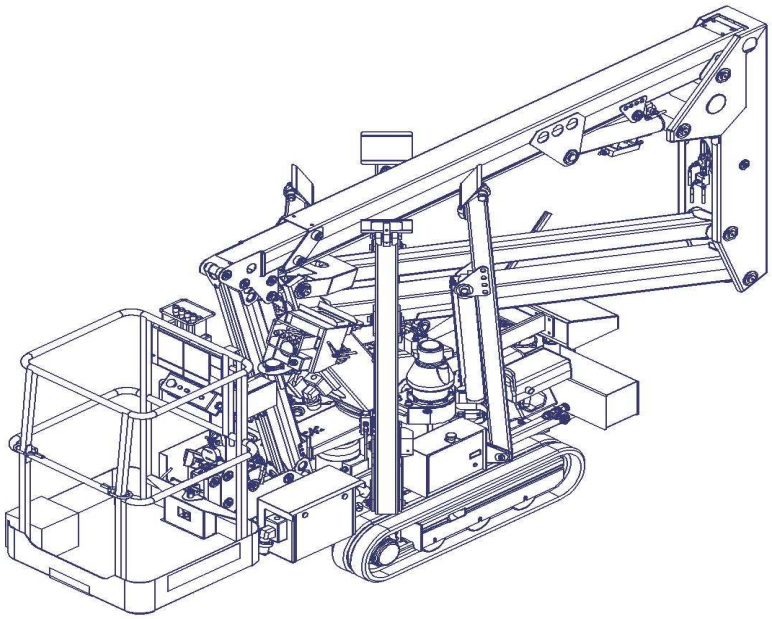
SEQUANI MECCANICA

Operator's and Maintenance Manual



ELEVATED WORKING PLATFORM

CS 135

SERIAL NUMBER.....

CE

ED. 01/07 **CODE 41518 GB**

INDEX

1 INTRODUCTION

1.1 Use and Maintenance Manual

IMPORTANT!

Before using this machine read carefully this manual and make sure you understand fully the safety regulations and operation instructions.

The manufacturer is ready to solve any doubt and provide you with the information you might need.

Manual storage

This manual is an essential part of the machine and it should always be kept in the drive panel protection casing, to be always ready for use.
The manual shall always follow the machine it refers to, even if the machine is sold or transferred to another owner, until the machine is put out of order or dismantled.
We recommend to note the machine manufacturer's reference number on the cover in order to identify the machine without risking mistakes.
Should this manual be damaged or lost, request another copy to the manufacturer (use the code printed on the cover or the machine's factory reference number).

1.2 The Manual

CAUTION!

The aim of this manual is to describe the machine and its intended use as conceived by the manufacturer, as well as describing the main technical features, provide operators with the information and knowledge needed for correct use, ordinary maintenance and control log writing.

This manual cannot be used to train unskilled operators nor to teach how to use the machine. All the information in this manual have been written for experienced operators with the skills required to use this machine.

This manual cannot replace an operator's skills and knowledge .

The operator is responsible for the machine and its use.

1.3 Operator Training

The employee must make sure that the operator:

- has the necessary basic skills and knowledge needed to operate the machine
- has specific skills and training for this type of machine.
- has read and understood this manual.

NOTE: Sequani Meccanica Srl and CTE Spa can provide specific training to operators.

1.4 Amendments and Integrations

This manual is compliant to all laws and regulations in force at the time the machine has been sold. The manual cannot therefore be deemed as inadequate or non-compliant in case changes or additions to it are needed due to the issuing of new legislative provisions or updates to regulations or experiences.
However, the manufacturer reserves the right to deliver additions and changes to the manuals of previously issued products to product owners.
To facilitate this service, please inform us whenever the machine is transferred to other owners.

1.5 Standards applied

The machine has been designed and manufactured in compliance with the European Directives on Safety and with standardisation of EU Member States legislations. Specifically, directives 98/37/EC – 89/336/EEC and 73/23/EEC shall apply.

1.6 Design life

This machine has been designed to lift, to move people and equipment within the maximum permitted capacity of the Elevated Working Platform (EWP) towards the working areas. Access to the working platform is allowed only through a gate at ground level. Usage limits are those described in this manual.

Any modality or usage condition over the limits specified in this manual or not foreseen by the manufacturer is strictly prohibited.

The machine has been designed to operate for 100,000 operating cycles under heavy duty load cycle conditions (e.g. 10 years, 50 weeks per year, 40 hours per week and 5 cycles per hour).

Before the end of its design cycle, the machine must undergo thorough inspection and overhaul by its manufacturer. In case of extremely heavy usage, overhauls can be performed earlier. The recommended inspection interval is every 2,000 hours, and the recommended overhaul internal is 5,000 hours.

1.7 After-sale Service and Spare-Parts

To request special maintenance operations, repairs or spare-parts, please contact the Manufacturer's After-sale Service Department, which has highly trained personnel and specialized equipment suited to any requirement.

☎ After-sale Service Centre: +44 01924 268103 (UK)
☎ After-sale Service Centre: +39 0464 48 50 50 (Italy)

Use original manufacturer's spare-parts only for a correct operation and optimized machine life.

☎ Spare-Parts Service: + 44 01924 268103 (UK)
☎ Spare Parts Service: +39 0464 48 50 50 (Italy)

Always communicate the model and the serial number of the machine when requesting spare-parts.

1.8 Guarantee

The machine is covered by a 2 years guarantee valid from the delivery date unless otherwise agreed on the contract.

The manufacturer reserves the right to repair or replace defective parts during the warranty period.

The guarantee will not be valid if you do not follow the instructions and safety rules written in this manual.

All work covered by guarantee is carried out during normal working hours at an authorized workshop. If the job needs to be carried out at the customer's premises, travel expenses for technical staff will be charged to the customer. Transport costs for the equipment to and from the manufacturer's premises are charged to the customer.

By replacing the faulty part, the manufacturer is relieved of any responsibility to pay expenses incurred by the Dealer or by the Customer due to any assumed, present or subsequent damage, loss of earnings, agreed penalty, etc.

The warranty does not include replacement and/or repair of parts worn out or damaged by normal use of the machine.

1.9 Liability

The manufacturer cannot be held liable in the event caused by any of the following conditions:

- failure to comply with the manufacturer's recommendations for machine use and maintenance;
- improper use of the machine;
- failure to comply with safety legislation and Highway Code;
- wrong moves or operations during machine use and maintenance;
- inadequate maintenance
- use of non original spare-parts or parts suitable for another machine model
- changes to the machine, unauthorised by the manufacturer;
- exceptional environmental events and other events that cannot be related to the normal and habitual use of the machine.

In case the customer claims that an accident is related to a defect of the machine, they should prove that the damage is the main and direct consequence of the defect.

1.10 Terms and definitions

Elevated Working Platform (EWP) – a machine that can be used to lift people and carry out works standing inside the work platform

Working platform – platform equipped with railings and control panels, containing people authorised to operate.

Operators – people trained and instructed to use the elevating work platform

Maintenance engineer – qualified technician with special training to carry out all the routine maintenance operations described in this manual.

Authorised Service Centre – organisation consisting of one or more qualified technicians, authorised by the manufacturer to carry out special maintenance and repairs.

Danger area – area in which the machine is operating and where there is the risk to people of injury, even fatal or damage to health.

1.11 Symbols used

	**DANGER!** This symbol is used to describe procedures or instructions that, if not correctly followed, will cause or may cause death or serious injury
	**WARNING!** This symbol is used to describe procedures or instructions that, if not correctly followed, will cause damage to the machine
	**NOTE:** This symbol is used to indicate important information
	**PROHIBITED!** This symbol indicates dangerous or prohibited actions or procedures
	**OBLIGATORY!** This symbol indicates actions or procedures that must be followed
	**HARDHAT REQUIRED!** This symbol indicates actions or procedures that must be followed
	**HARNESS REQUIRED!** This symbol indicates actions or procedures that must be followed

2 MACHINE DESCRIPTION

2.1 Identification Data and Markings

Machine: Elevating Work Platform (EWP)
Model: Model: CS
Type: Type: 135
Year of Manufacturing: Reported on the identification label on the side of the machine

Manufacturer: Sequani Meccanica Srl
Località Terramatta 1
Rivoli Veronese (Verona)
Italy

Identification Label: The following identification label is found on the side of the machine, riveted on the turret:

Punching: The Factory Reference Number has been stamped also on the turret

2.2 General machine description

The Sequani CS135 elevating work platform consists of a chassis frame fastened to the crawler. Four hydraulic-operated stabilising feet are fastened to the frame to stabilise the machine. Stabilisers movement is carried out by means of a manually operated hydraulic distribution group. The rotating turret is fastened on the frame, the turret is mounted above a ball-bearing centre plate and operated by a hydraulic motor. The turret maximum rotation is 320°.

The jib group is fastened to the turret, it consists of a jib operated by a hoist cylinder; a telescopic boom composed by two parts (a fixed one and an extractable one) is fastened on the cylinder. The telescopic boom is moved by a hoist cylinder.

The telescopic part hosts a jib, moved by a hoist cylinder as well.

The work platform is fastened to the jib.

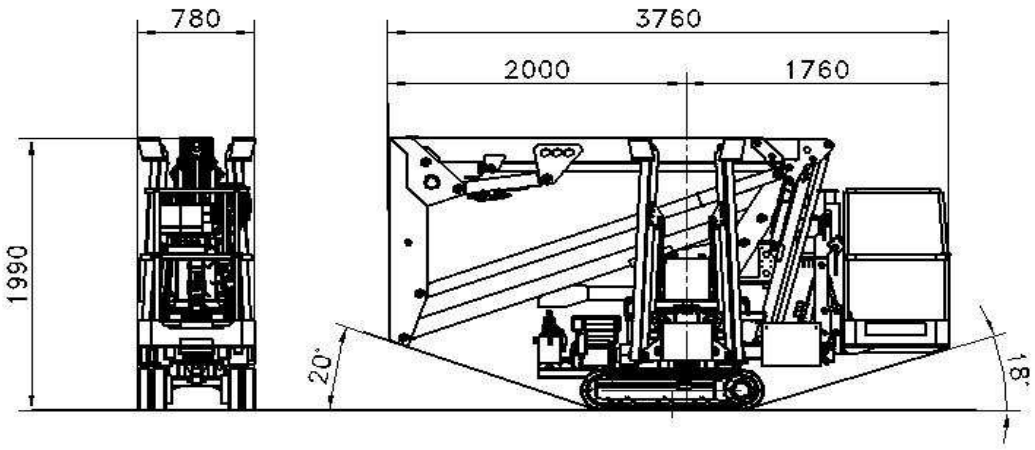
The work platform is kept on horizontal position (level) by means of hydraulic parallelogram levelling.

Machine movement is carried out by means of hydraulic controls. The control station is located on the work platform. Another control station, to be used in case of emergency, is fastened to the base turret. Power to operate the hydraulic devices is produced by an endothermic engine by means of a hydraulic pump. Electrical energy to controls is supplied by the battery.

Vehicle traction/steering is achieved by means of rubber tracks driven by reduction gears operated by hydraulic motors equipped with a holding brake (negative brake), that automatically blocks the crawler when the hydraulic motors are not powered. Steering is obtained by accurately varying the amount of oil flow to the traction motors by means of a mobile push button panel equipped with proportional levers. By driving one hydraulic motor in one direction and the other in the opposite one it is possible to keep turning radius to the minimum possible value.

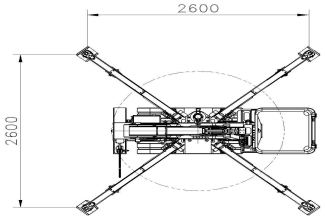
The following pages contain descriptions of machine controls, operating modes and devices.

2.3 Overall Dimensions



2.3.1 Overall Dimensions for Stabilised Machine (data refers to the portrayed vehicle)

Length	**3760** mm
Stabilised Machine Width (minimum)	**2600** mm
Stabilised Machine Width (maximum)	**2780** mm

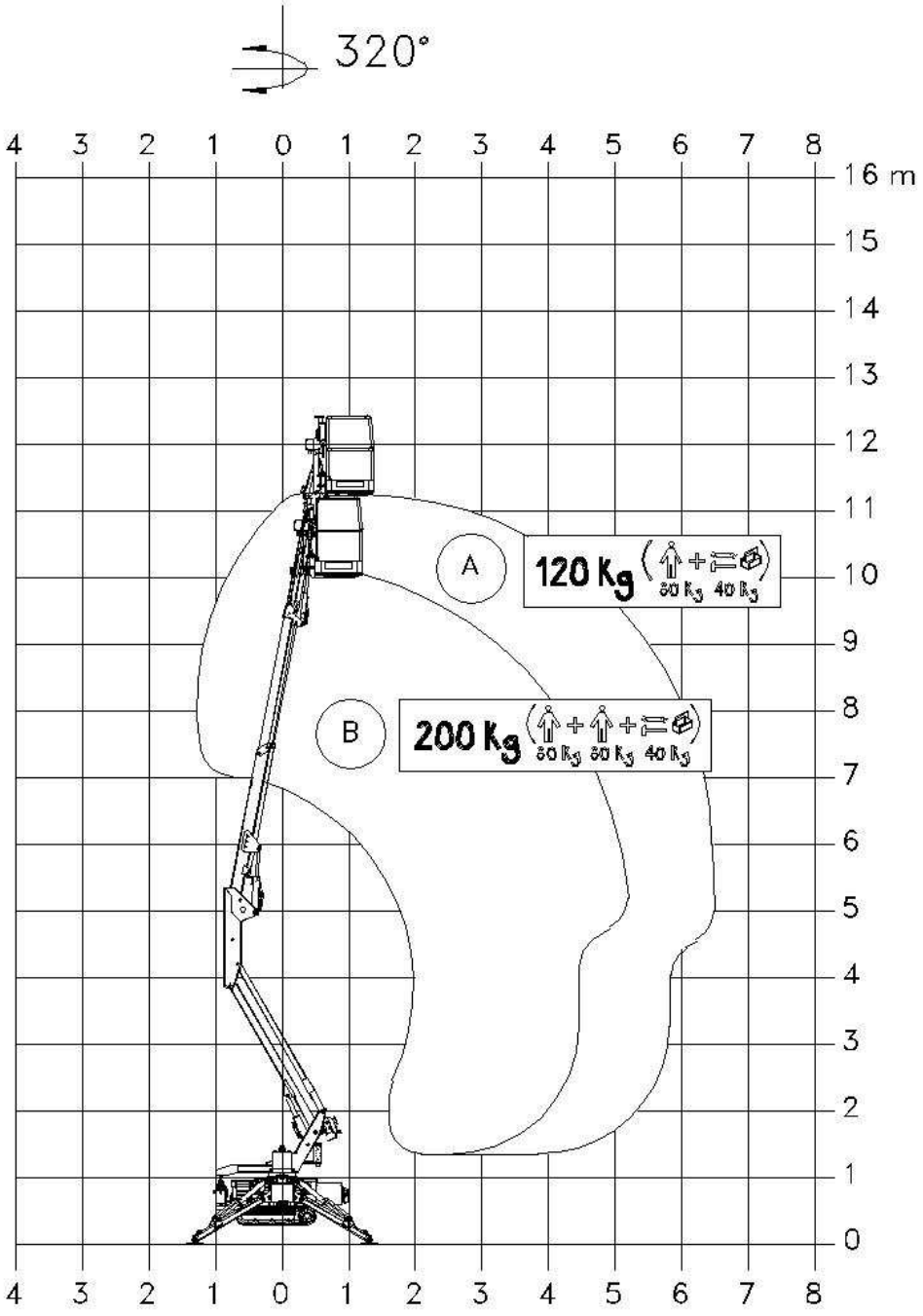


2.4 Technical Data

A		B
120 kg. (1 person plus equipment weighing 40 kg max.)	Maximum weight load on platform	200 kg. (2 people plus equipment weighing 40 kg max.)
11.30 m	Maximum Height of plating/floor	10.10 m
13.30 m	Maximum working height	12.10 m
6.50 m	Maximum radius (from the centre plate's centre to the platform edge)	5.10 m
7.00 m	Maximum working radius	5.60 m
3°	Maximum allowed ground incline	3°
0°	Maximum allowed frame incline	0°
12.5 m/sec	Maximum allowed wind speed	12.5 m/sec
320°	Turret Rotation	320°
780 x 700 x 1,100 mm	Working Platform Size	780 x 700 x 1,100 mm
20 daN	Maximum allowed manual lateral force	40 daN
12 V	Electrical system voltage	12 V
Hydraulic	Controls	Hydraulic
30 litre	Oil tank volume	30 litre
220 bar	Maximum working pressure	220 bar
1.45 ton	Overall weight	1.45 ton
1,500 daN	Stabiliser maximum ground reaction force	1,500 daN
2,600 mm	Stabilisation wheelbase from base plate pins (min)	2,600 mm
2,780 mm	Stabilisation wheelbase from base plate pins (max)	2,780 mm
2,600 mm	Stabilisers wheelbase	2,600 mm

NOTE: Please refer to the "EWP technical specifications and control log" manual that is part of the machine

2.5 Working area



2.6 Loudness

Airborne noise emitted by the machine is caused by the endothermic engine.

Noise measurement, carried out on the platform, 1.60 m above the plating/floor during raising, descent, rotation and extraction has not reported sound levels higher than 70 dBA.

2.7 Vibrations

The machine does not produce vibrations that may be harmful for the operator.

Measurements carried out during the most unfavourable working conditions have ascertained that:

- The frequency-weighted RMS of the acceleration suffered by the operators' upper limbs is lower than 2,5 m/sec^2;
- The frequency-weighted RMS of the acceleration suffered by the operators' whole body is lower than 0.5 m/sec^2;

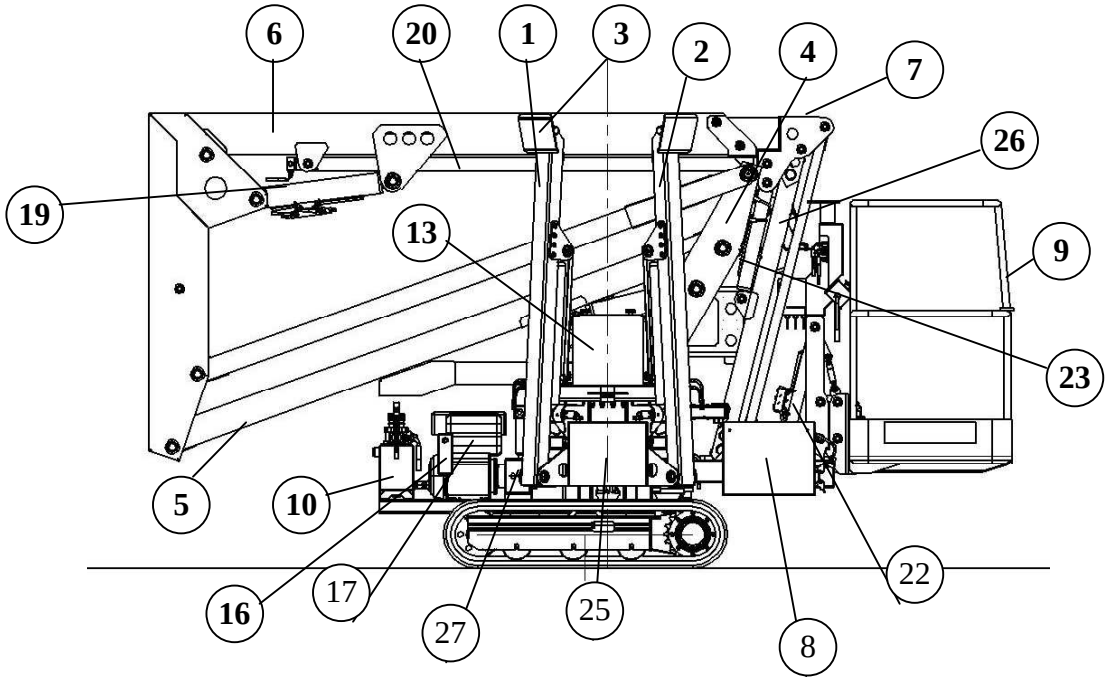
2.8 Gas emissions

The machine emits gases from the endothermic engine.

The vehicle battery emits hydrogen during recharge.

2.9 Main components

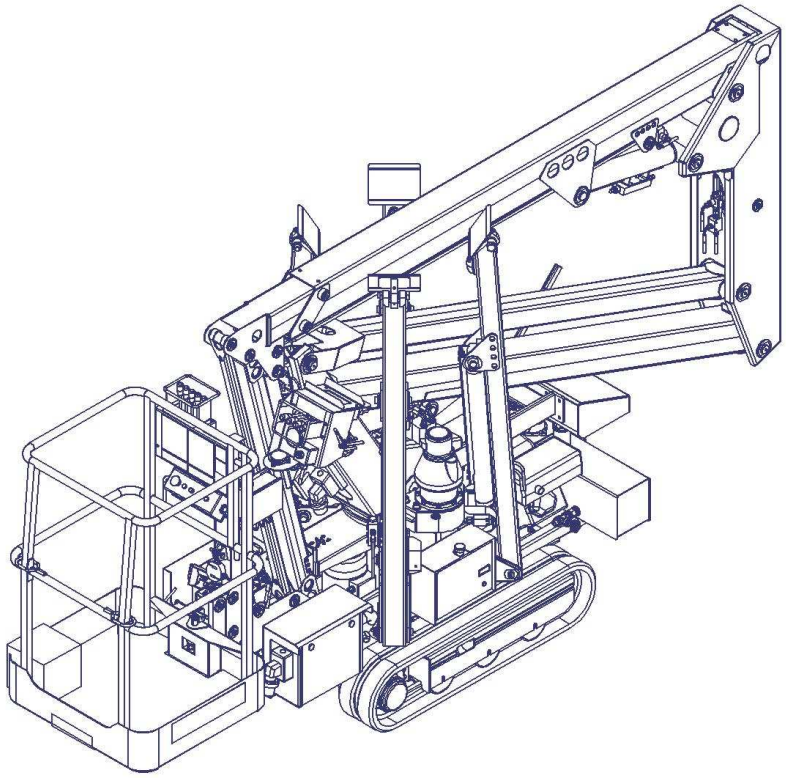
fig. 2.9.1



2.9.1 Key to symbols

1. ***Front Stabiliser***
2. ***Rear Stabiliser***
3. ***Base plate***
4. ***Rotating Turret***
5. ***Pantograph boom***
6. ***Base Jib***
7. ***Telescopic extractable jibs***
8. ***Vehicle Drive Control Board***
9. ***Working Platform***
10. ***Hydraulic Oil Tank***
11. ***Turret Rotation Motor***
12. ***Main Board***

fig. 2.9.2



13. ***Ground Emergency Controls***
14. ***Stabilisers Controls***
15. ***On-Platform Control Board***
16. ***Endothermic Motor Control Board***
17. ***Endothermic engine***
18. ***Pantograph lifting cylinder***
19. ***Telescopic boom lifting cylinder***
20. ***Telescopic boom extraction cylinder***
21. ***Platform Controls***
22. ***Working Platform Levelling Cylinder***
23. ***Jib cylinder***
24. ***Boom rest***
25. ***Electric-hydraulic Drive Assembly***
26. ***Jib***
27. ***Battery detacher panel***
28. ***Stabilisers-Drive-Working Platform Control Panel***
29. ***Crawler***

2.10 Safety Devices

fig. 2.10.1

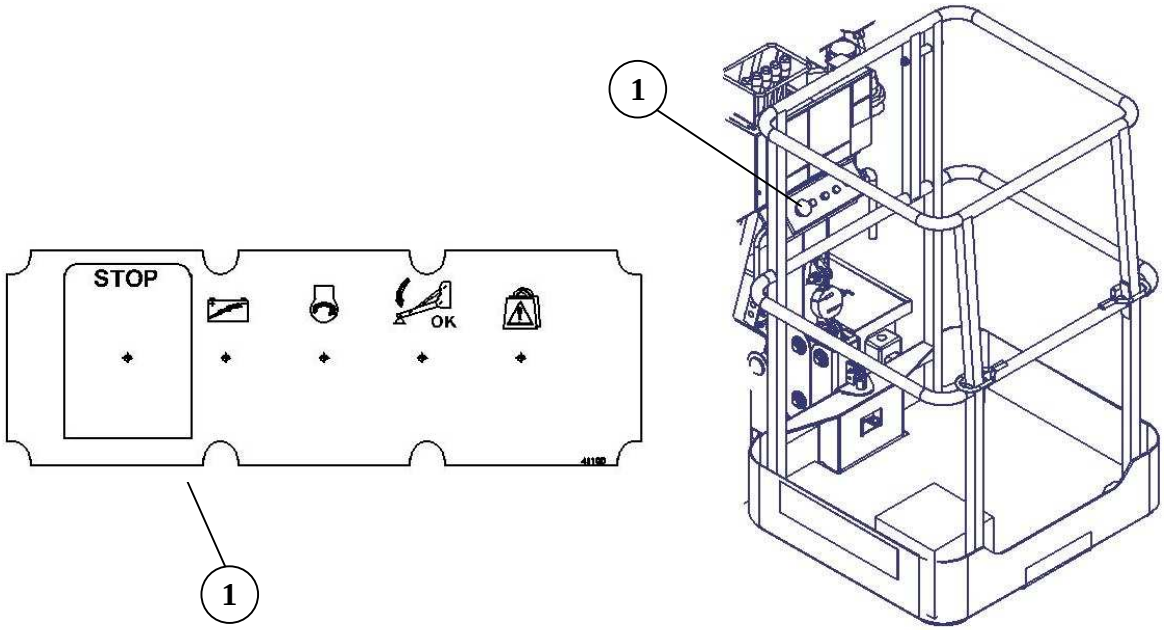
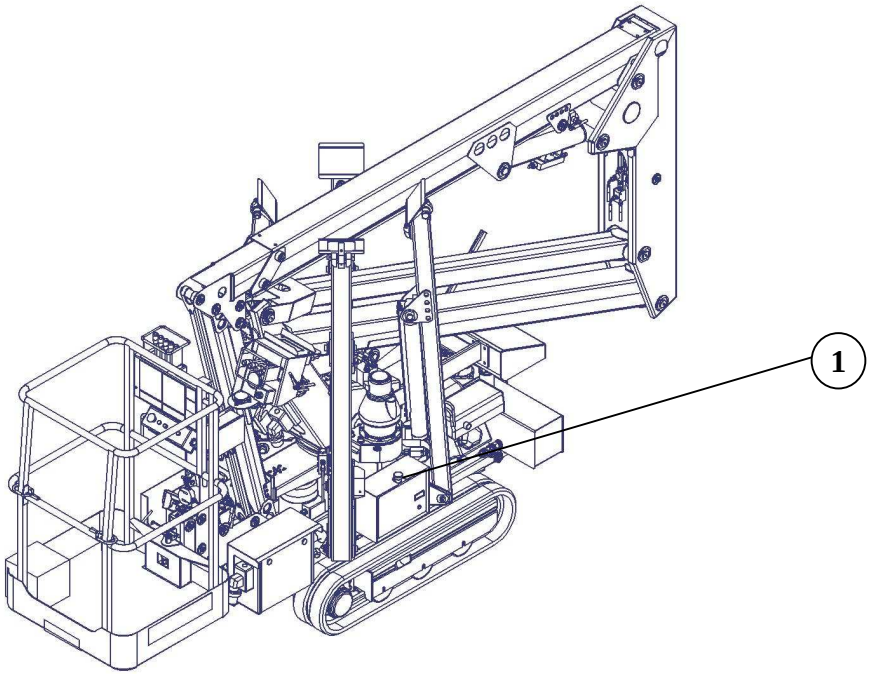


fig. 2.10.2

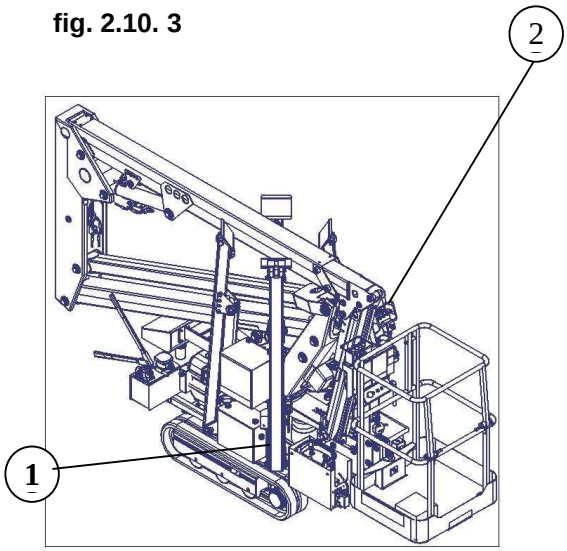


2.10.1 Emergency stop buttons

One red button on position 1 (pos. 1 fig. 2.10.1) on the control panel on the platform and another (pos. 1 fig. 2.10.2) on the main control panel on the ground.
Pushing one of the two buttons will deactivate all working platform operations and switch off the crawler's engine.
To restore the machine to normal operation turn the button clockwise.

2.10.2 Maximum pressure valve

fig. 2.10. 3



One is located on the base of the main electromagnetic valve (pos. 1 fig. 2.10.3) the other on the stabiliser distribution group (pos. 2 fig. 2.10.3).
The valves prevent the system from exceeding maximum working pressure.

2.10.3 Block valves in the cylinders

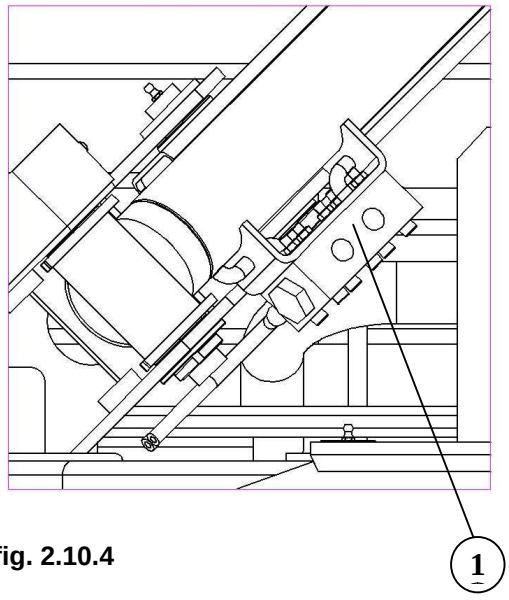


fig. 2.10.4

One is located on the base of the stabiliser cylinder (pos. 1 fig. 2.10.4) one on the telescopic boom lifting cylinder, one on the telescopic boom extraction cylinder (pos. 20 fig. 2.9.2), one on the pantograph lifting cylinder (pos. 18 fig. 2.9.2), one on the working platform levelling cylinder (pos. 22 fig. 2.9.2) and one on the jib cylinder (pos. 23 fig. 2.9.2).
The block valves are hydraulic-operated; in absence of pressure (e.g. in case one air supply hose breaks) they will prevent cylinders from moving without control.

2.10.4 Negative lamellar brake

It is located in the rotation reduction gear (pos. 11 fig. 2.9.1) operates in absence of pressure in the hydraulic system blocking the turret rotation.

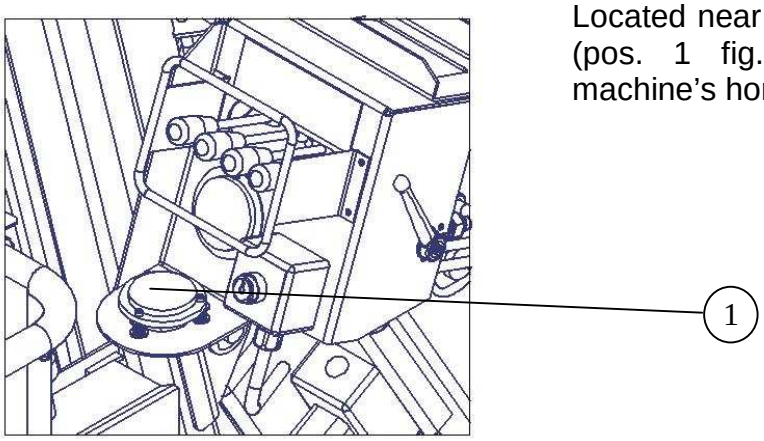
2.10.5 Anti-shock valve

It is located in the oil-pressure turret rotation motor (pos. 11 fig. 2.9.1), its function is to prevent the rotation movement from stopping abruptly.

2.10.6 Stabilisation control device

This device consists of a micro-switch on each stabiliser that checks the correct ground position on each stabiliser, signalling the minimum stabiliser stroke and the fact that it rests on the floor.

2.10.7 Level bubble



Located near the stabiliser control levers (pos. 1 fig. 2.10.5), it gauges the machine's horizontal position.

fig. 2.10.5

2.10.8 Jib/stabilisers Interlock

Micro-switch limit switch placed on the jib resting bracket (pos. 24 fig. 2.9.2). This switch allows stabiliser controls to be operated only when the Superstructure is completely closed, the boom rests on the resting bracket and the key switch is in the "stabilisers" position. The stabilisers controls are automatically switched off when the jib moves from resting position.

2.10.8.1 Working Platform overload control device

This device detects the load on the Work Platform. If the maximum load is exceeded, this switch will block all operations, light the overload warning light and switch on an audible alarm.
It switches off automatically once the overload has been removed.

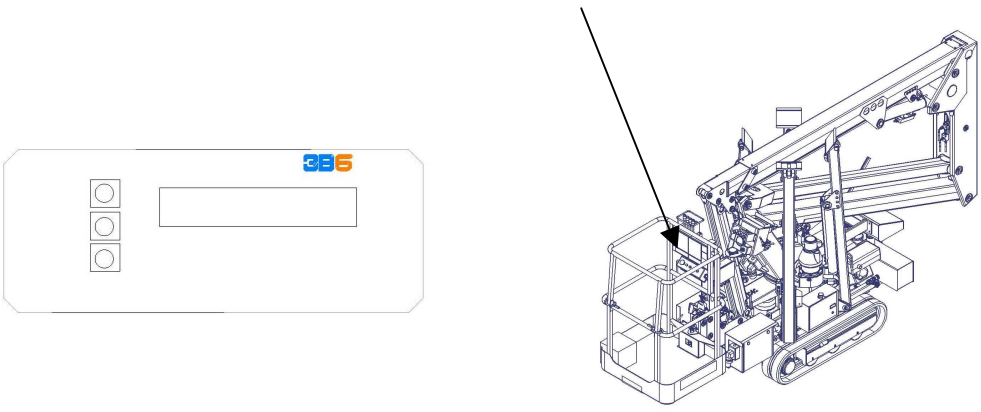
2.10.8.2 Ground/Platform Control board selector

This hydraulic switch prevents simultaneous use of both control boards (fig. 2.11.8 pos.2).

2.10.9 Anti-overturning device

The platform is equipped with an anti-overturning device called “area control”, consisting of 1 device used to select either of the two working areas (120-200kg).
This device is in operation when the 200 kg area is selected, it is triggered by two limit switches controlling the pantograph end and two limit switches at the telescopic boom extraction cylinder; monitored data is immediately processed by an electronic card.
When the cradle reaches the maximum allowed working radius a red warning light and an audible alarm are switched on to warn the operator:
From this point onwards only the movements that will bring the cradle back in the safe areas are allowed.
In case the movements that may bring the platform back to safety are allowed but the platform nonetheless does not perform them stop immediately and call Servicing.

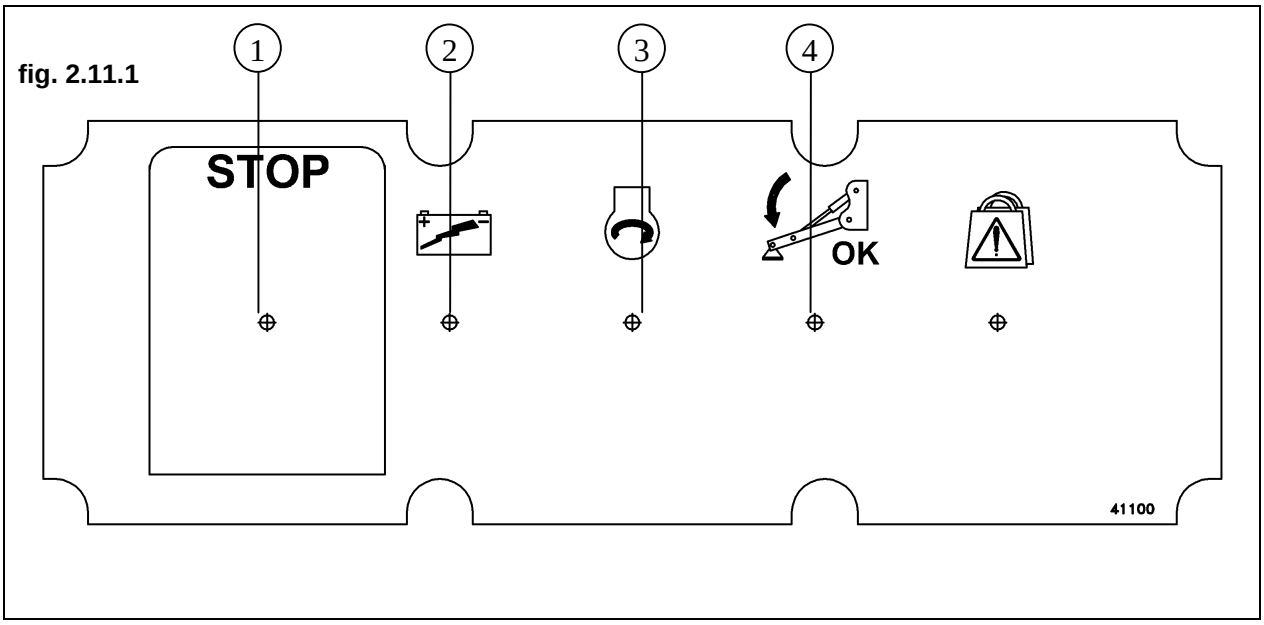
fig. 2.10.6



2.11 Description of Controls

2.11.1 On-Platform Control Board

fig. 2.11.1

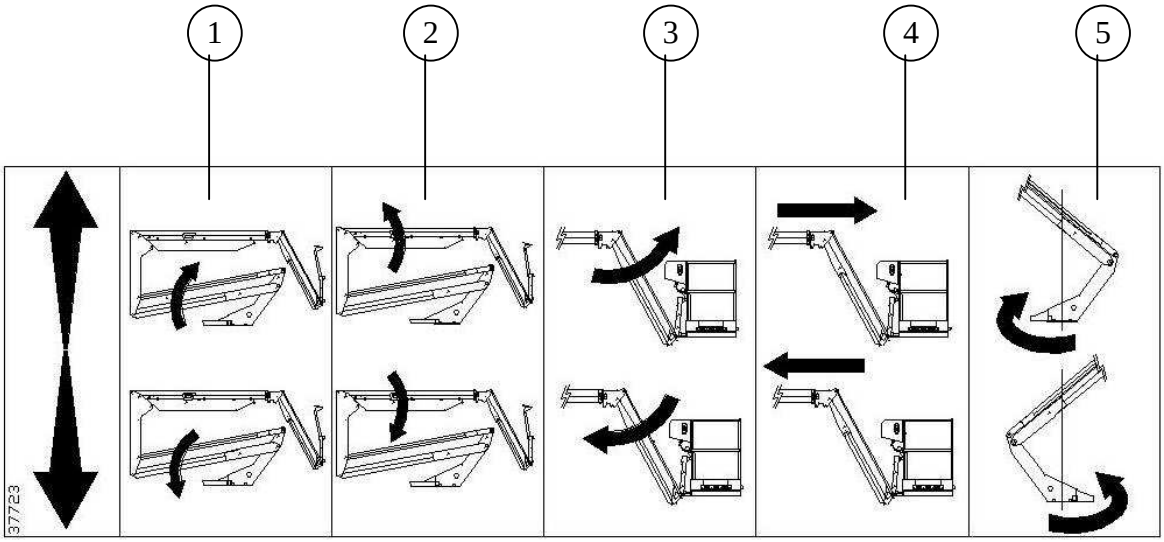


1. Emergency Stop - pushing the Emergency Stop button deactivates all machine controls and switches the engine off.
2. Electrical voltage presence warning light
3. Engine start button – push it to switch the engine on
4. Stabilisers warning light

	CAUTION! **The stabilisers warning light lights on when the base plate is at its minimum opening range and touches the ground.**

2.11.2 Working Platform Controls

fig. 2.11. 2



1. *Pantograph Boom lifting Proportional lever* – moving the lever upwards lifts the boom, moving it downwards lowers it.
2. *Telescopic Boom lifting Proportional lever* – moving the lever upwards lifts the boom, moving it downwards lowers it.
3. *Jib lifting proportional lever* – moving the lever upwards lifts the jib, moving it downwards lowers it.
4. *Telescopic Boom extraction proportional lever* – moving the lever upwards extracts the boom, moving it downwards retracts it.
5. *Turret rotation proportional lever* – moving the lever will rotate the turret according to the arrow sign direction.

2.11.3 Working area Control Panels

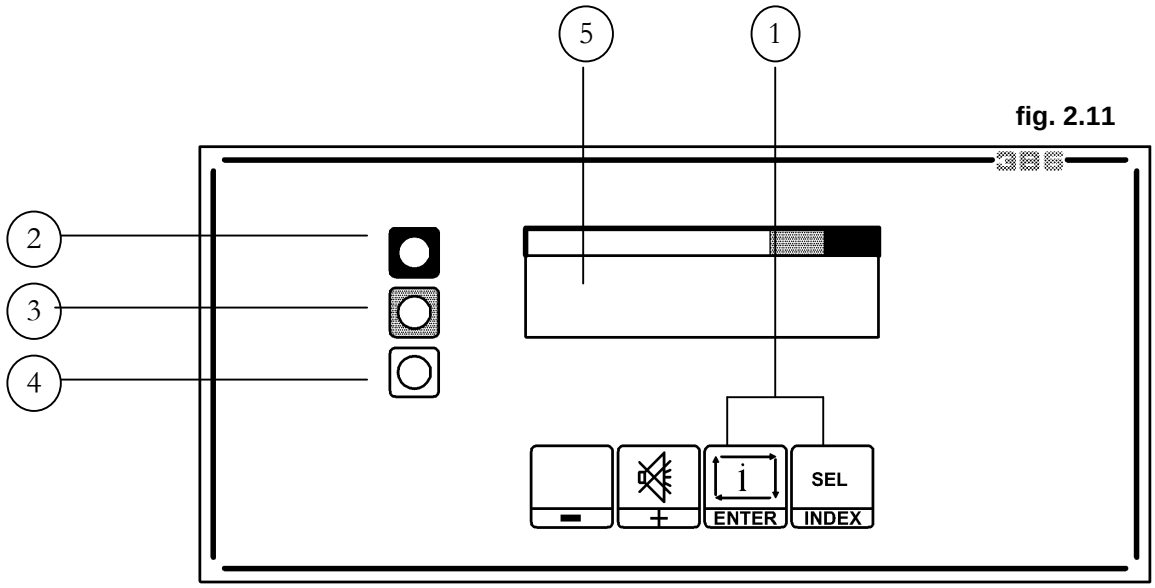


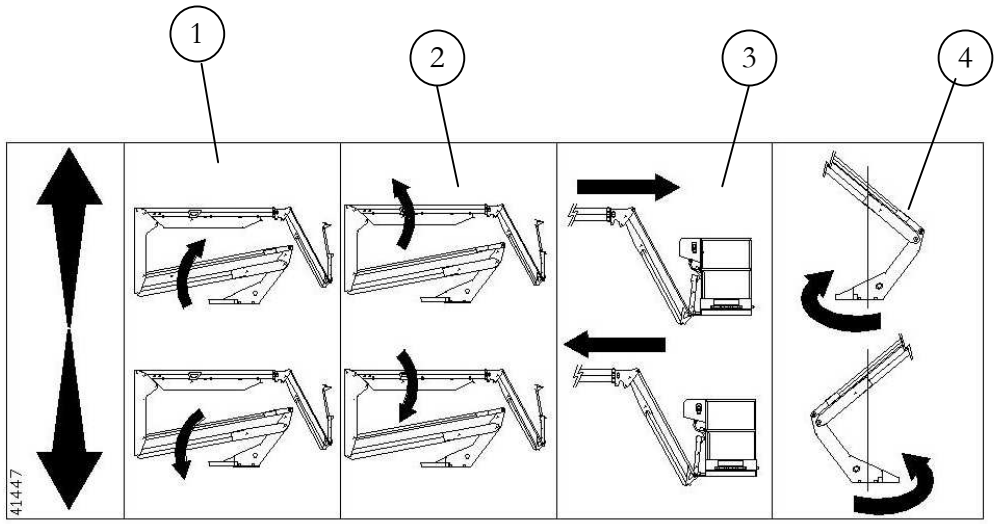
fig. 2.11

1) Selection switch 120/200 Kg: pushing at the same time ENTER and SEL for 5 seconds you choose the 200 kg or 120 kg area, only in the case you are not in a block area.
2) RED LED: overload light. This light is on when the weight on the basket is more than the maximum capacity allowed (at the same time an alarm will sound).
3) YELLOW LED: indicates the block of the area (at the same time an alarm will sound).
4) GREEN LED: when this light is on the 120 kg working area is in operation.
5) Display: shows the selected working area and damages diagnostics.

Ground Controls – Inside (Emergency Controls)

!	**NOTE:** **These controls are useable only in case of emergency. They are located in the turret, inside the protection casing.**

fig. 2.11. 3



1. *Pantograph Boom lifting Proportional lever* – moving the lever upwards lifts the boom, moving it downwards lowers it.
2. *Telescopic Boom lifting Proportional lever* – moving the lever upwards lifts the boom, moving it downwards lowers it.
3. *Telescopic Boom extraction proportional lever* – moving the lever upwards extracts the boom, moving it downwards retracts it.
4. *Turret rotation proportional lever* – moving the lever will rotate the turret according to the arrow sign direction.

2.11.4 Vehicle Drive Control Board

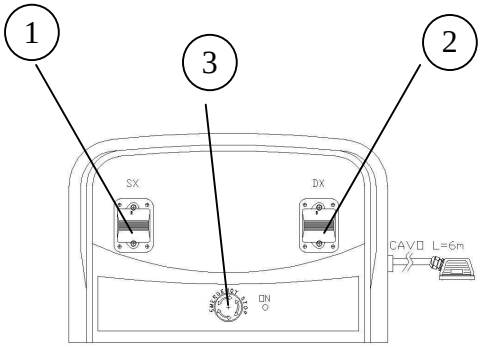
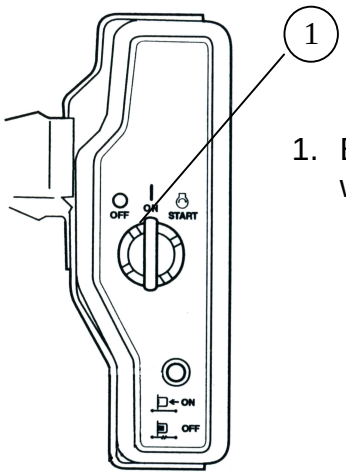


fig. 2.11.4

1. Left track control lever – moving the lever upwards moves the track forward, moving it downwards moves it backward.
2. Right track control lever – moving the lever upwards moves the track forward, moving it downwards moves it backward.
3. Emergency Stop. Pushing this button will deactivate all machine controls and switch off the engine.

2.11.5 9 HP Endothermic Engine Control Board

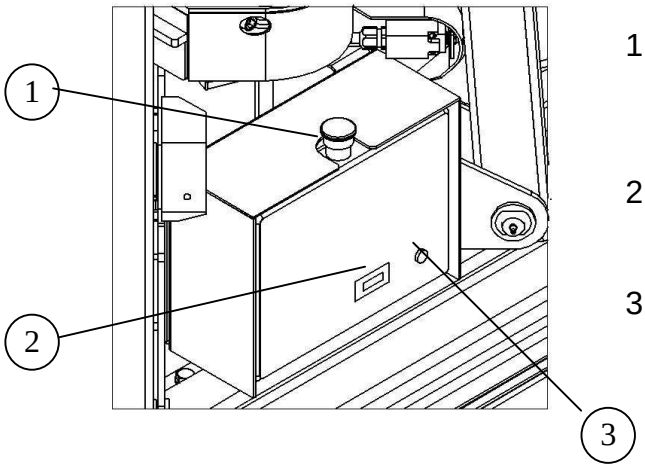
fig. 2.11.5



1. Endothermic engine start/stop – rotating the switch to the right will start the engine, rotating it to the left will stop it.

2.11.6 Main Board

fig. 2.11.6



1. Emergency Stop. Pushing this button will deactivate all machine controls and switch off the engine.
2. Working Hours counter
3. Electrical voltage presence warning light

2.11.7 Stabiliser Controls and level bubble

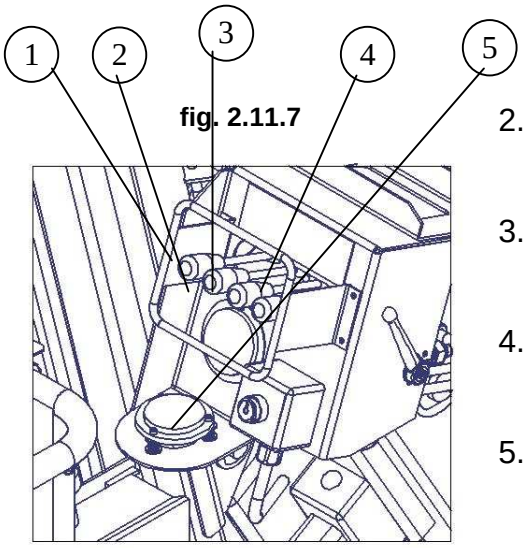
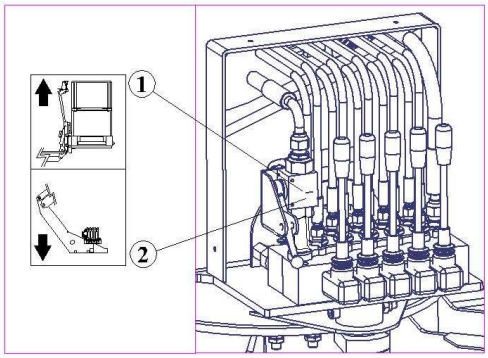


fig. 2.11.7

1. Rear left stabiliser control lever – moving the lever down will lower the stabiliser, moving it up will lift it
2. Front left stabiliser control lever – moving the lever down will lower the stabiliser, moving it up will lift it
3. Front right stabiliser control lever – moving the lever down will lower the stabiliser, moving it up will lift it
4. Rear right stabiliser control lever – moving the lever down will lower the stabiliser, moving it up will lift it
5. Level bubble

2.11.8 Ground Controls (Emergency Controls) / Platform Controls selection switch



This lever enables either the platform controls (pos.2) or ground controls (pos.1), disabling the other set of controls. It is locked in place using a padlock.

fig. 2.11.8

2.11.9 Battery detacher panel

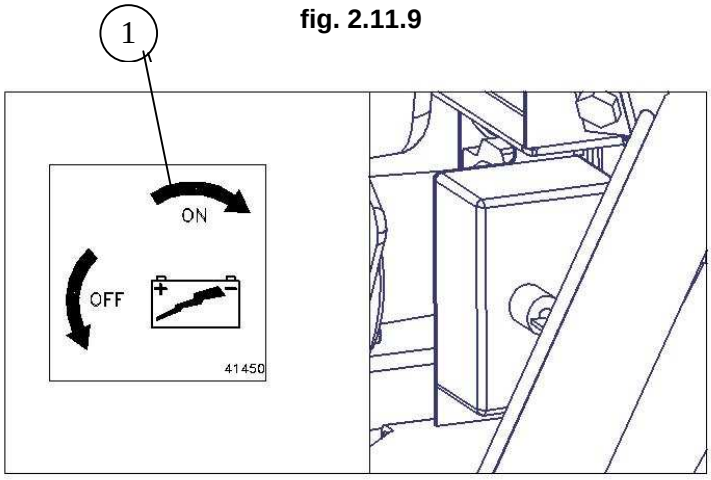
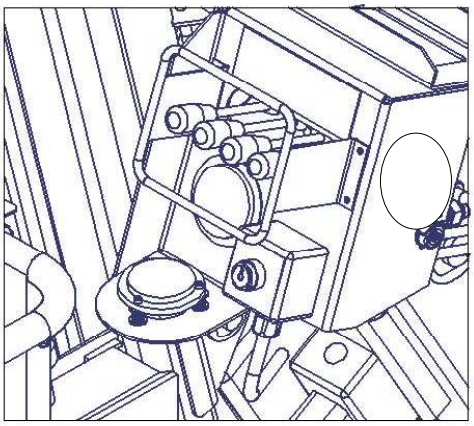


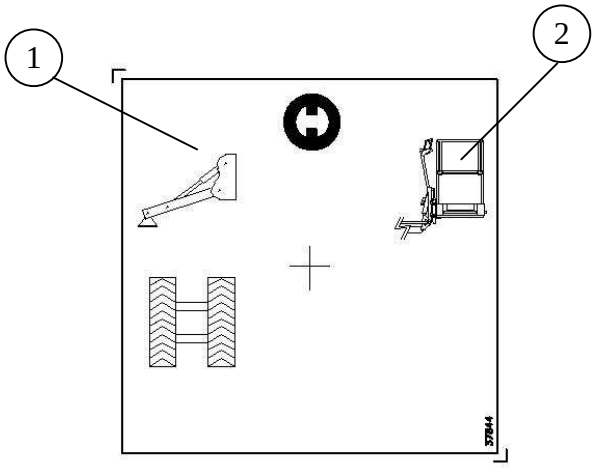
fig. 2.11.9

This switch interrupts the electrical circuit, rendering the platform non-operational.

2.11.10 Stabilisers and drive Working Platform Control Panel

fig. 2.11.10





Three-way key switch : - Rotating left: stabilisers-drive controls
- central position: idle
- Rotating right: working platform controls

3 SAFETY

3.1 Conditions of use

The EWP can be used to carry out works that require operators to be lifted to certain heights, for example:

- Whitewashing and other ordinary and special maintenance works on buildings
- Industrial plants and facilities maintenance
- Power lines maintenance and power plants installation
- Pruning

Usage limits are those described in this manual.
Any modality or usage conditions that are not within the limits described in this manual or not foreseen by the manufacturer are prohibited.

3.2 Environmental limits

The machine can be used in the following atmospheric conditions:

- temperature between -10°C and + 40°C
- humidity 80% at 40°C
- wind speeds less than 12.5 m/s (45 km/h) - 6° on th e Beaufort wind scale (annex 1)

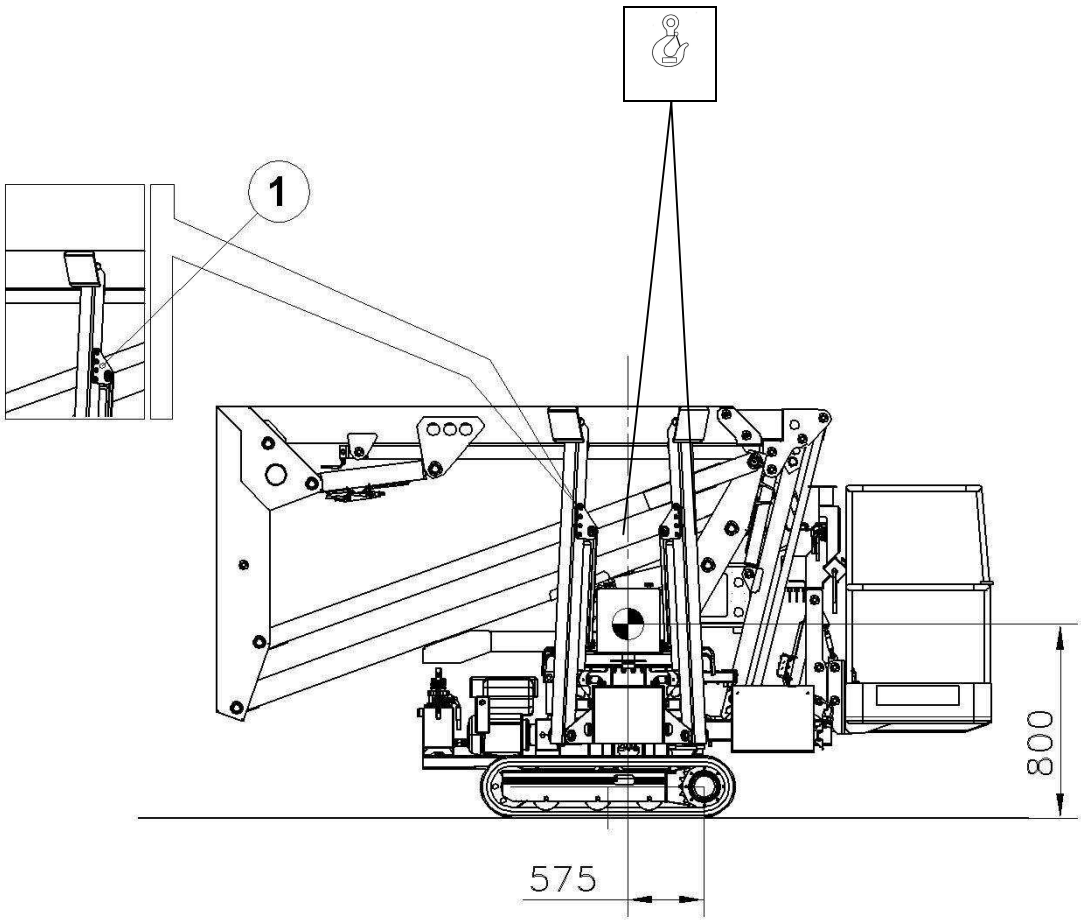
The machine cannot be used in the following atmospheric conditions:

- unfavourable weather or limited visibility (rain, snow, fog, etc.)
- presence of explosive environment
- inadequate ventilation in case of indoor areas
- insufficient lighting (lighting must be sufficient to cover the whole working area and to allow the machine-board decals to be read and all controls of emergency devices to be identified).

3.3 Lifting

The machine is equipped with four anchor points for lifting placed in the final part of the stabilisers (fig.3.3 pos.1).

fig 3.3



DANGER!

Use lifting devices with lifting power adequate to the load that needs to be lifted and moved.

Before lifting, check weight as stated in the "specifications" chapter.

3.4 Safety regulations – Obligations and Prohibitions

DANGER!

The non-compliance of safety regulations can cause serious accidents or death.

OBLIGATORY!

Always comply with all national safety laws and regulations, employer safety regulations and workplace-specific safety regulations.

CAUTION!

Carefully read and understand all safety regulations before moving to the next chapter.

ELECTRIC SHOCK HAZARD

- This machine is **not** insulated and it **does not** provide protection from contact or proximity to power lines.
- Users are required to keep minimum safe distance from electrical equipment and overhead wires, as per the following table. failure to comply with minimum safety distance may cause serious injury or death.

Minimum safe distance from power lines

Tension				Safe distance in Italy (Pres. Decree no. 547)	Safe distance (outside Italy)
from		to		(metres)	(metres)
0	V	300	V	5.00	Avoid contact
300	V	50	Kv	5.00	3.10
50	kV	200	Kv	5.00	4.60
200	kV	350	Kv	6.10	6.10
350	kV	500	kV	7.60	7.60
500	kV	750	Kv	10.70	10.70
750	kV	1000	Kv	13.70	13.70

–Calculating this distance always consider the machine's maximum boom reach.

–The machine must not be used as earth for welding works.

–The machine must not be used during rainstorms or in presence of lightning.

OVERTURNING HAZARD

- Use of the portable drive control from the platform is forbidden.
- It is forbidden to move the machine from the working platform.
- Before using the machine make sure that the working ground can stand the machine's weight and the pressure exerted by the stabilisers. The maximum load is reported on the stickers (on each stabilisers) and in the specifications in the manual.
- The machine must always be located only on a level and steady surface. It is forbidden to stabilise the machine on soft, muddy, icy or slippery ground or near holes, ditches or manholes.
- Do not rest the platform on other machines or structures.
- It is forbidden to exceed the maximum allowed frame incline (reported in the specifications and stamped on the label on the side of the machine). Do not operate the machine in case ground slope or incline exceed 3°.

- It is forbidden to exceed the maximum allowed working load and/or the maximum number of allowed people (reported in the specifications and stamped on the label on the side of the machine).
- It is forbidden to overload the working platform once it has been lifted. In case it is necessary to disassemble parts when the platform has already been lifted, carefully check weight to avoid exceeding maximum load.
- It is forbidden to use the machine with wind faster than 12.5 m/s (45 km/h) or during gusts of wind.
- It is forbidden to increase the working platform's surface or load. Increasing the surface subject to wind action decreases stability.
- The machine must not be used with hostile weather, during rainstorms or in presence of snow or fog.
- Do not push or try to move any object outside the platform. Maximum manual stress allowed is 40 daN
- It is forbidden to modify, replace or disable any machine part that may affect its safety or stability.
- It is forbidden to modify or alter the working platform in any way. Mounting connections to support tools or other materials on the working platform, on the pad or on the handrail increases weight, load and platform surface exposed.
- It is forbidden to load metal wires, cables or similar objects on the working platform. These objects may get stuck or tie to a fixed object outside the platform.
- It is forbidden to modify, replace or remove any machine part that may reduce overall platform weight or stability, batteries and so on.

- It is forbidden to place or fix overhanging loads in any part of the machine. It is forbidden to place loads on the outside of the machine or to use it to lift hanging loads. It is forbidden to use the machine as a crane.
- It is forbidden to use the machine to lift loads using the platform or to use the machine as a hoist.
- It is forbidden to use the machine to move people from a floor to another using the platform or to use the machine as a lift.
- It is forbidden to use the platform controls to free the platform if it is blocked or in any way hindered by a nearby structure. Contact qualified staff for assistance.

FALLING HAZARD

- Users must wear anti-falling equipment in compliance with the laws in force. The safety anchor rope shall be clamped to the special connection located on the working platform.
- It is forbidden to fasten operators working outside the platform to the platform's safety rope connection.
- It is forbidden to sit or climb on the working platform rail.
- It is forbidden to use ladders, scaffolding or planks in the platform to further climb up.
- It is forbidden to rest ladders on the machine's frame.
- It is forbidden to descend from the working platform once it has been lifted. It is forbidden to descend from the boom.
- The platform's working pad shall be kept free from debris.
- Check that the working platform access gate is correctly closed before using the platform. It is forbidden to lock the access gate in the "open" position.

COLLISION HAZARD

- Always check the working area to make sure there is no danger or potential threat overhead.
- During boom movement always check the working area to avoid hitting objects with the boom or the platform.
- Pay the utmost care in grabbing the platform's rail to avoid being crushed.
- Operators are recommended to wear a standard protection helmet during machine operation. Do not lower the boom if the area below is not free from people or obstacles.

WORK ENVIRONMENT HAZARDS

- Do not use the machine if temperature is lower than –10 °C or higher than 40 °C. In presence of environment temperatures below or above said limits, contact the manufacturer.
- Always operate the machine in an adequately ventilated area to avoid carbon oxide poisoning.
- It is forbidden to use the machine in hazardous environments or in presence of gases, flammable or explosive materials or in areas with potentially explosive atmosphere.
- Do not start the engine in presence of traces or scent of gas, petrol, diesel oil or other explosive substances.
- It is forbidden to use the machine in environments where visibility is inadequate for safe machine operation or movement.
- The machine must not be used for playing games.

MACHINE HAZARDS

- Always carry out a thorough pre-operational check on the machine and test all functions before any working shift.
- Put the machine out of service immediately in case of malfunction or failed safety devices. Never use the machine if damaged or broken.
- Never use the machine in case of hydraulic oil or air leaks. Hydraulic oil or air leaks may cause burns or skin injuries.
- Make sure that all maintenance checks have been carried out as specified in the manual.
- Make sure that all decals are present and legible.
- Make sure that the operator's instruction manual is complete, legible and located in its housing in the cab.

3.5 Summary table of Operator Rules

SEQUANI MECCANICA s.r.l.

INSTRUCTIONS RULES FOR THE OPERATOR

1– This equipment is only to be used by trained professionals.
2– Do not move the equipment on its crawlers from the work–platform.
3– Never exceed the maximum allowed capacity.
4– Harnesses and helmets must be used on the platform.
5– All manufacturer's instructions of use and maintenance must be carefully followed.
6– All applicable health and safety regulations must be followed when using the equipment.
7– Do not use the equipment if it is working abnormally or improperly.
8– Check all safety devices before using the equipment.
9– Level the machine correctly before use, using the stabilizers that must be completely extracted and positioned in order to raise the crawlers.
10–Do not use the equipment on weak or broken surfaces. Avoid inclines or other surfaces which may compromise the stability of the equipment.
11–Never move the vehicle when the platform is raised.
12–Do not use the platform closer than 5 meters from any electrical lines.
13–Do not attach wires or cables or anything else to the platform.
14–Do not use ladders, stools or anything else in the platform to gain extra height.
15–Operate all controls in a smooth and consistent manner.
Never make abrupt movements or direction changes. Before changing manoeuvre stop the joystick in neutral position.
16–Before moving the platform, verify that there are no obstacles or personnel in the working area.

THE MANUFACTURER ASSUMES NO RESPONSIBILITY FOR ACCIDENTS CAUSED BY NON–OBSERVANCE OF THE ABOVE RULES

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3.6 Operator Position

During movement the operator shall stand at least 3 metres away from the platform.

During use the operator shall control the platform using only the control panel on board of the platform.

During machine stabilisation the operator shall operate from the ground, beside the working platform.

3.7 Danger Zone

The danger zone is the circular area covered by the boom in full extended horizontal position.

It is forbidden to stay in this area.

The borders of this area shall be marked with special barriers like special ribbon, chains and so on.

Use the special road signals normally used for operations in road construction sites.

3.8 Residual risk

Mechanical risks:

risk of foot crushing during stabilisation

danger of crushing limbs due to contact with the boom joints as the boom closes.

Risk areas are indicated with appropriate decals.

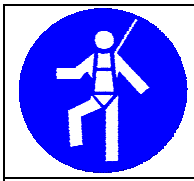
3.9 Individual Safety Devices

All people working on the platform shall wear individual anti-falling protection apparel (slings) compliant to the laws in force, fastened by a safety cable to the platform anchor points.

This equipment shall be used in compliance with manufacturer's directions and the laws in force.

It is also recommended to wear helmets with chinstraps.

Other devices may be necessary depending on the type of work and the working environment, for example gloves, goggles, ear-protection headsets and so on. The need of individual protection devices and their type shall be assessed by the employer or by the construction site manager.

	**OBLIGATORY!** The procedures and actions indicated with this symbol are obligatory
	**OBLIGATORY!** The procedures and actions indicated with this symbol are obligatory
	**OBLIGATORY!** The procedures and actions indicated with this symbol are obligatory

4 OPERATING INSTRUCTIONS

4.1 Introduction

CAUTION!

Carefully read and understand all the previous chapters before reading this one.

The Operating Instructions chapter provides all instructions required to operate the machine. The operator is bound to follow all instructions contained in this chapter and observe safety laws and regulations.
The machine shall be used only by operators with specific skills and training for this peculiar type of machine and authorised to operate. If the machine is to be used by more than one operator during different phases of the work shift, then all operators shall have the same training, follow these instructions and comply with safety laws and regulations.
This means that **all** operators must:

1 Avoid hazardous situations.
2 Always carry out pre-operational checks.
3 Always carry out functions test before operating the machine.
4 Always carry out the working area check.
5 Use the machine only for the functions it has been designed for.

OBLIGATORY!

Always comply with all national safety laws and regulations, employer safety regulations and workplace-specific safety regulations.

4.2 Movement

This elevated working platform is mounted on a crawler, which is not type-approved for road use.

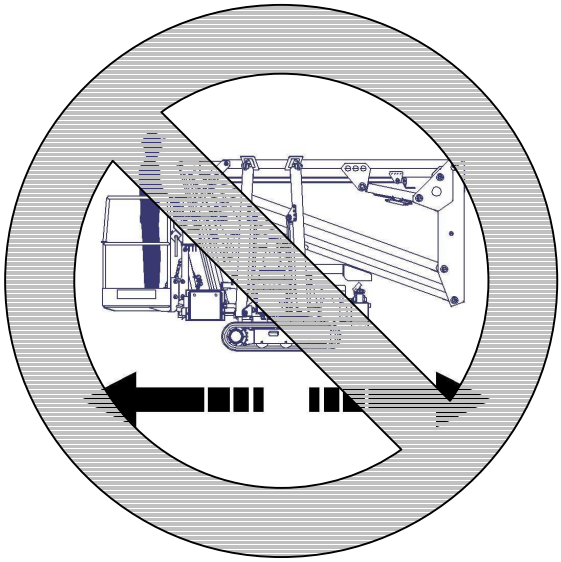
4.2.1 Checks and tests to be carried out before movement

- Check the lubricating oil level.
- Check that the working platform and the booms are folded closed.
- Make sure all the stabilisers are completely retracted.
- During machine movement always check that speed matches local conditions and all regulations, that the path on which the machine moves does not feature excessively steep or bumpy roads.
- During movement pay attention to machine encumbrance (check the technical specifications)

4.2.2 Platform movement

DANGER!
It is forbidden to stay on the platform during its movement.

DANGER!
Operators carrying out platform movement must not climb on the platform.



DANGER!
Always use adequately sized access ramps.

DANGER!
During movement the operator shall stand at least 3 metres away from the platform.

- Do not exceed the maximum allowed ground inclination.
- Do not tread on steep roads where the crawler tracks may lose the grip (slippery or wet roads, ice, snow).
- Do not tread on roads whose surface is so uneven that it may cause the crawler tracks to lose grip or traction, in particular in case of abrupt level changes.
- Do not tread on hard, pebbly and uneven surfaces (grovel and river rock), or abrasive (sand, stones, minerals and so on).

- Avoid steering on asphalt and cement as much as possible to avoid early wearing down of the track's sliding shoes.
- Avoid moving the crawler on asphalt roads when road temperature exceeds 60° C to avoid early wearing down of the track's sliding shoes.
- Do not operate the machine if one of the tracks is loosened.
- Do not move the machine on surfaces stained with oil or fuel, and in case it happens immediately clean the track.
- Avoid using rubber tracks in seaside areas since salty air and salt in general may erode the adhesion between rubber and inner metal core.

CAUTION!
Check that the endothermic engine fuel tank contains enough fuel.

DANGER!
The ramp should be long enough to have a 15° slope.

PLATFORM USAGE MODALITIES.

1- Rotate the battery detacher switch to "ON" (fig.2.11.9 pos.1), to provide electric power to the engine.
2- Start the endothermic engine by rotating the key (fig.2.1.5 pos.1).
3- Remove the portable drive control panel from the housing (fig.2.9 pos.8) and strap it on.
4- Check that the controls are in "drive" position (fig.2.11.10 pos.1).
5- Move the machine by acting on drive control panel levers 1 and 2 (fig.2.11.4), always keeping a minimum distance of 3 metres from the platform, making sure that there are not hindrances or obstacles along the road.
6- Once the destination (i.e. the working place) has been reached, return the drive control to the housing. Use the elevated platform as described in chapter 4.3.

4.3 Use of the Elevated Working Platform

CAUTION!

Always comply to road regulations when working in roads or in areas open to traffic; always use visual and audible signals (like flashing lights) and the relevant road signals.

OBLIGATORY!

The working area must be fenced.

4.3.1 Checks and tests to be carried out before machine operation

CAUTION!

Before using the machine users must have read and understood this operator's and maintenance manual

CAUTION!

Use the elevated working platform (EWP) only for the uses described by the manufacturer and mentioned in this manual

Before using the machine, it is mandatory to check that:

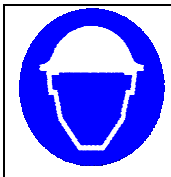
1. The ground is solid and capable to stand the machine weight (the load exerted by each stabiliser is found on the specifications and on the stabiliser)
2. Check that the ground is flat and level or in any case that incline is below 3° (maximum allowed incline)
3. Carry out the working area check (**see chapter 3.3.**).
4. Check if there is any obstacle or overhead line in the working area that may hinder or restrict machine use
5. Check that the Use and Maintenance Manual is available, readable and that no parts of it are missing
6. make sure that all decals are present and legible. Check Chapter 6 – MAINTENANCE – Decals Position.
7. Check the hydraulic oil level, refill if necessary. Check Chapter 6 – MAINTENANCE.

8. Inspect the Elevated Working Platform (EWP), checking all the following areas and components for damages, oil leaks or missing/improperly installed parts:
   - electric components, wiring and cables
   - piping, fittings, cylinders and distribution groups
   - centre plate rotation motor
   - Nuts, bolts and other fastening equipment
   - cracks in welds or structural parts and damages to the machine
   - working platform and access gate
   - limit switches and safety devices
   - check integrity of individual protection devices before use
   - wear the sling and any other IPD (Individual Protection Device) before boarding the platform
   - fasten the sling spring catch to one of the anchor points located within the working platform

9. Check that the switches for the levelling of the basket are in the deployment position and that the block padlock is closed

	**If the ground is not capable of standing the machine weight, use wood boards and make all necessary checks before use.**

	**Before climbing on the platform make sure that the machine is correctly stabilised: the crawler must be lifted and levelled and all four stabilisers shall rest on adequately stiff ground.**

	**Before boarding the platform, wear the helmet**

	**Before boarding the platform, wear the sling**

After having started and stabilised the Elevated Working Platform, and before boarding it, make sure that the ground controls work correctly.

After having boarded the Elevated Working Platform, make sure that the controls on the platform work correctly.

4.3.2 Elevated Working Platform (EWP) stabilisation

To stabilise the platform operate as follows:
- board the Working Platform
- check that the access gate is closed
- check that the control switch is in drive/stabilisers position (fig.4.3.2 pos.1).

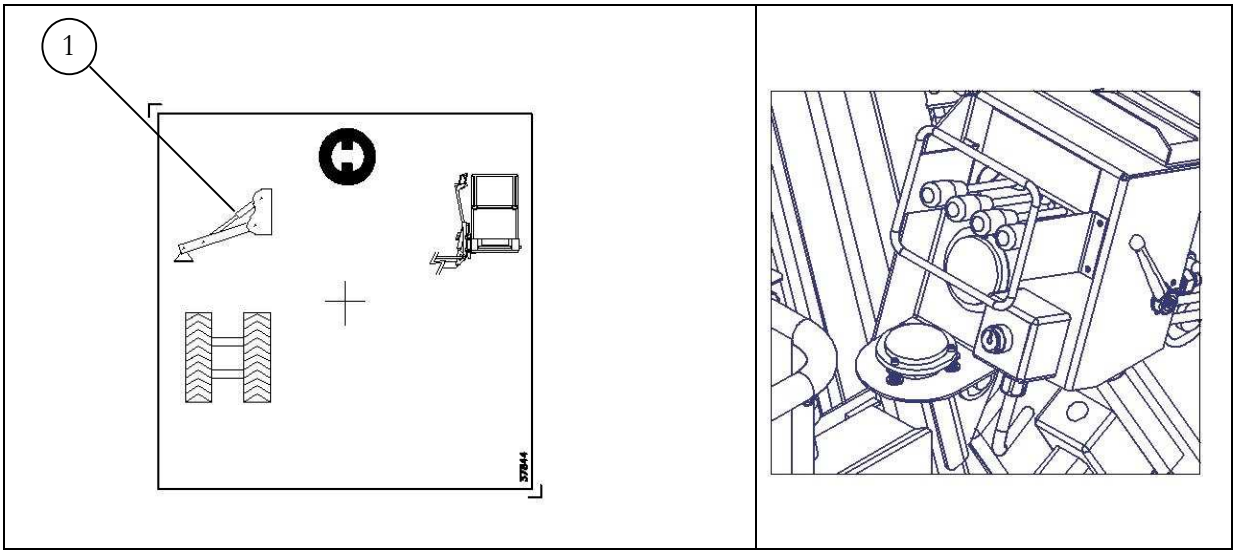


fig.4.3.2

Move to the control panel in the middle of the working platform and check that the voltage light is on (pos.2 fig.4.3.3).
Check that the stabilisers warning light is not lit: this would indicate a malfunctioning of the stabilisers' limit switches (pos.4 fig.4.3.3).

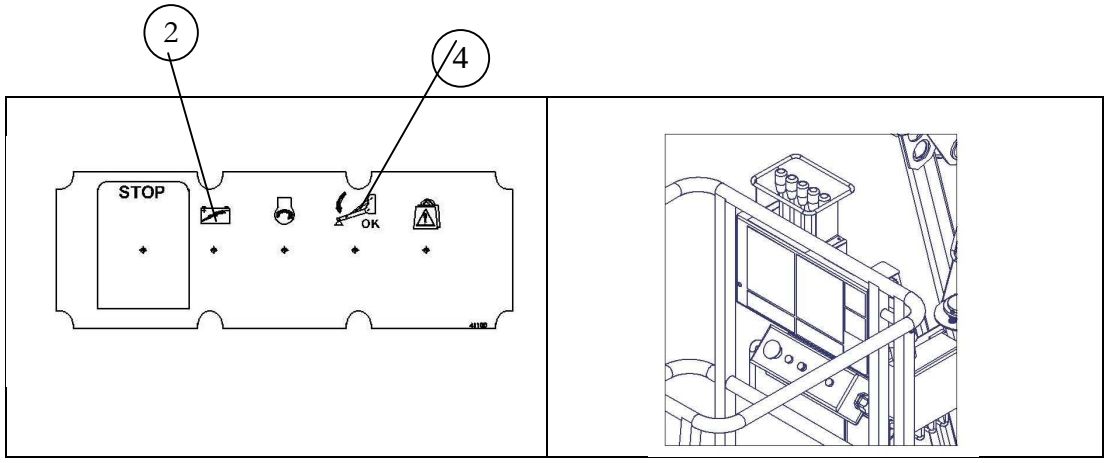


fig. 4.3.3

Correctly stabilise the platform as follows:

Lower the stabilisers by operating the levers alternatively ***(pos. 1-2-3-4 fig. 4.3.4)***. Moving one lever downwards extracts (moves downwards) the stabiliser, moving the lever upwards retracts it (moves it upwards). Fully extract the stabilisers to lift the tracks. The stabilisers' controls position is shown in figure 4.3.4.

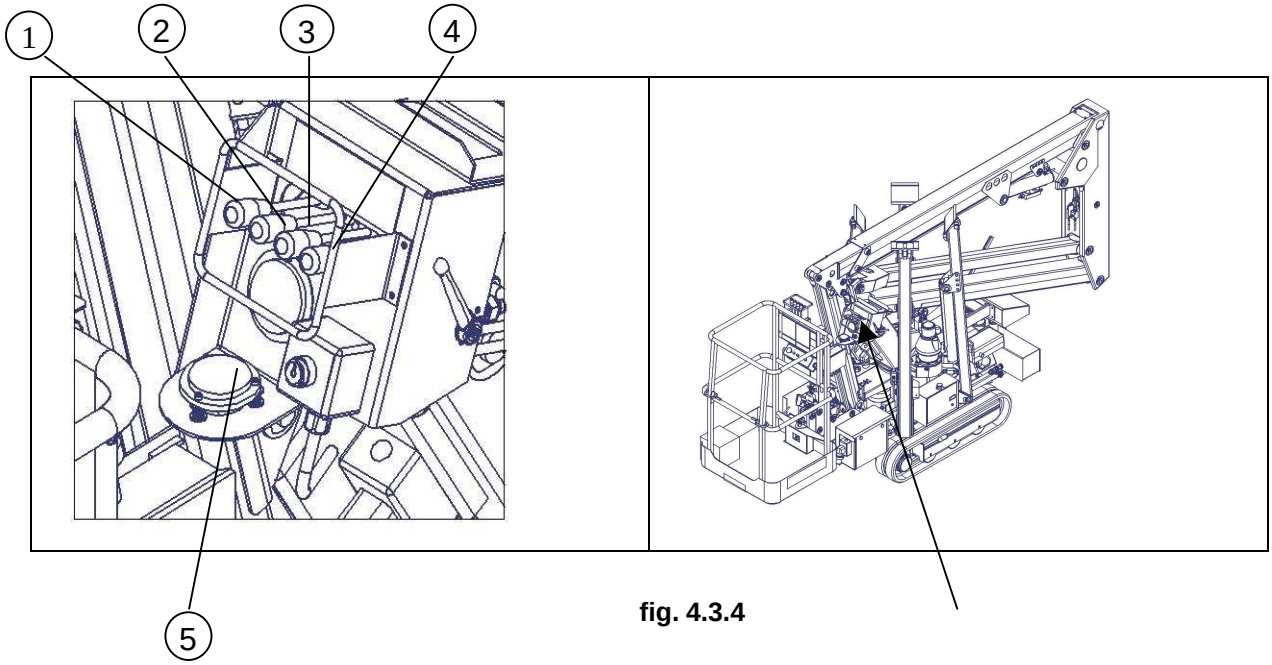


fig. 4.3.4

1. Check the level bubble ***(pos.5 fig. 4.3.4)*** located on the side of the stabilisers' controls and accurately level the platform by moving the stabiliser levers accordingly. The machine has been correctly levelled when the air bubble stays in the central section of the gauge (0º) .

2. Check that the warning light has switched on ***(fig. 4.3.3 pos 4)***, signalling authorisation to raise the boom.

⚠	**The warning light's switching on does not indicate that the crawler has been correctly stabilised. This indication is provided by the level bubble.**

4.3.3 Platform commissioning

To commission the working platform operate as follows:

1. Rotate the selector key switch ***(pos.2 fig. 4.3.5)*** in the "Working Platform" position

2. Remove the key, that the operator shall always keep with him

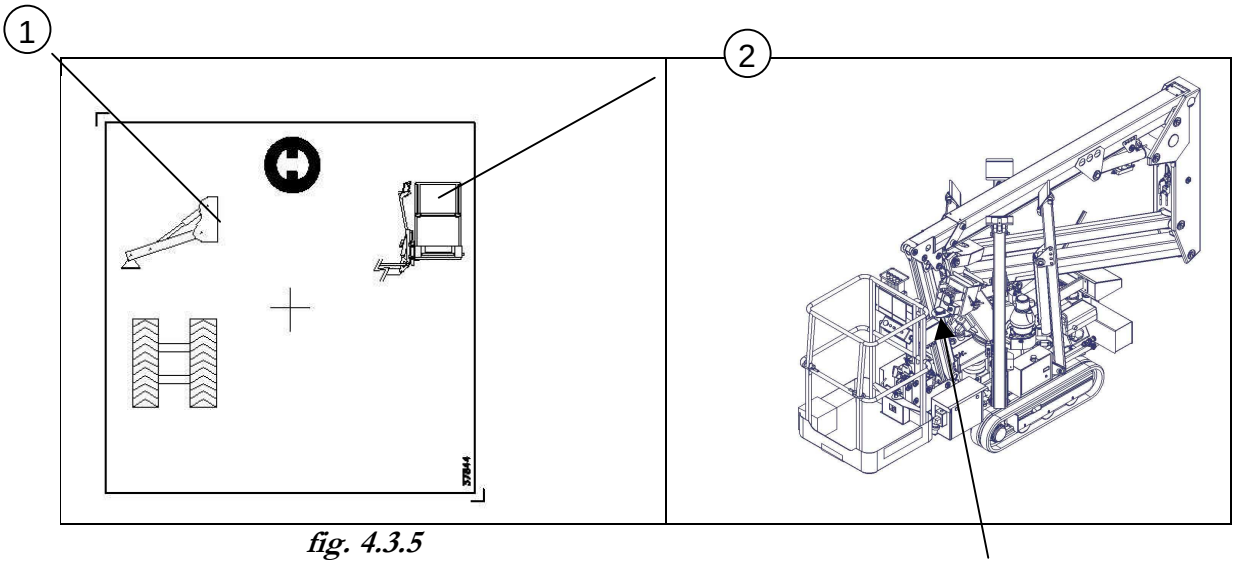


fig. 4.3.5

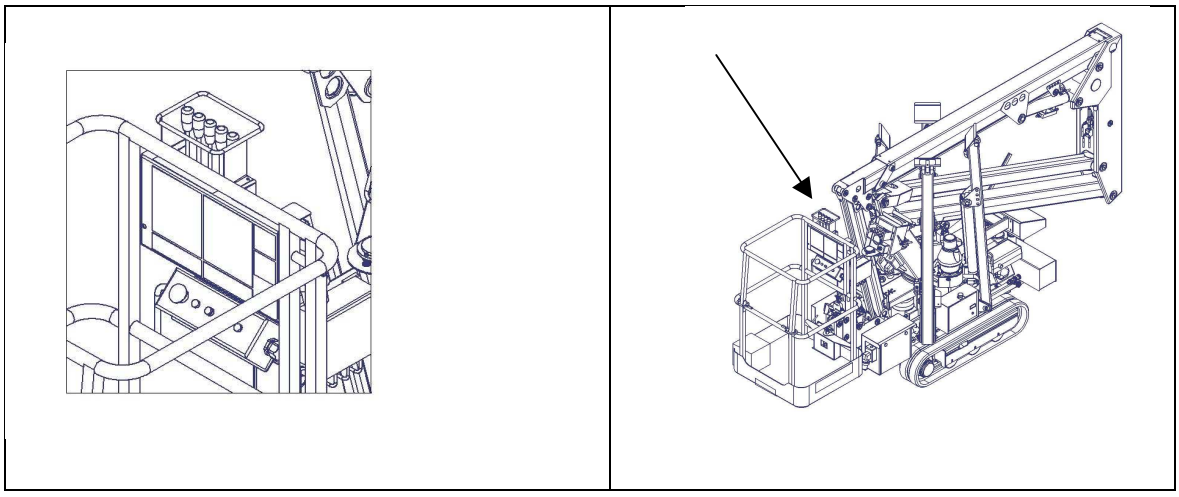


fig. 4.3.6

	**ATTENTION:** The voltage presence warning light on the working platform ***(pos.2 Fig.4.3.3)*** shall be lit during operation.

	**ATTENTION: The machine is equipped with a platform load control device.** **If the working platform load exceeds the maximum load the "overload" warning light (position 5, fig. 2.11.1) will switch on together with an audible alarm, and all the controls will be blocked.** **Once the excess load has been removed from the platform the alarms will be switched off and the controls will be available again.**

	**ATTENTION**: **The machine is equipped with an area control device (fig. 2.11).** **When the working platform extends to the maximum allowed radius this device will automatically block all dangerous manoeuvres. The manoeuvres will become available again when the machine moves back in the safe area.**

	**ATTENTION**: **Selection of the working area shall be carried out when the platform is in resting position.**

- Choose the desired area (and the working load associated with it) on the area selection panel (fig. 2.11 pos.1), checking the display
- If the 120 kg area (1 operator) has been chosen the relevant warning light will lit on the area control panel (fig. 2.11 pos.2).
- Raise the jib to the point it is possible to operate it without being hindered by the stabilisers or the turret.
- Move the jib by moving slowly the control levers ***(fig. 4.3.6)*** until the desired position is reached.

- It is necessary that at least one specialised operator or one trained in the use of this machine assists the process from the ground
- Operators working on the platform, once it has been lifted, shall take care not to bump into fixed or movable objects. Always comply with the minimum safe distance from power lines requirements. Pay special attention during jib movements (rotation, raising and lowering). Do not lean out or grab parts on the outside of the working platform.

!	**NOTE:** **To switch off the engine once the working position has been reached, push the Emergency Stop button (fig.2.11.1, pos. 1). The engine will then switch off.** **To restart the engine, unlock the Emergency Stop button by rotating it and then the start button (fig.2.11.1, pos. 3).**

4.3.4 How to put the Elevated Working Platform back to resting position

- Fully retract the extraction cylinder, fold back the pantograph, rotate the turret back to the central position (check that the yellow signs match), lower the telescopic boom and the jib until the resting position is reached.
- Check that the boom rests on the resting bracket.
- Insert the key in the platform/stabilisers control panel key selector switch and rotate it to the "stabilisers" position (***pos.1 fig. 4.3.5***).
- Retract the stabilisers completely by operating the levers alternatively ***(pos. 1-2-3-4 fig. 4.3.4)***.
- Check that the stabilisers warning light has turned off ***(pos. 4 fig. 4.3.3)***.
- Turn the key to the neutral position and remove it from the key selector switch.
- Descend from the working platform carefully.

4.3.5 Engine switching off

- Reach the endothermic engine and switch it off using the key (**pos.1 fig.2.11.5**).
- Rotate the battery detacher switch to "OFF" (fig.2.11.9 pos.1), to switch off electric power to the engine ***(fig. 2.11.9)***.

4.3.6 Parking

- Park the machine in a suitable area, in any case far from traffic-congested areas.
- The ground should be level and firm.
- Check that all electric panels, protection casings and tool boxes are closed.

4.4 Emergency Manoeuvres

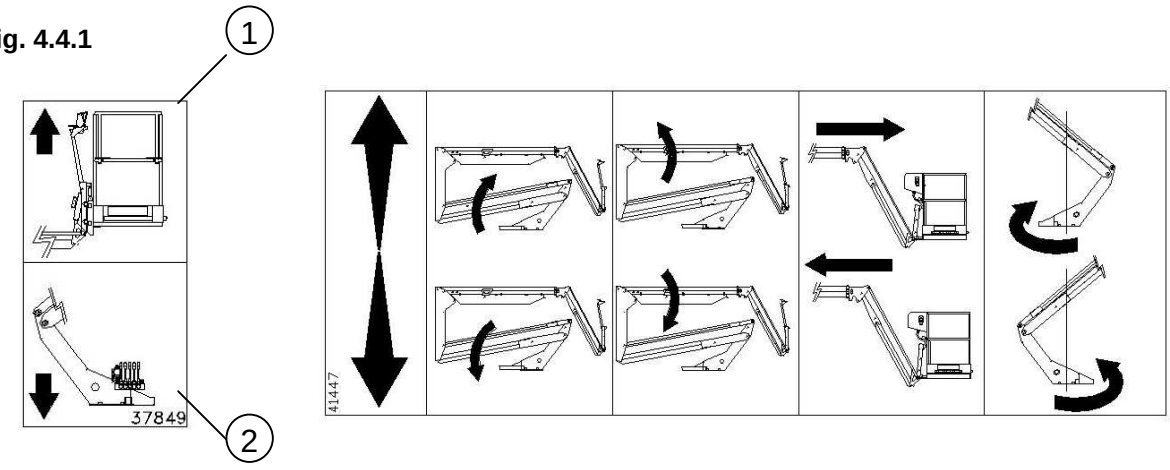
4.4.1 Elevated Working Platform Emergency Stop

The platform is equipped with an immediate emergency stop device that stops all movements. To activate it just push the red mushroom shaped emergency button on the working platform panel (pos.1 ***fig. 2.11.1)***. Another emergency stop button is located on the main panel (pos.1 ***fig. 2.11.6)***

Once the emergency has been dealt with it is possible to restore normal functioning by rotating the button one quarter of a turn.

4.4.2 Recovering the cradle from the ground in case platform operator faints, is injured or otherwise unable to operate

fig. 4.4.1



If the Platform operator faints, is injured or otherwise unable to act, it is necessary to operate the emergency ground controls as follows:

1. remove the protection casing on the turret

2. remove the key fastened to the turret by means of a thread with lead seal

3. remove the padlock

4. rotate the hydraulic switch ***(pos.2 fig. 4.4.1)*** in the "Ground Controls" position

5. activate the control lever required to carry out the desired movements and bring the cradle back to the ground. The last movement shall be closing the extractable cylinder.

6. rotate the hydraulic switch ***(pos.2 fig. 4.3.5)*** in the "Cradle Controls" position

7. restore the padlock and close the casing

!	**NOTE:** **it is necessary to return the lead seal to the key; contact the nearest service centre.**

4.4.3 Recovering the Working Platform in case of power failure

In case of malfunctioning in the endothermic engine or the gear pump that provides motive power to the whole equipment the working platform can be returned to the resting position as follows:

- remove the manual pump control level, fastened on the frame, by releasing the black blocking knob,
- insert the handle in the manual pump, **(*fig. 4.4.4 pos. 1)*** located near the hydraulic oil tank.
- operate the manual pump while the operator in the cradle operates the control levers required to carry out the movement
- after the platform has been recovered, return the manual pump control level to the original position and fasten it on the frame, tightening the black blocking knob.

4.4.4 Manual platform recovery from the ground

In case of malfunctioning in the endothermic engine or the gear pump that provides motive power to the whole equipment the cradle can be returned to the ground with the following procedure:

- remove the manual pump control level, fastened on the frame, by releasing the black blocking knob,
- insert the handle in the manual pump,
- remove the covering coffer and the frame protection casing on the turret.
- carry out the recovery procedure according to the recommendations on the decal located on the coffer (fig. 4.4.5).

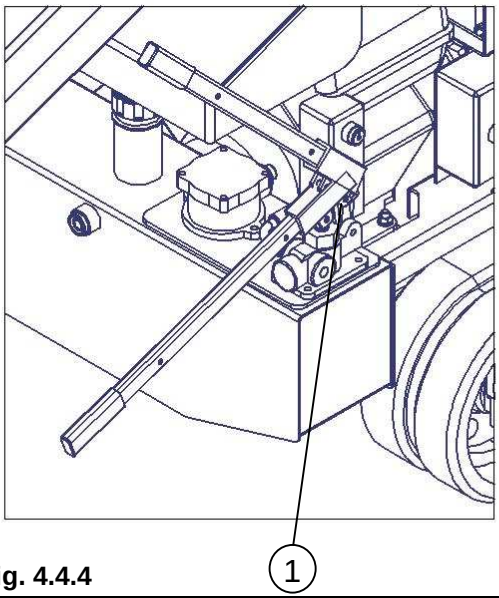
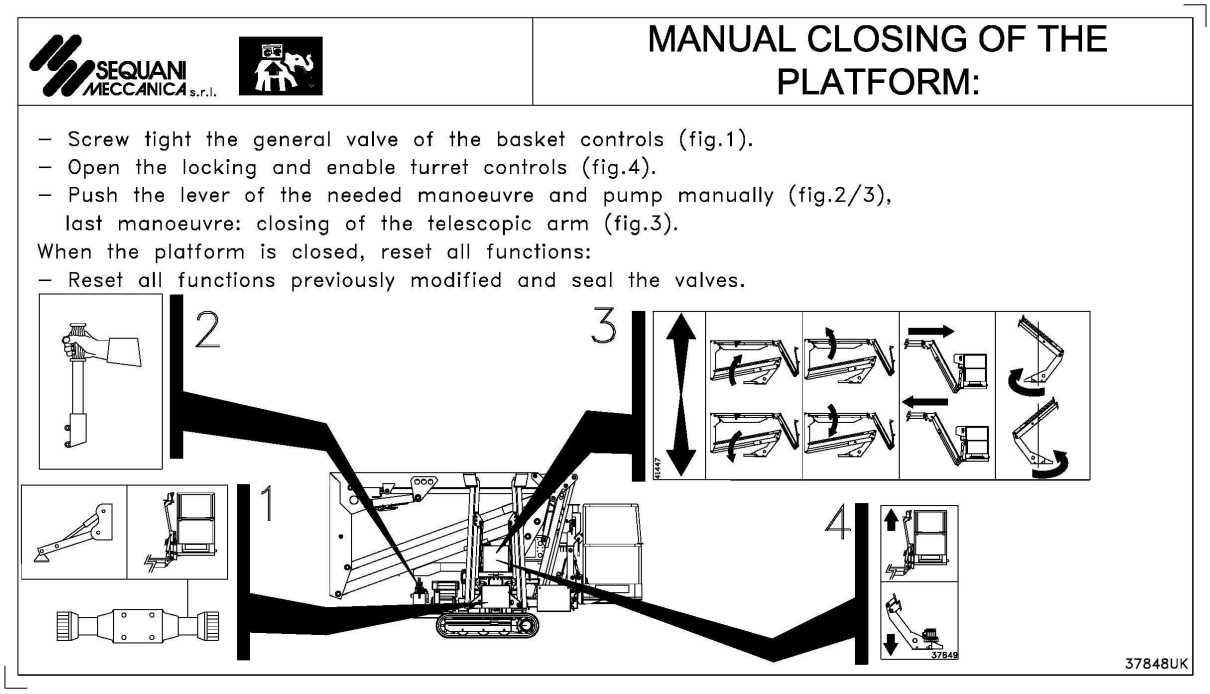


fig. 4.4.4

Manual working platform recovery from the ground

	ATTENTION: **Contact the service centre to check and repair all malfunctioning and to apply a new seal and thread to the exchange valve.**

fig. 4.4.5



4.4.5 Manual recovery in case of drive malfunctioning.

In case of malfunctioning in the drive system it is possible to move the platform with the following procedure:

- Switch on the deviation valve that controls the stabilisers (pos. 1 fig. 4.4.6).
- Switch on the two drive valves to move the machine in the required direction (pos. 2 fig. 4.4.6).
- Operate the manual pump to carry out the required movement.
- After the platform has been recovered return the valves to the original state.

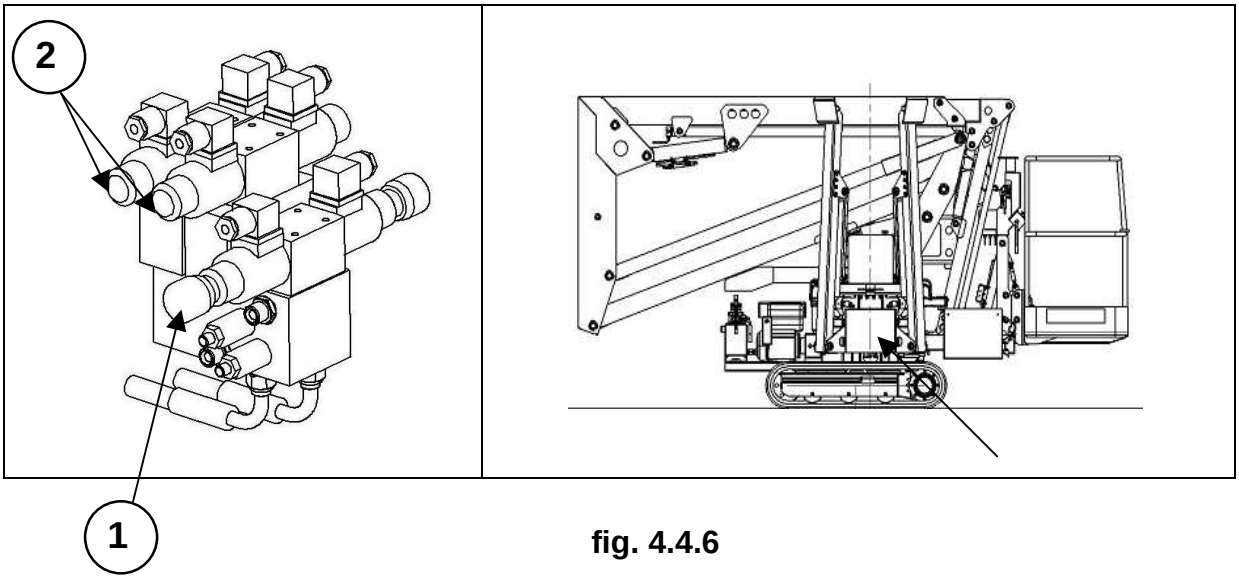


fig. 4.4.6

	ATTENTION: **contact the service centre to check and repair all malfunctioning and to apply a new seal and thread to the exchange valve.**

4.5 Loading and Transportation

	ATTENTION **It is forbidden to stay on the platform during movement, loading and unloading**

- When the platform is being moved using lorries or trailers, it is necessary to know the exact maximum height of the machine in order to avoid clashing with bridge arches, electrical lines or other low structures.
- Make sure that all fastening devices are effective and correctly placed.
- Check that the working platform is fully closed and all parts are locked in resting position.
- Make sure all the stabilisers are completely retracted.
- Check the loading capacity of the lorry and ramp where the machine will be loaded.

4.5.1 Loading the machine on a transport vehicle

- Carefully carry out all lifting procedures, as described in the use and maintenance manual (point 3.3) before loading the machine.
- Do not grab the platform by the boom to lift it during loading.
- The special lifting points on the stabilisers shall be used to lift the platform.
- Use lifting devices with lifting power adequate to the load that needs to be lifted and moved.

4.5.2 Loading on a vehicle with ramps

	**DANGER!** **Always use adequately sized access ramps.** **The maximum ramp length shall be such to allow a maximum 15% incline.**

	**DANGER!** **During the following operations the operator shall control the machine standing at least 3 metres away from the platform.**

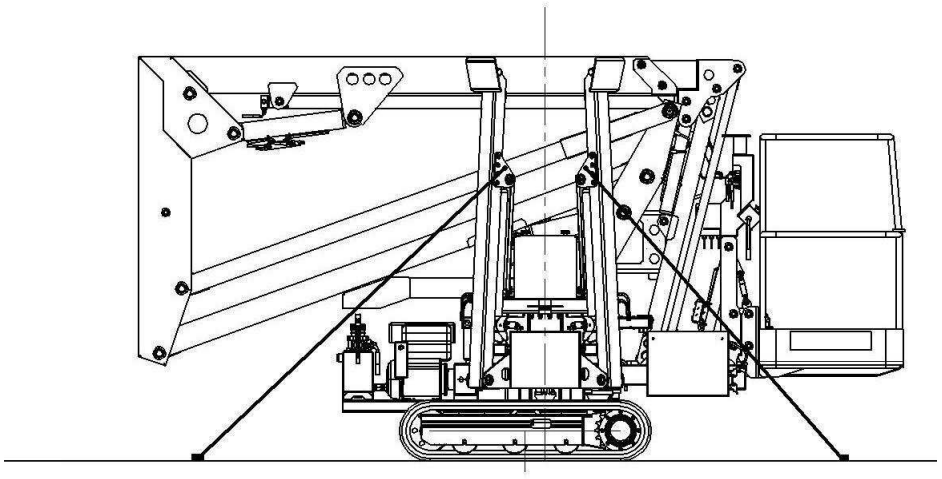
- **Raising:**

1 Pull the vehicle hand-brake.
2 Mount the ramps and fasten them with the break-pins.
3 Operate the controls to move the machine and stop it once the tracks have climbed up on the ramps.

- **Lowering:** repeat the above operation in the opposite order.

4.5.3 Machine blocking for lorry or trailer transport

- Rotate the key-switch on the "off" position and remove the key before transportation.
- Check for loose or not fastened components and parts on the machine.
- Use chains and locking devices capable of standing heavy loads.
- Use at least 4 chains or 4 locking devices.
- Adjust the blocking device to prevent damages.



4.6 Storage

4.6.1 Short-term stops (less than 15 days)

Carry out general cleaning procedures as mentioned in chapter 6, point 6.7 "Washing".
Park the machine in a dry, covered place.
Remove the keys from the Elevated Working Platform (EWP) to prevent unauthorised use.
If the machine does not have a battery detachers switch, remove the battery.

4.6.2 Long-term stops

Follow the above procedure, and also:
Carry out lubrication and greasing as mentioned in chapter 6.8 "Lubrication and Greasing".
Protect the machine with a suitable protection covering sheet.

5 ACCESSORIES

5.1 230V Socket outlet for Working Platform

The machine can be equipped with a 230V Socket outlet to be installed on the Working Platform. To power the socket connect a power cable with minimum cross section 2.5x3 and maximum length 20 metres to the socket in the turret.

ATTENTION **it is forbidden to connect non-230V appliances or appliances using power higher than 1.5 KW to the socket**

ATTENTION **before connecting electrical tools check that the coupler is working correctly by pushing the test button "T" (the coupler should switch on upon pressing). Restore the device operation by lifting the main switch levers. If the coupler does not switch automatically, contact a CTE service centre for repairs.**

5.2 Working Headlamp

(Available only for machines equipped with a 230V Socket outlet on the Working Platform). This device operates by plugging it in the 230v socket on the cradle and pushing the power switch on the lamp.

NOTE **the lamp is a low-voltage one and the system is equipped with a transformer**

5.3 Air/water supply hose

It is an automatic hose reel with plastic fairing, featuring a revolving clamping bracket, useable both for air and water (temperature –10℃ + 60℃) that can be used with hoses having inner diameter 8 mm, outer diameter 12 mm and maximum length 15 m. Air inlet fittings 3/8.
Maximum working pressure 20 bar.

5.4 Auxiliary motor-driven pump, 230V 2.5kW single-phase

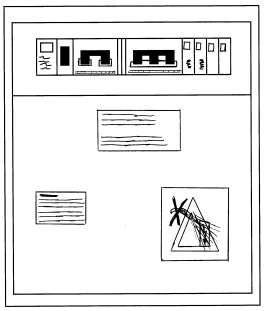
The machine can be equipped with an auxiliary motor-driven pump (fig.5.4) electrically powered, to be used in all environments where the endothermic engine cannot be used.

ATTENTION:

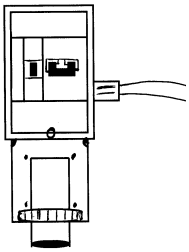
It is forbidden to use the pump if the endothermic engine is in operation

To use the machine with the motor-driven pump connect the power cable with minimum cross section 2.5x3 and maximum length 20 metres to the pump.
Attention: the cable shall be plugged in a socket with residual current operated circuit breaker that connects it to an electric network built according to the safety regulations in force.
The system is activated by switching the battery detacher switch to "OFF" (fig.2.11.9).
After switching it is possible to stabilise the machine as usual, as described in ***paragraph 4.3.2.***

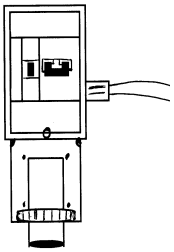
NOTE: during stabilisation the motor-driven pump is always in operation.



Motor-driven pump board



230v socket outlet on the turret



230V Socket outlet on the Working Platform

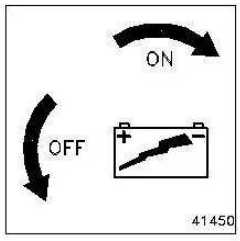


Fig. 2.11.9

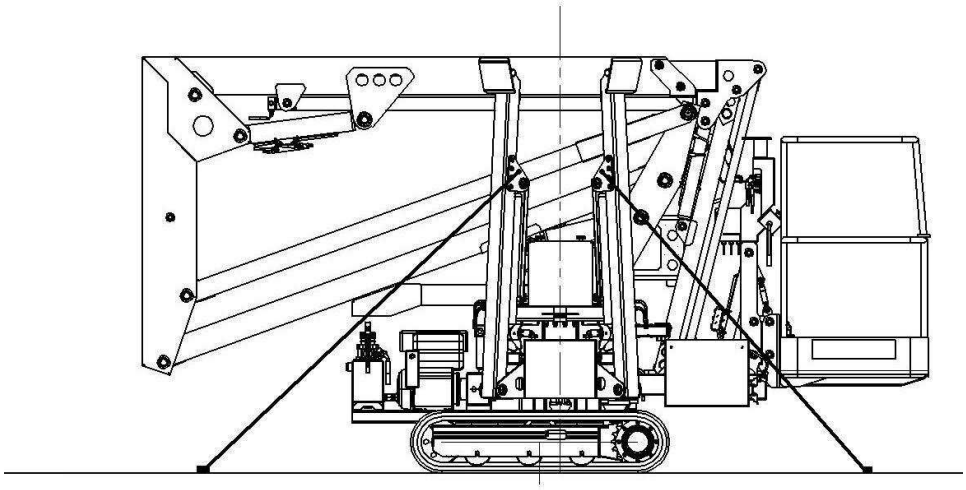


fig. 5.4.1

5.5 Auxiliary motor-driven pump, 400V 4.5kW three-phase

The machine can be equipped with an auxiliary motor-driven pump (fig.5.4) electrically powered, to be used in all environments where the endothermic engine cannot be used.

ATTENTION:

It is forbidden to use the pump if the endothermic engine is in operation

To use the machine with the motor-driven pump connect the power cable with minimum cross sectio□2.5x3 and maximum length 20 metres to the pump.
Attention: the cable shall be plugged in a socket with residual current operated circuit breaker that connects it to an electric network built according to the safety regulations in force.
The system is activated by switching the battery detacher switch to “OFF” (fig.2.11.9).

ATTENTION: check that the engine rotates in the correct direction (clockwise); if it rotates counter-clockwise invert the rotation direction by means of the polarity switch. After switching it is possible to stabilise the machine as usual, as described in ***paragraph 4.3.2.***

NOTE: during stabilisation the motor-driven pump is always in operation.

5.6 Oversized Working Platform

The machine can be equipped with a 1.3 m wide Working Platform.

ATTENTION:

The machine can be used only if the working platform has been installed as follows:

To install this accessory it is necessary to remove the seal from the turret key and then remove the padlock from the standard working platform locking pin. It is then possible to install the oversized working platform and inserting it on its support, meanwhile inserting the locking pin. Lock the pin with the padlock and contact an authorised service centre for restoring the lead seal to the padlock key.

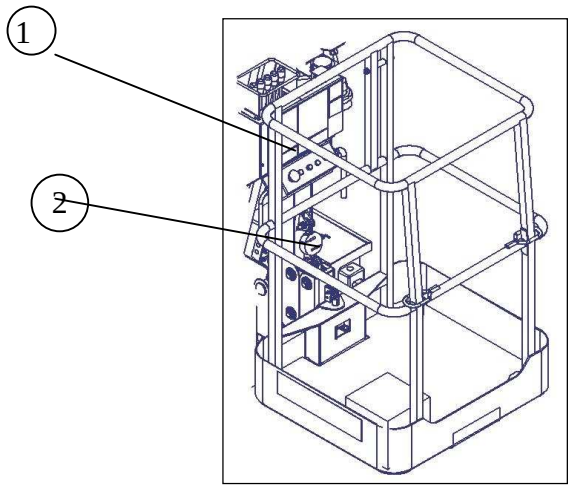


fig. 5.6.1

6 MAINTENANCE.

6.1 Introduction

This chapter deals exclusively with ordinary maintenance.

The operator can carry out only ordinary maintenance operations that in the maintenance summary table are labelled "***O*** – *operator*".

All other maintenance operations, labelled "***T*** – *Qualified Technician*" shall be carried out by qualified technicians, in compliance with operation schedule and the other recommendations in this manual.

In order to keep the equipment efficient and guarantee the machine's safe functioning users must take care of the required maintenance operations.

The annual, six-monthly and three-monthly operations carried out after the first 100 work hours, shall be mentioned in section 7 (Periodical checks and maintenance) of the Control Log provided with the machine.

The control log is a document to be used for reporting also replacement of parts in the hydraulic and electric systems, as well as structural mechanisms or elements, safety devices or major malfunctioning and the relevant repairs.

The Control Log shall be regarded as a part of the machine, which must be kept with it for the whole lifespan of the machine, until it is dismantled.

The surveillance authority having jurisdiction shall be allowed to have access to the Control Log for five years from the date of the last operation recorded or until the machine is removed from service (if that happens before the aforesaid 5 year time).

A document testifying the last check carried out shall in any case be available wherever the machine is used.

	***ATTENTION:*** **Any maintenance operations not included in this chapter must only be performed by the After sale Service Centre or by an Authorized Service Centres.**

The elevated platform can operate as normal in presence of water, sand, dirt and so on, provided it is properly lubricated. Lubrication is especially important not only to extend machine use but also to reduce the expenses.

For further clarification and information contact our After sale Service Centre:

After sale Service Centre: +44 1924/268103 (UK)
After sale Service Centre: +39 0464/48 50 50 (Italy)

Before each use make sure that all the required maintenance operations have been carried out and carry out all controls mentioned in the "before each use" column.

ATTENTION:

A damaged or broken machine must be removed from service immediately.

Repair all damage and/or breakdowns before operating the machine again.

The machines that remained out of service for more than three months shall undergo the regular three-monthly control before returning to service.

6.2 General provisions

- During assembling/disassembling always use appropriate spanners, extractors and other equipment to avoid damaging parts.
- To unlock tightly joined parts use copper hammers or wooden mallets.
- Keep all parts belonging to the same group together and separated from other parts; partially screw back the nuts on their pins and stud bolts. Clean the parts with brushes or cloths, then wash with hot water or petroleum, removing residuals with compressed air.
- After grinding with abrasive material always wash the parts accurately or use a compressed air jet to clean them and fully remove the abrasive dust.
- During reassembling, make sure that all parts are clean, and remember to lubricate adequately.
- Pay the utmost care to the snap rings and stop pins: if they feature cracks or other breaking signs immediately replace them.

ATTENTION:

Maintenance operations described in the following pages pertain exclusively to the elevated working platform.

Follow manufacturer directions for the endothermic engine.

6.3 Maintenance Table

O = operator **M** = qualified technician

Operation	Before each use	Once every 50 hours	After 100 hours	Every 500 hours	Every 1000 hours	Each year or after 2000 hours	References
Visual inspection	*O*	*O*	*O*	*O*	*O*	*O*	*4.3.1*
Use and Maintenance Manual status check	*O*	*O*	*O*	*O*	*O*	*O*	*4.3.1*
Plates and stickers readability	*O*	*O*	*O*	*O*	*O*	*O*	*4.3.1 and 6.10*
Check for damages and missing, loose or detached parts	*O*	*O*	*O*	*O*	*O*	*O*	*4.3.1*
Welds, joints and pins check	*O*	*O*	*O*	*O*	*O*	*O*	*4.3.1*
Check for any hydraulic leakage	O	O	O	O	O	O	*4.3.1 and 6.6*
Pressure check	*O*	*O*	*O*	*O*	*O*	*O*	*6.6.4*
Hydraulic oil level check	*O*	*O*	*O*	*O*	*O*	*O*	*6.6.6 and 6.6.7*
Hydraulic oil filter clogging gauges check	*O*	*O*	*O*	*O*	*O*	*O*	*6.6.8*
Cradle and ground controls operation check	*O*	*O*	*O*	*O*	*O*	*O*	*6.9*
Emergency devices (emergency stop buttons) check	*O*	*O*	*O*	*O*	*O*	*O*	*6.9*
Limit switches check	*O*	*O*	*O*	*O*	*O*	*O*	*6.9.1*
Overload device and area control test	*O*	*O*	*O*	*O*	*O*	*O*	*6.9.2 and 6.10.11*
Cradle residual current operated circuit breaker test	*O*	*O*	*O*	*O*	*O*	*O*	*5.1*
Hydraulic oil system replacement					*M*	*M*	*6.6.6*
Hydraulic oil filters replacement			*M*	*M*	*M*	*M*	*6.6.8*
Reduction gear oil replacement			*M*			*M*	*6.8.3*
Track tension and status check	*O*	*O*	*O*	*O*	*O*	*O*	*6.5.2*
Lubrication and greasing		*O*	*O*	*O*	*O*	*O*	*6.8*
Centre plate fastening screws			*M*	*M*	*M*	*M*	*6.5.1*
Check correct fastening of all bolts connecting the under-chassis to the crawler			*M*	*M*	*M*	*M*	*6.5.1*
Check correct fastening of all turret rotation reduction gear bolts			*M*	*M*	*M*	*M*	*6.5.1*

ATTENTION: The checks pertaining to the frame and structure shall be carried out in a CTE-authorised workshop once every 2000 hours or every year to preserve compliance to warranty conditions.

6.4 Spare parts

Use only original spare parts.

In the application remember to state:

- model, factory reference number and vehicle where the platform is mounted;
- reference code and technical description of damaged part;

6.5 Mechanics

6.5.1 General Mechanics

The mutually rotating mechanical parts shall be checked periodically, verifying also the fastening status of nuts, bolts and screws, checking for any loosening.

Visually inspect the screws and nuts that fasten the centre plate to the frame and the turret, as well as the reduction gear screws and nuts, the connection of the rotating coupling connecting plate to the turret, the pin retainers, the vehicle fastening nuts and all other bolts, especially for all the parts that suffer from vibrations and other movements.

Visually inspect, before each use, all the structural components to verify any cracks in welds, corrosion or other signs of wear and decay.

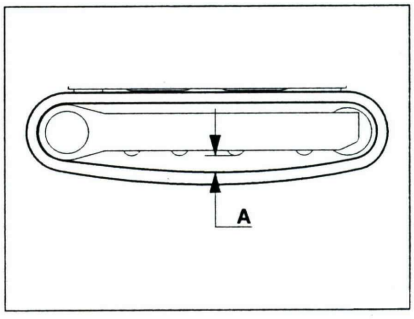
We recommend to test the following after the first 100 work hours and then once every 3 months or 500 hours

- tightening of centre plate nuts, with dynamometric spanner (see the "tightening torque" table).
- tightening of all the turret reduction gear bolts with dynamometric spanner (see the "tightening torque" table).
- tightening of all the bolts fastening the under-chassis to the vehicle, with dynamometric spanner (see the "tightening torque" table).

6.5.2 Track tension and integrity check

Track tension check

fig. 6.5.2



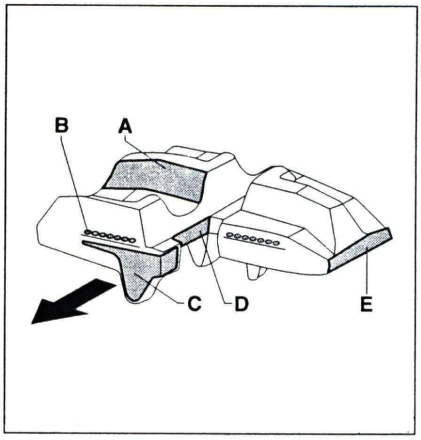
Halt the machine on a firm and level ground and stabilise it.

Measure the "A" distance on the track middle roller, from the bottom of the roller to the stiff interior of the rubber tape.

Tension is normal if "A" ranges between 10 to 15 mm.

Otherwise, contact an authorised workshop for adjusting it.

Track status check



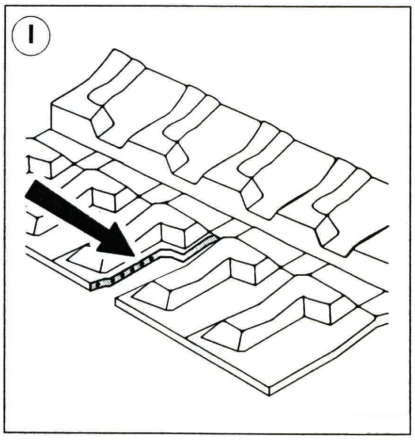
- Track structure:

A- tread pattern
B- steel wire
C- steel core
D- pulling wheel cog insertion slot
E- wheel side

fig. 6.5.3

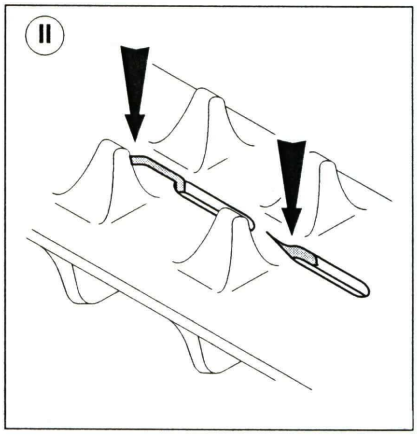
	***ATTENTION:*** **Contact an authorised workshop for track replacement in case inspection detects one of the following types of damage.**

I) Broken Steel wires



Likely causes:
- excessive tension

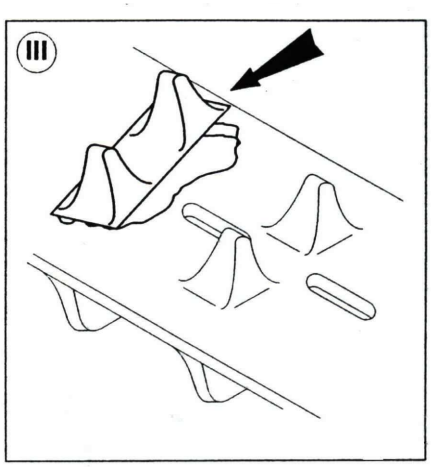
II) Broken or Worn-out metal cores



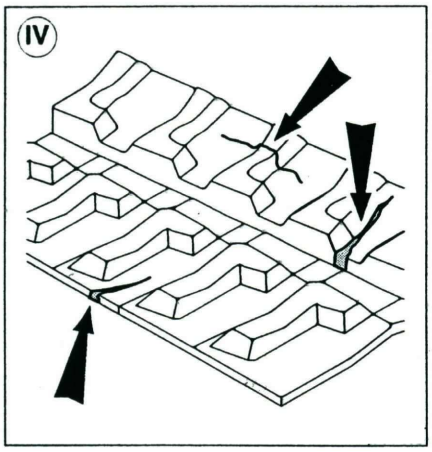
Likely causes:
- excessive tension
- worn out pulling wheel cogs
- presence of sand, stones or other things.

III) Metal Cores Detachment

Likely causes:
- excessive tension
- worn out pulling wheel cogs
- presence of sand, stones or so on.



	ATTENTION: **In presence of damages listed under "II)" and "III)" the pulling wheel shall be replaced as well.**



IV) Cracks

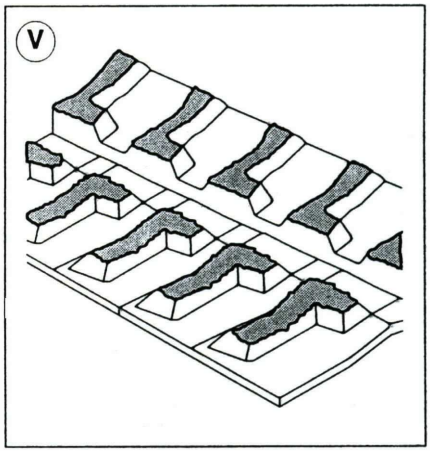
In case of cracks on the rubber track it is still possible to keep using the track.

It is however recommended to check frequently the cracks size and status since by widening they could expose the metal cores.

V) Abrasions

In case of massive abrasions on the rubber tread patterns, it is still possible to keep using the track.

However, a special care must be paid when treading on steep or slippery roads since the track's grip is decreased.



6.5.3 Endothermic Engine

For the maintenance of the endothermic engine follow carefully the maintenance instructions reported on the engine manufacturer's use and maintenance manual.

6.6 Oil-pressure system

The oil-pressure system consists of several parts that need different maintenance operations with different frequency

6.6.1 Oil-pressure Cylinders

Before every use, make sure there are no leaks or outpours in the following spots: stem gasket, fittings, valves and piping/hoses.

In case of leaks or outpours do not use the machine and call Servicing Department.

6.6.2 Working Platform Levelling

ATTENTION:

Should you note that the cradle is not perfectly level with the horizontal surface, lower it and descend from it.

Restore the safety condition (level cradle) as follows:

DANGER:

It is forbidden to stay in the cradle during these operations.

ATTENTION:

This maintenance operation can only be performed by a qualified technician (M).

1. remove the ground control protection casing,
2. remove the padlock and rotate the diverter in the "Turret controls" position,
3. operate the control lever to lift the extractable jib ***(pos.2 fig. 2.11.3)***, to lift the platform to about one metre of height.

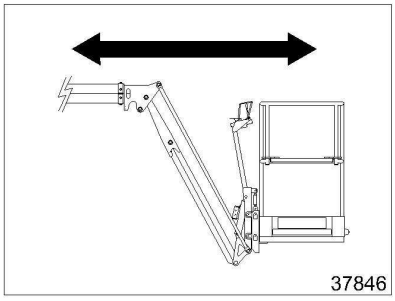


fig. 4.9.a

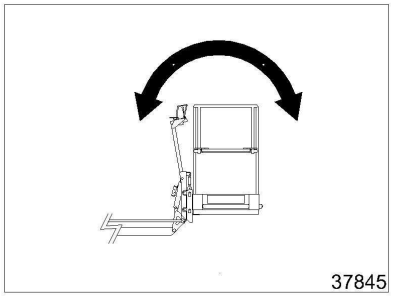


fig.4.9.b

4. open the block padlock placed on the switch using the key issued to the safety engineer remove the levers located in the turret by loosening the black locking knob. rotate 90 degrees both the two-way diverters located in the rear part of the joint ***(fig.4.9.b)***

5. operate the "telescopic boom extraction lever" It is therefore possible to level the cradle (move the cradle all the way down and then all the way up, then level it) ***(fig. 4.9.b)***,

6. after the operations have been completed, return the two-way diverters to the original position (extraction position, as shown by the sticker) ***(fig. 4.9.a),*** remove the lever from the diverters and return it to the turret, locking it in place with the black locking knob.

7. set up the padlock on the block position, close it and give the key back to the safety engineer.

8. carry out an extractable boom test by operating the "extractable boom out" control. return the extraction cylinder in resting position.

9. reposition the diverter on Cradle Controls position, lock back the padlock and close the protection casing.

ATTENTION:
It is necessary to return the lead seal to the padlock key; contact the nearest service centre.

DANGER!:
It's forbidden to use the boom motion during cage levelling set up.

6.6.3 Oil-pressure system piping

Before each use visually inspect the pipes, checking for leaks in fittings, pipes and valves.

Check that rubber hoses are undamaged and with no cracks.

In case of leaks do not use the machine and call Servicing Department.

6.6.4 Valve Pressure Check and Adjustment

Maximum pressure valve check:

After correctly stabilising the platform, return the jib to the base position with the emergency ground control board, check that pressure on the manometer is 220 bar.

If the pressure value is different, please contact Servicing Department.

	***ATTENTION:*** **All valve adjustment operations shall be carried out exclusively by the manufacturer or by Authorised Workshops.**

6.6.5 Oil-pressure pumps and motors

Before each use visually inspect pumps and motors, checking for leaks in fittings, pipes and flanges.

Oil-pressure pumps and motors do not need any other maintenance check. In case of leaks, please contact Servicing Department.

6.6.6 Hydraulic Oil

Before each use, check the hydraulic oil level using the visual gauge on the tank. The level should be about in the middle of the gauge. Refill by adding oil if necessary, via the refill cap. (***fig.6.6.6).***

	***ATTENTION:*** **The following operations shall be carried out with the platform in resting position (fully retracted stabilisers and folded back booms)**

Hydraulic oil shall be replaced once every 2000 hours or at least once per year. In these cases it is necessary to replace the hydraulic oil filters as well.

To replace the oil, use an appropriately sized container (or more than one) and discharge exhaust oil by removing the drain plug located under the tank.

Screw back the plug and refill the tank.

Oil tank volume **25 litres**

Specifications: **AGIP OSO 32**
Viscosity at 40℃=30 mm ^{2}/s
Viscosity at 100℃=5.3 mm ^{2}/s
Viscosity Index =106
Pour Point= -30℃

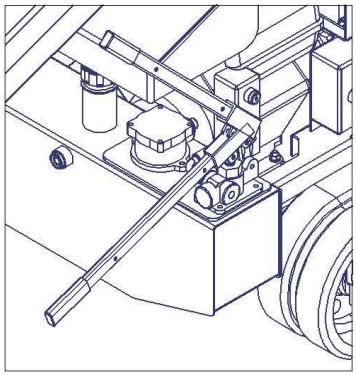
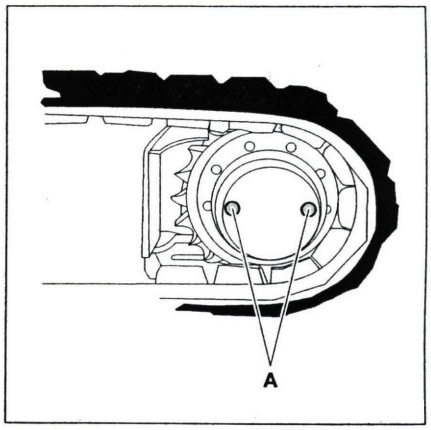


fig.6.6.6

ATTENTION
During replacement, dispose of exhaust oil carefully.
Always comply to the laws in force as regards exhaust oil disposal.

6.6.7 Hydraulic oil level in track reduction gears check



Halt the machine making sure that the caps correspond to the horizontal axis.
Remove the "A" caps and check that the oil is on their same level.
Refill if needed from one of the two caps, using the other as a level gauge.

fig. 6.6.7

6.6.8 Hydraulic Oil filters

A filter is located near the tank.

Always check the clogging gauge when using. This check must be carried out in the operational phase. In case the gauge moves to the red zone, it is necessary to replace the filter.

We recommend to replace the filter after the first 100 work hours and then once every 3 months or 500 hours.

We recommend to comply with the aforesaid check and replacement deadlines since filter clogging decreases machine efficiency and can cause damage to oil-pressure components.

ATTENTION:
In case some parts of the oil-pressure circuit are replaced due to serious damage like pump, hydraulic motors, or cylinders seizure, which leads to large amounts of impurities entering and flowing in the oil circuit, it is necessary to repeat the above described filter replacement procedure from the start.

Replace the hydraulic oil filters as follows ***(fig. 6.6.8)***:

- unscrew the lid retaining screws using the spanner
- remove the old cartridge from the inside and replace it with a new one, taking care to lubricate the seal gasket with grease
- refill the hydraulic oil tank and check the level using the visual gauge on the tank.
  (fig.6.6.6)

ATTENTION:
During replacement, always remember to dispose of exhaust oil carefully.
Always comply to the laws in force as regards exhaust oil disposal.

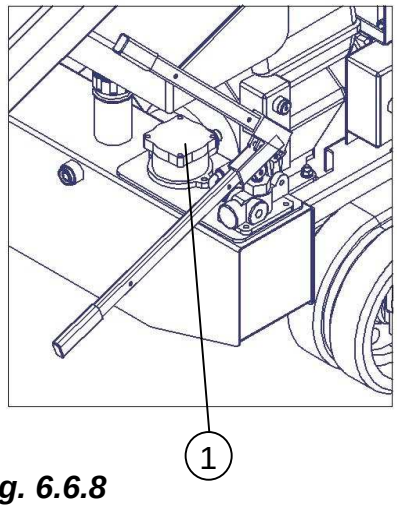


fig. 6.6.8

6.7 Washing

Washing frequency depends on the type of machine use.
Machine washing can be carried out with a high-pressure water jet machine, complying with the following safety measures:

- maximum temperature cannot exceed 70°C
- use neutral detergents do not use solvents or petrol
- keep a safe distance with the nozzle
- do not direct the water jet towards electrical panels or appliances
- do not wash the machine in presence of live electrical appliances
- wear adequate individual safety devices
- wash the machine only in areas suitable to that purpose and dispose of the material according to the laws in force.

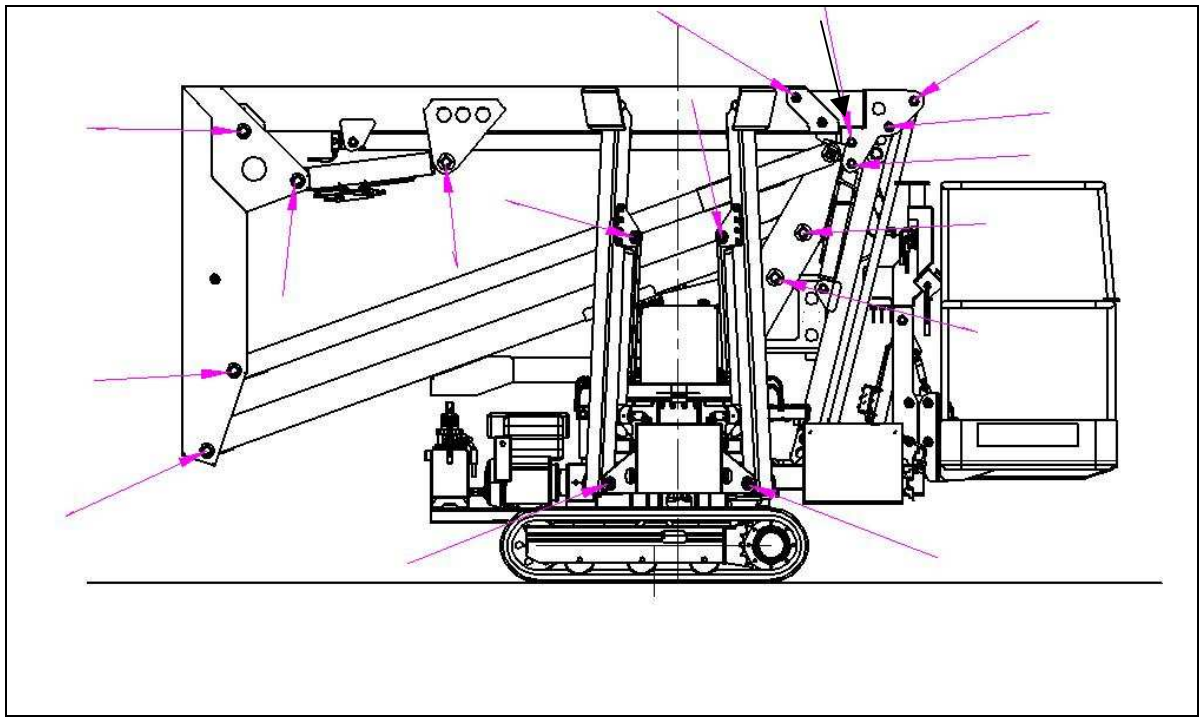
ATTENTION:
After washing, it is necessary to carry out lubrication and greasing on all parts mentioned in the "Lubrication and Greasing" chapter.

6.8 Lubrication and greasing

6.8.1 Pin greasing

Grease the machine pins once every 50 work hours in the points mentioned in the picture by pumping a little amount of grease with a grease gun.

Lubricant: Grease for grease guns **AGIP F1 GR MU2** or any with similar specifications.



	***ATTENTION:*** **Do not grease the pair of lubricators on the centre plate.**

6.8.2 Telescopic Boom Lubrication

Lubricate the telescopic boom once every 50 hours as follows:
Stabilise the machine and completely extract the telescopic boom.
Check the parts lubrication status, in presence of dust or impurities, then clean and remove grease, restore a slight layer of a mix (50% Agip F1 GR MU2 grease, 50% hydraulic oil Agip OSO32) with a brush.

	***ATTENTION:*** **All lubrication and greasing operations shall be carried out when there are no operators on the working platform.**

6.8.3 Rotation reduction gear lubrication

Check the lubricating oil level once every 3 months or once every 500 work hours. Refill if needed. In case more than 10% of the lubricant volume needs to be refilled, we recommend checking for oil leaks in the whole system.

Replace rotation reduction gear oil after the first 100 work hours and then again once every 2000 hours or once per year.

Use AGIP ROTRA MP SAE 80W/90 oil for environment temperatures ranging from -10°to +30°and AGIP ROTRA MP SAE 80W/140 oil for environment temperatures ranging from +20° to +45° ***(fig. 6.5.8)***

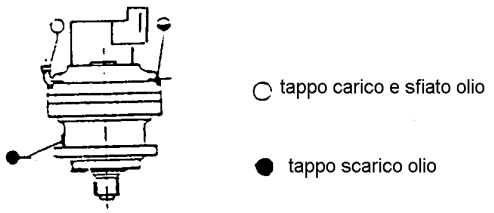


fig. 6.5.8

Depending on actual operating conditions the frequency of these checks may be changed accordingly. Upon oil replacement we recommend to accurately wash the inside of the protection casing with a suitable fluid, recommended by the lubricant manufacturer.
To avoid sludge deposit oil shall be changed when the reduction gear has not still cooled down.

Do not mix different types of oils, either of the same brand or of different brands, and do not mix mineral oils with synthetic oils.

ATTENTION:
During replacement, always remember to dispose of exhaust oil carefully. Always comply to the laws on oil disposal in force.

6.9 Electrical system.

Electrical circuit

The electric circuit consists of several parts, whose proper operation must be checked due to the functions they carry out.

Before each use carry out a complete functioning test of all function controls, carrying out a complete test cycle. Check that emergency stop buttons work properly.

ATTENTION:

this check shall be carried out when there are no operators on the working platform.

Climb on the working platform and repeat the test.

Check the ground control power cord status. The power cord is located on the ground, under the turret.

6.9.1 Stabilisers and interlock limit switches

Before each use carry out a complete functioning test of all stabilisers/boom interlock limit switches.

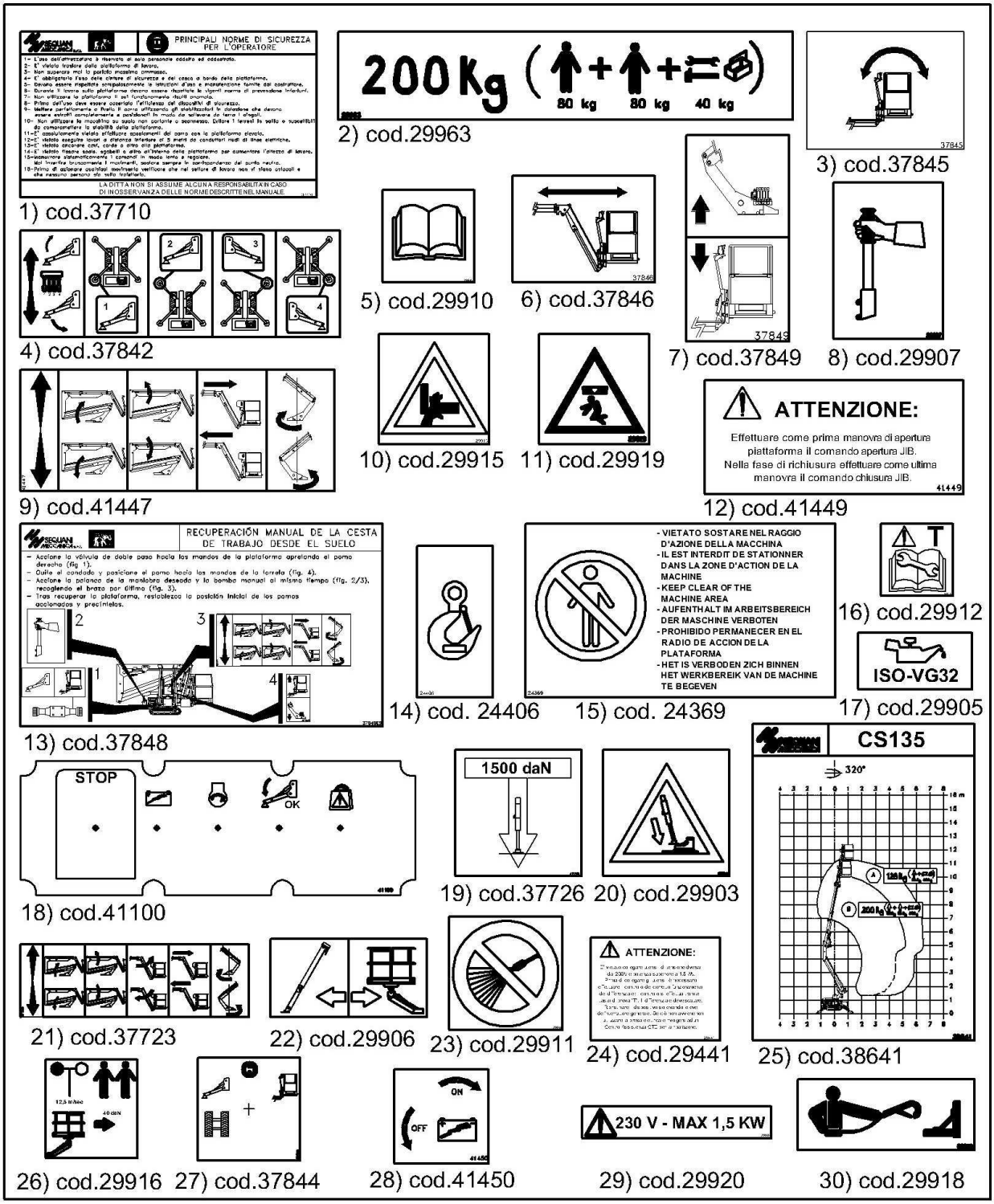
To carry out correct functioning test stabilise the machine and check boom functioning.

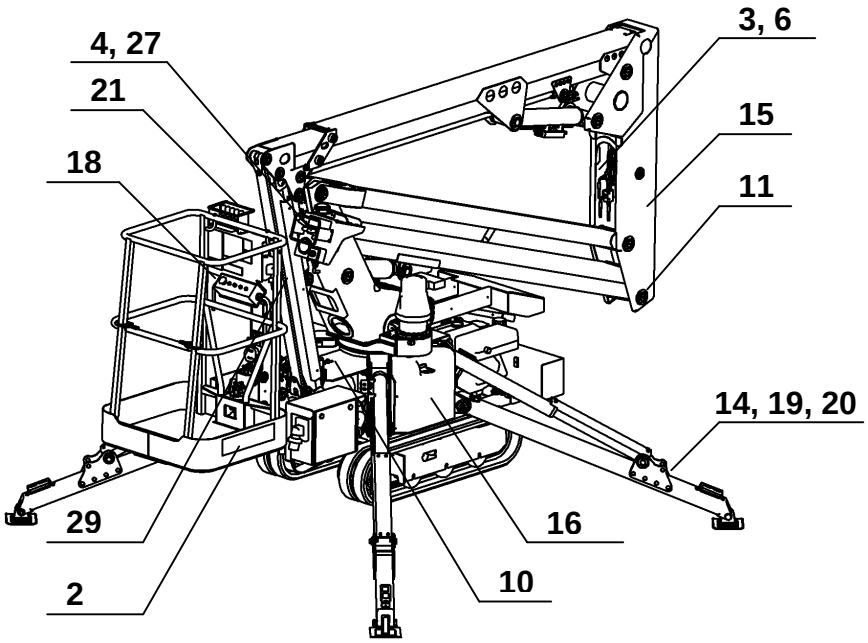
Lower the boom, retract the stabilisers one by one and check that the boom is not in operation.

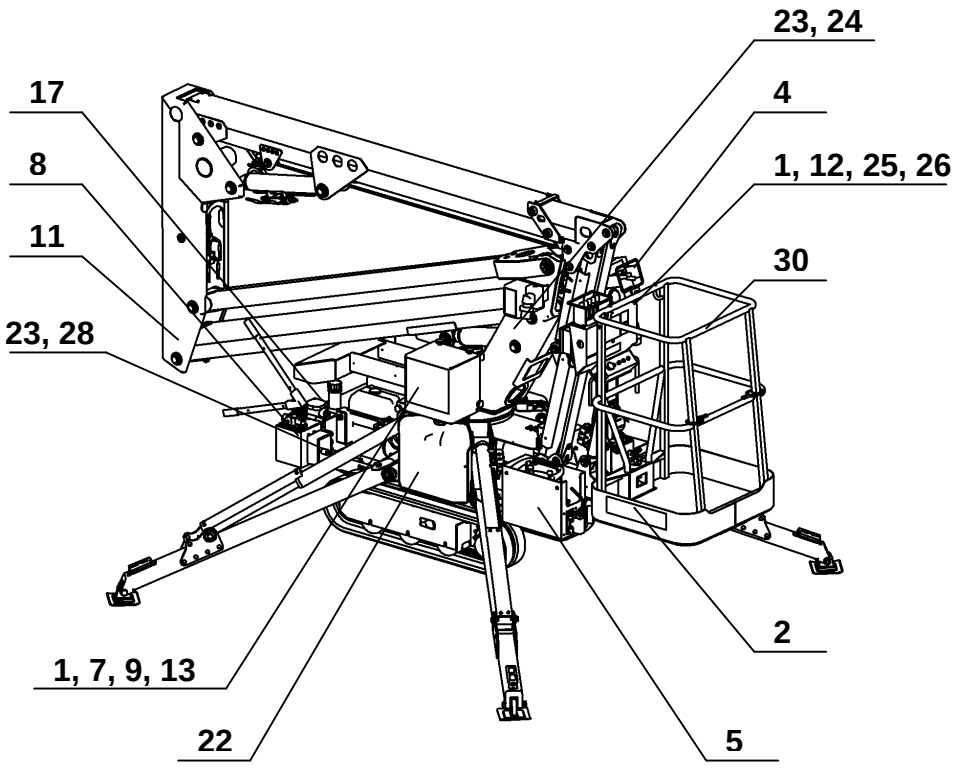
6.9.2 Working Platform overload control device

The efficiency of this device shall be tested before each use.
To carry out this test, position the key switch to working platform controls and load the platform with a load slightly heavier than the maximum load limit.
Result: the device triggers the alarm, the control panel warning light switches off and an audible alarm switches on, the control panel warning light switches off and the machine halts.
Remove the overload: the machine must return to normal operation.

6.10 Decals


PRINCIPALI NORME DI SICUREZZA PER L'OPERATORE
LA DITTA NON SI ASSUME ALCUNA RESPONSABILITA' IN CASO DI INOSSERVANZA DELLE NORME DESCRITTE NEL MANUALE
1) cod.37710
200 Kg
80 kg
80 kg
40 kg
2) cod.29963
3) cod.37845
4) cod.37842
5) cod.29910
6) cod.37846
7) cod.37849
8) cod.29907
9) cod.41447
10) cod.29915
11) cod.29919
ATTENZIONE:
Effettuare come prima manovra di apertura piattaforma il comando apertura JIB.
Nella fase di richiusura effettuare come ultima manovra il comando chiusura JIB.
12) cod.41449
RECUPERACIÓN MANUAL DE LA CESTA DE TRABAJO DESDE EL SUELO
13) cod.37848
14) cod. 24406
- VIETATO SOSTARE NEL RAGGIO D'AZIONE DELLA MACCHINA
- IL EST INTERDIT DE STATIONNER DANS LA ZONE D'ACTION DE LA MACHINE
- KEEP CLEAR OF THE MACHINE AREA
- AUFENTHALT IM ARBEITSBEREICH DER MASCHINE VERBOTEN
- PROHIBIDO PERMANECER EN EL RADIO DE ACCION DE LA PLATAFORMA
- HET IS VERBODEN ZICH BINNEN HET WERKBEREIK VAN DE MACHINE TE BEGEVEN
15) cod. 24369
16) cod.29912
ISO-VG32
17) cod.29905
STOP
OK
18) cod.41100
1500 daN
19) cod.37726
20) cod.29903
CS135
320°
25) cod.38641
21) cod.37723
22) cod.29906
23) cod.29911
ATTENZIONE:
24) cod.29441
26) cod.29916
27) cod.37844
ON
OFF
28) cod.41450
230 V - MAX 1,5 KW
29) cod.29920
30) cod.29918


4, 27
21
18
3, 6
15
11
14, 19, 20
29
2
16
10


23, 24
17
4
8
1, 12, 25, 26
11
30
23, 28
2
1, 7, 9, 13
22
5

6.11 Troubleshooting

DIAGNOSTICS

NOTE Remedies marked with (*) shall be carried out only in Authorised Workshops

Trouble	Cause	Remedy
Noisy pump	◊ Hydraulic Oil viscosity is too high ◊ Hydraulic oil level in the oil tank is too low. ◊ Clogged or crushed intake hose. ◊ The flanges on the intake let air in.	☞ Use recommended Hydraulic Oil ☞ Refill with Hydraulic Oil of the same type ☞ (*) Check hose integrity ☞ (*) Check seals and replace gasket
Some hydraulic operations of the machine are performed very slowly.	◊ The maximum pressure valve on the malfunctioning distributor group is not correctly calibrated or its cut-off is locked open due to presence of impurities. ◊ Worn-out pump	☞ (*) Recalibrate the valve. Disassemble and clean the valve, then assemble it back with new metal packing. (*) Replace the valve. ☞ (*) Replace the pump.
Oil-pressure cylinder functions erratically	◊ Oil outpours between the two cylinder chambers leading to inability to bear the required load. ◊ Loose piston/stem connection. ◊ Clogged or worn-out distributor group maximum Pressure Valve.	☞ (*) Replace the jack gaskets. ☞ Check the piston/stem connection ☞ (*) Disassemble and clean the maximum pressure valve or replace it.
No drive	◊ - Lack of or insufficient voltage ◊ The coil does not work properly. ◊ The drive reduction gear does not work.	☞ (*) Check the electrical system ☞ (*) Replace the coil. ☞ Move the platform as described in chapter 4.4.5

Trouble	Cause	Remedy
The warning lights do not work	◊ Blown bulbs ◊ - Electrical connection is interrupted ◊ - Burnt fuse	☞ Replace the bulb. ☞ (*) Restore the connection ☞ Replace the fuse.
Hydraulic oil overheating	◊ Hydraulic oil level in the oil tank is too low.	☞ Refill with Hydraulic Oil of the same type
The electromagnetic valves do not work	◊ No voltage ◊ The slider does not move ◊ The coil does not work.	☞ (*) Check the electrical system ☞ (*) Replace electromagnetic valve ☞ (*) Replace the Coil

NOTE: Contact Servicing for any other trouble not described in the table.

6.12 Dismantling and disposal

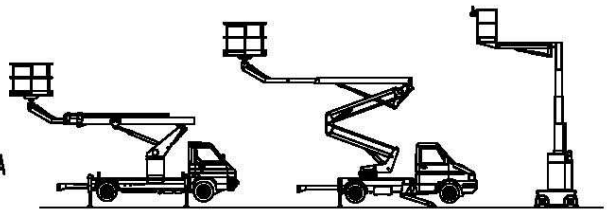
Dismantling shall be entrusted exclusively to specialised companies that will take care of exhaust oil collection, machine disassembling and parts disposal pursuant to the laws in force in the country where the machine is being dismantled.

You can also contact the manufacturer for dismantling.

In case the machine is dismantled or put out of commission, always inform the manufacturer and the bodies in charge of periodical inspections (if any).

7 DECLARATION OF CONFORMITY - FACSIMILE

SEQUANI MECCANICA s.r.l.
Loc. Terramatta,1 - 37010 RIVOLI V.SE (VR) ITALIA
tel.(045)6280100 - telefax(045)6280099



DECLARATION CE OF CONFORMITY

(DPR 459/96 – Attached 2.A)

The manufacturer SEQUANI MECCANICA s.r.l. declares, under its own responsibilty, that the machine :

TRUCK–MOUNTED AERIAL WORKPLATFORM

MODEL: TYPE:
SERIAL NUMBER: YEAR OF CONSTRUCTION:
WEIGHT: CHASSIS NO.:

is in accordance with the following directives:
98/37/CE , 89/336/CEE , 73/23/CEE ,
and, being included in the IV enclosure of first directive, it is identical to the machine indicated on the CE certification type number :

issued by the notified body :
ICE European Certification Institute S.p.A.
European Commission Number n.0303

The CE marked on the machine guarantees its conformity.

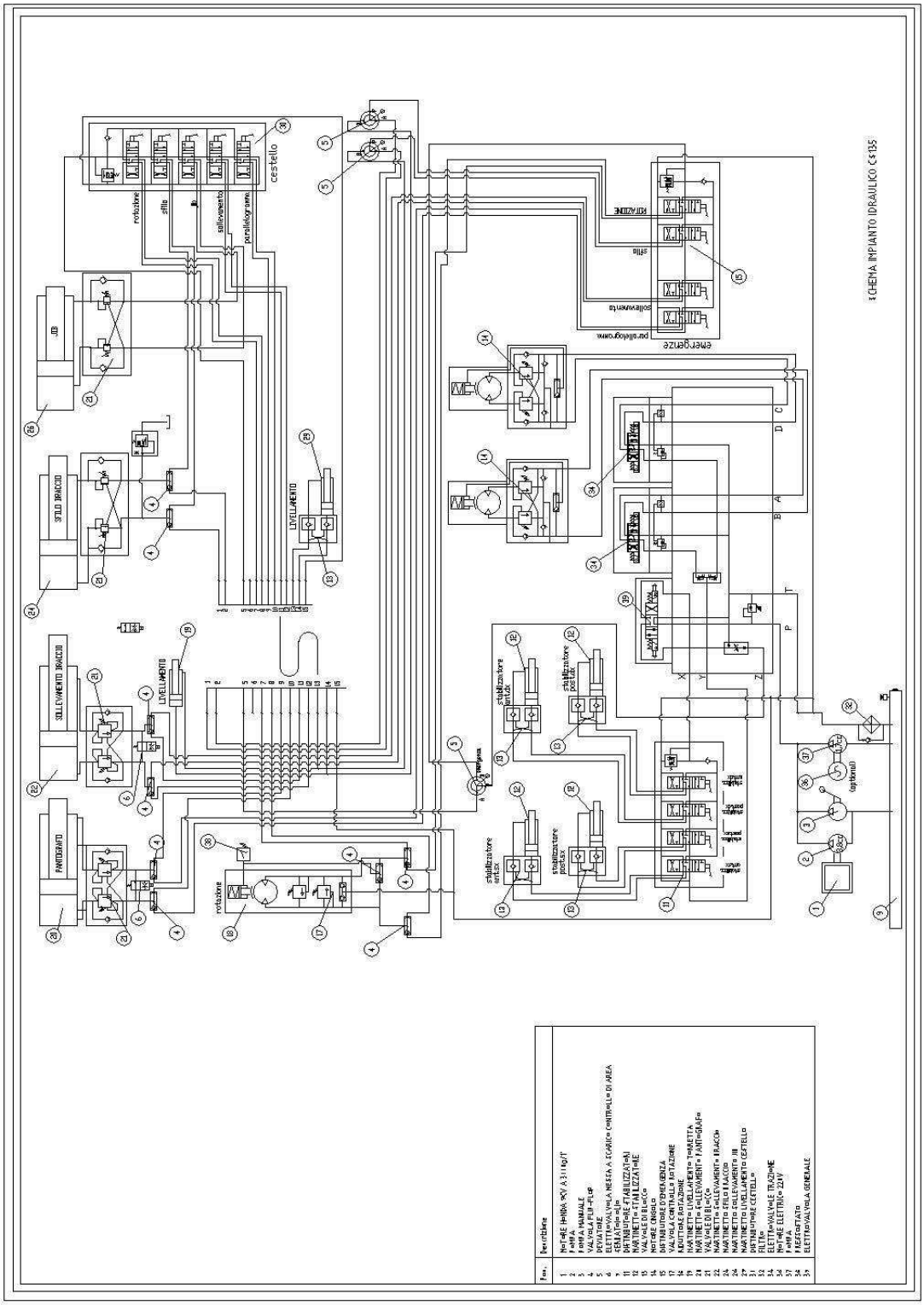
DECLARATION n.

CE

RIVOLI V.SE(VR),

VIOLA GIUSEPPE
The Legal Representative

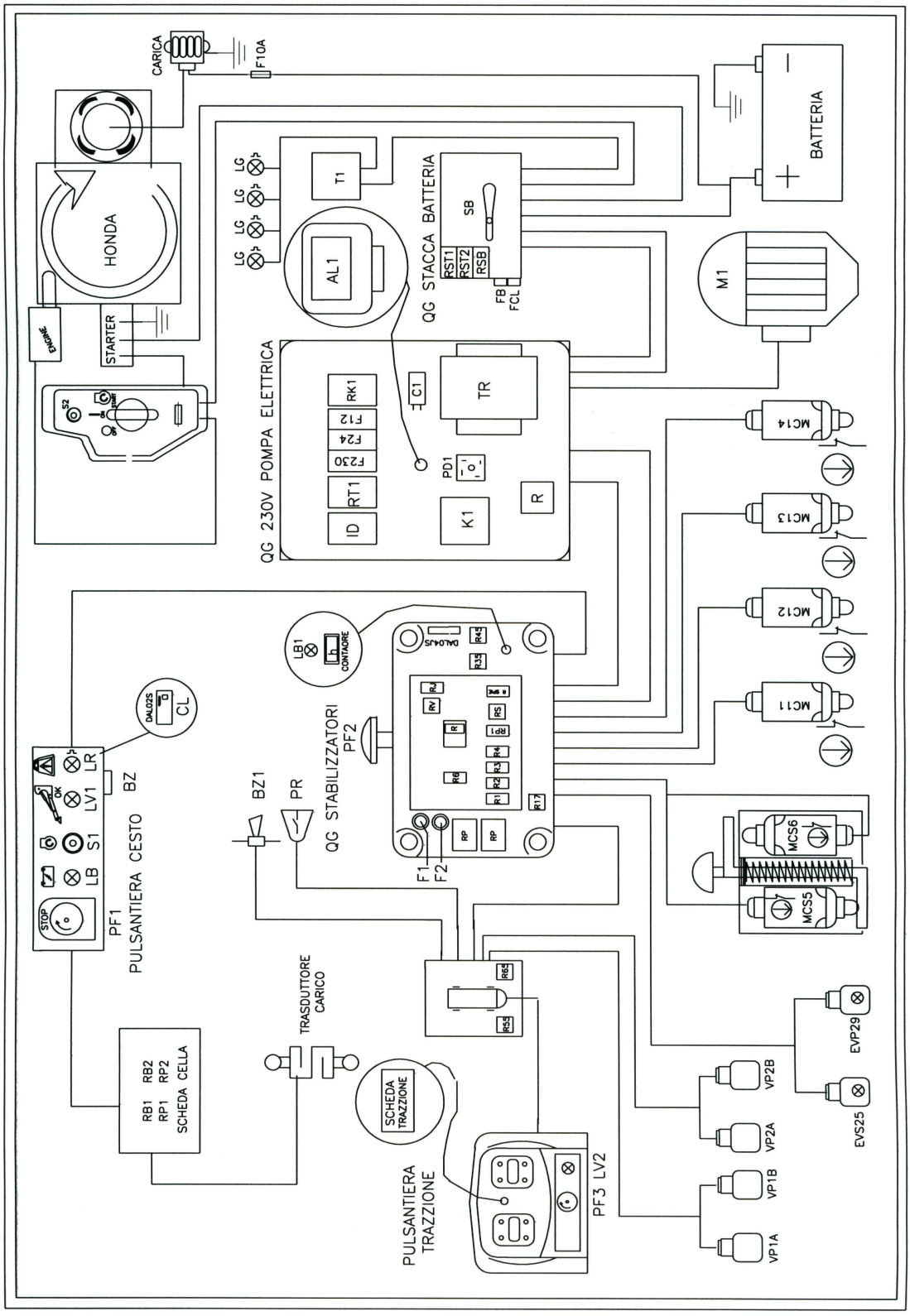
8 HYDRAULIC SYSTEM DIAGRAM



POS	DESCRIPTION
1	HONDA ENGINE 9 HP AT 3000 RPM
2	PUMP
3	MANUAL PUMP
4	FLIP-FLOP VALVE
5	DIVERTER
6	AREA CONTROL DISCHARGE ELECTROMAGNETIC VALVE
9	OIL TANK
11	STABILISER DISTRIBUTOR GROUP
12	STABILISER JACK
13	BLOCK VALVE
14	TRACK MOTOR
15	EMERGENCY DISTRIBUTOR GROUP
17	ROTATION CONTROL VALVE
18	ROTATION REDUCTION GEAR
19	TURRET LEVELLING JACK
20	PANTOGRAPH LIFTING JACK
21	BLOCK VALVE
22	BOOM LIFTING JACK
24	BOOM EXTRACTION JACK
26	JIB LIFTING JACK
29	CRADLE LEVELLING JACK
30	CRADLE DISTRIBUTOR GROUP
32	FILTER
34	DRIVE ELECTROMAGNETIC VALVE
36	220V ELECTRIC MOTOR
37	PUMP
38	PRESSURE SWITCH
39	MAIN ELECTROMAGNETIC VALVE

9 ELECTRICAL SYSTEM DIAGRAM

NOTE: The single-wire electric diagram is stored at the authorised service centres



10 BEAUFORT WIND SCALE

Force	Wind name at 10 m height on a flat and unprotected ground	Nm/h Km/h	Effects on land	Effects at sea
0	calm	0-1 0-1	Calm: Smoke rises vertically	Sea like a mirror.
1	Light air	1-3 1-5	Smoke drifts, weathercocks do not move	Small scale like ripples form on the waves; no crests.
2	Light breeze	4-6 6-11	Wind felt on face; leaves move, normal weathercocks stir	Small wavelets, although larger than the other ripples. Crests look glassy, but they do not break
3	Gentle breeze	7-10 12-19	Leaves and small branches move, small flags are stretched	Small waves; crests begin to break: Glassy-looking foam; some whitecap.
4	Moderate breeze	11-16 20-28	Wind lifts dust and sheets of paper; branches sway	Small waves become longer, many whitecaps.
5	Fresh breeze	17-21 29-38	Bushes sway; inland waters show small waves with crests.	Moderate waves become elongated, many whitecaps. (possibly some spray).
6	Strong breeze	22-27 39-49	Large branches move, wires whistle, umbrellas are difficult to control.	Larger waves begin to form
7	Near Gale	28-33 50-61	Whole trees in motion, inconvenience in walking.	Mounting sea: foam from larger waves is blown in streaks downwind.
8	Gale	34-40 62-74	Walk against wind becomes very difficult. Twigs and small branches blown off trees.	Massive, moderately high waves form, their crests break into spindrift; foam is blown downwind in visible streaks.
9	Strong Gale			
10	Storm			
11	Violent Storm			
12	Hurricane			