



CIMOLAI Technology® spa
Special Equipment

OPERATION AND MAINTENANCE MANUAL

MACHINE:

MOBILE STRADDLE TRANSPORTER

Mod. "MST068"

CAPACITY: 20t (SWL 10t + 10t)



Serial N°: **18 18 MST068/2**
Year: **2018**
Work order: **18 18**

REV.00



INSTRUCTION MANUAL

Compiled in compliance with:

Enclosure 1 - Paragraph 1.7.4 of the Regulations machines
2006/42/CEE

The instruction manual is divided into chapters.

The manual herewith described is, in its frame, aimed at adequately trained staff who have specific knowledge in carrying out and maintaining large installations.

Any potential certification released by CIMOLAI Technology spa to technical users CONFIRMS SUCH PREPARATION.

The chapters processed in the manual contain the specifications and descriptions reported in the index.

The present manual constitutes integrating part of the machine and must follow the same throughout its life.

It must therefore be kept with care and stored in places easily accessible in order to allow consultation as required to guarantee its preservation.

CE marked equipment, designed in compliance with the applicable Community directives and related harmonized standards, and therefore intended exclusively for the European market.



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CHAPTER 1.: INTRODUCTION – GENERAL WARNINGS

1.1. Introduction

- The present manual addresses the staff who, at various levels of RESPONSIBILITY and COMPETENCE IS AUTHORISED TO OPERATE THE MACHINE. The operation by persons not familiar with the process could result in DANGEROUS situations.
- The instructions supplied are in accordance with such type of operations. Any other use or application is considered improper and therefore DANGEROUS.
- It is important that the warnings and the instructions contained in the present manual are read CAREFULLY, as they provide important recommendations regarding the safe use and maintenance of the machine.
- In the event the part of the aforementioned “manual” should result NOT clear, you can contact the Technical and Assembly Service Center at CIMOLAI Technology spa who will supply:
 - Clarification regarding the documentation supplied.
 - Clarification regarding the supply of spare parts and procedure particular with regard to maintenance.
 - Intervention by CIMOLAI Technology spa technical staff to assist with repair or revision of special undertaking.
 - Clarification of possible encumbrances not described in the present manual.
 - Possibility to carry out instructive training.

To such scope we supply our address herewith:

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35010 Carmignano di Brenta (PD) – ITALY
Tel. +39 049 9404539 – Fax +39 049 5973960
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1.2. General information on safety

The manufacturer cannot be held responsible for any eventual damage or accidents caused by improper, wrong or unauthorised usage.

The machine must be used only by explicitly authorised personnel.

The use by personnel not familiar with the process could generate situations of danger.

In the event of need for technical assistance, address exclusively to the assistance service of the Manufacturer or to authorised centres, in order to request original spare parts.

Under no circumstances should elements or sealed parts of the machine be tampered with. Such operations, which would allow the opening of protections, access to spaces and the variation of calibration, would provoke dangerous situations.

In order to guarantee the efficiency of the machine and its correct functioning it is essential that the instructions supplied by the Manufacturer in the matter of cleaning and ordinary maintenance as contained in the present handbook be adhered to.

The cleaning operation and ordinary maintenance are to be affected by the user through trained and authorised personnel.

The section “replacement parts” is supplied exclusively for the scope of facilitating the service technical assistance and is therefore destined to authorised and professionally qualified personnel.

The user is not authorised under any circumstances to intervene on the machine except for the running operations and ordinary maintenance explicitly outlined in the present handbook.

For eventual repair service, the user must address exclusively the after-sales service centre of the manufacturer or the centers explicitly authorised by the same.

The use of non-original replacement parts can compromise the security of the machine and is therefore not authorised.

Any tampering or modification of the machine not authorised by the manufacturer will clear the latter of any damages provoked by and on the machinery and referable to the aforementioned acts.

Check that during the normal functioning no condition of danger is identified. Immediately stop the machine in the event irregular functions are discovered and consult the service centre of the manufacturer or a technical service centre which is explicitly authorised by him.

The warning or prescription labels are integral elements of the machine on which are applied, therefore must be requested and substituted in the event they should be damaged or missing.

The cleaning and maintenance operations must be affected in conditions of maximum security.

- Before effecting the maintenance /cleaning operations it is compulsory to disconnect the electrical supply of the machine and put the general switch to the OFF position. Disconnect any other form of energy connected to the machine for operations of maintenance and/or cleaning.
- In the event of access to the inside of the machine, disconnect any source of energy connected to the machine; make also sure that the internal temperature has come down to an acceptable level (Max 30°C).

- It is absolutely forbidden to remove the fixed protection whilst the machine is in operation or connected.



This symbol, which is found on many pages of the present manual, represents an important warning. It is therefore advisable to give the maximum attention to the operations or the indications evidenced by the same symbol.

It is advisable for the staff operating and maintaining the machine, to attend a specific course held by the manufacturer of the same machine. The staff appointed to attend the course should have a basic knowledge of the machine.

After unpacking and after verifying the good condition of the machine, check that no parts appear to be damaged. If in doubt, do not install/use the machine and contact the after sales service centre of the manufacturer.

The packaging components (plastic, polystyrene, nails, screws, wood, etc.) must be kept in inaccessible areas.

All the soiled and not biodegradable materials must be returned to the appropriate places of collection.

In the event that the machine ceases to be used, it is advised to make the machine inoperative by disconnecting the electrical supply. Also, all those parts which could be dangerous or pollutable, such as oils or lubrication oil, plastic components or other materials labelled by the laws in force for disposable material, should be taken care of.

Scrap the structures and the components placing the composites in the designated collection centres.

The manual refers to the technical and technological features implemented on the machine at the time of marketing it and cannot be considered inadequate if, following future developments and/or modifications of the project, the technical and technological characteristics applied to the machine are updated. The manufacturer reserves the right to update the design and modify the machine, updating the manual accordingly.

1.2.1 Manufacturer liability

The manufacturer hereby declares that the machine is compliant with state-of-the-art standards at the moment of its construction in regard to its design, manufacture and intended use. The manufacturer shall not be liable for any failures or inconveniences whenever these are linked to tampering and/or improper applications and/or incorrect use of the machine.

The customer must follow the requirements in this user's manual, and in particular:

- use the machine within its limits of design;
- carry out constant and diligent maintenance;
- properly instruct and train personnel having proven abilities and aptitude to use the machine;
- exclusively use the manufacturer's original spare parts.

Any modifications, adaptations or other changes to the machines released on the market do not oblige the manufacturer to perform any work on the machine previously supplied nor consider it and the user's manual incomplete and inadequate.

The instructions in this manual are integrations to the Employer's requirements governing compliance with the laws in force on hazard prevention and safety, and in no way, replace these.

1.2.2 Validity, contents and preservation of the manual

The manual reflects the machine's state-of-the-art standards at the moment of manufacture and shall remain valid for the entire life cycle of the machine.

All customers may contact the manufacturer for additional information and also make proposals for improvement so that this manual better meets the needs for which it is intended.

The manual must be kept in a place that is suitable for its preservation and can be accessed by the:

- Employer;
- Machine Operator;
- Maintenance Technician;
- Assembly Technicians;
- Personnel charged with demolition and scrapping.

These instructions have been carefully translated into the customer's language.

In order to prevent possible accidents from occurring to persons or objects, due to improper translation of the instructions, we advise the customer to:

- refrain from performing operations or manoeuvres on the machinery if there are any doubts or uncertainties on the operations to be performed;
- request details on the instructions at issue by contacting the Technical Assistance-Assembly Service of CIMOLAI TECHNOLOGY SpA.

1.2.3 Manufacturer's note

The manufacturer has provided all the information required to use the machine correctly when drafting this manual. It is understood that this information cannot replace the operator's experience and knowledge related to the machine's use.

1.2.4 Compliance with the directives

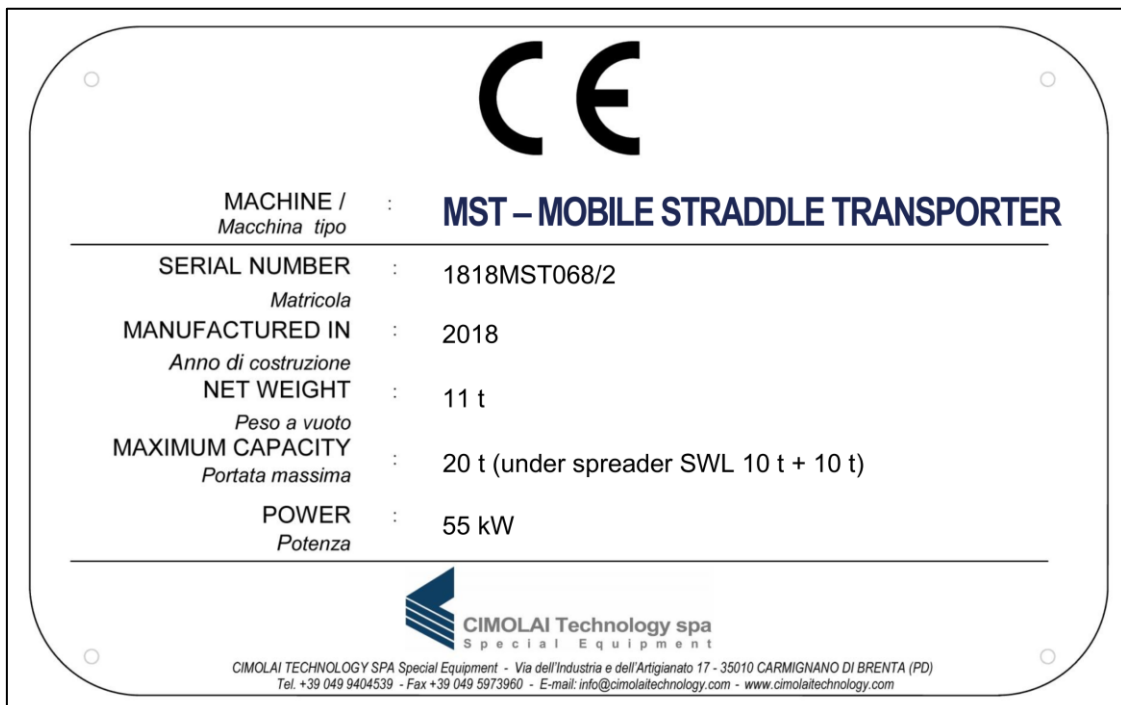
The machine has been designed and manufactured in compliance with the regulations on the EC declaration of conformity provided as annex. The equipment is CE marked, designed in compliance with the applicable Community directives and related harmonized standards, and therefore intended exclusively for the European market.

1.3. Machine identification data

A fixed nameplate that contains the following identifies each machine:

- the name and address of manufacturer
- designation of the series or the type (model)
- serial number (matriculation)
- year of construction
- CE label
- net weight
- Maximum capacity
- Power

The nameplate is made of brushed aluminium and screen printed in blue and grey. The information concerning the machine to which it is applied are stamped during machine testing at CIMOLAI TECHNOLOGY SpA.



Pic.1-1



CHAPTER 2: DATA AND TECHNICAL CHARACTERISTICS

2.1. Dimensions and machine measures

SEE ATTACHMENTS

Pic.2-1

2.2. Configuration of the machine

Technical Data

Type:	MOBILE STRADDLE TRANSPORTER
Model:	MST068
Wheels n°:	4
Winches n°:	2
Purpose:	Prefabricated elements
Lifting points n°:	2
Rated capacity:	20 t (10 t +10 t under spreader)

Machine Color

Main structure: Ral 5017

Tank capacity

Hydraulic oil tank capacity: 180 liters
Diesel tank capacity: 80 liters

Environment conditions

In order not to compromise the safety and the proper functioning of the machine, conform to the following values:

Temperature

- functioning environment temperature -10 °C / +40 °C
- electric closet temperature max ≤ 40 °C

Wind

- operation of staddle carrier 45 km/h
- out of service wind (equipment in parking position) 60 km/h

2.3. Power

Installed Power

Power: 55 kW

CHAPTER 3: INSTALLATION

3.1. General prescriptions for the installation of the machine

Machine

All of the tools / cranes made available by the Client (transporters, cranes, cables / ropes, slings, clamps) have to be certified and homologated, to guarantee safety and accident prevention protection (based on the required loads as advised by Cimolai Technology SpA); besides, they have to be suitable for being used in the specific work conditions in the installation areas as advised by Cimolai Technology SpA. Cimolai Technology SpA waives any and whatsoever responsibility for accidents caused by non-compliance with the above requirements.



ATTENTION: All the lifting methods and transport used should be compatible with the working environment; therefore, methods which emit polluting exhaust gases are to be excluded.

Recommendations

It is recommended to strictly follow the instructions provided hereafter during the installation of the machine:

- Organize the worksite to comply with the applicable regulations in force; affix signs which indicate the state of work in progress, highlighted by the personnel in charge;
- Install scaffolds, ladders, etc. in accordance with safety prescriptions; access to areas of work must be limited to the personnel in charge of works;
- The personnel in charge of assembly works must be equipped with clothes and material for their own safety etc.
- Verify the weight of various parts of the machine on the shipment label, use appropriate lifting equipment
- Ascertain that the position of the machine does not create difficulty and/or danger to the installations and other machines or the personnel in charge;
- Verify that the opening and the passages for the movement of the machine are adequate;
- Supply a lighting system of the work area, minimum 150 lux.

CIMOLAI Technology spa is not responsible for damages to persons or things if the regulations of above reported prescriptions are not respected.

3.2. Sub-division and movement of the packages

- Based on the transport equipment and contractual agreement terms, the shipment of the machine can be carried out by means of lorries, ships, containers, in cages and in crates.
- The machine is shipped without packaging if transported by road or packed in the event of shipment by sea or air.
- To move it whilst it is packed, use a truck-crane of a size adequate to the weight of the Machine



ATTENTION! In the event of moving of the packaged machine using forklifts, the maximum lift from the ground allowed is of 40 cm.

3.3. Acceptance and storing of the machine

Once the machine reaches its destination, it is recommended that the Client performs the following verifications:

- Check that the material delivered corresponds to that listed on the packing list.
- In the event of missing or damaged pieces, immediately contact and lay forth complaint to the Insurance company which issued the policy to cover the delivery of the material.
- The machine and/or its components that have reached their final destination and are awaiting installation should be stored in a dry, covered and clean environment, away from corrosive agents until they are ready for use.
- The responsibility for the packages and their contents is with the Client who remains responsible for their intactness

3.3.1 Storing of machine

In the event of prolonged storing, leave the machine protected from rain and wind and if possible in a dry place.

Carry out possible intervention of lubrication as detailed under paragraph “**LUBRICATION IN THE EVENT OF PROLONGED STORAGE**” of the chapter **LUBRICATION**.

It is not advisable to cover the machine with a waterproof tent because it would prevent the evaporation of eventual humidity.

Humidity, in fact, can cause corrosion to the hardware, whilst the exposure of the machine to the sun’s rays can bring about yellowing of the painted parts.

3.4. Unpackaging

To unpack the machine, follow scrupulously the following procedure.

- 1 Partially open and lift the cover of the pallet.
- 2 Remove the lateral walls of the pallet.
- 3 Unscrew the fixing screws of the pallet.
- 4 Pay attention not to damage the chassis or the covers of protection, lift the machine from the pallet using adequate belts.
- 5 Take off the protective film, the hygroscopic bags from the electrical parts.

- 6 Check that the supply corresponds with the order or to the accompanying document. In the event of mistake immediately informs CIMOLAI Technology spa or its area representatives.
- 7 Check that there are no damaged parts, in such event, follow instructions as per point 6.
- 8 If the supply comprises of more pallets, for every pallet, follow instructions as per points 7.



ATTENTION: Do not spread the packaging material around the work place. For the disposal of the packaging material (tarred paper, film etc..) contact the appropriate disposal agencies.

3.5. Lifting



ATTENTION: All loads with weight in excess of 30 kg must be lifted with special lifting gear.

The methods indicated for the lifting are crane, overhead crane and undercarriage elevator and must have a capability adequate to the weight to be lifted. All equipment must have indication of the maximum load admissible.

For the lifting use capable bands or ropes, check that the capability indicated on the same is superior to the weight to be lifted.



ATTENTION: During the lifting operations and transportation of the machines and of the relative groups pay particular attention to the equilibrium of the load and to protruding parts.

3.6. Assembly operations

Personnel assigned to the assembly and necessary equipment

The personnel required for assembly is generally established at contractual phase since the number of persons and type of qualification required depends on the size and complexity of the machine.

The equipment required for the standard assembly is for the Client's account, save in the event of specific contract terms and conditions, and includes standard tools that will thereafter be used for the maintenance operations to be performed on the machine at fixed intervals.

Along a general line, the supervision staff is not equipped with own equipment, unless this is specifically requested.



WARNING: the activities described in the present paragraph must be carried out by CIMOLAI personnel.



WARNING: the machine must be positioned on the ground/floor capable of supporting the loads declared by the constructor and mentioned in paragraph "DATA AND TECHNICAL CHARACTERISTICS"

3.7. Electrical connections



WARNING: Prior to carrying out works on the machine it is necessary to switch off the electrical supply by the main switch on the thermal unit, as prescribed by the safety norms.

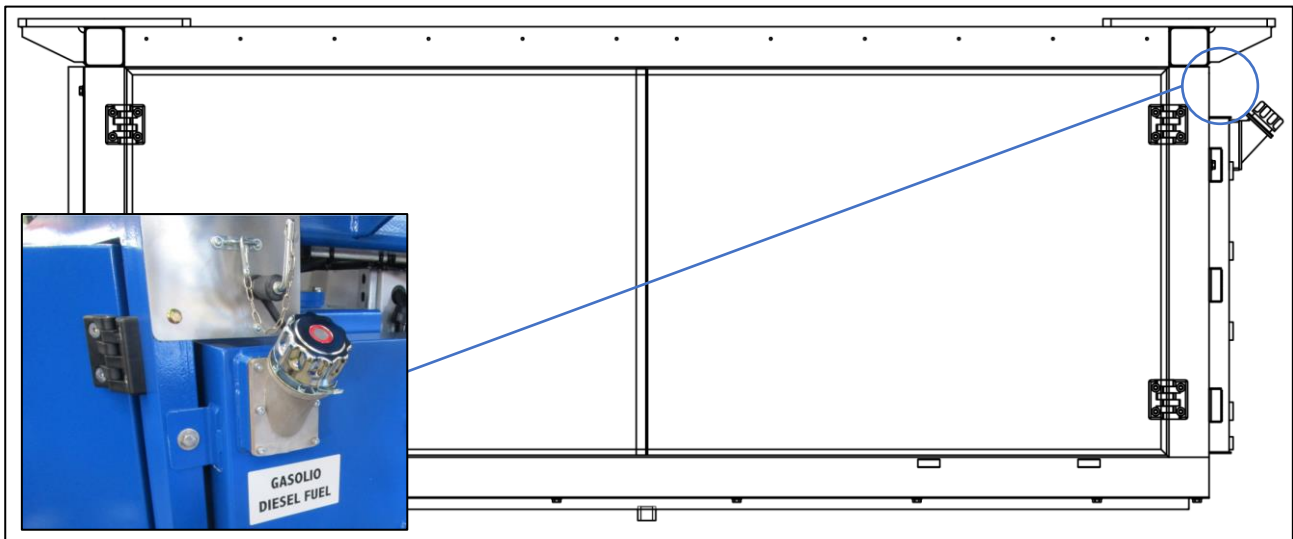
For electrical connections, conform to the general rules of installation for the preparation and operation of electrical systems, **Norms EN 60439-1 and Norms EN 60204-1.**

Furthermore, adhere to the design of the electric management supplied with the machine, or to the system which the machine is included, on which are reported the sections of feeding cables and the specific characteristics for their employment and use.



IMPORTANT: Before starting the machine up, the site manager will have to ascertain and verify that the equipotential connection of all of the installation's huge masses has been made, checking, via the instrument designed for this purpose, that continuity is respected and falls within the limits imposed by the standards in force in the country of installation.

CIMOLAI Technology SpA will not be held liable in the event of non-respect of the above.



Pic.3-1

3.8. Cleaning



ATTENTION: Before carrying out an operation on the machine it is necessary to switch off the electrical supply positioning to OFF the general isolator as specified in the safety norms.

Following complete installation of the machine (fixing, connections and lubrication), carry out an accurate clean of all the groups. Do not use metallic equipment or abrasive materials.

The cloths utilized for the cleaning, must be disposed of in the collection points provided respecting the ecological laws in force in the Country where the machine is installed.

3.9. Reinstallation



WARNING: the dis-assembling and re-assembling for an eventual re-installation of the machine must be carried out exclusively by the staff of CIMOLAI Technology spa. For guidance to request intervention of the technical staff of CIMOLAI Technology spa please refer to instructions in chapter 1.



WARNING: Following the dis-assembling carried out by CIMOLAI Technology spa staff all further packaging and moving operations, for an eventual reinstalment of the machine, must be carried out exclusively by qualified staff. For the new put in place and connection refer to relative paragraphs of the present manual.

3.10. Demolition and disposal

Directives

In various Countries there are different legislations in force, therefore the directives imposed by laws and authorities of the Country where the demolition takes place must be strictly observed. At the action of the machine being put out of service, it must be disconnected from the electrical net, hydraulic and from the compressed air. Furthermore, possible dangerous areas must be blocked (drops, cuts, traps). The machine awaiting disposal must be kept as long as possible in area protected from diverse weather conditions or at least should be kept covered.



WARNING: The dis-assembling operations for the disposal must be carried out by qualified staff.

Machine identification plate

For the said machine it is not required to be registered with the public offices, therefore it is not mandatory that the machine is accompanied by documents which are given back to the overseeing agency. Before the disposal it is only advisable to send to the constructor of the machine, the identifying plate specifying that the machine will be scrapped.

Disposal of the oils

Some of the components of the machine, such reducers and **oleodynamic** pumps, contain some lubricating oil which, at the time the machine is out of service, must be collected and disposed of in accordance with the guidelines of the norms in force.

Disposal of diesel oil

As far as the electricity generating group is concerned container of combustible (diesel), at the time the machine is out of service, must be collected and disposed of in accordance with the guidelines of the norms in force.



WARNING: Never disperse in the environment exhausted oils, grease, combustible or other polluted fluids.

Disposal of the production refuse

For the other components, such as electric cables, electric motors, rubber (gasket, transport belts), plastic materials, to carry out a subdivision for typology, then entrust for the disposal, agencies authorized for single typology. For the remainder, the machine results built predominantly in common steel and stainless steel (Aisi 304) for which there are no particular disposal procedures in place.

CHAPTER 4: INSTRUCTIONS FOR THE OPERATOR

Preface

The electrical equipment is maintained by the electricity generating group (batteries). For their correct functioning, it is necessary to conform to the values as follows:

- Tension: 24 V
- Frequency: DC

4.1. Radio remote control

The supplied radio remote control permits controlling all of the machine's movements.





Pic.4-1

To use the radio remote control, the following operations must be performed:

1. Verify that the power supply of the machine is active (see Paragraph 4.2 "Start up");
2. Turn the radio control key to position 1;
3. Press the "START" button.

Instruction for the operator - 4

The radio remote control, besides checking the general condition of the machine, visualizes the weight lifted on a display installed on the top of the remote control itself. At the bottom of the display panel, there are light telltales signaling the presence of alarms, the positions of twist locks and the status of the diesel engine. The alarm is indicated not only by the relevant telltale lighting up, but also by an icon that will appear on the top the display.

N° LIGHT	DESCRIPTION	COLOUR	ICON
1	EMERGENCY ON	RED	
2	FAILURE OF WHEELS	RED	
3	OVERLOAD	RED	
4	SPARE	RED (NEVER SWITCHED ON)	/
5	FILTERS CLOGGED	RED	
6	MAX TEMPERATURA ACEITE	RED	
7	PRE-FILTER DIÉSEL	RED	
8	SPARE	RED (NEVER SWITCHED ON)	/
9	10VDC	GREEN	/
10	ENGINE STARTED N ° 1	GREEN	/
11	ENGINE STARTED N ° 2	GREEN	/
12	SPARE	GREEN (NEVER SWITCHED ON)	/
13	SPARE	GREEN (NEVER SWITCHED ON)	/
14	SPARE	GREEN (NEVER SWITCHED ON)	/
15	SPARE	GREEN (NEVER SWITCHED ON)	/
16	SPARE	GREEN (NEVER SWITCHED ON)	/

4.1.1 Radio remote control failure

In the event of breakage or failure of the radio remote control it is possible to use a wire button strip that includes the same commands as the radio remote control:

- 1 - Switch the machine off by turning left the general selector (line selector) positioned on the electrical board (LINE 0 --- 1);
- 2 - The multi-pole connector, marked as CN1R (on the radio remote control), must be removed and replaced by the connector marked as CN1P. In this way, the remote control is disabled, and the same commands are enabled on the emergency button strip (umbilical radio remote control).



IMPORTANT: For the activation of the push buttons the operator must refer to the function described on the plate fastened to all of them.



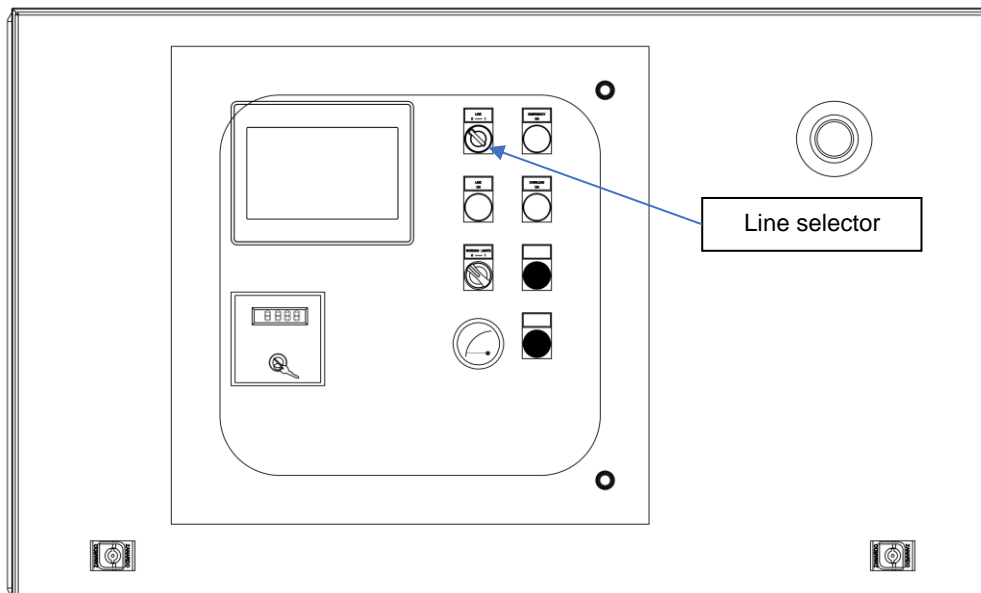
Pic.4-2

4.2. Electrical panel

The electrical panel (Q01) is complete with all buttons, selectors and so on for the start-up and the general controls of the machine.



Pic.4-3



Pic.4-4

4.3. Start up



WARNING: At the start of every work shift and before starting production, carry out a preliminary verification to ascertain a good state of functioning of the safety systems. Below it is reported the “Daily Inspection Checklist” to be completed before starting the working procedure.

Daily Inspection Checklist:

Daily Inspection Checklist



Work order:	1818
Serial n°:	1818 MST068/2

Page n°:	1/1
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MACHINE INSPECTION

	Operations description: <i>check if</i>	Pos	Neg
1	Machine correctly positioned		
2	Protection carters correctly positioned		
3	Tracks clean and free of debris		
4	General hardware intact and in good condition		
5	Safety guards and plates undamaged		
6	Emergency push buttons on wheels functioning and undamaged (x8)		
7	Emergency push button on radio remote control		
8	Emergency push button on electrical boards functioning and undamaged		
9	Temperature sensors undamaged		
10	Brake pressure switch functioning and undamaged		
11	PVG pressure switches functioning and undamaged		
12	Lubrication completed as described in Chapter 8		
13	Gear case hydraulic oil levels checked and adequate		
14	Remove the excess grease		
15	Ropes are correctly positioned on the winches and pulleys		
16	Spreader and pulleys are correctly positioned		
17	Any visible leaks or oil seepage		
18	Check oil level in drive pump		
19	DIESEL MOTOR: Check leaks		
20	DIESEL MOTOR: Check loose or damage parts		
21	DIESEL MOTOR: Check worn or damaged belts		
22	DIESEL MOTOR: Check worn or damage low and high voltage harnesses		
23	DIESEL MOTOR: Check any change in system appearance		
24	DIESEL MOTOR: Check odor of fuel		
25	DIESEL MOTOR: Check odor of electronic devices		

Daily Inspection Checklist



Work order: 1818
Serial n°: 1818 MST068/2

SITE CONSIDERATION

1	Good visibility / clear weather?		
3	Area adequately delineated?		
4	Any other work in the vicinity		

Other observations/comments:

Were there any conditions which required the machine to be shut down? Yes No. If Yes, explain below

IMPORTANT: If the answer is "NEG" to any of the above inspection items, shut down the manipulator lock out the equipment, and seek assistance from the Manipulator Supervisor

Date of examination (yy/mm/dd):

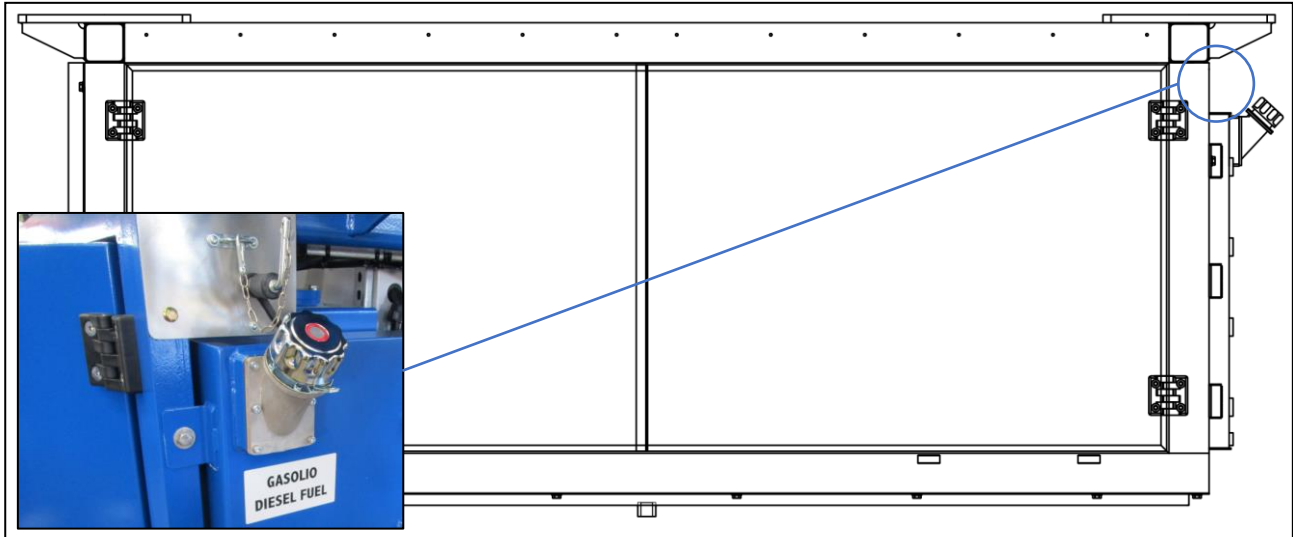
Shift: Day Afternoon Night

Name:

Signature:

After completing the “Daily Inspection Checklist” and verifying that everything is in order, it is possible start the machine:

1. Turn the main switch to connect the batteries;



Pic.4-5

2. Turn the line selector “LINE 0----1” to “1” (see Pic.4-4);
3. Disconnect the emergency push button inside the cabin;
4. Select “ON” with the “BRAKE” selector;
5. Push the start push button and the light “DRIVE LINE ON” will switch on;
6. Switch on the diesel engine:
 - **Manual start:**
 - a. Turn the diesel engine key clockwise (first position-ON);
 - b. Check that there is no alarm on the ENGINE CONTROL devices;
 - c. Turn the diesel engine keys clockwise (second position) until the engines are running (one motor per time);
 - **Radio way:**
 - a. Turn the diesel engine key clockwise (first position-ON);
 - b. Check that there is no alarm on the ENGINE CONTROL devices;
 - c. Press the button “START ENGINE”.

4.4. Halt

To halt the machine, adhere to the following procedure:

1. Switch off the diesel engine;
 - **Manual stop:**
 - a. Turn the diesel engine keys counterclockwise (OFF);
 - **Radio way (only for radio remote control):**
 - a. Press the button "STOP ENGINE";
 - b. Turn the diesel engine keys counterclockwise (OFF);
2. Turn the line selector "LINE 0----1" to "0";
3. Turn the general switches to disconnect the batteries;
4. Push the emergency push button.



CHAPTER 5: FUNCTIONING AND USE

5.1. Scheduled and not scheduled use, agreed uses

The machine has been designed and fabricated solely for unloading and loading of prefabricated elements.

The number of daily operations and the maximum capacity are established during the contractual stage. The machine should not be used with products other than those which it has been built with. The machine is in any case designed and built so as to ensure there are no risks to the operator as long as the procedures described in this manual are respected.

It is recommended not to exceed the capacity or travel limits, because the machine can get damaged and cause serious risks to persons and things.

In any event of malfunction, breakdown, breakage etc., always refer to the present use and maintenance manual before operating the machine and eventually to contact the Service Department of CIMOLAI TECHNOLOGY spa.



WARNING: If usage does not conform to the one recommended CIMOLAI TECHNOLOGY spa does not assume any responsibility for damages to the machine, things or persons.

5.2. Information on safety

Compliance with the general and specific rules on security, provided in the workplace and in this manual of use and maintenance, puts the operator in ideal conditions to work productively limiting the risk of generating reasonably foreseeable dangers that may result in personal harm or to others.

Before commencing work inside the plant, the operator should be made aware of the possible danger related to the various areas of the plant depending on the activity (machine operation, machine maintenance, dangers linked to type of material processed, etc.). The user must also be aware of the function and location of all machine and operator safety devices provided in the system.

5.2.1 General safety standards

Before analysing the possible risks specifically related to individual areas of plant operation and relative safety measures to be taken, it is useful to provide a set of general guidelines on safety standards to be adopted in order to limit the risks of accidents during normal work activities.

During standard work shift all operators must typically:

- Closely observe the directions and instructions provided by the employer, by the safety officer and by his representatives for the purpose of collective and individual safety;
- Accordingly, and appropriately use all the personal protective equipment required in performing the individual tasks machine operation and/or maintenance;
- Immediately report to the head of workplace security, to personnel in charge of safety and to the employer the possible lack and/or inadequacy of the personal protective equipment (PPE) as well as any potentially hazardous situations detected;

In case of emergency and as part of own personal skill set/ability, take all actions necessary to eliminate, reduce or remedy any hazardous situation at hand.

All personnel on the workplace **MUST ALWAYS**:

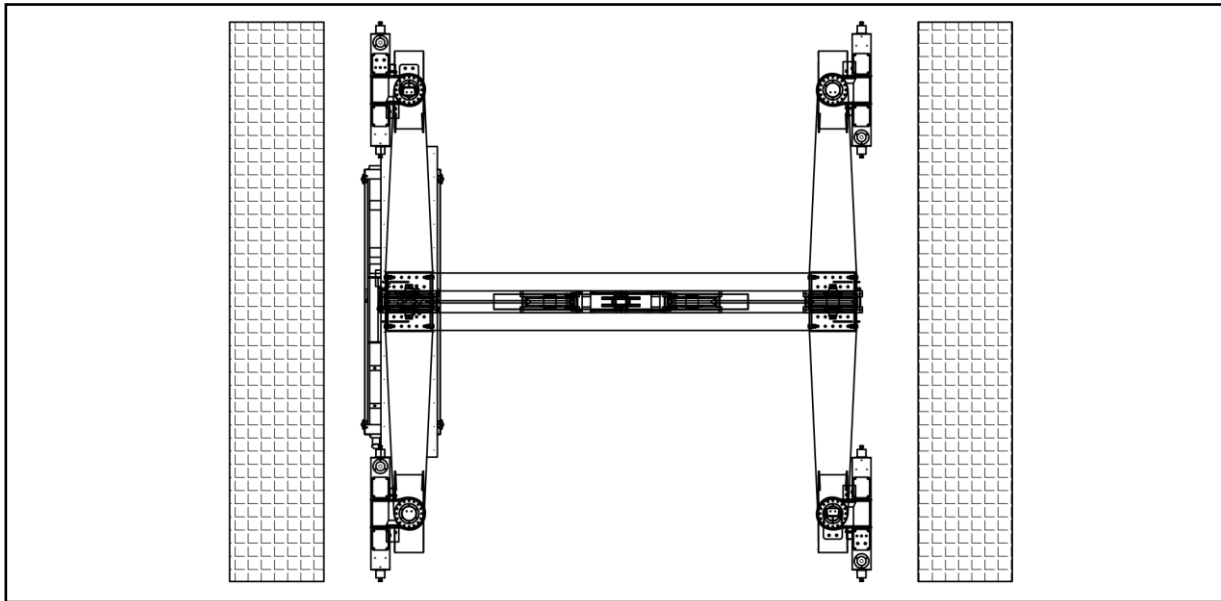
- Keep the workplace in order: disorder and any tools used for standard maintenance may generate risk and danger if not correctly stowed away;
- Dress accordingly: wear adequate protective apparel (standard compliant work coveralls) that is not too loose and free of dangling parts that may tangle in moving parts. Sleeves must be tightened around the wrists with an elastic. Do not wear rings, necklaces and chains. Always and exclusively wear standard compliant safety footwear. Long hair must be tied with an elastic band and/or appropriately bundled;
- Avoid unstable positions pay close attention to your position, making sure that it is always stable and safe with respect to the machine when performing tasks position and secure to the machine (whether it is moving or stationary);
- Have any repairs and / or maintenance work performed by qualified personnel only: Repairs and maintenance should be performed by qualified and trained personnel for the purpose at hand, provided with appropriate personal protective equipment and using original spare parts or those recommended by the manufacturer;
- Isolate sources of electrical and pneumatic supply to the machine before performing any maintenance. Ordinary and extra-plan maintenance operations must be performed with the machine stopped with all air and electrical supplies cut off. For this purpose, the main power switch inside the electric board must be set in the "O" position and locked with a padlock. The pneumatic system pressure must be relieved via its shutoff valve and then secured with padlock on the valve in the "closed" position;
- Check proper operation of the machine safety devices before the start of each work shift;
- Keep this use and maintenance manual: the manual, or a copy thereof, must be kept near the machine so that the operator can refer to it when needed.

Employees on the workplace **MUST NEVER**:

- Remove, modify and/or by-pass devices safety and signalling devices applied to the machine without authorisation;
- Perform operations or actions not assigned to them that might jeopardize the security of persons (personal or others) and the integrity of the machine;
- Climbing atop protections or over railings: It is absolutely forbidden to climb on the outer parts of the safety railings of the stairs and walkways to move from one part of the machine. It is absolutely forbidden to climb on the moving parts of the machine (reclaimed boom and/or conveyor belt) and fixed parts are not intended for the stationing of the operators;
- Rest ladders, scaffolding and/or other equipment on the side of the machine structure;
- Introduce foreign objects into electrical parts. Do not put keys and tools of any inside the covers of electric drives and inside moving parts of the machine;
- Power the machine tampering with the power switch and/or safety devices installed;
- Station on the wheels and/or leave the material unattended in their vicinity.

5.3. Perimeter accessibility and work emplacement

Save for the element to be handled, there is no part or accessory positioned on the ground that determine a limit or hindrance to the access of the machine's perimeter.
On the machine's side, a space is to be left available to permit the passage of the personnel or of the transport trolleys for the operation or maintenance of the machine.

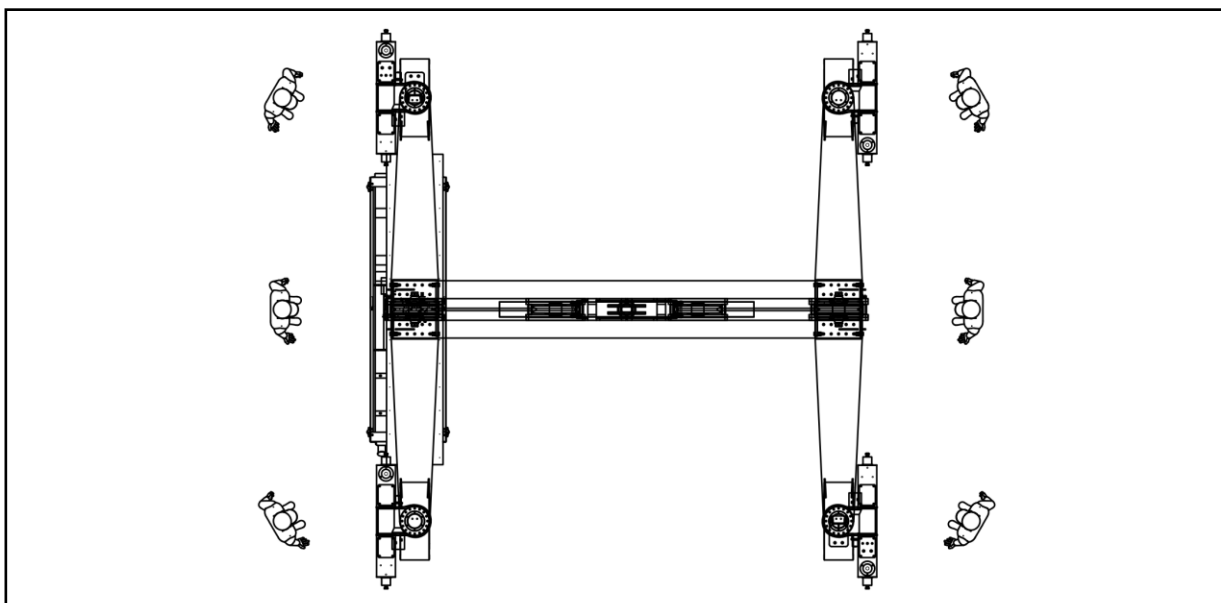


Pic.5-1



WARNING: The control and the operation of the machine during normal working conditions must happen only and solely from areas designated for this purpose.

These areas are without risk to the staff in charge of the operation and are marked as “COMMAND AND OPERATOR CONTROL AREAS (see Pic.5-2).



Pic.5-2

5.4. Dangerous areas

The dangerous parts of the machine are its front and its rear (because of its travelling) under the load.

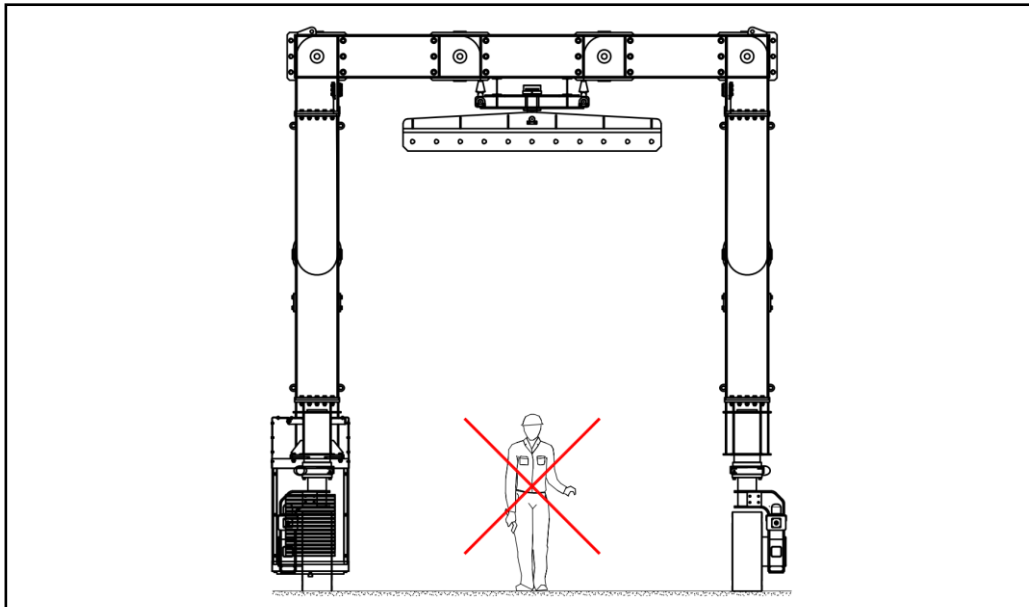
When moving backwards, forwards or lowering the load, great attention must be paid as there is the risk of “crushing” for the operator.



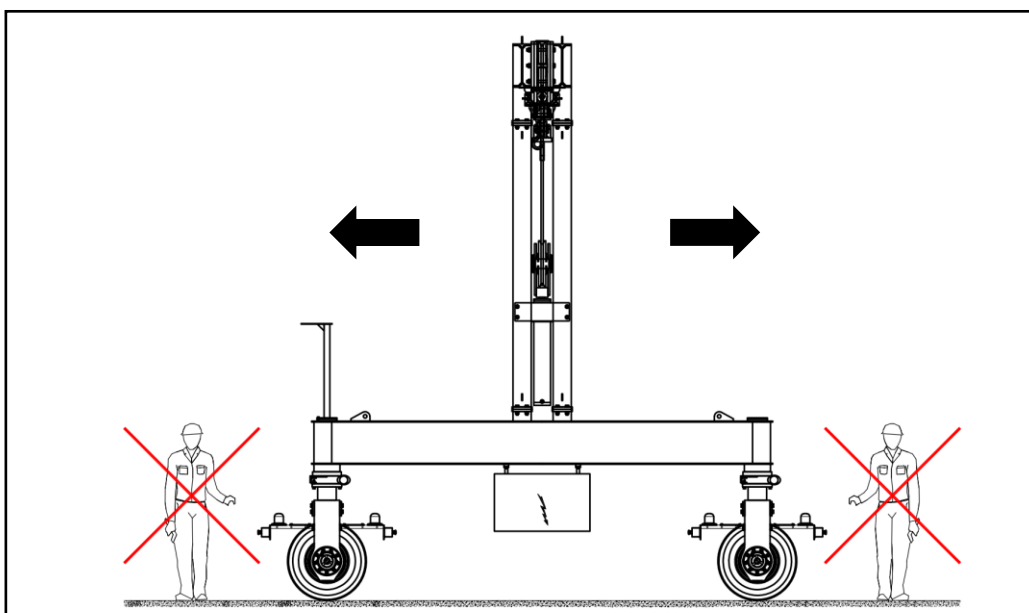
WARNING: It is prohibited to enter the areas mentioned above with the machine in operation.



WARNING: CRUSHING DANGER.



Pic.5-3



Pic.5-4

5.5. Risks and danger

5.5.1 Residual risks

A residual risk is given by the movement of the pulleys when turning, by the ropes inside the system, by the slings when being “tensioned” in the contact areas with the load and between hook and sling in the event the operator during functioning involuntarily clutches onto them.



WARNING: The movement of the pulleys, the ropes and the slings can haul the operator and provoke impact against parts of the machine.

5.5.2 Danger and avoidable risks that may occur during assembly operations

DANGER CAUSE	RISKS	MEASURES THAT MUST BE ADOPTED
Unloading parts of the machine	Interference with persons, equipment, plant and/or fixed structures.	Always use the P.P.E., helmet head protection. During unloading and loading of parts of the machine the drivers must from the conducting cabin for the whole of the duration of the work
Truck-cranes and forklifts	Interference with persons, equipment, plant and/or fixed structures. Fall of the load and relative consequences: Overturning of the crane and/or the forklifts a relative consequences: Run over, bruising or crushing of persons, things, equipment, structures during the lifting and assembling operations	To use only lifting equipment which has been approved and suitable plant for the harness. Mark off the area of work and access to unauthorized personnel. Provide appropriate signs.
Suspended loads	Interference with persons, equipment, plant and/or fixed structures.	No waiting in the vicinity of operations with loads in suspense. Wait and pass outside of the operations by the crane. Provide suitable signs and close off of the area
Work in hand	Persons falling; material falling, collapse and breakdown, falling of particles and tools	The work in hand will be carried out a platform or scaffolding developable for the lifting of persons. The personnel on the basket will adapt to the latter by belt safety
Assembly	Abrasions, cuts, bruises to hands, fall of material from the air, run over, crushing of persons due to presence of lifted loads and equipment in motion	Use the P.P.E (helmet, gloves, shoes with protection sole and point in steel). Keep working area orderly and clear of superfluous material
Tightening of the screws	Loss the grip of the keys, sliding of the same, their fall with risk of bruising and crushing of persons; damage to muscle or to joints (arm, shoulders, wrists)	Use the P.P.E (helmet, gloves, shoes with protection sole and point in steel).

DANGER CAUSE	RISKS	MEASURES THAT MUST BE ADOPTED
Collapse of parts of the structure during assembly phase when this is not yet able to support itself and is not yet altogether solid	Run over, bruising or crushing of persons (, things, equipment, structures)	In the event of bracing being necessary to provide an optimum dimension taking into consideration all the variables reasonably procured. See to a seal off of the working area and appropriate safety signs.
Use of truck-crane for the lifting of material; truck-crane, mobile cranes, ropes and service harness, hook and chains	Fall down of the load during its lifting; run over, bruising or crushing of persons (or of things, equipment or structures) during the lifting operations and put in force of work	During the lifting phases, prohibit approach, waiting and the transit of persons not authorised on the works; if necessary display suitable barriers and adequate signs; use the appropriate protection device; prior to commencing the works organise the working areas and arrange for the orderly layout of the materials in order to enable their safe movement and manoeuvres; Guarantee the maximum visibility of the amp of action of the operator of the truck-crane, in the event this is not feasible, provide authorized persons for ground signalling. It is useful in some cases to also use, preferably, closed circuit distance methods of communication; Always assure the effective weight of the indications of the constructor
Lifting	Load falling during the lifting	If for whatever reason the work that is being done has to be stopped, the load, the tools and the job area must be left in a safe state; if in the job area there is more than one crane, before starting to work, it is necessary to arrange a meeting in order to coordinate the various operations; the driver must be well trained on the specific risks and on the ways the machine must be driven; during the operative phase the driver must: ensure the ground solidity and stability; never exceed the maximum load given by the machine supplier; ensure that the job area is free; carry out the lifting avoiding abrupt and/or unexpected moves; avoid to have the load swung; never move sideways the beams with the spreader.

5.5.3 Dangers and non-removable risks that may occur when the machine is operating



WARNING: If the machine is not used correctly, the following dangers and unavoidable risks may occur:

DANGER CAUSE	RISKS	MEASURES THAT MUST BE ADOPTED
Motors and exhaust pipes	Burn and temperature from hot elements contact	The motors are closed into protections to work inside of which the operator must wear mechanical gloves and protective clothes.
Displacement group	Collisions and crushing	When the machine is moving, the operator will be warned by acoustic and visual alarms in order to be able to operate at safety distance. In case of dangerous approach of the machine, the operator can stop it pushing the emergency bottom placed in the nearest wheels group.
People presence in the load area	Material falling from above	It is forbidden to stay near or under the load hung; before starting the operation, it is necessary to check the chains, the ropes and the slings' perfect efficiency; sling the load properly and ensure about the real weight of the load that has to be lifted.
Machine doing displacement; working on the swung load.	Collisions with moving elements	It is forbidden to approach to the machine on work unless it is strictly necessary; in this case the driver must be warned and must stop the machine; it is forbidden to work on the swung load; it is necessary to keep the cabin glass clean in order to have always a good vision of the load and the route that needs to be done; before slinging the load it is necessary to put the load perpendicular to the spreader anchorage point; before the lifting operation the chain must be perpendicular to the load.
People on the spreader	People falling from the spreader	It is forbidden to carry or lift people on the spreader.
Improper sling: the maximum lifting capacity has been exceeded	Fall of the load	It is necessary to sling properly following the rules of the good sling; to lift the load it is necessary to use suitable and approved devices; during the lifting and deposit operation it is necessary to verify that the load is in a stable position in order to avoid accidents due to its fall; it is forbidden to knock against any fixed load; it is forbidden to exceed the maximum lifting capacity.
Material on the load	Fall of material put on the load	It is forbidden to put unfixed loads on the main load.

DANGER CAUSE	RISKS	MEASURES THAT MUST BE ADOPTED
Negligence from the crane driver	Crushing risk due to the load fall	When the load has to be put down, it is necessary to verify that there are no operators under the load itself; it is forbidden to leave swung loads without observation; it is forbidden to stay under the load; it is forbidden to pass with the swung load above people.

5.5.4 Risks of general type and due to dangerous combinations

The machine is constructed from complex parts, whose functioning can be managed from the cabin by an operator. They can command the starting, synchronisms, regulations etc., of the machine of the entire structure. Therefore, dangers could encountered, for example, on starting and stopping unexpected.

5.6. Safety warning signs

5.6.1 Safety warning signs in the work yard





To inform all staff working on the plant of the required conduct and of the residual risks present regarding the machine, proper safety signs are applied in the workplace and on the machine as required by directive 92/58/EEC.















The evaluation of additional risk to safety and health carried out in the workplace and on any other equipment used, allow the EMPLOYER to assess the need for further warning signs in addition to those defined by CIMOLAI TECHNOLOGY SpA.










5.6.2 Safety sign list and description




CIMOLAI TECHNOLOGY Spa, upon assessment of residual risk zones on the machine and identified rules of conduct that shall be disclosed to all staff involved, plans for the application of warning signs (Compulsory, Prohibition and Danger) listed in the tables that follow.

COMPULSORY WARNING SIGN		
Ref.	PICTOGRAM	DESCRIPTION
A		Wear protective footwear.
B		Compulsory use of safety helmet.
C		Compulsory use of safety glasses.
D		Compulsory use of work gloves.

COMPULSORY WARNING SIGN		
Ref.	PICTOGRAM	DESCRIPTION
E		See the use and maintenance manual.
F		Padlock - (lock the Breaker in position "O").
G		Use safety straps and/or harnesses.

PROHIBITION / DANGER SIGNS		
Ref.	PICTOGRAM	DESCRIPTION
1		Warning! Moving parts. No lubrication or cleaning when moving.
2		Do not remove the protection and safety devices.
3		Access denied to unauthorized personnel.
4		Warning! Risk of crushing hands.
5		Warning! Risk of crushing.
6		Warning! Risk of tripping.
7		Warning! Risk of falling.
8		Warning! Pressurized oil.
9		Warning! General danger.

PROHIBITION / DANGER SIGNS		
Ref.	PICTOGRAM	DESCRIPTION
10		Warning! Cable reel maintenance.
11		Warning! Pressurized air.
12		Warning! Risk of side crushing.
13		Warning! Moving parts.
14		Warning! Danger - High voltage.
15		Warning! This machine is remote controlled, the operator is unable see you.
16		Warning! Internal spinning gears risk crushing and cutting your hands.
17		Warning! Risk of contact with scalding surfaces.
18		Warning! Risk of crushing feet.

PROHIBITION / DANGER SIGNS		
Ref.	PICTOGRAM	DESCRIPTION
19		Warning! Do not extinguish fires with water.
20		Do not climb and climb down from scaffold
21		Do not pass and stand under the crane

5.6.3 Layout of safety labels applied to the machine

The safety signs and labels listed in the tables above are applied to the machine during installation.

Labels and the area of application shall nevertheless remain valid for all models of CIMOLAI TECHNOLOGY SpA machines.

A suitable safety signs must be applied, by the customer, even on the outside walls of the building in which the machine is installed.



WARNING: all safety signs on the machine and on the applied external protection must be kept clean and in good condition. The customer is responsible for providing timely replacement if for any reason these are damaged, lost or unreadable.

5.7. Protection devices



WARNING: in order to safeguard their own and safety and that of others, all staff in the vicinity of the machine and/or within the confines of the system in which the machine is installed **MUST** always maintain appropriate behaviour and coherent to the task re- requested, comply with the behavioural provisions issued by the employer and properly use all safety devices (personal or specific to the machine).

The following sections illustrate the various devices intended to safeguard the safety of the operator when using the machine.

5.7.1 Personal protection equipment (P.P.E.)

The proper use of appropriate personal protective equipment is always an effective solution aimed at containing the various potential risks, preventing this may result in damage to your health. To be effective in their purpose of protection devices must:

- be worn correctly;
- be used and stored with care.

It is also a duty of the user to report to the employer any deficiencies or damage of the protective equipment assigned. It is possible that the personal protective equipment, despite being built in an ergonomic design, may create minor inconveniences or be poorly tolerated by the user; these annoyances, generally only initial are not comparable to any incident or damage to health that may result from their lack of use.

With reference to Figure 5-5, the recommended personal protective equipment when working near the machine is as follows:

1. Protective footwear;
2. Safety helmet;
3. Hearing protectors [plugs or headphones in environments with sound pressure level detected is above 85 dB (A)];
4. Safety glasses;
5. Proper apparel;
6. Respiratory mask;
7. Safety gloves.



Pic.5-5



WARNING: these must be selected in relation to the work environment and material handled.

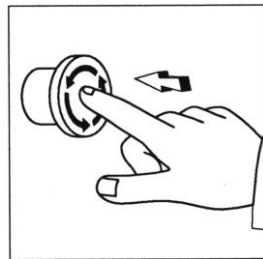


WARNING: As the characteristics of the operator's area of work are not known with accuracy, please consult the Safety Manager of the plant where the machine is installed and operating for selecting the type of personal protective equipment most suitable in relation to effective risk.

5.7.2 Operator protection devices

The machine is provided with special safety electromechanically devices to protect the operator.

- Emergency buttons: the machine is equipped with emergency mushroom buttons on electrical board, on the control panel and on the wheels in positions easily accessed by the operators. The emergency button must be pressed when there are situations of danger for the operators and/or plant. When pressed, it immediately shuts down all drives of the machine by cutting power to the command circuits (auxiliary circuits). The machine is placed in a state of emergency and the button remains in position until it is manually pressed and reset.

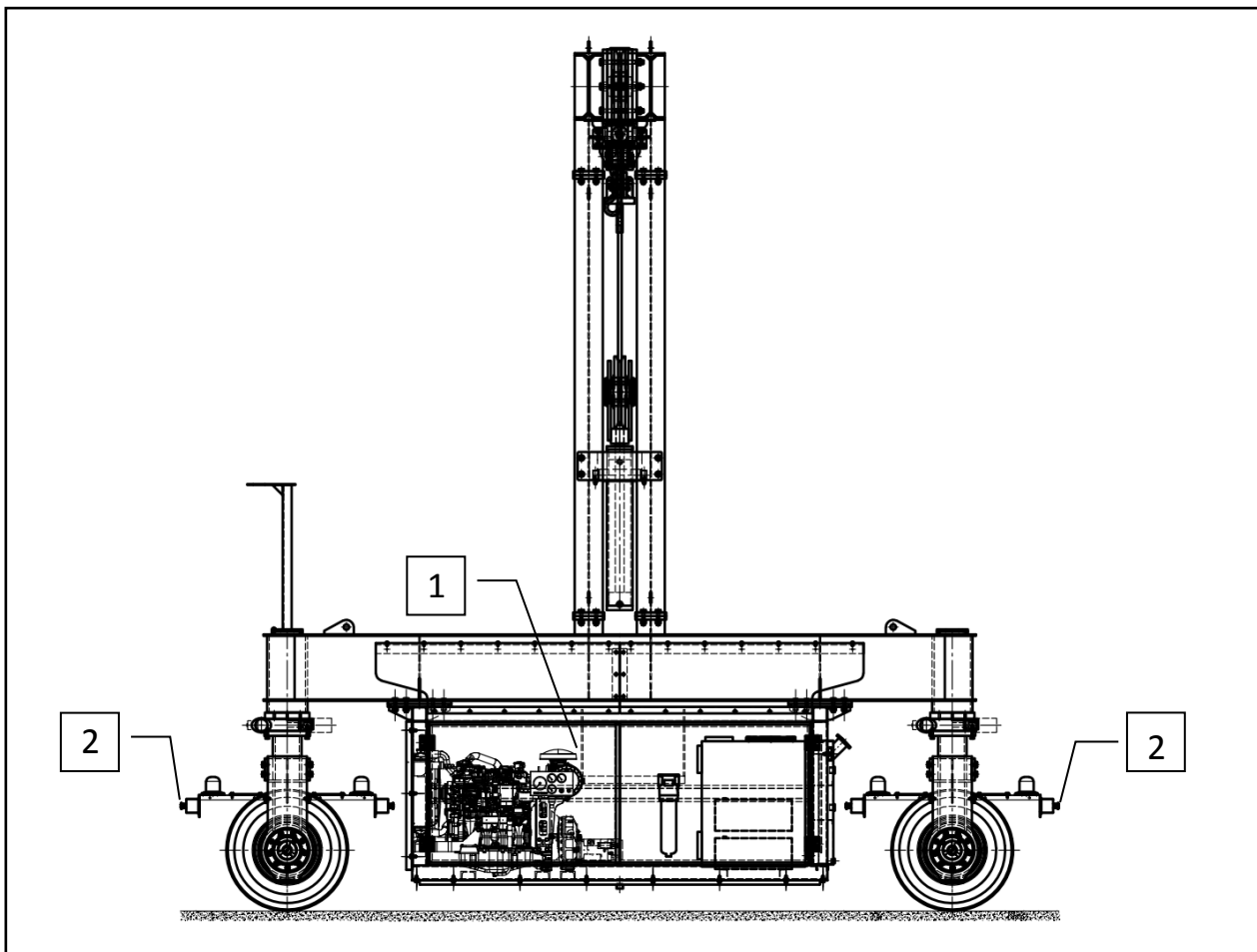


- Warning lights and acoustic siren: the plant is equipped with warning lights and acoustic sirens that emit light signals and sound alerts with each start-up before the machine actually engages movement. The light and acoustics alerts warn all staff in the vicinity of the imminent start-up, giving the time needed to move away from any dangerous areas. The audio alert issued prior to the start of each cycle is controlled automatically by the system and is repeated several times with the following sequence: siren activated for 2 seconds, siren pause of 0.5 seconds.
- Protection against electrocution: all electrical parts are made and designed in such a way as to avoid any danger from electrocution. The minimum protection rating of junction boxes and electrical devices installed on the machine is IP55.
All electrical equipment on the machine is breaker line of the electrical panel in accordance with EN 60204-1.
- Local commands for drive maintenance: various electric drives, that control motion, are intercepted by a system disconnected which cuts power.
The disconnect switch, if provided, shall be used for engine maintenance and operations that require opening fixed and mobile guards. The disconnecter is connected in series to the batteries.

5.7.3 Devices for the safety and reliability of the machine

To guarantee the security and the reliability of the machine, it is supplied with mechanical and electrical devices in various points and with precise functions (Pic.5-6).

- Nr. 2 Pressure switches on lifting (1), applied to the lifting circuit.
- Nr. 10 Emergency push-button (2), applied to:
 - Nr. 8 on the wheels
 - Nr. 1 on electrical board
 - Nr. 1 on radio remote control



Pic.5-6

5.8. Displacement and steering of the machine

The machine travels thanks to two motorized groups of wheels placed one in front of the machine on the left side and one behind on the right side. The travelling system is provided with a blocking system defined as parking brake. This kind of brake is installed between the hydraulic motor and the reduction gear is disconnected from the operator by means of selector on the radio remote control. To disconnect the brake, it is necessary to switch the selector “BRAKE” on “OFF”.

It is then possible to displace the machine moving the joystick, the machine can be moved forwards or backwards by moving the joystick towards the labels which indicates the direction of the displacement (BACKWARD/FORWARD TRAVELLING);

The control is proportional, so the operator can regulate the speed of the machine by operating on the joystick, either pushing more to have a higher speed or less to have a lower speed.

To have a smooth displacement, it is advisable to operate on the joystick smoothly in order to avoid sudden speed changes.

The displacement speed depends also on the motor’s revolutions, which can be regulated with the selector “GAS +/- “.

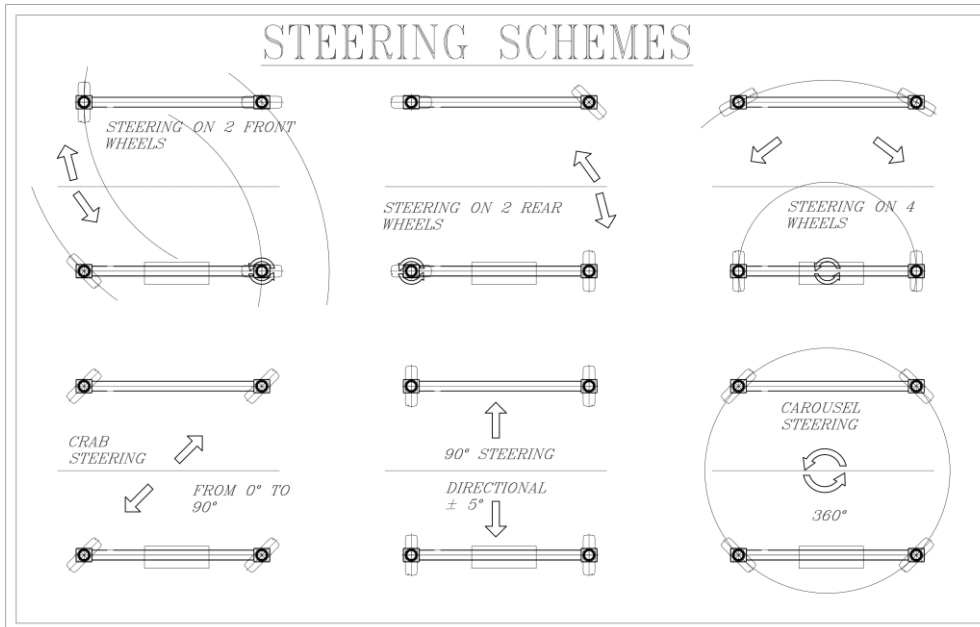


Pic.5-7



5.8.1 Steering system

The wheels group can steer in addition of being motorized. Each wheel group is controlled by a slew drive.



Pic.5-8

To steer with the machine, it is necessary to move the dedicated joysticks; the machine can be steered leftwards or rightwards by moving the dedicated joysticks towards the labels, which indicates the direction of the displacement (LEFT/RIGHT STEERING).



Pic.5-9

The machine can perform six different steering combinations. It is possible to select one of them from the selector with six positions which are placed on radio remote control. To complete a steering or to change a steering cycle it is necessary to put every time the wheels in position 0° (wheels in line).

The positioning to 0° phase is divided into two operations:

- Manual
- Automatic

The manual operation is the first that must be performed. The operator must turn the steering joystick until the wheels reach the position 0° ± 5°.

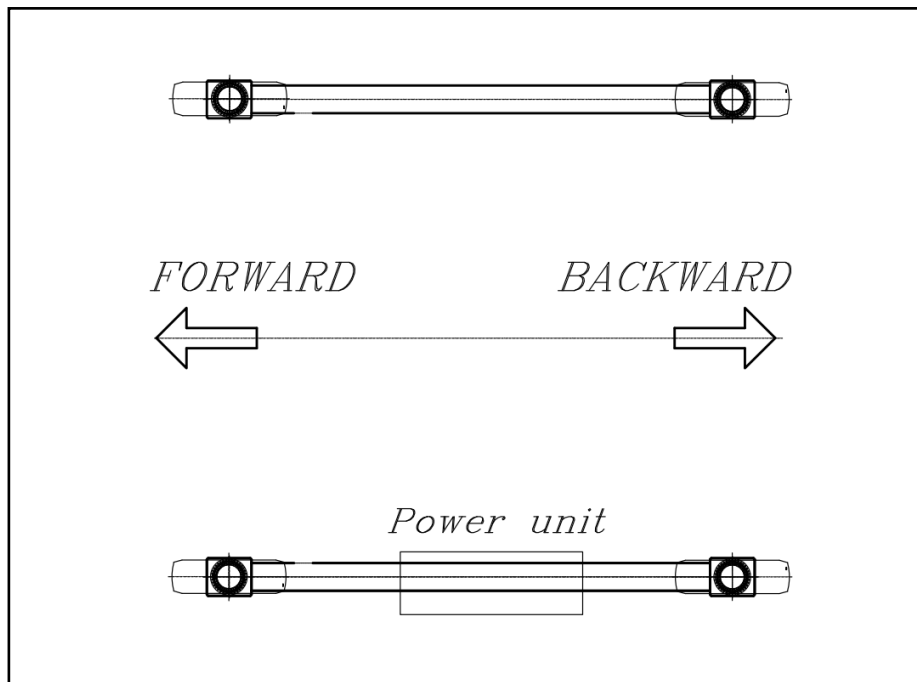
In the automatic or software operation, the operator has to select the needed steering and push the bottom "STAR STEERING CYCLE". This operation is really important because it lets the wheels reach the right position 0° and enable the selected cycle according to the inner algorithm.



Pic.5-10



Wheels at 0° position or in line:

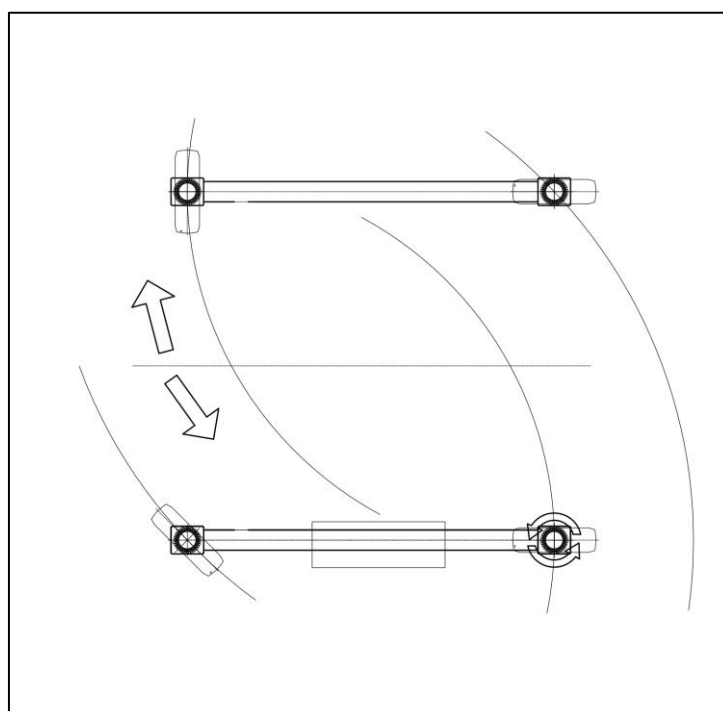


Pic.5-11

To select a steering, it is necessary to let the selector reach the needed position and move the left joystick. The operator will be able to steer the machine to the left moving the selector forwards or to the right moving the selector backwards.

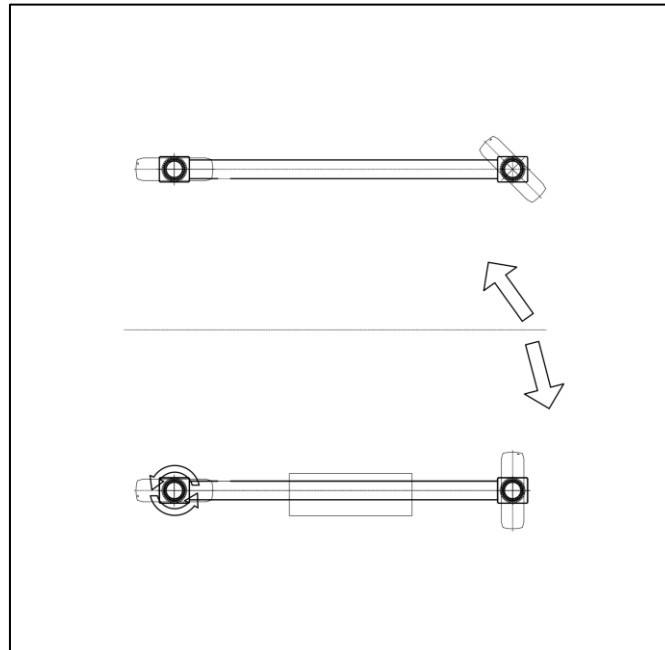
5.8.2 Steering type

1. "NORMAL FRONT"



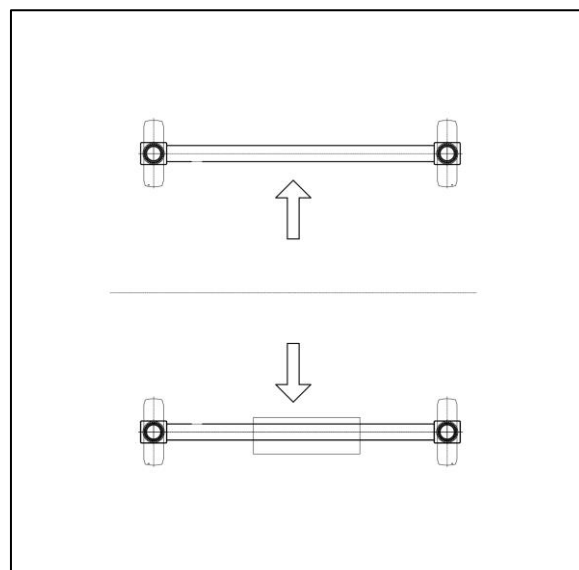
Pic.5-12

2. “NORMAL REAR”



Pic.5-13

3. “90°”



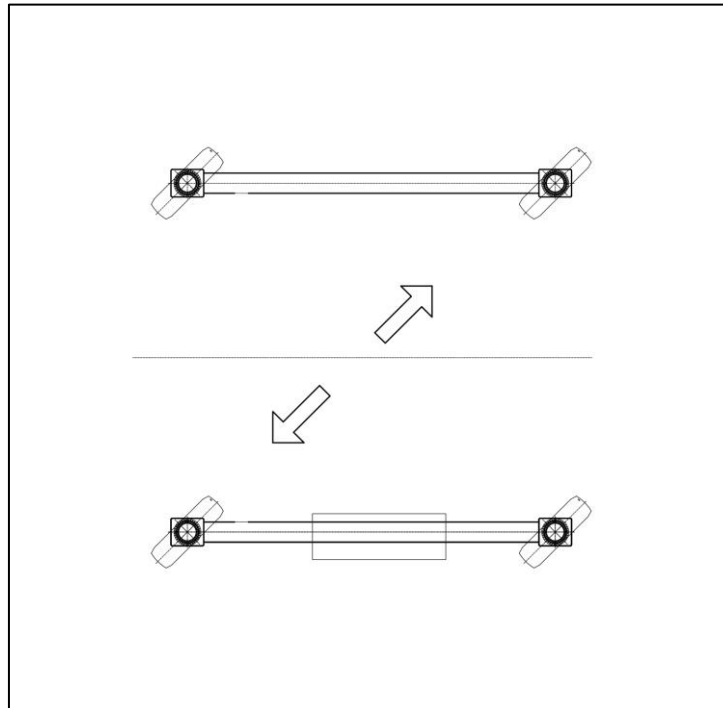
Pic.5-14

It is possible to steer with the directional wheels $\pm 5^\circ$ when the “90°” position is reached. The directional wheels are automatically set when the operator starts the positioning operation: steering leftward the directional wheels will be the wheels on the left side, steering rightward the directional wheels will be the wheels on the right side. When the machine uses a 90° steering and the operator needs to have the machine displacing towards the other side (for example the operator is steering 90° to the right but needs to steer 90° to the left) it is necessary to do the following operations

- select the “CRAB” cycle;
- steer the machine until the wheels reach the 0° position;
- select the 90° cycle and steer towards the needed direction.

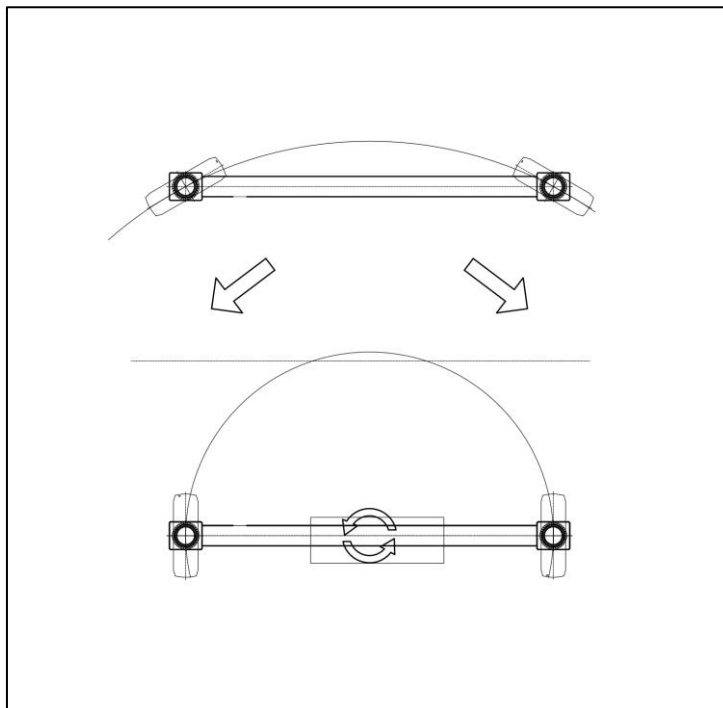
It is necessary to follow these instructions also when the operator has to steer with other cycles.

4. "CRAB"



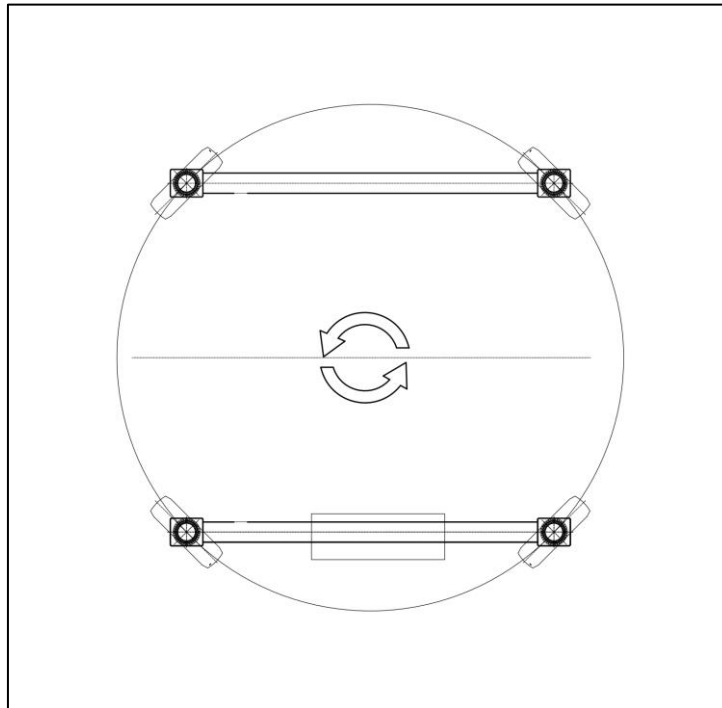
Pic.5-15

5. "ROTATIVE"



Pic.5-16

6. "CARRUSEL"



Pic.5-17

When "CARRUSEL" has been selected, the positioning automatic movement of the wheels starts because of the joystick which controls the steering.

During the positioning phase, the operator must operate on the joystick doing short and slow displacements forwards and backwards (about 150 mm).

To change cycle the operator has to select "ROTATIVE" cycle and moving the machine forward/backward steer till to reach the 0° position, when the right position is reached the operator can select the desired cycle.

5.9. Lifting and descent movements

The radio remote control is provided with two joysticks for commanding the lifting movements, the operator can choose the cylindric to move.

The control is proportional, so the operator can regulate the speed of the machine by operating on the joystick, either pushing more to have a higher speed or less to have a lower speed.

To have a smooth displacement, it is advisable to operate on the joystick smoothly in order to avoid sudden speed changes.

The displacement speed depends also on the motor's revolutions, which can be regulated with the selector "GAS +/-".



Pic.5-18



WARNING: During the normal movements (up/down), the two cylinders must move together so as to maintain the spreader in the levelling configuration, Operate on the two joysticks at the same time and with the same inclination.

When the load has been lifted, we suggest bringing the spreader in support to the upper beams in order to avoid the load oscillations during the travelling of the machine. To bring the spreader in support of the upper beams it is necessary to:

- Lift the spreader until the cylinders maximum lift positions are reached;
- Press the "BY-PASS UP" button on the radio remote control.

Keeping the "BY-PASS UP" button pressed, lift slowly the spreader until it is brought in support to the upper beams

5.9.1. Weighing system

The machine is provided with a weighting system which stops the lifting movements of a cylinder if it is overloaded.

In case of overload, the operator must:

- put the load on the ground or on suitable supports (or let a side of the spreader descend and let the other side lift if the spreader is not flat and the load weight is tilted on a side of the spreader only);
- check that the load does not exceed the machine maximum capacity;
- verify that the weight is well distributed in each lifting point, if the load is included in the capacity.

The set values already include about 5% margin in respect to the rated load, in order to allow for operating with the max load without the continuous halt caused by the load's oscillation. Any alarm has been set with a delay filter open at 2 sec.

5.9.2 Variations of cubic capacity

To speed up the lifting operations, the remote control is provided on the right with a selector which allows to increase the cylinder speed (variation of cubic capacity) if it is enabled. During the configuration "FAST", the maximum capacity will be 20 tons (total load). If the total load is exceeded, the cylinders lifting will not be stopped but the speed will return the normal one.

5.10. Operator panel

The machine is provided with an operator panel which provides the dialogue between the operator and the machine.

The display windows let the operator have a complete supervision of the machine's functioning.

The windows protected by password contain parameters recorded by Cimolai Technology's technician during the machine's assembly stage. This information can only be modified with Cimolai Technology's authorization.

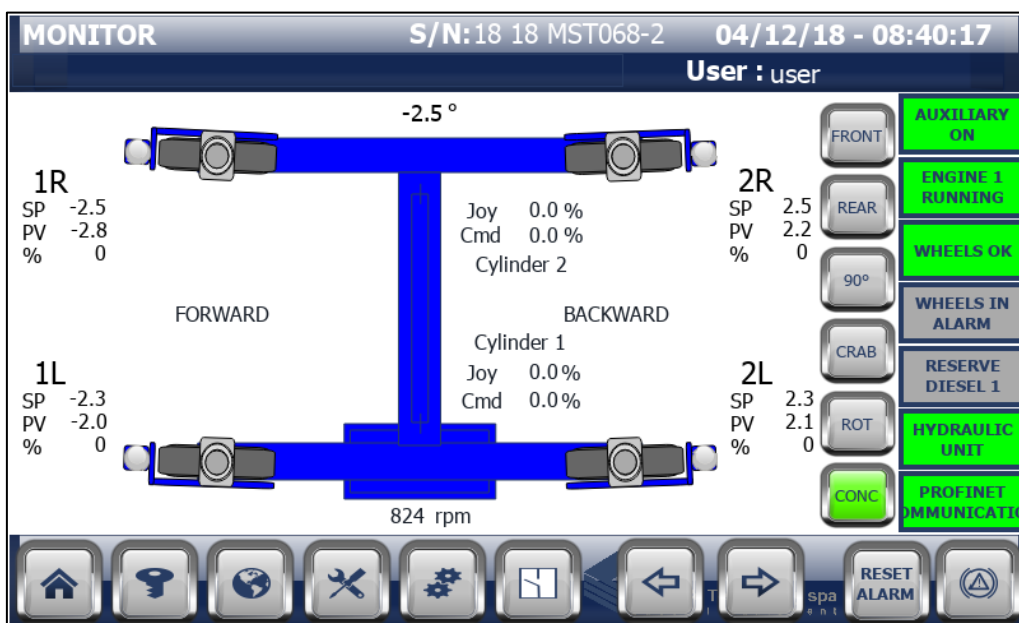
The operator panel shows the following initial page:



Pic.5-19

By touching the display, it is possible to change the window shown and gradually the main pages here below can be seen.

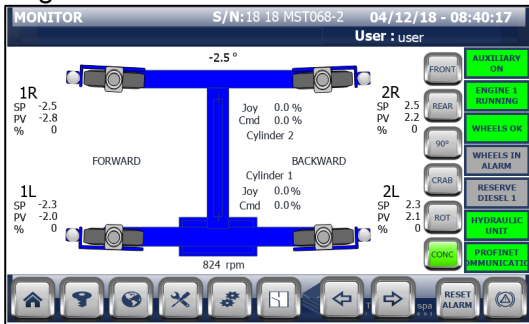
Page 1:



Pic.5-20

It is possible to move between the three main pages with the previous-page and next-page buttons in the command bar.

Page 1



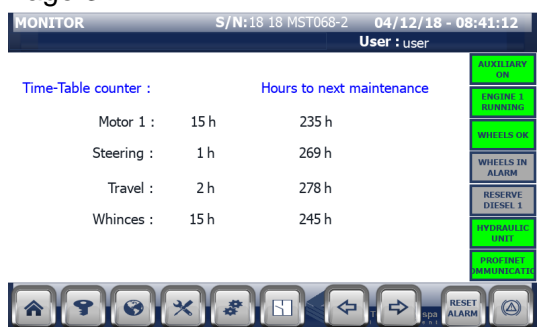
Page 2



Page 2



Page 3



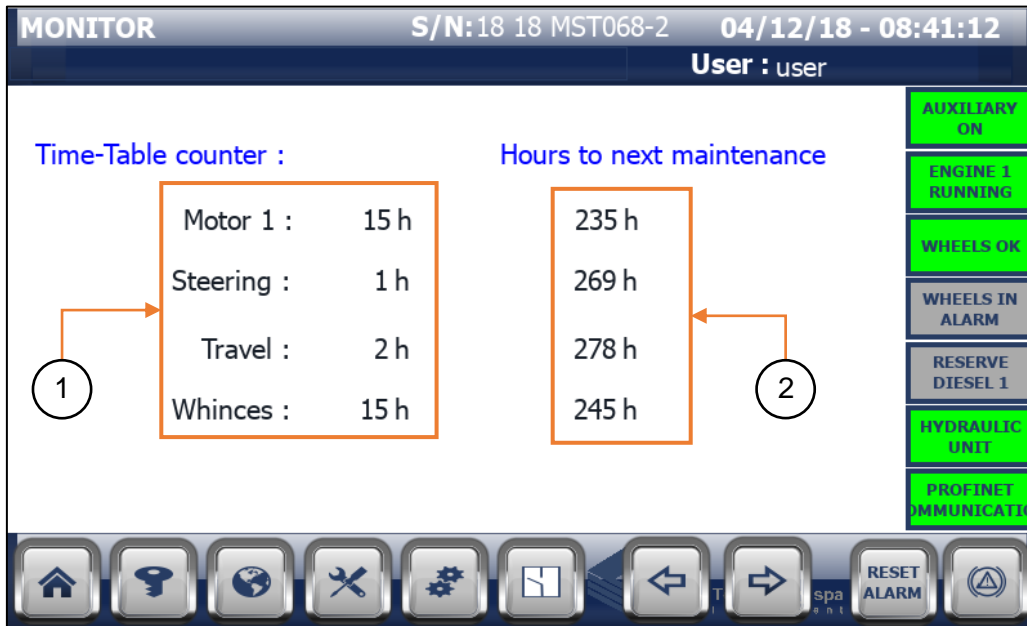
Page 2:



Pic.5-21

Green light → Operation enabled

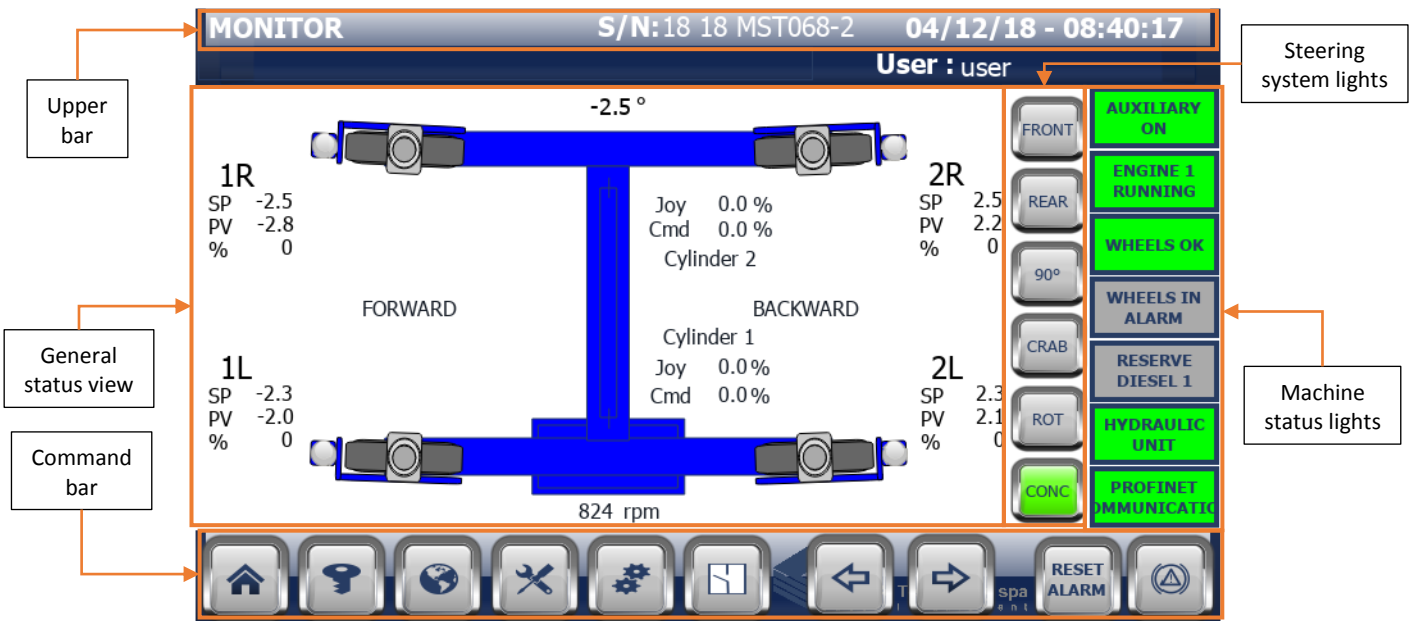
Page 3:



Pic.5-22

1. Actual working hours counter
2. Hours counter to next maintenance

5.10.1 Elements of main page



Upper bar:

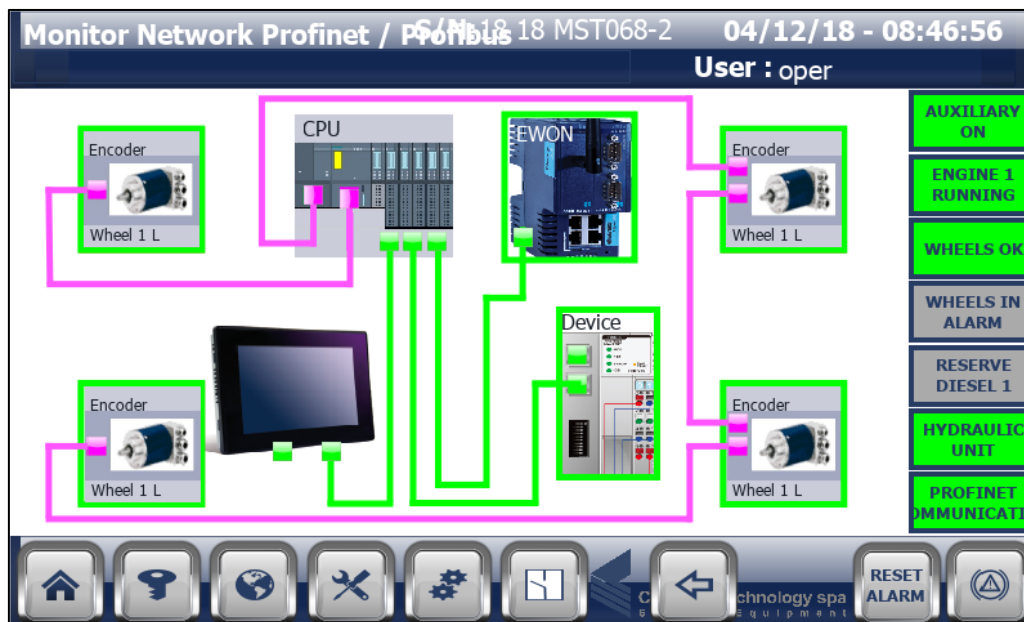
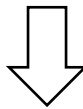
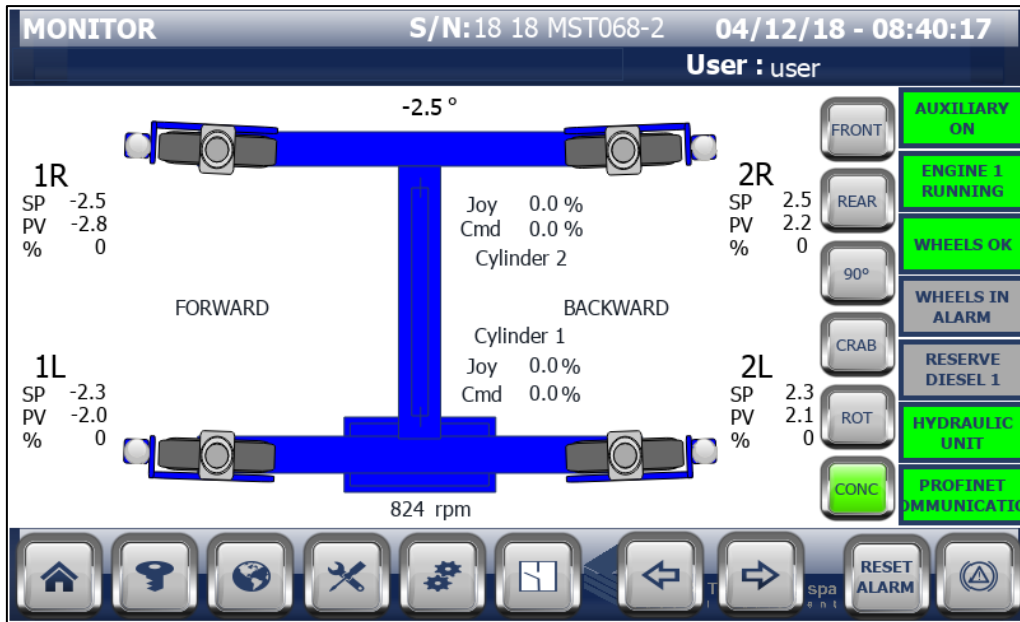


Machine status lights:

In this section of the page it is possible to see the general status of the machine in real time. The following control lights indicate:

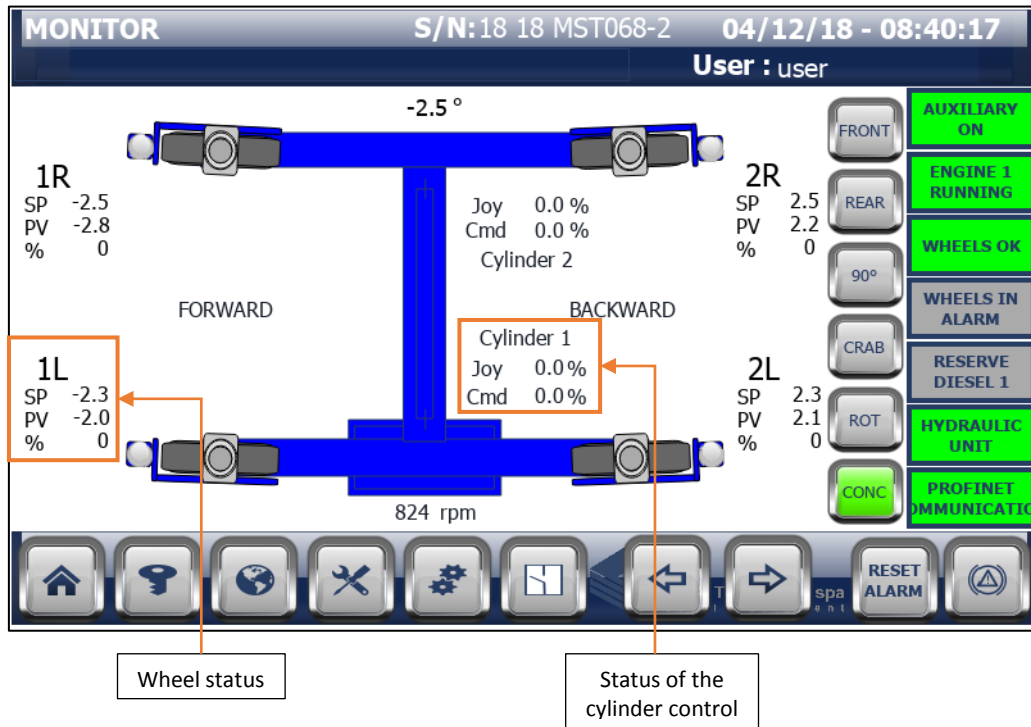
AUXILIARY ON	Gear inserted (green light on)		
ENGINE 1 RUNNING	Engine running (green light on)		
WHEELS OK	Operating wheels	green light →	wheels in automatic mode
		blue light →	wheels in manual mode
WHEELS IN ALARM	Wheels malfunction (red light on)		
RESERVE DIESEL 1	Engine in reserve (orange light on)		
HYDRAULIC UNIT	Hydraulic power unit operating (green light on)		
PROFINET COMMUNICATIO	Profinet communication operating (green light on)		

It is possible to see the specific status of the profinet network by touching the respective control light. The related page appears on the screen:











General status view:

The central picture of the main page shows the status of the lifting and travelling limit switches and the general status of the machine: wheels, winches, trolleys.



1L	Wheel name
SP -2.3	Measure to be achieved
PV -2.0	Measure in real time
% 0	Percentage of valve opening that controls the wheel
Cylinder 1	Trolley name
Joy 0.0 %	Joystick inclination
Cmd 0.0 %	Corresponding command

Command bar:

	Home: back to main page
	Login
	Language
	Maintenance for operator
	Maintenance for manufacturer
	Inputs/outputs
	Previous and next page
	Reset alarm bottom and alarm light (red light on)

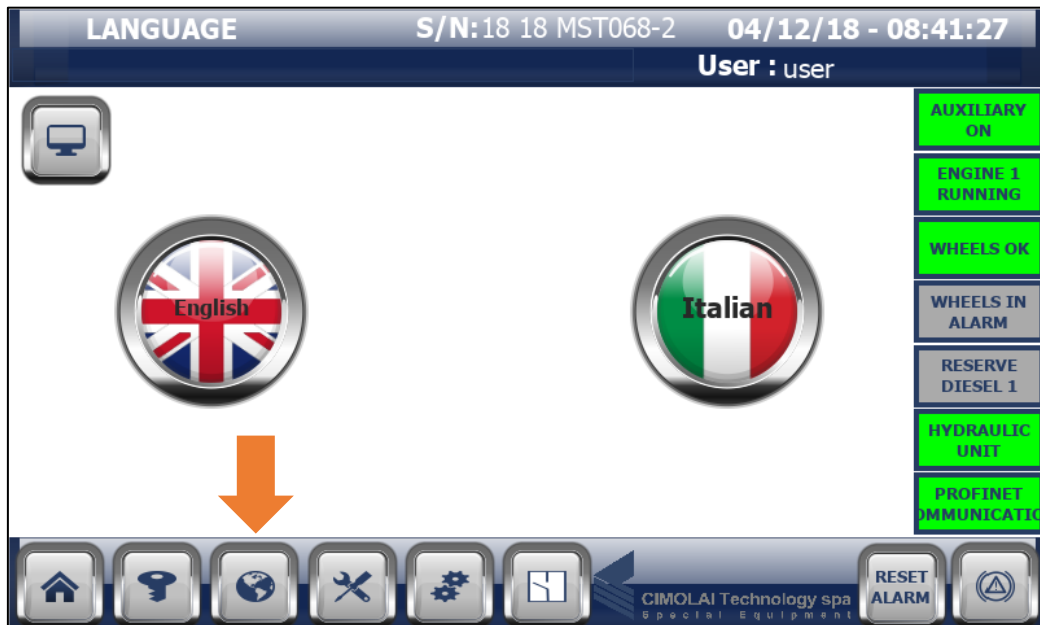
5.10.2 Login

To help the maintenance technician during ordinary/extraordinary maintenance operations or during a breakdown, pages dedicated to it have been inserted in the operator panel. These pages are accessible only after entering a "PASSWORD" and "USER ID".



Pic.5-23

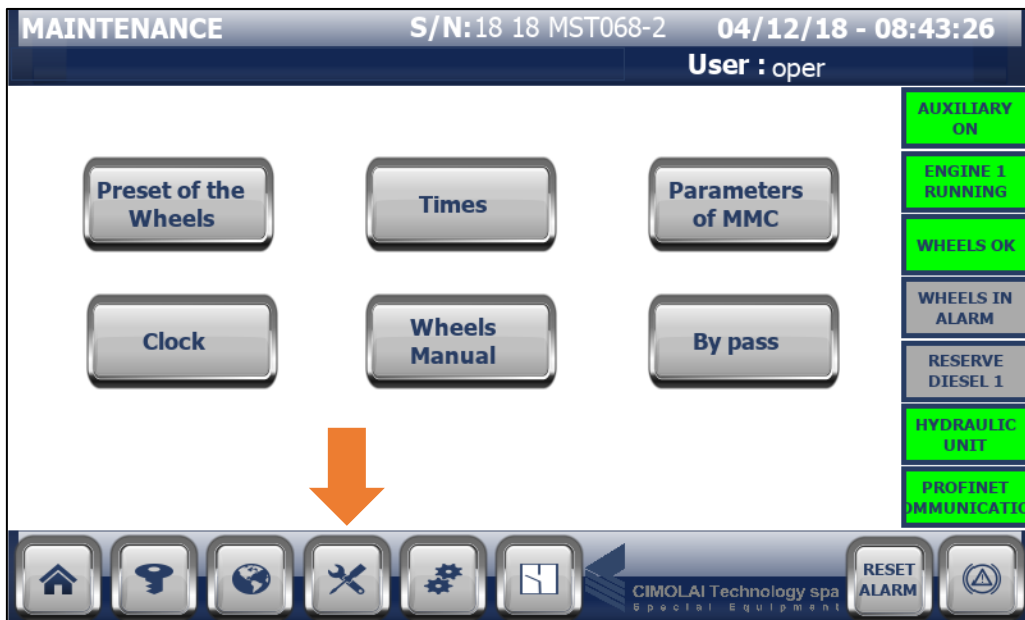
5.10.3 Language



Pic.5-24

5.10.4 Maintenance for operator

In this page the operator can access the various maintenance sections of the machine.



Pic.5-25

Preset of the wheels:

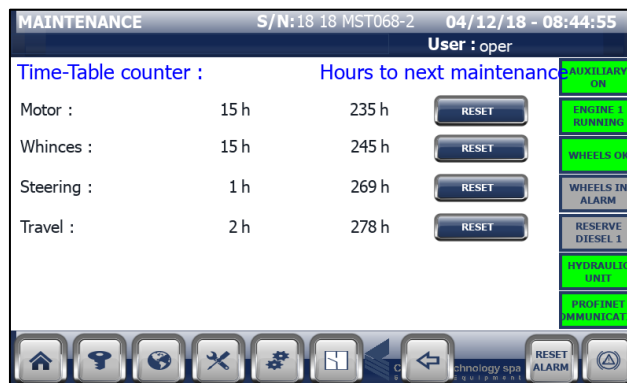
Page 1



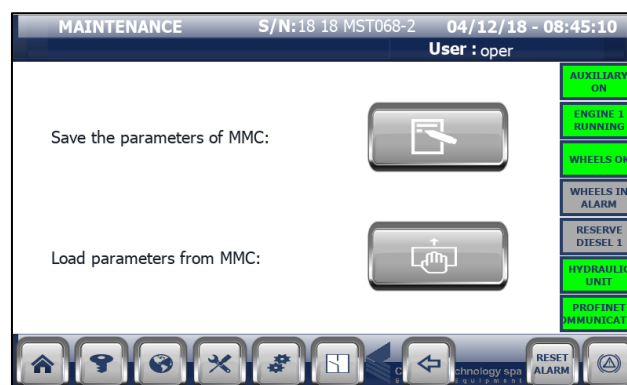
Page 2



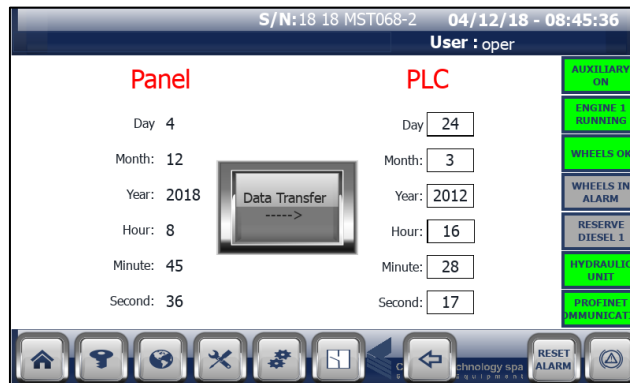
Timers:



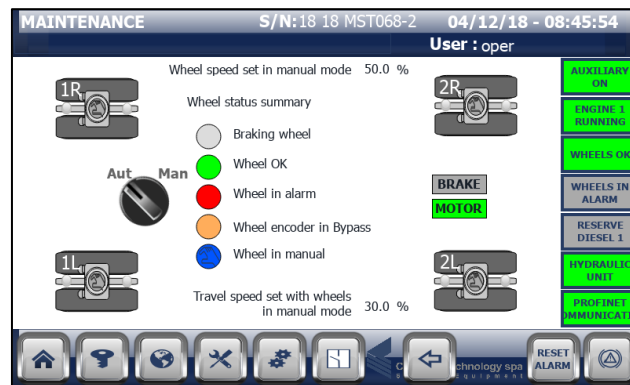
Parameters of MMC:



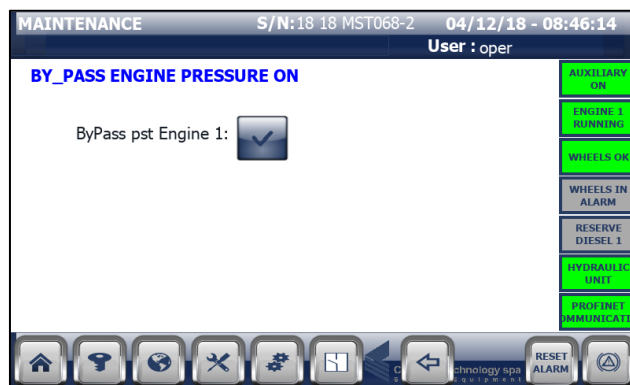
Clock:



Wheels manuals:



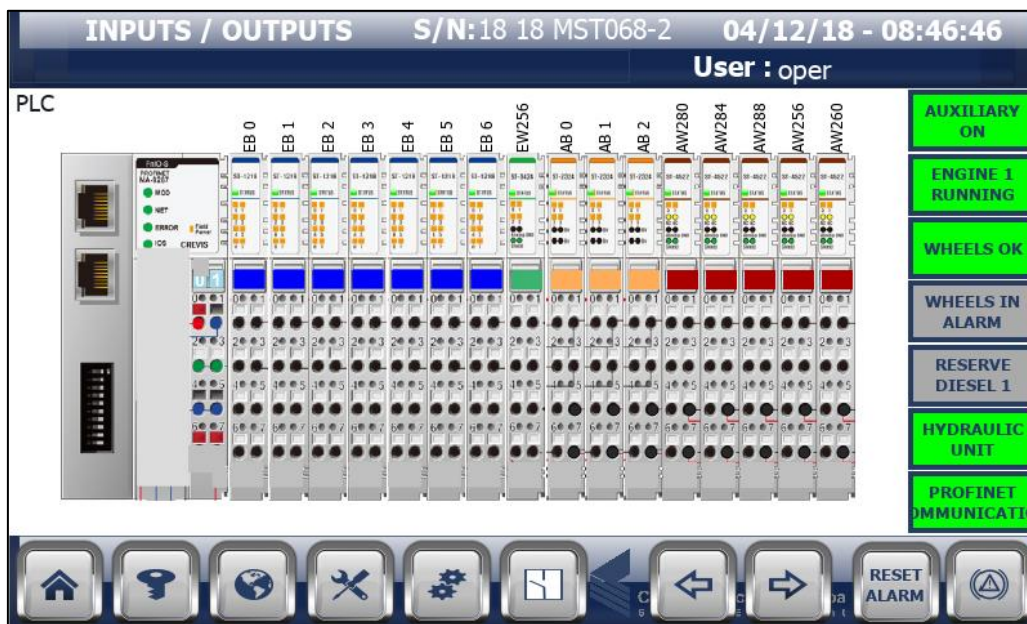
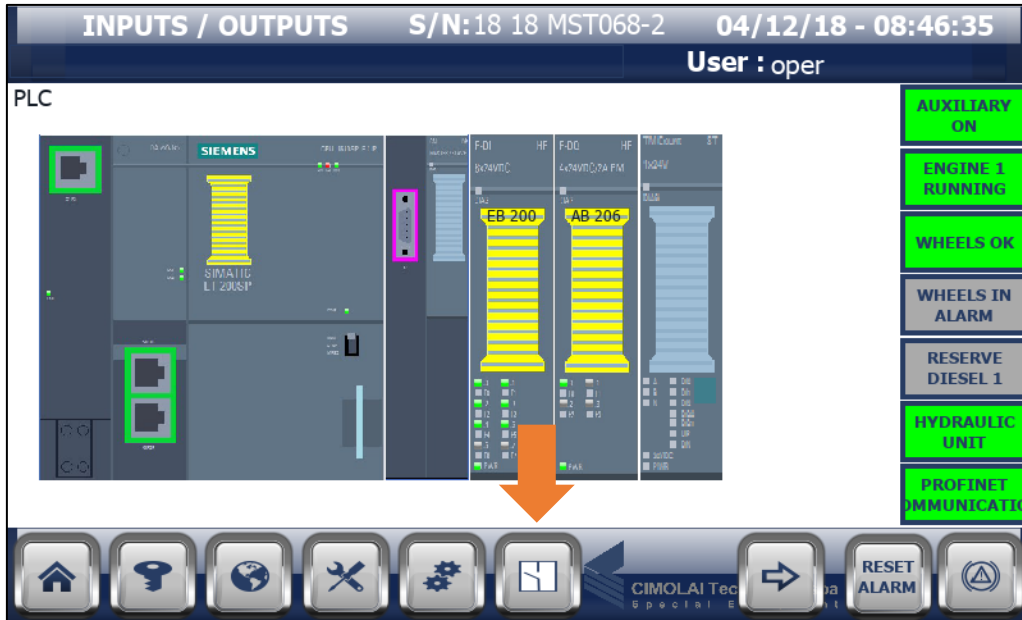
Bypass:



5.10.5 Inputs/outputs status

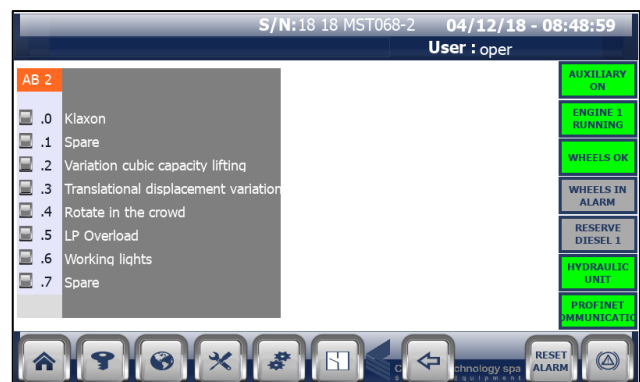
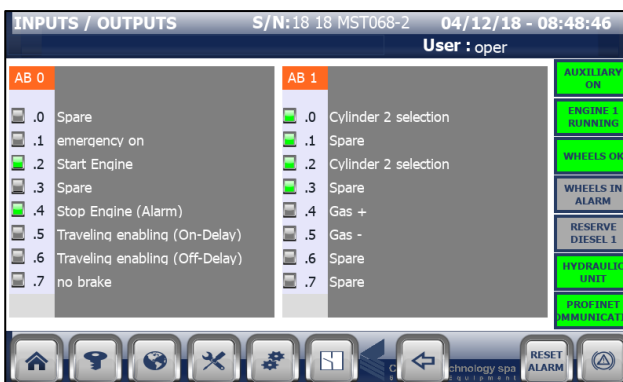
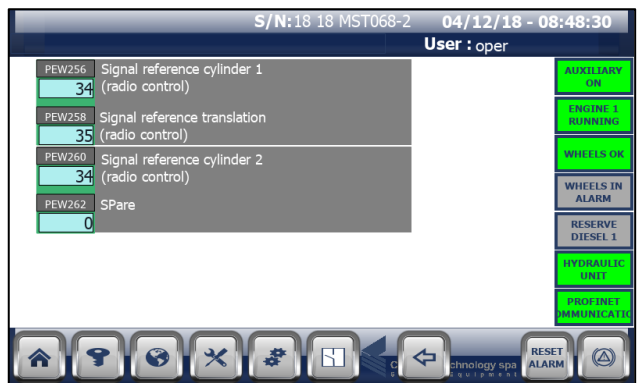
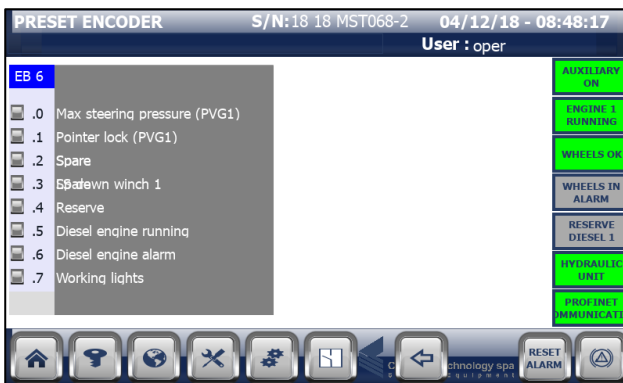
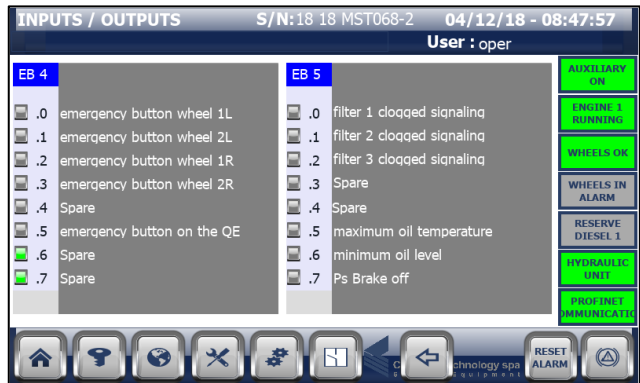
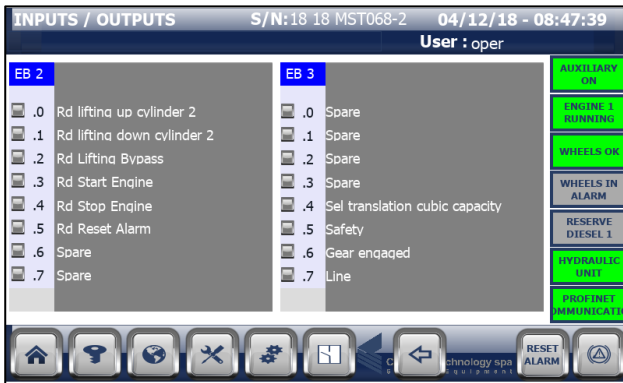
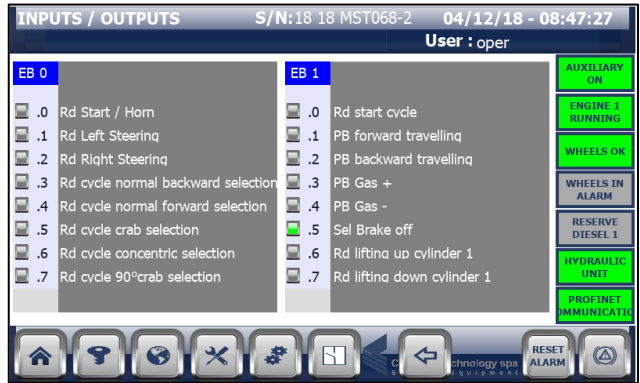
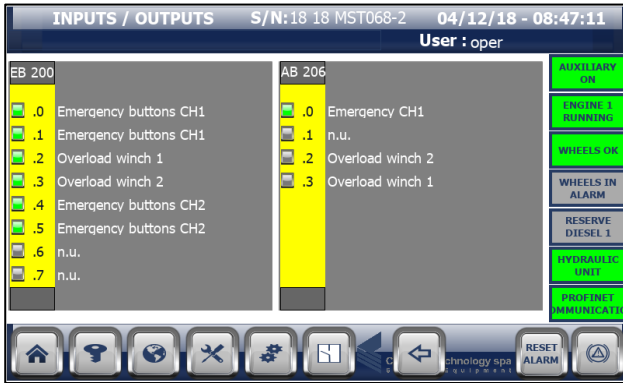
The following pictures show the status of the inputs and outputs.

The first three global screens showing the complete layout of the PLC and of the in/out devices:



The subsequent screens allow going into detail of the devices with the indication of the status of the inputs and outputs.

To switch between the main page and the details page, simply touch the device on the screen. The various screens for the electrical panels are shown below:



INPUTS / OUTPUTS S/N:18 18 MST068-2 04/12/18 - 08:49:18
User : oper

PAW280	Cylinder analog control 2	0	AUXILIARY ON
PAW282	Cylinder analog control 1	0	ENGINE 1 RUNNING
PAW284	Analog translation command	0	WHEELS OK
PAW286	Analogue signal of RPM for Radio remote control	0	WHEELS IN ALARM
PAW288	Analogue signal of travelling for Radio remote control	0	RESERVE DIESEL 1
PAW290	Spare	647	HYDRAULIC UNIT
			PROFINET COMMUNICATION

RESET ALARM

INPUTS / OUTPUTS S/N:18 18 MST068-2 04/12/18 - 08:49:31
User : oper

PAW256	Analog control steering wheel 1 Left	0	AUXILIARY ON
PAW258	Analog control steering wheel 1 Right	0	ENGINE 1 RUNNING
PAW260	Analog control steering wheel 2 Left	0	WHEELS OK
PAW262	Analog control steering wheel 2 Right	0	WHEELS IN ALARM
			RESERVE DIESEL 1
			HYDRAULIC UNIT
			PROFINET COMMUNICATION

RESET ALARM

5.10.6 Alarm pages

In this page the operator can access and view the list of active alarms on the machine (if any). It is possible to reset the alarms by pressing the bottom "RESET ALARM".

List active alarms:

Active Alarms S/N:18 18 MST068-2 04/12/18 - 08:49:49
User : oper

				AUXILIARY ON
				ENGINE 1 RUNNING
				WHEELS OK
				WHEELS IN ALARM
				RESERVE DIESEL 1
				HYDRAULIC UNIT
				PROFINET COMMUNICATION

RESET ALARM

Alarms history:

Alarm history S/N:18 18 MST068-2 04/12/18 - 08:49:59
User : oper

From : 12/04/18 - 08:44:57 To : 12/04/18 - 08:49:57 Duration : 5 Mins Refresh

				AUXILIARY ON
				ENGINE 1 RUNNING
				WHEELS OK
				WHEELS IN ALARM
				RESERVE DIESEL 1
				HYDRAULIC UNIT
				PROFINET COMMUNICATION

Backward Forward

RESET ALARM

CHAPTER 6: REGULATIONS AND SUBSTITUTIONS

6.1. General Warnings



WARNING: Before intervening on the machine it is necessary to switch off and block the electrical maintenance, position to OFF “O” the isolator of the electric panel controls. Besides, it is important that the personnel in charge are familiar with the “General Safety Guidelines” provided under chapter 1 of this manual.

The duties of regulation and substitution of machine parts described in the present chapter must be carried out by QUALIFIED personnel.

During the regulation and substitution operations to carry out the isolation of the area surrounding the machine. Do not permit persons unfamiliar with the works to approach the machine.

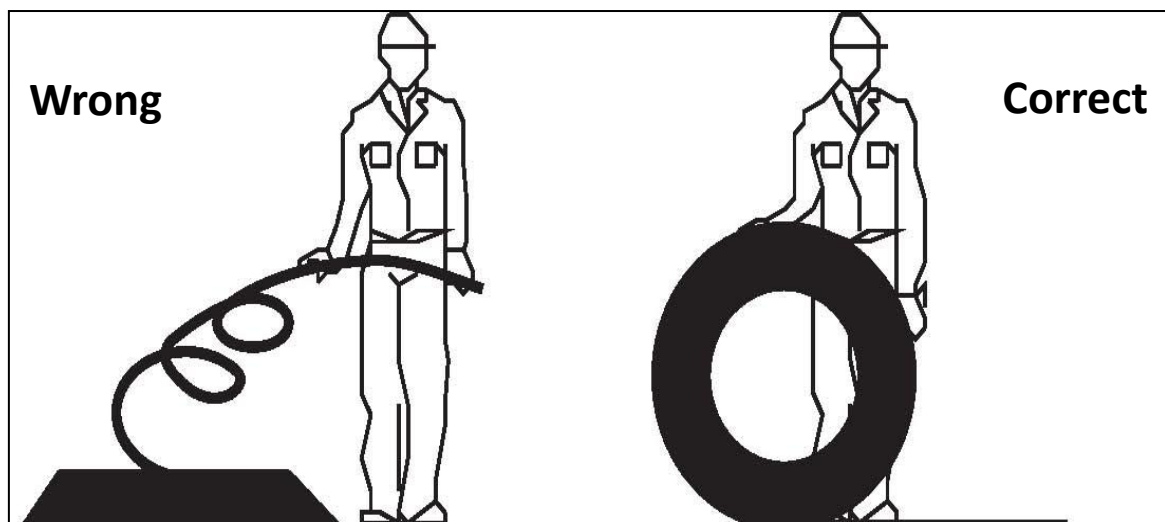
Any modification or substitution of the machine parts, not authorized by the constructor, and the use of non-original replacement parts, in addition to voiding the guarantee, can compromise the correct operation of the machine and represent a potential risk for accident and relieve the constructor from penal and civil responsibilities.

6.2. Substitution of the ropes

6.2.1 Development and put in force of new ropes (Pic.6-1)

The rope is manufactured by the fabricator wrapped round a coil or in a roll advisably supported, in accordance with the diameter and length of the rope or the requirements of the Client. If the rope is wound round a coil, in its opening there will be passed through a bar of suitable diameter and length and the ends of the bar will rest on two frames; after which the head of the rope will be pulled, unwinding it, making sure that the rope does not become loose on the coil. If the rope is made in a roll, it will be placed on a reel and then it will be unwound pulling it by the external head, in order that the roll turns around on its axis.

If the roll is of small dimensions, we can proceed to the unwinding keeping firmly on the ground the external head of the rope and unwinding it by turning the roll kept vertically on the ground.



Pic.6-1

6.2.2 Substitution of the ropes

Before the assembling of a new rope it is necessary ascertaining that the rims of the pulleys and of the drum have not been worn out and deformed by the passage of the old rope. In this case it is necessary to re-pass the rims re-establishing the correct profile.

Furthermore, it is very important to verify that the pulleys turn freely without excessive clearance and, if the case, substitute the bearings and the bushing.

In the event of winding on the drum (fluted and not) and when the rope is wound on more layers overlapping, the overcoil of the condition must be well tightened, keeping the rope at a minimum tension during all the winding, in order to avoid overlapping of the rope and unusual behaviour of the machine.

If the old rope is used to haul the new in its course on the various pulleys of the machine, it is necessary to avoid that accumulated anomalous torsions in the old rope, are transmitted to the new, causing irregular internal torsions, which will compromise the life of the rope or will even cause flaking or spillage of the core.

The heads of the two ropes should not be tied solidly between them (for example with welding or with clips) but interposing an element capable of absorbing the torsions (for example a piece of fibre cord tied to the heads of the ropes with clips or hose of rope).

6.2.3 Tying of the fixed head

As a rule, it is necessary to remember that all the ropes, in order to offer the best performance and durability, must work maintaining their constructive parameters unchanged.

Therefore, their extremities must be connected to a fastener that prevents the spins due to the revolving brace or induced by the system.

All the lifting equipment must have determined proportions to oppose the revolving brace of the ropes used to keep in balance the system with the extremities of the ropes blocked.

6.2.4 Adaptation of the ropes to the conditions of work

When a new rope is mounted on a system, this must be used for a brief period, after its installation, with loads inferior to its normal work.

It is very important, every time a new rope is installed, to let it work for a short time (15-20 days) with complete cycles of work, to concur the arrangement of all its elements and the adaptation to the normal conditions of work.

After this period the rope must be unwound from the drum and left free, to the aim of unloading the internal tensions and torsions provoked during the phase of installation of the trial stage. Subsequently the fixed head of the rope is refixed to the drum like originally.

By not following this procedure of trial the rope will be immediately subjected to excessive work which could result in premature breakages or in any case a shorter life of the rope.

CHAPTER 7: ORDINARY AND PLANNED MAINTENANCE

7.1. Procedure of maintenance operations



WARNING: All operations of scheduled maintenance and repairs must be performed by personnel properly trained and instructed to the task of Mechanical and Electrical Maintenance.



WARNING: The use of any unoriginal spare parts may compromise machine safety and is, therefore, not allowed.



IMPORTANT: Before doing any ordinary maintenance operation, it is necessary to take the following precautions:

- Ensure the equipment and the machine are stopped and no load is suspended; ensure the batteries switch is in 0 position – batteries disconnected;
- Place the equipment in the most suitable area to avoid interferences with other machines or with other operations in progress;
- It is strongly suggested to limit an appropriate area to avoid any damage caused by eventual materials falling from above during the maintenance operations at a considerable height (for example during maintenance of the trolleys hydraulic motor).
- If it is necessary to operate with the equipment to make some checks, the operation must be done under the direction of a supervisor who is qualified and responsible for the maintenance intervention.
- If it is necessary to remove the safety devices in order to have the check operations done, it is necessary to ensure, first of all, that all the safety measures are applied to have the minimum risk;
- It is forbidden to operate with the electrical systems while they are fed by tension;
- It is forbidden to remove or disconnect any component which belongs to the hydraulic group when it is under pressure;
- It is always necessary to wear all the individual safety devices during the maintenance operations;
- During the maintenance operation, it is strongly suggested that the staff puts the appropriate sign “equipment not at work” (for example in the power unit);
- When the maintenance operation is completed, before having the machine at work again, it is necessary to reinstall all the safety devices and remove all the tools used during the maintenance. It is also necessary to remove the signs “equipment not at work” if they had been used.

Upon completion of maintenance:

After performing maintenance, before returning the disconnecter keys to the machine operator, the maintenance technician must ensure that:

- any parts replaced, and / or the tools used for maintenance have been removed from the machine;
- fixed guards, any security devices (switches and / or sensors etc...), if removed during maintenance, have been replaced properly and secured.



WARNING: it is absolutely forbidden to tamper with and remove safety devices. In case of tampering and / or removal of such devices, the manufacturer declines all responsibility for the safety of the machine.

7.2. Instruments required

The machine adjustment and disassembly operations can be carried out using standard tools that are found on the market and commonly available to the company.
Any special equipment (if needed) is described and represented in a specific manner during the removal and/or adjustment of those parts of machinery that require so.

7.3. Maintenance operations

The aim of this inspection is to guarantee the safety while the equipment is working. It is necessary to check that the equipment structure, the installations and the devices are in full efficiency. This preliminary stage of the maintenance consists of searching out any possible anomaly, deterioration or damage of the equipment.
Only after this first inspection, the supervisor can have a general view on the equipment efficiency and can define if the machine can keep on working because it is in a good status or if it needs an intervention to sort possible problems out.
A correct and well-done maintenance operation can prevent possible loss of power or breaks of components fundamental to avoid any failure of the machine.

7.3.1 Maintenance

The maintenance includes:

CLEANING-CONTROL (INSPECTION)-SUBSTITUTION-REGULATION

Cleaning

A correct and adequate cleaning lengthens greatly the life of the machine. It is extremely important that the (periodic) cleaning is affected in a complete and accurate way. The machine should be periodically cleaned externally and internally.

Replacement

At any time that a component of the machine develops a problem of use which could compromise the correct functioning of the same machine, the component must be immediately substituted.

Adjustment

Some components of the machine (for example: electronic controls etc.) need to be adjusted and/or calibrated.



IMPORTANT: In order to put into effect the regular maintenance operations, a scheduled plan has been prepared.

OPERATIONS TO BE PERFORMED EVERY THREE MONTHS OR 500H:
PROGRAMMED MAINTENANCE FOR MST
OPERATIONS TO BE PERFORMED EVERY THREE MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
A	CHECKS ON THE MACHINE'S STEELWORKS			
A.01	Verification of the overall status and conditions of the bolts of the steelwork's main joints			
A.02	Random checks of the tightening torque of the main bolts			
A.03	Overall check of the steelworks main welds			
A.04	Overall check of the status and condition of the paint			
B	TRAVELLING GROUP			
B.01	Check of the tyre's wear condition (visual check)			
B.02	Check of the tyre's inflation pressure			
B.03	Verification of the absence of oil leaks from the hydraulic rubber hoses			
B.04	Check of tightening of the fittings on the hydraulic hoses			
B.05	Check of the idle wheel hubs (make sure there is no allowance)			
B.06	Check of the tightening of the screws fixing the rims and the wheels			
B.07	Check of the convergence of the steering wheels			
B.08	Check of the lubrication oil level on the wheel reducers			
C	LIFTING GROUP			
C.01	Check of status and wear condition of the lifting ropes			
C.02	Check rope's greasing			
C.03	Check tightening of the rope thimbles			
C.04	Check the fixing of the pulleys with the cylinders			
C.05	Check passage of the ropes on the cylinder pulleys			
C.06	Check status of lifting ropes' return pulleys			
C.07	Check greasing of the pins of the lifting ropes' return pulleys			

PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY THREE MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
C.08	Verification of tightening of the cylinders fixing screws			
C.09	Verification of rating of cylinder descent control valves			
C.10	Verification of status of the accessories for load etching (shackles, slings, etc.)			
D	POWER UNIT			
D.01	Visual check of the overall status of the power unit			
D.02	Check of the absence of oil losses in the hoses' joint points			
D.03	Tightening of the fittings evidencing oil leakages and random check of the fittings in good condition			
D.04	Verification of the level of the hydraulic oil in the tank and topping up, if necessary			
D.05	Check of the operation pressures as per machine's hydraulic diagram			
D.06	Replacement of filter cartridges of the variable cubic capacity pump commanding travelling movement			
D.07	Replacement of the filter cartridges of the variable cubic capacity pump commanding steering and travelling			
D.08	Verification of clogging status of the air filter cartridge on the hydraulic tank (replacement at planned expiry)			
D.09	Verification of the level of the coupler's oil (replacement at planned expiry) and topping-up, if necessary			
D.10	Check the absence of oil leaks			
E	DIESEL MOTOR (INSIDE THE POWER UNIT) *			
E.01	Check the absence of fault codes			
E.02	Check drive belt wear			
E.03	Checking the coolant and antifreeze level			
E.04	Check oil level			
E.05	Check air filter			
E.06	Motor and transmission, check the absence of abnormal noises			
E.07	Motor and transmission, check the absence of oil/fuel/water leaks			
E.08	Change ventilation filter **			

PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY THREE MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
F	ELECTRICAL INSTALLATION			
F.01	Overall check of the status of the electrical board (verification of cleansing, water infiltrations, wiring order and so on)			
F.02	Verification of operation of the commands on electrical board, from radio remote control			
F.03	Verification of operation of emergency stop buttons			
F.04	Verification of operation of visual signaling devices during travelling movement			
F.05	Verification of operation of the acoustic intermittent signaling device during travelling movement			
F.06	Verification of operation of the horn			
F.07	Check status and charge of batteries			
F.08	Check of tightening of the wire clamps in the electrical board (random check – At least 30%)			
F.09	Check of fixing of the clamps in the electrical panels			
F.10	Check of securing of components inside the electrical board			
F.11	Checking the status of the radio receiver			
F.12	Overall check of the machine board circuits			
F.13	Verification of functioning of trolley limit switches			

Notes:

*: the maintenance of the diesel motor inside the thermal unit has to be performed every 3 months or 250h.

**: every 1500 hours

OPERATIONS TO BE PERFORMED EVERY SIX MONTHS OR 1000H:
PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY SIX MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
A	CHECKS ON THE MACHINE'S STEELWORKS			
A.01	Verification of the overall status and conditions of the bolts of the steelwork's main joints			
A.02	Random checks of the tightening torque of the main bolts			
A.03	Overall check of the steelworks main welds			
A.04	Overall check of the status and condition of the paint			
B	TRAVELLING GROUP			
B.01	Check of the tire's wear condition (visual check)			
B.02	Check of the tire's inflation pressure			
B.03	Verification of the absence of oil leaks from the hydraulic rubber hoses			
B.04	Check of tightening of the fittings on the hydraulic hoses			
B.05	Check of the idle wheel hubs (make sure there is no allowance)			
B.06	Check of the tightening of the screws fixing the rims and the wheels			
B.07	Check of the convergence of the steering wheels			
B.08	Check of the lubrication oil level on the wheel reducers			
B.09	Replacement of the travelling reducers' oil (Operation to be only performed at a planned expiry)			
C	LIFTING GROUP			
C.01	Check of status and wear condition of the lifting ropes			
C.02	Check rope's greasing			
C.03	Check tightening of the rope thimbles			
C.04	Check the fixing of the pulleys with the cylinders			
C.05	Check passage of the ropes on the cylinder pulleys			

PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY SIX MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
C.06	Check status of lifting ropes' return pulleys			
C.07	Check greasing of the pins of the lifting ropes' return pulleys			
C.08	Verification of tightening of the cylinders fixing screws			
C.09	Verification of rating of cylinder descent control valves			
C.10	Verification of status of the accessories for load etching (shackles, slings, etc.)			
D	POWER UNIT			
D.01	Visual check of the overall status of the power unit			
D.02	Check of the absence of oil losses in the hoses' joint points			
D.03	Tightening of the fittings evidencing oil leakages and random check of the fittings in good condition			
D.04	Verification of the level of the hydraulic oil in the tank and topping up, if necessary			
D.05	Check of the operation pressures as per machine's hydraulic diagram			
D.06	Replacement of filter cartridges of the variable cubic capacity pump commanding travelling movement			
D.07	Replacement of the filter cartridges of the variable cubic capacity pump commanding steering and travelling			
D.08	Verification of clogging status of the air filter cartridge on the hydraulic tank (replacement at planned expiry)			
D.09	Verification of the level of the coupler's oil (replacement at planned expiry) and topping-up, if necessary			
D.10	Replacement of the oil in the hydraulic circuit (replacement at planned expiry) *			
D.11	Verification of the operation of the hydraulic jacks (absence of oil leaks)			
D.12	Check of the chromium-plating status of the hydraulic jacks			
D.13	Cleaning of the heat exchanger			
E	DIESEL ENGINE **			
E.01	Change of the diesel prefilter			
E.02	Change of the diesel filter			
E.03	Change air filter			

PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY SIX MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	
E.04	Changing the diesel motor oil filter			
E.05	Check of flexible pipes and fasteners of the motor and transmission			
E.06	Cleaning/painting of the engine and transmission			
E.07	Inspection of valves ***			
E.08	Changing transmission belts ***			
E.09	Replacing the air filter and the tank breather ***			
E.10	Inspecting of the turbocharger, check/clean as required ***			
E.11	Changing the coolant ****			
E.12	Check and replace the hydraulic system filters, if necessary			
F	ELECTRICAL INSTALLATION			
F.01	Overall check of the status of the electrical board (verification of cleansing, water infiltrations, wiring order and so on)			
F.02	Verification of operation of the commands on electrical board, from radio remote control			
F.03	Verification of operation of emergency stop buttons			
F.04	Verification of operation of visual signaling devices during travelling movement			
F.05	Verification of operation of the acoustic intermittent signaling device during travelling movement			
F.06	Verification of operation of the horn			
F.07	Check status and charge of batteries			
F.08	Check of tightening of the wire clamps in the electrical board (random check – At least 30%)			
F.09	Check of fixing of the clamps in the electrical panels			
F.10	Check of securing of components inside the electrical board			
F.11	Checking the status of the radio receiver			
F.12	Overall check of the machine board circuits			
F.13	Verification of functioning of trolley limit switches			

PROGRAMMED MAINTENANCE FOR MST

OPERATIONS TO BE PERFORMED EVERY SIX MONTHS

POS.	DESCRIPTION	PERFORMED		NOTES
		Positive	Negative	

Notes:

*: After 1000 hours from the first test / Every 1500 hours after the first replacement.

** : Consult the diesel engine maintenance manual for the type of oil to be used and check/replace it.

***: Every 2000 hours.

****: Every 8000 hours.

INTERVENTION PERFORMED BY	
DATE	
MACHINE	
SERIAL NUMBER	
FABRICATION YEAR	
WORK HOURS OF THE MACHINE	

CHAPTER 8: MACHINE LUBRICATION INSTRUCTION

Forward

This chapter illustrates and describes the rules and procedure when lubricating a machine. The lubrication of machines methodically executed, is a key factor to achieve a longer-lasting operation under the best conditions, the highest yield and the best conditions of safety. To this end, a lubrication schedule has been established. The warranty on the machine has value only if the customer is in full compliance with the rules of lubrication specified in this chapter.



WARNING: in case where the machines supplied was not immediately installed, you must execute a temporary lubrication, as shown more specifically in the section "LUBRICATION IN CASE OF PROLONGED STOPPAGE" in this chapter.

8.1. Lubrication process

All operations of lubrication must be carried out by experienced and qualified personnel. All maintenance must act in full compliance with safety regulations and must follow the instructions in Chapter 1, "Introduction - General Information."



WARNING: before performing any lubrication and/or maintenance you must disconnect the power supply to the machine, placing the main switch in OFF "0" located on the electrical control panel and secure it with a padlock.

The key to the lock must be kept by the Chief Maintenance Officer who assumes responsibility. When disconnecting the control panel, apply a sign reading:

WARNING! MACHINE MAINTENANCE IN PROGRESS



WARNING: the machine must be started up only by the Chief Maintenance Technician upon completion of maintenance, who is required to perform all preliminary checks.

8.1.1 Lubrication during machine installation

Oil bath lubrication

All mechanisms in oil bath are supplied without lubricants. The customer must procure the lubricant to fill the bath up to its proper level, using the amounts and types indicated for each machine in the relative table.

Grease lubrication

All mechanisms in that are greased are supplied with lubricants. CIMOLAI TECHNOLOGY SpA shall perform their lubrication using the recommended brands and types of lubricant that are listed in the relative table for each machine.



WARNING: when restoring the lubricant never mix different types regardless if they are of the same brand or not. Never mix mineral and synthetic oils. The same advice goes for grease.

8.1.2 Lubrication during prolonged stoppage

Machine stoppage prior to start-up

If the machine is expecting to be commissioned only after 60 days upon arrival at the Customer, it is necessary to top up (up to the filler cap) all the mechanisms to be lubricated in an oil bath, except for "PERMANENTLY LUBRICATED".

If the machine is put into operation within 12 months from topping up, simply return the oil to the level defined for each mechanism and grease all parts lubricated with grease. If the machine is put into operation after 12 months of topping up, replace all the oil after cleaning internal mechanisms, and grease all the mechanisms lubricated with grease.

Machine stoppage after a production cycle

If after a production cycle the machine is expected to be stopped for over 90 days, you must top up (up to the filler cap) all the mechanisms lubricated in an oil bath with the exception of "PERMANENTLY LUBRICATED PARTS".

The lubricant used for each mechanism must be of the same type and brand contained in the machine. At the commissioning of the machine, you must change the oil of every mechanism and grease all grease lubricated mechanisms, even if they have not reached the number of hours indicated in the lubrication table

8.1.3 Oil change and internal reduction gear clean

The oil change must be done respecting the time intervals indicated in the lubrication table.



However, you should change the oil at least once a year unless otherwise indicated in the table.

Reduction gears, and more generally all the mechanisms with lubrication oil, must be completely emptied and thoroughly cleaned at each change of the lubricant.

Accumulated grime is composed of a mixture of dust, metal chips and tar products, the latter by the deterioration of the oil.

It is essential to remove the filth entirely since the abrasive particles quickly lead to wear of gear teeth, and the oxidation products would act as a catalyst for accelerating ageing of the new oil.

Flushes require the use of special oils provided by the manufacturers (e.g. SHELL - VITRES OIL 32 or corresponding other brands) making the mechanism rotation without load for 3-4 minutes. At the end of the operation, fully drain the lubricant and perform a second wash with a small amount of lubricant required for the mechanism.

8.1.4 Oil change for planetary reduction gear

When introducing the oil in planetary reduction gears is necessary to remove a level plug located at the axle of the reduction gear and in the point, farthest from the load.

This operation is necessary to vent the area and perform a visual inspection of the oil filled in the reduction gear.

The amount of oil to use is shown in the lubrication table. After the operation, has been carried out, let the reduction gear spin several times, acting on the pulley and check that the oil level remains constant.

8.1.5 Oil filtering

When topping up and/or changing oil use a 200/300-micron mesh filter to filter it.

8.1.6 Scheduled oil level check

Check oil level in the reduction gears and tanks periodically.

If, during the oil top-up to the level, you need to add more than 20% of the amount planned for the entire replacement, we recommend that you check for any leaks in the mechanism and providing for their elimination.

8.1.7 Permanently lubricated reduction gears

Gearboxes, and more generally all the mechanisms indicated in the summary table of lubrication with the words "PERMANENTLY LUBRICATED" do not require periodic lubrication as they are lubricated with a special lubricant for their life cycle.

However, damaged or serviced parts require thorough internal cleaning and top-up with type and quantity of lubricant indicated in the lubrication table.

8.1.8 Disposal of waste oil

Waste oil and objects impregnated with oil, grease and solvents if any, used for lubrication operations, must be disposed of through the appropriate collection points within the law in terms of the environment in force in the country in which the machines are installed.









WARNING: do not pollute the environment with waste oil, grease, solvents or other liquid pollutants.

8.2. Machine lubrication

8.2.1 Symbol used in the lubrication table

The lubrication summary table uses a specific symbology to offer quick, clear and intuitive descriptions of type of actions to be performed for the proper lubrication of the individual components.

List and explanation of symbols used in the summary lubrication table






	Top up Change and top-up		Greasing with pump
	Drip lubrication		Manual greasing
	Oil level visual check		No scheduled lubrication, component already permanently greased




8.2.2 Lubrication table

The lubrication operations to perform on the machine are summarized in the table below.



WARNING: The operations of lubrication must be carried out. For more information consulting the manuals of the components that are in attached documents.

LUBRICATION TABLE						
ITEM	COMPONENTE or UNIT	TIPO LUBRICANTE		TYPE OF ACTION	Q. ty	Frequency
		GREASE or OIL	TYPE			
1	Travelling gearboxes	OIL	AGIP BLASIA SX 220		As needed	see manufacturer manual (attached)
2	Hydraulic system	OIL	AGIP ARNICA 46		As needed	500h (topping up) 2000h (replacement)
3	Slew drives	GREASE	TOTAL CERAN MS		As needed	see manufacturer manual (attached)
4	Bearing and mechanisms	GREASE	TOTAL CERAN ST2		As needed	6 months or 500 hours
5	Rope and chains	GREASE	VITALIFE WIRE ROPE LUBRICANT or BILUBRO AERO		750g. Every winch	6 months or 500 hours

LUBRICATION TABLE						
ITEM	COMPONENTE or UNIT	TIPO LUBRICANTE		TYPE OF ACTION	Q. ty	Frequency
		GREASE or OIL	TYPE			
6	Drive pump	OIL	AGIP BLASIA SX 220		As needed	see manufacturer manual (attached)
7	No driving wheels	GREASE	TOTAL MULTIS EP2		As needed	6 months or 500 hours
8	Motor diesel	OIL	ENI I-SIGMA TOP 10W-40		As needed	see manufacturer manual (attached)



WARNING: if lubricants with the same characteristics as those recommended are unavailable, we recommend you consult the CIMOLAI TECHNOLOGY SpA Customer Assistance Services, indicating the brand, type and characteristics of the oils that you intend to use, to allow us to verify compatibility.

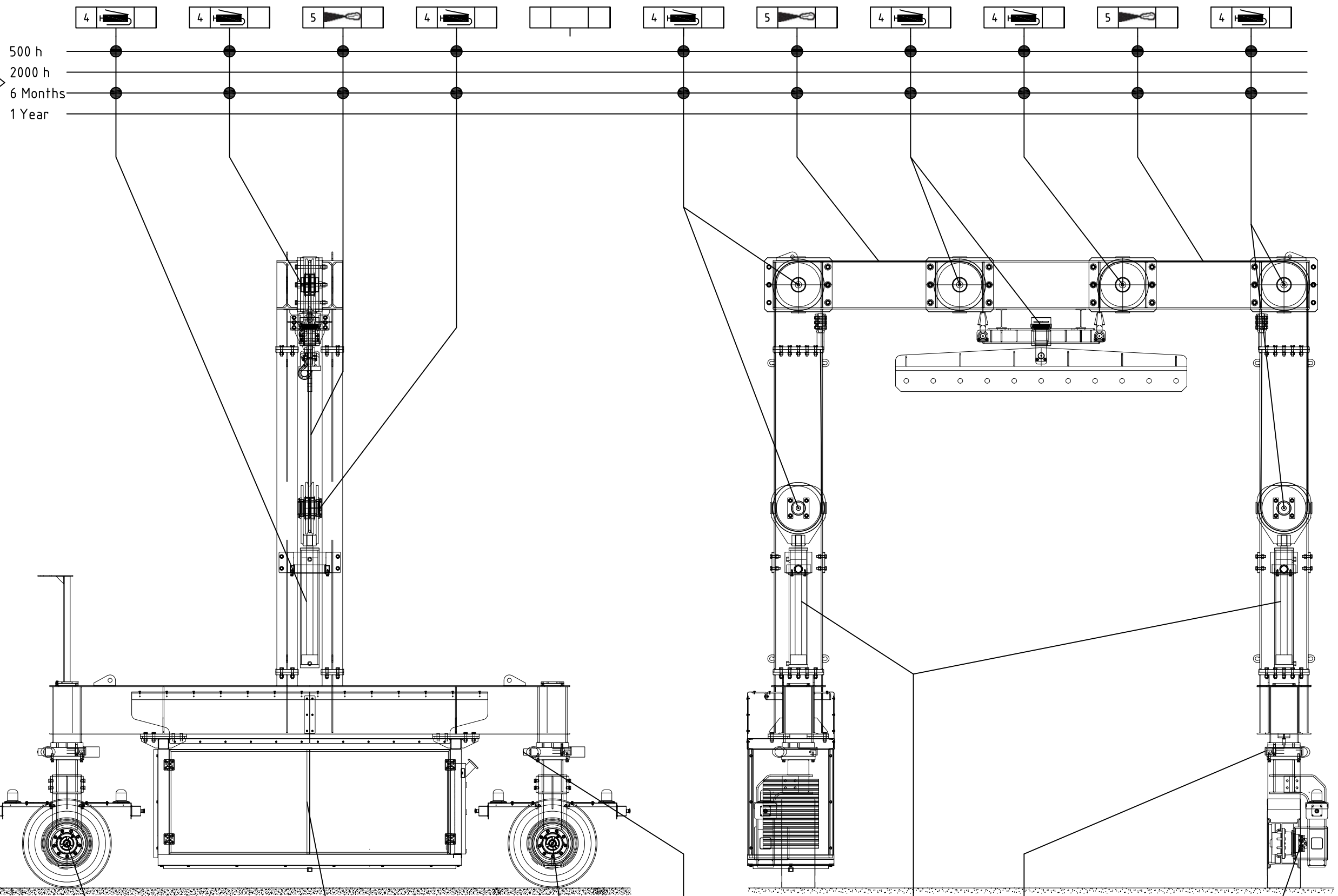
8.2.3 Identification of machine lubrication points

Figures on the following pages identify the lubrication points described in the above table - "LUBRICATION OPERATIONS".

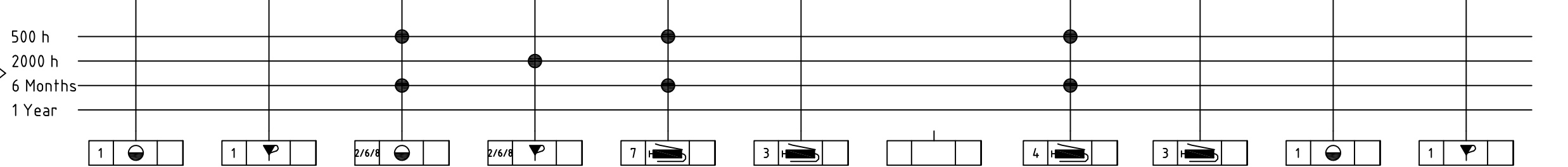


8.3. Lubrication of the machine

INTERVENTO OGNI
INTERVENTION EACH
INTERVENCION CADA
ZUTUN JE
INTERVENTION TOUTES LES



INTERVENTO OGNI
INTERVENTION EACH
INTERVENCION CADA
ZUTUN JE
INTERVENTION TOUTES LES



8.4. Characteristics and adherence lubricants

Table of the characteristics and adherence of the oils

RECOMMENDED BY **CIMOLAI TECHNOLOGY SpA**

Oil for hydraulic system:

Produttore Manufacturer Hersteller Marque Fabricante Produtor	Oli minerali Mineral oils Mineralöle Huiles minerals Aceites minerales Óleos minerais ISO VG46 HVLP
<i>Hydraulic Fluids HVLP according DIN 51524 parts 3</i> <i>ISO -Classi di viscosità / ISO -Viscosity classification</i>	
AGIP-ENI	ARNICA 46
AVIA	AVIA FLUID HVI 46
BP	BARTRAN HV 46
CASTROL	HYSPIN AWH-M 46
CEPSA LUBRICANTES S.A.	CEPSA MISTRAL HX 46
CHEVRON	MECHANISM LPS 46
ESSO	UNIVIS N 46
FUCHS	RENOLIN MR 1025 MC
Q8	Q8 HANDEL 46
MOBIL	DTE 15 M
PETRO-CANADA	HYDREX XV
VELPERCAR SPAIN	HIDROVAL 46 HV
SHELL	SHELL TELLUS OIL T46
TEXACO	RANDO HD-Z 46
TOTAL FINA ELF	EQUIVIS ZS 46
YORK	YORK 775 VG 46



Oil for gearboxes and pump drive:

Produttore Manufacturer Hersteller Marque Fabricante Produtor	Oli sintetici Synthetic oils Synthetische Öle Huiles synthétiques Aceites sintéticos Óleos sintéticos
ISO VG 220	
AGIP	BLASIA SX 220
BP	ENERSYN EPX 220
CASTROL	ALPHASYN EP220
CHEVRON	TEGRA SYNTHETIC 220
ESSO	SPARTAN S EP 220
KLÜBER	KLÜBERSYNTH EG 4-220
MOBIL	MOBILGEAR SHC XMP 220
MOLIKOTE	L-1122
OMV	GEAR SHG 220
Q8	EL GRECO 220
SHELL	OMALA HD 220
TEXACO	PINNACLE EP 220
TOTAL	CARTER SH 220

Table of the characterists and of adherence of the grease

- Grease for slew drives: **TOTAL CERAN MS**
- Grease for bearing and mechanisms: **TOTAL CERAN ST2**
- No driving wheels: **TOTAL MULTIS EP2**
- Grease for ropes: **WHITMORE'S WIRE ROPE LUBRICANT or BILUBRO AERO**



CHAPTER 9: DIAGNOSTICS

9.1. Alarm messages and remedial actions

MESSAGE

The "WHEELS IN ALARM" indicator is associated with a set of alarms that identify one or more failures to the steering system.

- Wheel out the window 1L
- Wheel out the window 1R
- Wheel out the window 2L
- Wheel out the window 2R

The wheel with the problem shows two different parameters in: REAL POSITION (PV) and SET POSITION (SP).

REMEDIAL ACTION:

1. Keep the "RESET" button pressed until the wheel gets back within the range of acceptability pre-set during the commissioning of the machine.

When the alarms listed above appear together with the alarm

- Off alarm window 5°

They are considered as medium level alarms and it is therefore necessary, in order to start up the machine, that the following operations be performed:

- Take off the electrical valve feeding of the wheel that is not in the correct position. It is possible to disconnect the connector or to open the protection fuse;

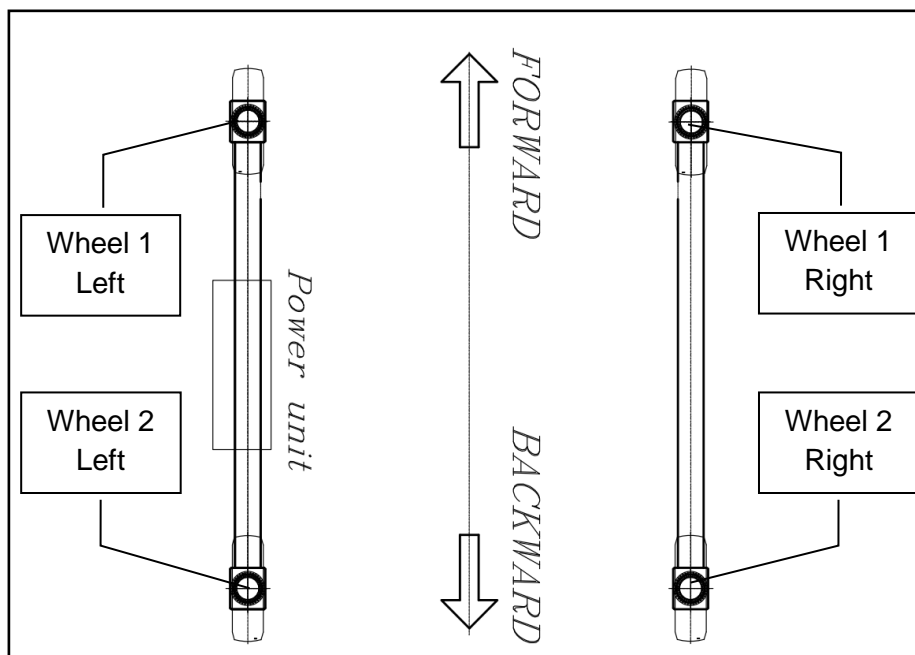


Fig. 9-1

- Wheel 1 left fuse: QS04.220
 - Wheel 2 left fuse: QS04.221
 - Wheel 1 right fuse: QS12.220
 - Wheel 2 right fuse: QS12.221
-
- Put manually the wheel/wheels on right position defined by the value: "SET POSITION" with the engine still working. To perform a manual steering of the wheel(s), push or pull the lever of the valve corresponding to the required wheel;
 - Push the "RESET" push button for more than three seconds (the alarm will disappear from the pushbutton keyboard).

If with the alarm "Off alarm window 5°" appears and the following alarm will also appear

- Off alarm window 10°

they are considered high level alarms and to re-establish the system it is necessary to carry out all the operations described above in order to initialize the alarm "Off alarm window 5°". All the operations have to be carried out keeping pushed the reset button (on the remote control or on the cabin control panel).

It is important to contact CIMOLAI TECHNOLOGY once the system has been re-established.

MESSAGE

- Alarm filter 1 clogged
- Alarm filter 2 clogged
- Alarm filter 3 clogged
- Alarm filter 4 clogged
- Alarm filter 5 clogged

REMEDIAL ACTION:

Check, clean or replace the filter and push the "RESET" button for 3 seconds.

MESSAGE

- Diesel prefilter alarm

REMEDIAL ACTION:

Check, clean or replace the filter and push the "RESET" button for 3 seconds.

MESSAGE

- Maximum oil temperature

REMEDIAL ACTION:

Make sure that the heat exchanger works properly. Keep the "RESET" button pressed for 3 seconds once the system has been restored.

MESSAGE

- Minimum oil level

REMEDIAL ACTION:

Top up the oil tank or decant manually the oil from a thermal unit to the other one. During the next working cycles, pay attention and check the machine behaviour in order to check and understand if the problem appear once again.

MESSAGE

- Emergency button pressed on wheel 1 left;
- Emergency button pressed on wheel 2 left;
- Emergency button pressed on wheel 1 right;
- Emergency button pressed on wheel 2 right;
- Emergency button pressed on electrical panel;
- Emergency button pressed on radio remote control;

REMEDIAL ACTION:

Check if the emergency push button is pressed and eventually enable it. Check if the push button is damage and replace it.

MESSAGE

- Alarm Overload winch 1;
- Alarm Overload winch 2;

REMEDIAL ACTION:

Check the value of alarm threshold, check the load weight and check the connection among the relays and the pressure switches in electrical board. Check if the pressure switch, indicated on the message, is damage and eventually change it.

9.2. Problem - Cause - Remedy

Preface

In the following table are reported the conditions of non-functioning not displayed on the operator panel, reasonably anticipated, relative to the single operative functions of the machine. For every type of difficulty, the possible causes are reported and the relative activities which the operator must carry out in order to reinstate operative function.

PROBLEM	POSSIBLE CAUSE	SOLUTION
LIFTING		
The cylinders don't move	The fuse which protects the solenoid valves is burnt	Change the fuse
CONNECT THE DRIVE LINE		
The machine is switched off	The batteries are discharged	Charge the batteries
	The selector for the disconnection of the batteries is not inserted	Connect the selector for the connection of the batteries
	The fuse is burnt	Change the fuse
The line is not connected	The line fuse is burnt	Change the fuse
	The contact of the key selector does not work correctly	Change the contact
The gear is not connected	The emergency card does not work correctly	Change the emergency card
	Someone pushed the emergency button	Disconnect the emergency button
	Gear counter does not work correctly	Change the emergency card
DISPLACEMENT		
The machine does not carry out the displacement operation	The brake is inserted	The pressure of the brake has to be higher than 35/40 bar
	The displacement card is not supplied	Change the burnt fuse



CHAPTER 10: EXTRAORDINARY MAINTENANCE

10.1. Extraordinary Maintenance

Preface

By extraordinary maintenance we refer to the operation which is carried out after approx. 6 months, 1 year, and over, of activity by the machine, or else as required by unforeseen circumstances.



IMPORTANT: before doing any ordinary maintenance operation, it is necessary to take the following precautions:

- Ensure the equipment is stopped and does not have any hung load; ensure the main switch is in OFF “0” position;
- Place the equipment in the most suitable area to avoid interferences with other machines or with other operations in progress;
- It is strongly suggested to limit an appropriate area to avoid any damage caused by eventual materials falling from above during the maintenance operations at a considerable height (for example during maintenance of the trolleys hydraulic motor).
- If it is necessary to operate with the equipment to make some checks, the operation must be done under the direction of a supervisor who is qualified and responsible for the maintenance intervention.
- If it is necessary to remove the safety devices in order to have the check operations done, it is necessary to ensure, first of all, that all the safety measures are applied to have the minimum risk;
- It is forbidden to operate with the electrical systems while they are fed by tension;
- It is forbidden to remove or disconnect any component which belongs to the hydraulic group when it is under pressure;
- It is always necessary to wear all the individual safety devices during the maintenance operations;
- During the maintenance operation it is strongly suggested that the staff puts the appropriate sign “equipment not at work” (for example in the power unit);
- When the maintenance operation is finished, before having the machine at work again, it is necessary to reinstall all the safety devices and remove all the tools used during the maintenance. It is also necessary to remove the signs “equipment not at work” if they had been used.

10.2. Verification of the ropes

10.2.1 Criteria of verification and substitution of the ropes

With reference to norm ISO 4309, the safety of exercise of a rope is guaranteed in particular by the correct valuation of the following:

- number of breakages and their position
- use of wire
- internal and external corrosion
- damage and deterioration of the rope

10.2.2 Breakage of the wires

The broken wires of the rope externally visible must be counted, in the stretch most worn. Such a stretch must have a length equal to 6-30 times the diameter of the rope. If the rope seems to have broken wires, the rope itself must be replaced.

10.2.3 Usage of wires

To replace the rope, in addition to the broken wires, it is necessary to bear in mind that the levelling of the wires for usage leads to their breakage over a short period of time. In the presence of a worn rope the interval between a verification and another in the counting of the broken wires must therefore be reduced and are considered as similar those which have undergone a reduction in diameter, appraised on sight, of 50% inferior to the original.

10.2.4 Corrosion

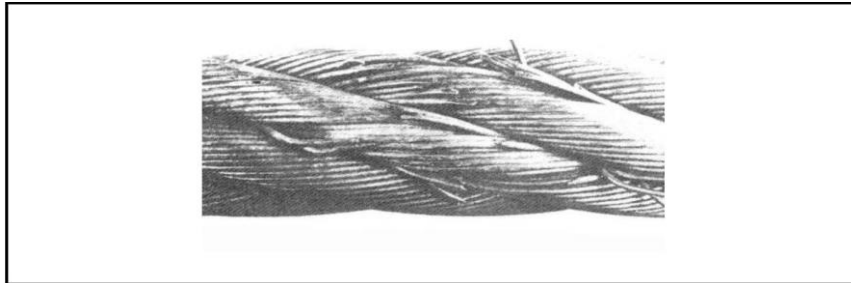
The external corrosion produces a reduction of the diameter of the wires. Therefore, the rule of the previous paragraph prevails, but applied in this case, with a very prudent criteria, corrosion being a more serious deterioration than non-wear. The assessment of the internal corrosion requires a lot of practice. The rope can be opened with clamps advancing with care to the de-torsioning

10.2.5 Damage and deterioration of the rope (in accordance with ISO 4309)

In addition to the assessments made previously it will have to proceed to the replacement of the rope when:

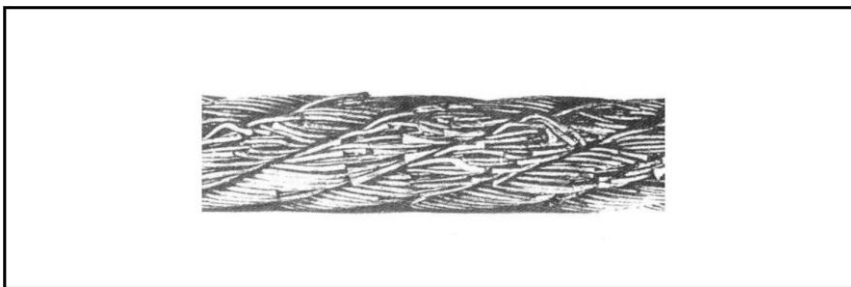
- the diameter of the rope, even in one point only, results reduced (6-7% in respect to the normal diameter of the rope)
- The rope has permanent crushing, torsions or bending
- the web protrudes from the rope even in a single point
- the rope, even though in traction, develops one or more loosened or protruding strands

Pic.10-1. Breakage and moving of the wires on two adjacent strands in a rope of crossed coil type. Such condition requires its replacement.



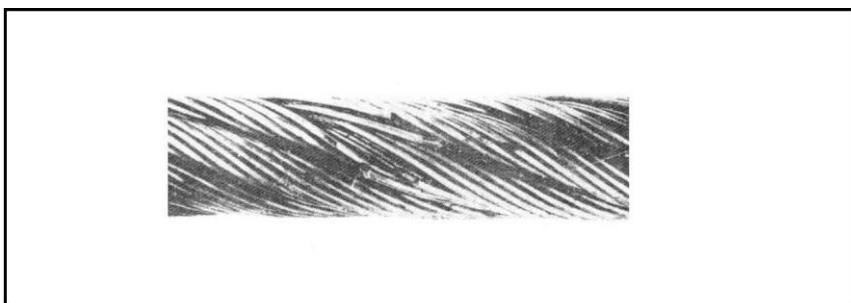
Pic.10-1

Pic.10-2. Major usage and notable number of broken wires, in a rope of crossed coil type. Such condition requires immediate replacement.



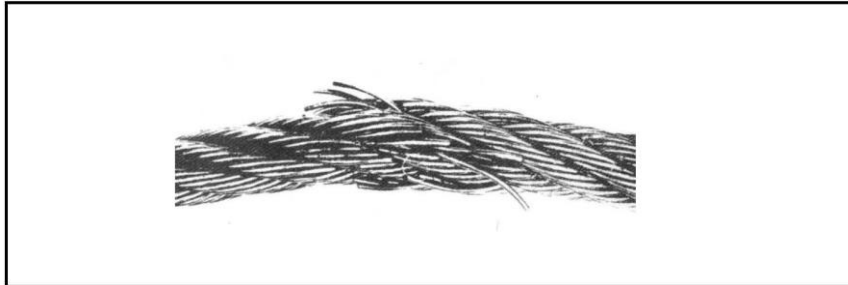
Pic.10-2

Pic.10-3. Broken wires on the same strand, working lightly together, in a rope of parallel coil type. Such condition requires the removal of the broken wires, until the extremity is level with the external profile of the rope.



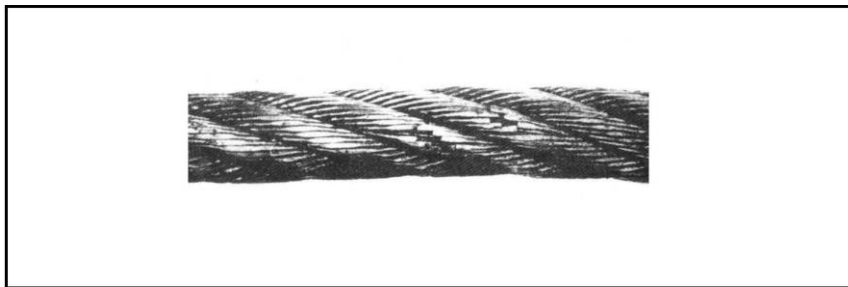
Pic.10-3

Pic.10-4. Broken wires in numerous strands, near a departure pulley (and at the same time hidden by this pulley). Such condition requires replacement.



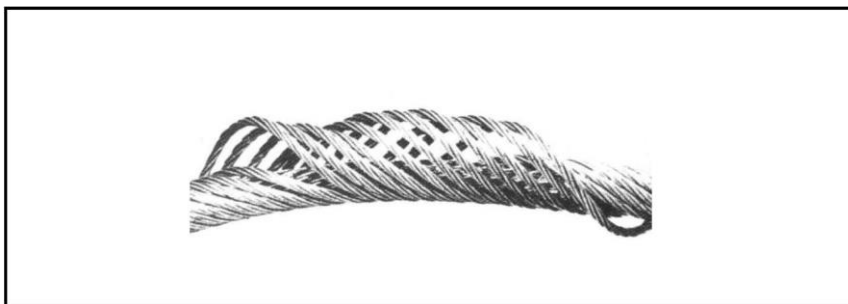
Pic.10-4

Pic.10-5. Broken wires in two strands, for fatigue or flexion, associated to major localized use. Such condition requires replacement.



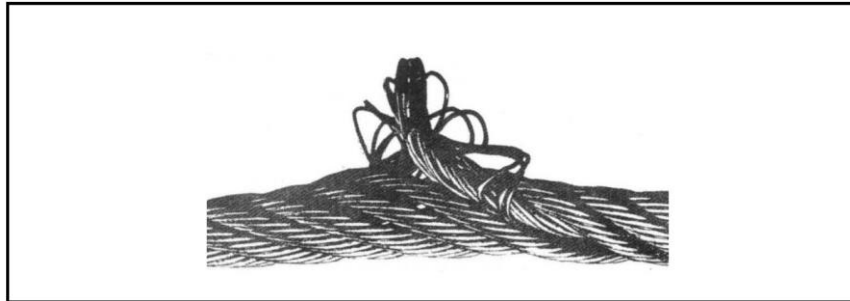
Pic.10-5

Pic.10-6. Deformity of basket (nest) type of a multi-strands rope (anti-spin type), caused by a spin forced because of too tight hooks or angle of excessive deviation. Such condition requires immediate replacement.



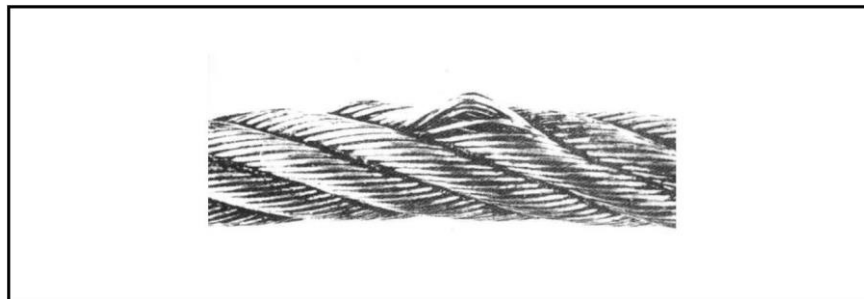
Pic.10- 6

Pic.10-7. The expulsion of the metallic web generally associated to a deformity of basket type. Such condition requires immediate replacement.



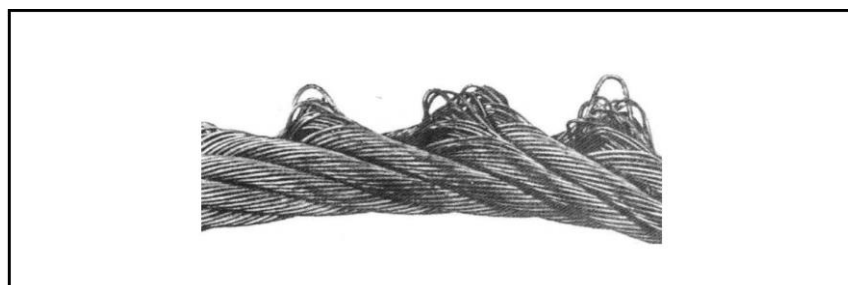
Pic.10-7

Pic.10-8. Only one strand is affected from expulsion of wires, even though the examination of a stretch of rope demonstrates that the deformity is visible at regular intervals, normally equal to stages of coiling. It is necessary to keep such defect under control.



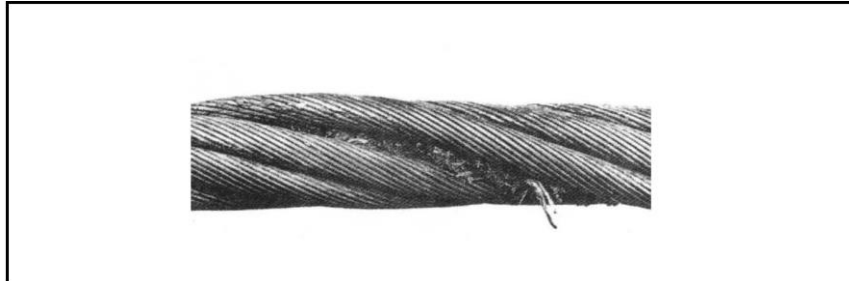
Pic.10- 8

Pic.10-9. Deterioration of the previous defect with expulsion of the internal wires of the strands. Major defect localised due to the application of push button loads. Such condition requires immediate replacement.



Pic.10- 9

Pic.10-10. Localised increase of a rope of parallel winding type, determined by distortion of the metallic web, deriving from a sudden load. There are noted also traces of corrosion and major use of the external wires. Such condition commands immediate replacement.



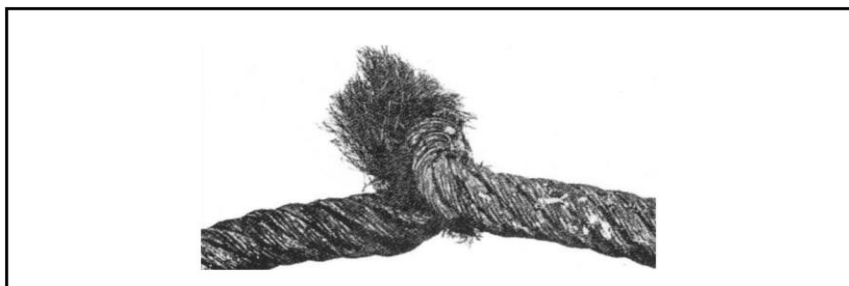
Pic.10-10

Pic.10-11. Localised increment of the diameter of the rope, due to the protruding textile web, in the area between the external strands. Such condition requires replacement of the rope.



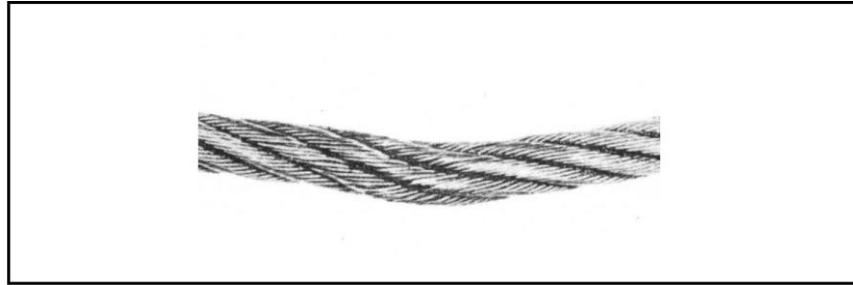
Pic.10-11

Pic.10-12. Major twisting with the winding contorted which causes the protruding of the textile web. Such condition requires immediate replacement.



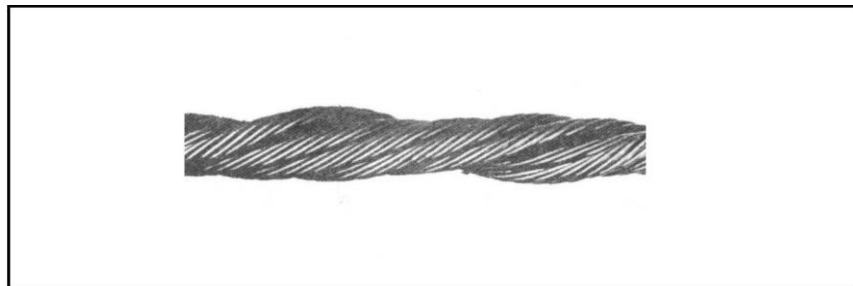
Pic.10-12

Pic -10-13. Metallic rope which has been contorted during installation, but nevertheless put into operation and now subject to localised wearing and loosening of the threads. Such condition requires replacement.



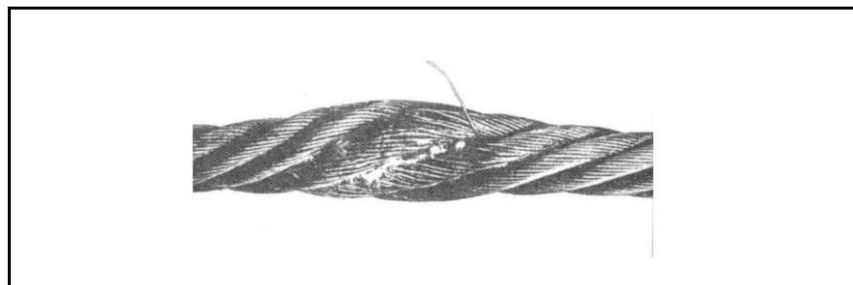
Pic.10-13

Pic.10-14. Localised decrease of the diameter of the rope, since the external threads tend to occupy the place of the textile web, which is destroyed. Such condition requires the immediate replacement.



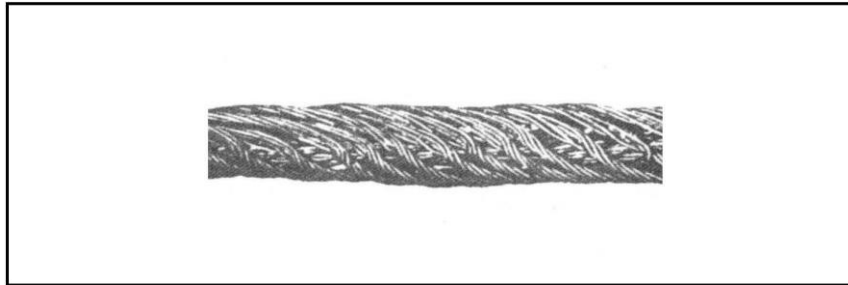
Pic.10-14

Pic.10-15. Flattened area, caused by localised crushing for mechanical action, which provokes imbalance in the strands. Concurrent presence of broken wires. Such condition requires replacement.



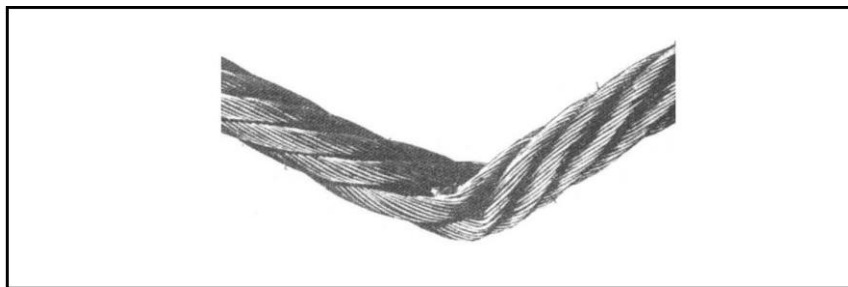
Pic.10-15

Pic.10-16. Flattened area of a multi-strand rope for mechanical action on a long stretch, caused by incorrect unwinding from a drum. To note the increase of pace when winding the external strands, with imbalance of tension under condition of load. Such condition requires its replacement.



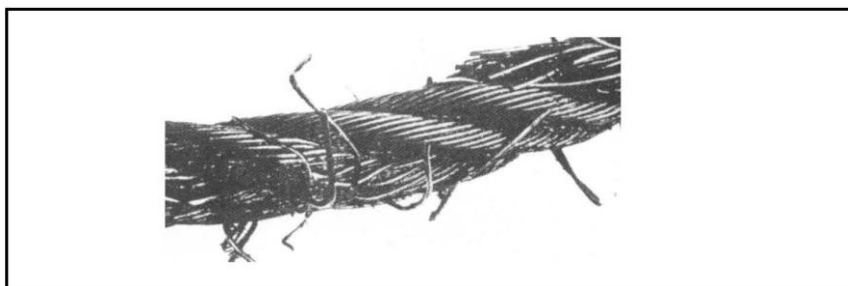
Pic.10-16

Pic.10-17. Example of major bending. Such conditions require replacement.



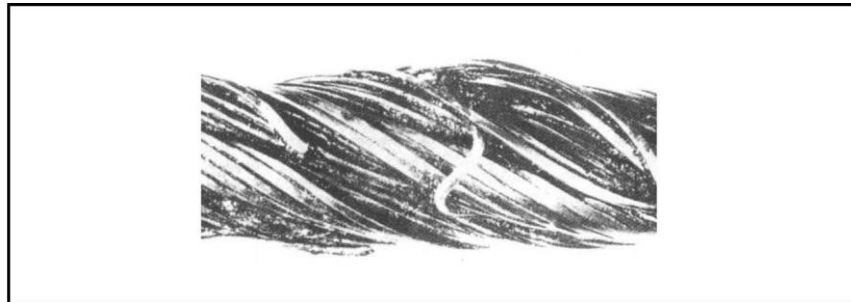
Pic.10-17

Pic.10-18. Typical example of a rope which has protruded from the groove of a pulley and is stuck. If a flattening deformity results, with localised wear and lots of broken wires, such condition requires immediate replacement.



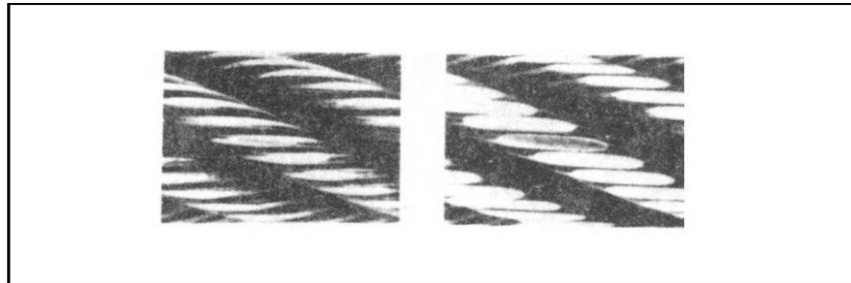
Pic.10-18

Pic.10-19. Accumulative effects of more than one factor of deterioration. To note in particular the major wear of the external wires, which provokes a loosening of the wires such as to cause a basket type deformity with danger of protruding of the pulley. There are present also lots of broken wires. Such condition requires immediate replacement.



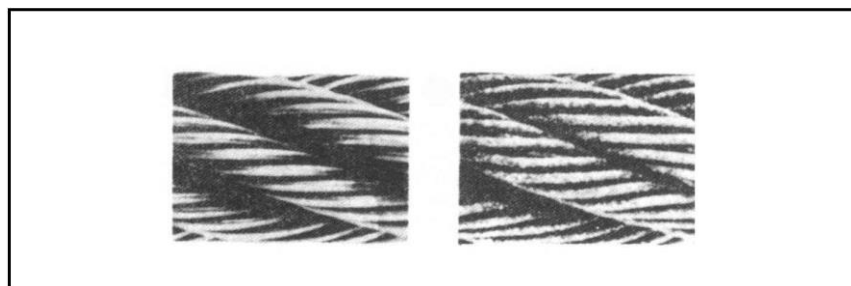
Pic.10-19

1. Pic.10-20. Light flattening of external wires. Slight reduction of the diameter of the rope.
2. Pic.10-20. Continuous flattening; the metallic wires which begin to loosen, with a assessable reduction of their diameter equal to circa 40%.



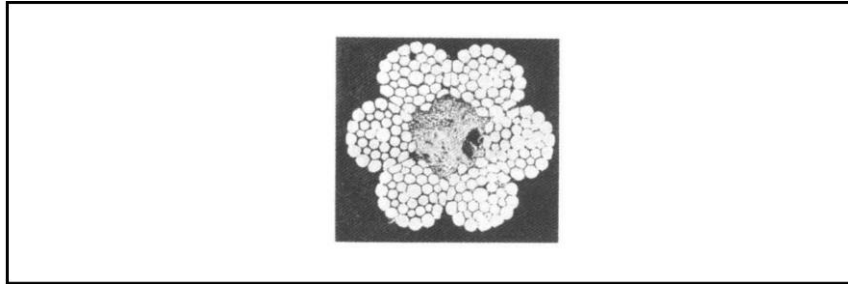
Pic.10- 20

1. Pic.10-21. Start of superficial oxidation.
2. Pic.10-21. Heavily punctured surface and wires completely loosened. Major reduction of the diameter, with game between the wires equal to more than half of their diameter. Immediate replacement.



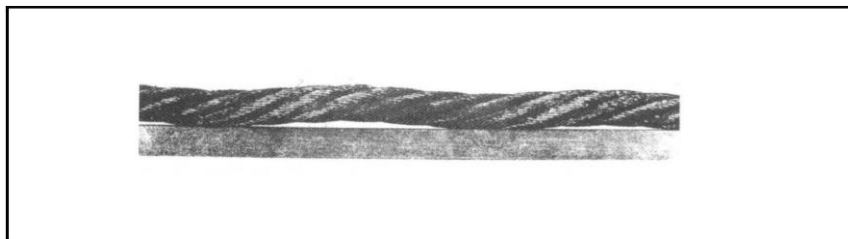
Pic.10- 21

Pic.10-22. Example of major internal corrosion. It is in evidence the reduction of the area of many external wires in the strands, in the contact area with the web, high volume of compression, the lack of space between the strands and the consequent reduction of the diameter of the rope. Such condition requires the immediate replacement.



Pic.10-22

Pic.10-23. The propeller type distortion is a deformity in which the longitudinal axis of the rope assumes the form of a propeller. Such condition requires a continuous inspection of the rope. In the event of prolonged use, wearing and breakage of the wires can develop. If the deformity exceeds the value indicated in, the rope must be substituted.



Pic.10- 23

10.3. Criteria for verification of the ropes

The safety of exercise of the rope is guaranteed by the correct valuation of some parameters. These are:

- number of breakages of the rope and their position
- state of wear of the wires
- corrosion
- damage and deterioration of the same rope

10.3.1 Breakage of the wires

The broken wires visible externally of the rope must be counted, in the piece mostly worn out. Such piece must be equal in length to 6-30 times the diameter of the rope. If the rope has any broken wires, it is necessary to proceed to the replacement of the rope.

10.3.2 Wear out of the wires

The ultimate flattening of the wires for use preannounces their breakage over a short time. Therefore, in the presence of worn out rope the interval of checking up time must be reduced and to proceed if necessary to the replacement of the rope.

10.3.3 Corrosion

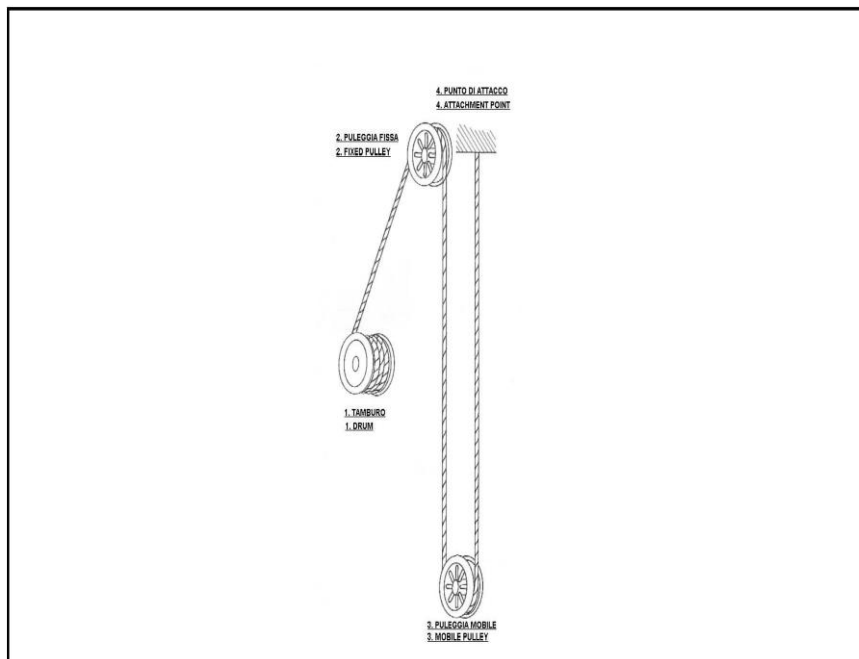
Any ultimate corrosion of the wires provokes the reduction of the diameter of the same wires with consequent deterioration of the rope. Therefore, in the present of a worn out due to corrosion the interval of checking up time must be reduced and to proceed, if necessary, to the replacement of the rope.

10.3.4 Damage and deterioration of the rope

In addition to the assessments made previously it is necessary to proceed to the replacement of the rope when:

- the diameter of the rope, even in one point only, results reduced (6-7% in respect to the normal diameter of the rope)
- the rope looks crushed, has torsions or permanent folds.
- the web protrudes from the rope even only in one point
- the rope, although in traction, seems to have one or more loose or protruding strands.

10.3.5 Verification points



Pic.10-24

10.3.6 Position 1: Drum

- check the tying up point of the drum
- check any defective winding on the drum
- identify breakages of wires
- check for corrosion
- identify deformities due to the load

10.3.7 Position 2: Fixed Pulleys

- check the piece of rope which winds round pulleys to reveal any breakage and wearing of wires

10.3.8 Position 3: Mobile Pulleys

- look for breakage of the wires and artificial wear
- examine the corrosion
- carefully examine the piece which winds onto the pulleys and particularly the piece which is on the pulley when the apparatus is under load

10.3.9 Position 4: Tie up point

- check the breakage of the wires
- identify the deformities
- check the diameter of the rope

10.4. Rope maintenance

After the installation of the rope it is necessary to check its state, every 12 working hours, for the first 15 days.

If during this verification, the rope presents some deformities at its ends, it is necessary to disconnect the cable-fix and vent the rope reinstating the correct winding.



CHAPTER 11: DECOMMISSIONING, DEMOLITION AND DISPOSAL

11.1. Decommissioning

“Decommissioning” implies all operations carried out in order to put the machine and / or system under conditions of maximum security for an indefinite period.

Therefore, the customer is urged to perform the following:

- Stop the reclaimer with the boom fully lowered and resting on the ground;
- Disconnect the system from the mains power supply.



WARNING! Assign disconnection operations from the main electrical power box to expert and qualified personnel. Consult a technician of the electrical energy supplier if needed, which can isolate power to the plant upstream.

- Drain, store and subsequently dispose of substances such as oils and grease contained in the lubrication tanks (centralised lubrication units, reduction gears, drives, gearboxes, etc...) as required by the legislation in force in the country of installation of machine installation.



WARNING! Do not pollute the environment with waste oil, grease, solvents and/or other liquid pollutants.

- Deny access to areas prone to sever risk (falls, cuts, entrapment, etc.) to all personnel and lock the entrance door to the plant.

Note: the machine in question does not require registration with public offices, so it is not mandatory that the machine be accompanied by documents that have to be returned to the institution responsible for surveillance.

11.2. Demolition and disposal

“*Demolition and disposal*” imply all operations performed to completely disassemble the machine and clear the area of installation of all components.



IMPORTANT: Due to the size of the system, it is recommended to entrust the dismantling demolition and disposal specialized companies and enable the demolition of large systems, with suitable equipment.

The company responsible for the demolition of the machine will then have the task of:

- Performing the disassembly of the machine taking care to divide the materials, that compose it according to their chemical nature (iron, aluminium, bronze, plastic, wood, etc.);
- covering the parts removed from the machine with insulating sheets in order to avoid weather such as rain and moisture (if stored outdoors) from compromising the structures, causing oxidation and rust that can infiltrate into the ground;

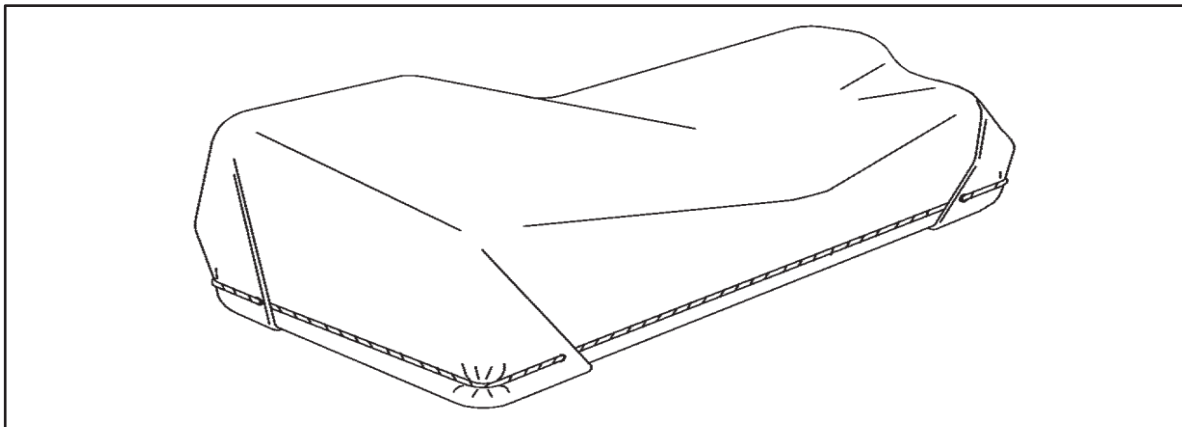


Fig.11-1

- separating the disassembled machine parts according to the type of material of which they are composed (e.g. Iron, plastic, copper, electrical and electronic components, etc.) and then provide to their collection and differentiated disposal according to the laws in force in the country of installation of the machine.



WARNING: Should contractor requested to carry out demolition of the machine not deal directly with the subsequent disposal of the removed component, contact specialised companies and enable the collection and disposal of various types of materials accumulated.