVERY DAY	196
4.7.2.a	VARIOUS CHECKS	196
4.7.2.b	CHECKING THE ACOUSTIC ALARMS, WARNING LIGHTS AND INSTRUMENTS	196
4.7.2.c	CHECKING THE ENGINE COOLANT LEVEL	197
4.7.2.d	CHECKING THE RADIATOR FLUID LEVEL	197
4.7.2.e	CHECKING THE ENGINE OIL LEVEL	198
4.7.2.f	CHECKING THE TYRE PRESSURE	198

4.7.2.g	CHECKING THE SERVICE BRAKES.....	199
4.7.2.h	CHECKING AND ADJUSTING THE PARKING BRAKE.....	199
4.7.3	MAINTENANCE EVERY 50 HOURS OF OPERATION OR EVERY 2 WEEKS.....	200
4.7.3.a	LUBRICATING THE ARTICULATED JOINTS AND THE PADS.....	200
4.7.3.b	LUBRICATING THE CHAIN GEAR SHAFTS (Only for 3-section boom version) ...	202
4.7.3.c	DRAINING THE WATER SEPARATOR	202
4.7.3.d	LUBRICATING BOOM	203
4.7.4	MAINTENANCE EVERY 100 HOURS OF OPERATION	204
4.7.4.a	LUBRICATING THE DRIVE SHAFTS.....	204
4.7.4.b	LUBRICATING THE FRONT AND REAR AXLE SWING JOINT	205
4.7.4.c	LUBRICATING THE WHEEL HUB JOINTS.....	205
4.7.5	MAINTENANCE AFTER THE FIRST 250 HOURS OF OPERATION	206
4.7.6	MAINTENANCE EVERY 250 HOURS OF OPERATION OR EVERY 3 MONTHS	206
4.7.6.a	LUBRICATING THE ARTICULATED JOINTS	206
4.7.6.b	LUBRICATING THE BOOM INNER HOSES, ROLLERS AND GUARD.....	207
4.7.6.c	CHECKING THE AXLE OIL LEVEL (FRONT AND REAR AXLE)	208
4.7.6.d	CHECKING THE TRANSMISSION OIL LEVEL.....	209
4.7.6.e	CLEANING THE OUTSIDE OF THE RADIATOR AND OF THE HEAT EXCHANGER.....	210
4.7.6.f	CHECKING THE ALTERNATOR-FAN BELT.....	210
4.7.6.g	CHECKING AND ADJUSTING THE A/C COMPRESSOR BELT TENSION (Optional)	211
4.7.6.h	CHECKING THE ADJUSTMENT OF THE PARKING BRAKE	212
4.7.6.i	CHECKING THE ELECTROLYTE LEVEL	212
4.7.7	MAINTENANCE AFTER THE FIRST 500 HOURS OF OPERATION (Only for machines in which synthetic biodegradable oil HEES is used)	213
4.7.8	MAINTENANCE EVERY 500 HOURS OF OPERATION OR EVERY 6 MONTHS	214
4.7.8.a	CHANGING THE FUEL FILTER	214
4.7.8.b	DRAINING THE FUEL TANK.....	215
4.7.8.c	CHECKING THE HYDRAULIC OIL LEVEL	215
4.7.8.d	CHANGING THE HYDRAULIC OIL DRAIN FILTER.....	216
4.7.8.e	DRAINING CONDENSATE FROM THE OIL TANK (Only for machines in which synthetic biodegradable oil HEES is used)	217
4.7.8.f	CHANGING THE ENGINE OIL	218
4.7.8.g	CHANGING THE ENGINE OIL FILTER.....	219
4.7.8.h	CHECKING THE CHAINS FOR OXIDATION (Only for the 3-section boom version)	220
4.7.8.i	CHECKING AND TIGHTENING THE BOOM CHAINS (Only for the 3-section boom version)	221
4.7.8.j	CHECKING THE LENGTH OF THE CHAINS (Only for the 3-section boom version)	226
4.7.8.k	LUBRICATING THE EXTENSION CHAINS (Only for the 3-section boom version)	227
4.7.8.l	CHECKING THE CLEARANCE OF THE CHAIN DRIVING GEAR BUSHINGS (Only for the 3-section boom version)	228
4.7.8.m	CHECKING THE SLIDING BLOCK CLEARANCE.....	228
4.7.8.n	CHECKING THE WHEEL NUT DRIVING TORQUE.....	228
4.7.9	MAINTENANCE EVERY 1000 HOURS OF OPERATION OR EVERY YEAR.....	229
4.7.9.a	CHANGING THE FRONT AND REAR AXLE OIL	229
4.7.9.b	CHANGING THE HYDRAULIC TRANSMISSION OIL.....	230
4.7.9.c	CHANGING THE HYDRAULIC TRANSMISSION FILTER	231
4.7.9.d	CHECKING THE ENGINE COOLANT LEVEL AND TOPPING UP	231
4.7.10	MAINTENANCE EVERY 2000 HOURS OF OPERATION OR EVERY 2 YEARS	232
4.7.10.a	CHECKING THE ALTERNATOR AND THE STARTER	232
4.7.10.b	CHANGING THE ALTERNATOR BELT.....	232

TABLE OF CONTENTS

4.7.10.c	CHANGING THE COOLANT	232
4.7.10.d	CHANGING THE BRAKING SYSTEM OIL	233
4.7.10.e	CHANGING THE HYDRAULIC OIL AND CLEANING THE INTAKE FILTER.....	235
4.7.11	MAINTENANCE EVERY 3 YEARS	236
4.7.11.a	CHANGING THE SAFETY BELT	236
4.7.12	MAINTENANCE EVERY 3000 HOURS OF OPERATION OR EVERY 3 YEARS	236
4.7.12.a	CHANGING THE ENGINE THERMOSTATIC VALVE	236
4.7.12.b	CHECKING THE ENGINE ANTIVIBRATION AND RETAINING SCREWS	236
4.7.12.c	CHECKING AND ADJUSTING THE ENGINE VALVE CLEARANCE AND THE INJECTION TIMING ADVANCE	236

TECHNICAL DATA

5.1	TECHNICAL DATA	238
5.1.1	DIMENSIONS WITH FORKS	238
5.1.2	TECHNICAL CHARACTERISTICS	240
5.1.2.1	TECHNICAL CHARACTERISTICS WH609 (Aspirated engine).....	240
5.1.2.2	TECHNICAL CHARACTERISTICS WH609 (Turbo engine)	241
5.1.2.3	TECHNICAL CHARACTERISTICS WH613 (Aspirated engine).....	242
5.1.2.4	TECHNICAL CHARACTERISTICS WH613 (Turbo engine)	243
5.1.2.5	TECHNICAL CHARACTERISTICS WH713	244
5.1.2.6	TECHNICAL CHARACTERISTICS WH714	245
5.1.2.7	TECHNICAL CHARACTERISTICS WH714H	246
5.1.2.8	TECHNICAL CHARACTERISTICS WH716	247
5.1.3	VIBRATIONS TO WHICH THE OPERATOR IS SUBJECTED.....	248
5.1.4	LOAD DISTRIBUTION ON THE AXLES	248
5.1.5	OPERATING PERFORMANCE.....	249
5.1.5.1	OPERATING PERFORMANCE WITH FORKS (ON WHEELS).....	249
5.1.5.2	OPERATING PERFORMANCE WITH FORKS (ON STABILIZERS).....	250