

**TECHNICAL COURSE
BOOKLET**

The image shows a 3D rendering of a boom lift. The boom is primarily blue with red safety stripes. It is extended upwards and to the right. The base is partially visible, showing a red and white structure.

LightLift 17.75 3S

LightLift 20.10 3S

PERFORMANCE



TTPE1720021602

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THE PRESENT MANUAL HAS TO BE CONTEMPLATED SIMPLY WITH INDICATIVE PURPOSE, IT DOESN'T REPLACE ANYHOW THE USE AND MAINTENANCE MANUAL OF THE MACHINE. THEREFORE ALWAYS REFER TO USE AND MAINTENANCE MANUAL FOR ORDINARY AND EXTRAORDINARY USAGE, FOR MAINTENANCE, FOR PROBLEM SOLVING AND GENERALLY FOR ANYTHING REGARDING THE MACHINE.

1. INTRODUCTION

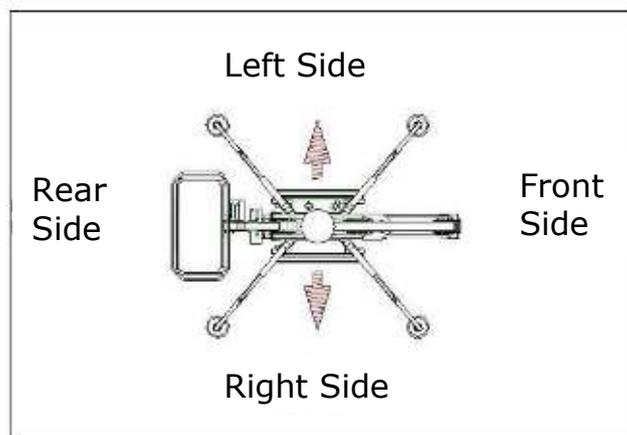
This booklet describes the technical and safety features, the electrical system and the hydraulic system of the Hinowa LightLift 17.75 3S and 20.10 3S Performance.

It does not include how to operate the machine, for this purpose see the **Operation and Maintenance Manual**.

The first two digits of numerical part of the LightLift name identify the maximum working height of the machine in meters, while the last two digits indicate the maximum outreach in decimeters.

The aerial platform is equipped with an hydraulic system and an electrical system that interact to ensure safe operating in any situation. The two systems are described below, the present manual describes also how they interact.

Remember that the operating position of the machine is established from inside the basket, which is positioned in the rear. See the diagram below.



All the machine movements are controlled by the machine remote control supplied with the machine. Usually, the remote control is positioned in the specific seat in the basket, anyway there are others options illustrated and described later.

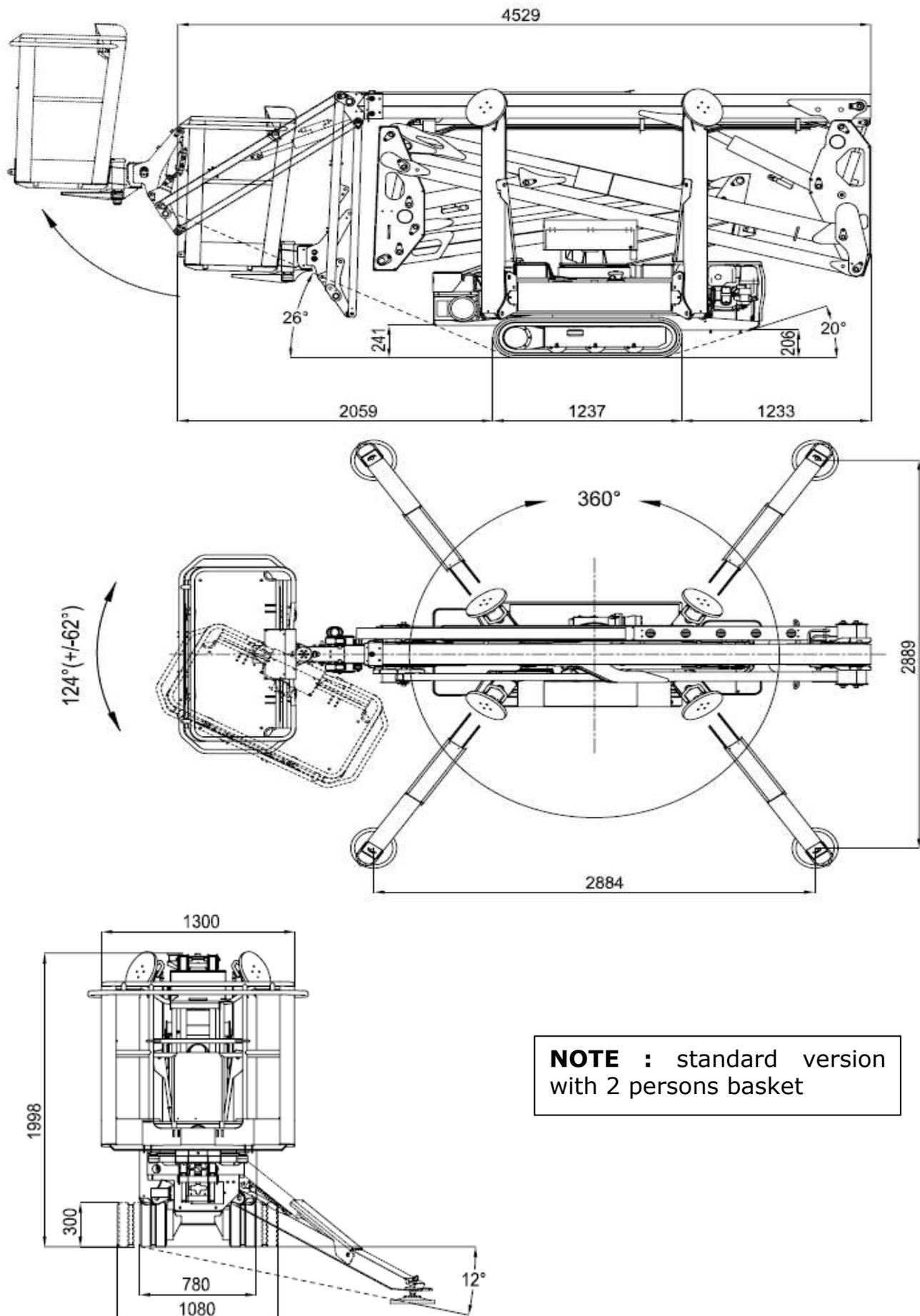
2. LL17.75 3S AND 20.10 3S PERFORMANCE DATAS

2.1 LL17.75 3S AND 20.10 3S PERFORMANCE TECHINICAL SPECIFICATIONS:

	LL1775	LL2010
Platform capacity	230 Kg	230 Kg
Max height (basket floor level)	14,96m	18.05m
Max working height	17,06m	20.15m
Basket dimensions (standard 2 persons basket)	1335x690mm	134x69
Max working horizontal extension	7,00m	9,20m
Undercarriage width (Retracted/Extended)	798 / 1086mm	795 / 1095mm
Rotation (non-continuous)	360°	360°
Basket rotation	124° (+/- 62°)	124° (+/- 62°)
Max pressure on the ground for tracks	0,64 daN/cm ²	0,67 daN/cm ²
Max pressure on the ground for outrigger	2,45 daN/cm ²	3,04 daN/cm ²
N° of operators	2	2
N° operators for optional 1 person basket	1	1
Jib function	89° (+0° / -89°)	89° (+0° / -89°)
Max aerial part working inclination	1° / 1,75%	1° / 1,75%
Max slope tolerance	12°	15°
Petrol version dry weight (indicate in CE plate)	2190 Kg	2840 Kg
Petrol machine operating weight (without operator)	2230 Kg	2880 Kg
Lithium machine operating weight (without operator)	2300 Kg	2980 Kg
Max drive speed with thermic engine (with double speed)	0,7 / 1,8 / (optional 3,6) Km/h (*)	0,5 / 1,3 / (standard 2,5) Km/h
Angle of attack	20° / 36,4%	20° / 36,4%
Max admitted translation inclination	16° / 28,7%	16° / 28,7%
Max wind speed	12,5 m/s	12,5 m/s
Max manual force allowed	400N	400N
Hydraulic pressure of ground part (tracks-outriggers)	165bar	165bar
Hydraulic pressure aerial part	185bar	185bar
Hydraulic oil tank capacity	40 liters	40 liters
Electric system tension	12V	12V
Battery	12V 55Ah (*)	12V 55Ah (*)
AC electric motor	110V or 220V 50 Hz, 2.2KW	110V or 220V 50 Hz, 2.2KW

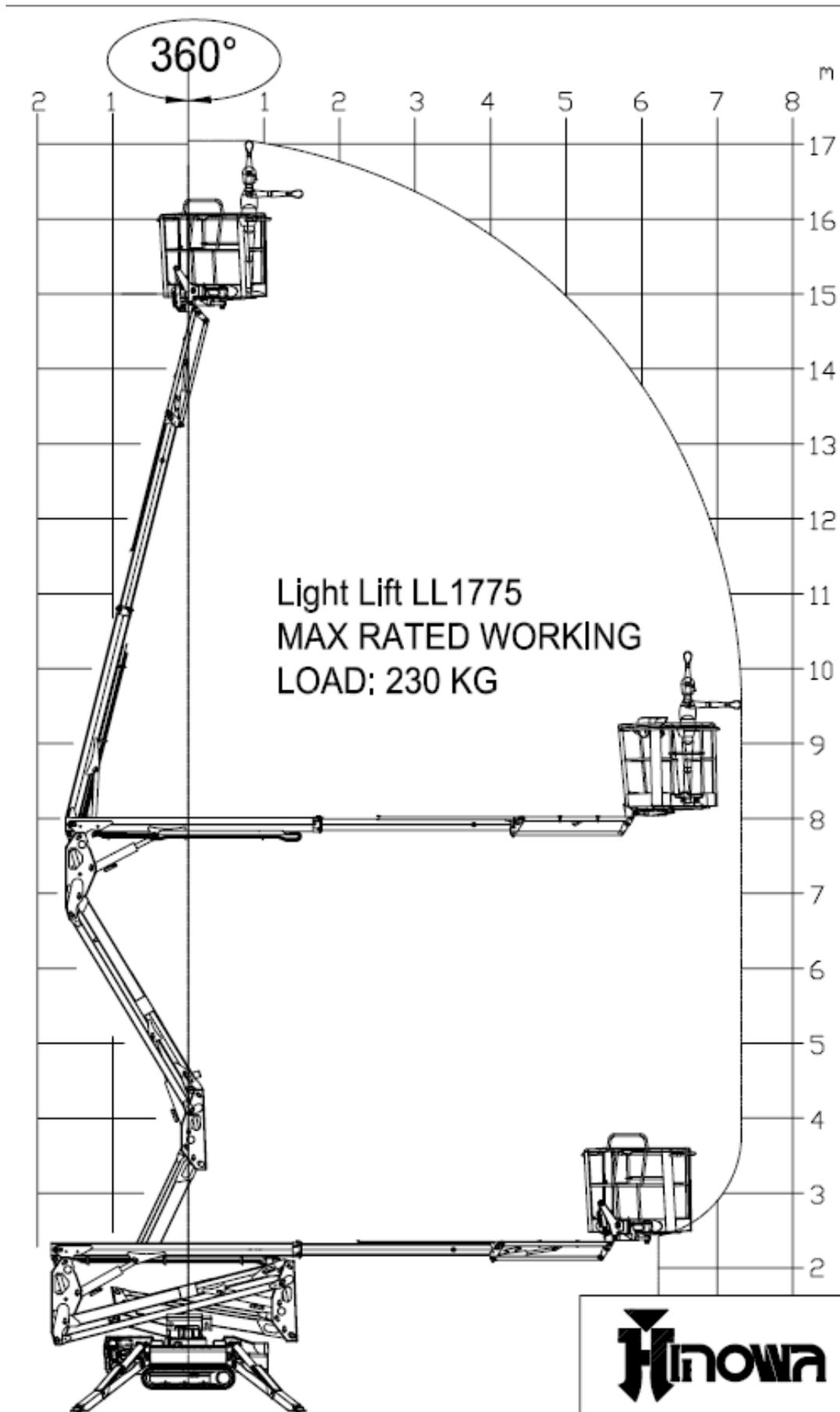
(*) (FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

2.2.1 LL17.75 3S PERFORMANCE DIMENSIONS

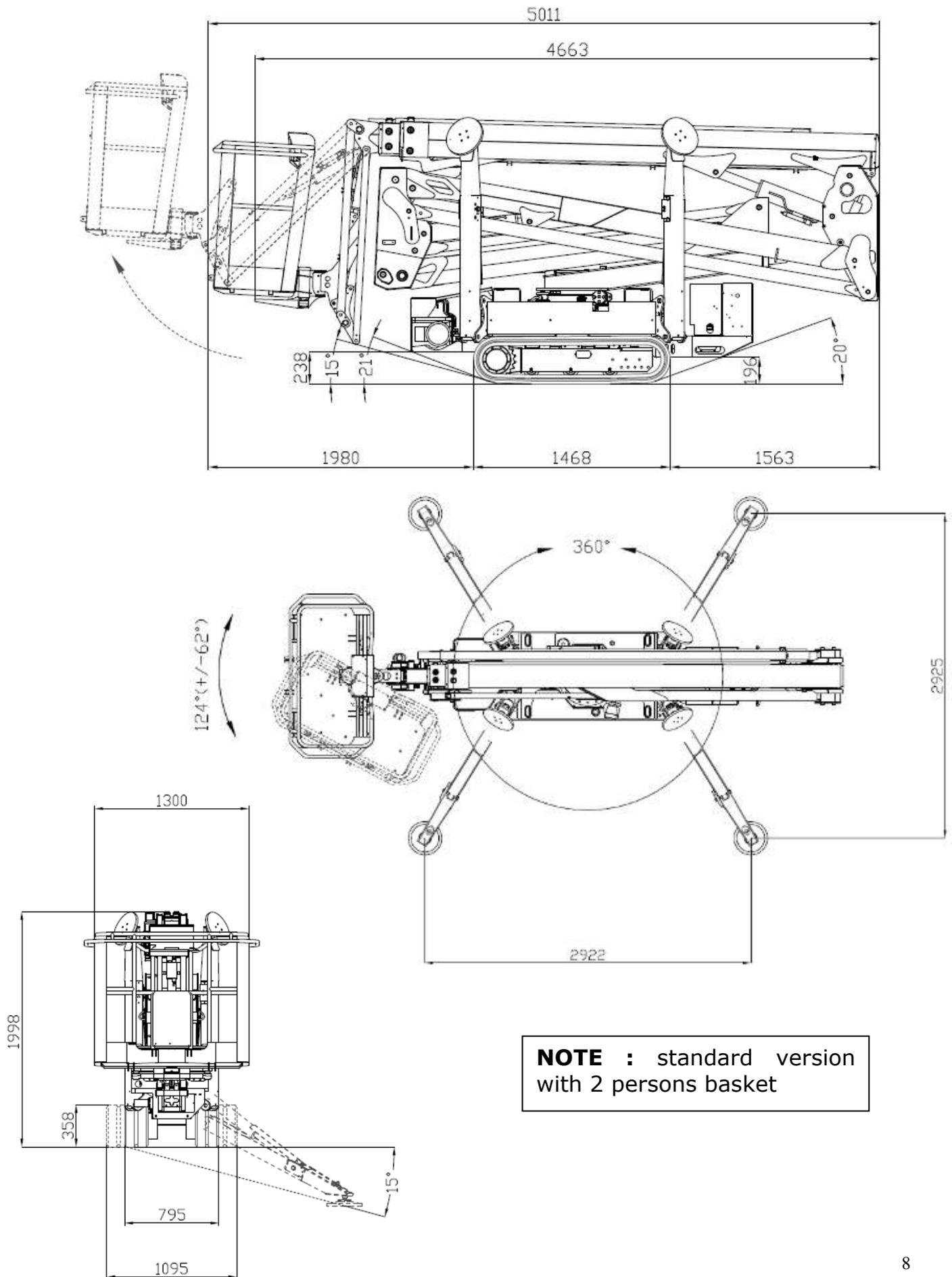


NOTE : standard version with 2 persons basket

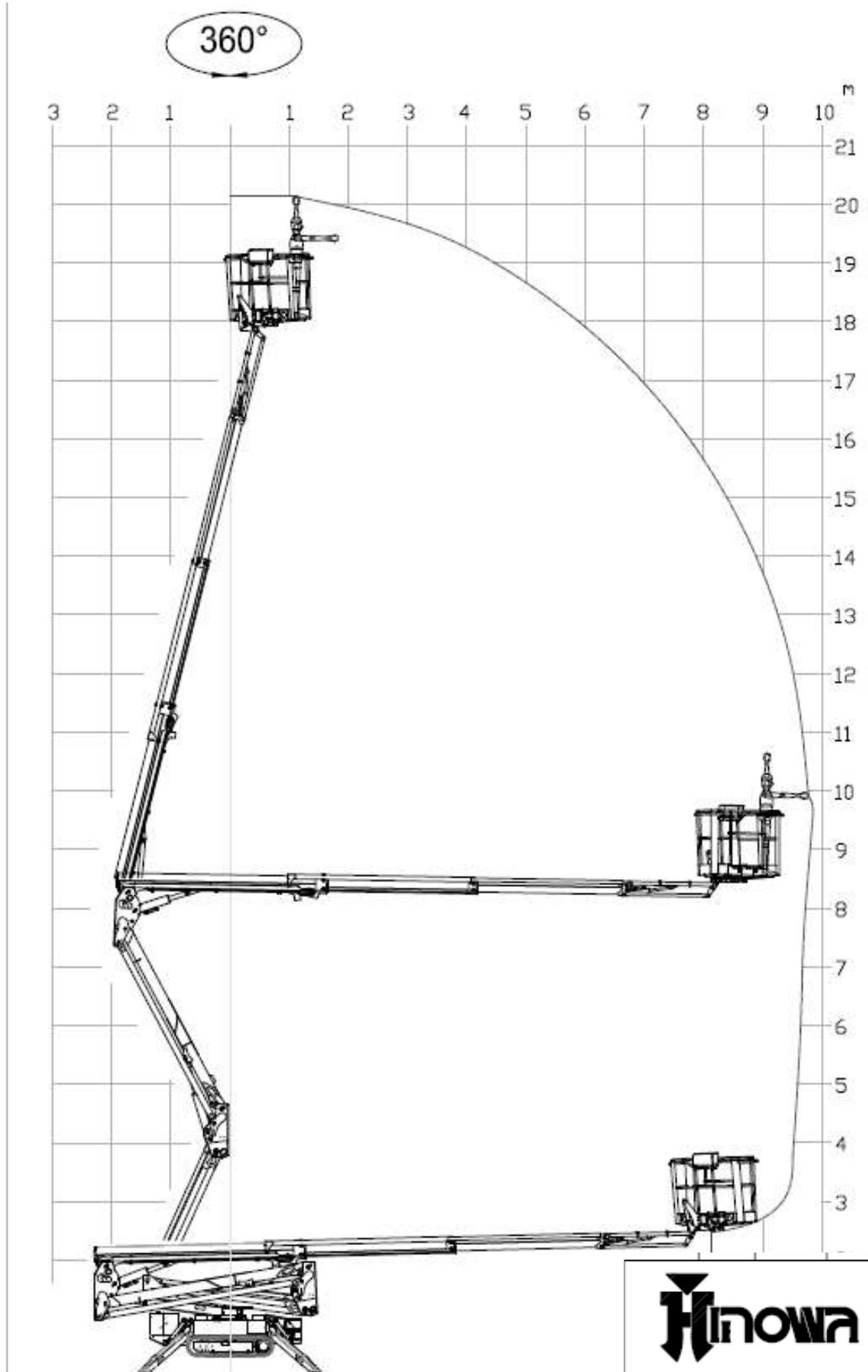
2.2.2 LL17.75 3S PERFORMANCE WORKING AREA - 230 KG CAPACITY



2.3.1 LL20.10 3S PERFORMANCE DIMENSIONS



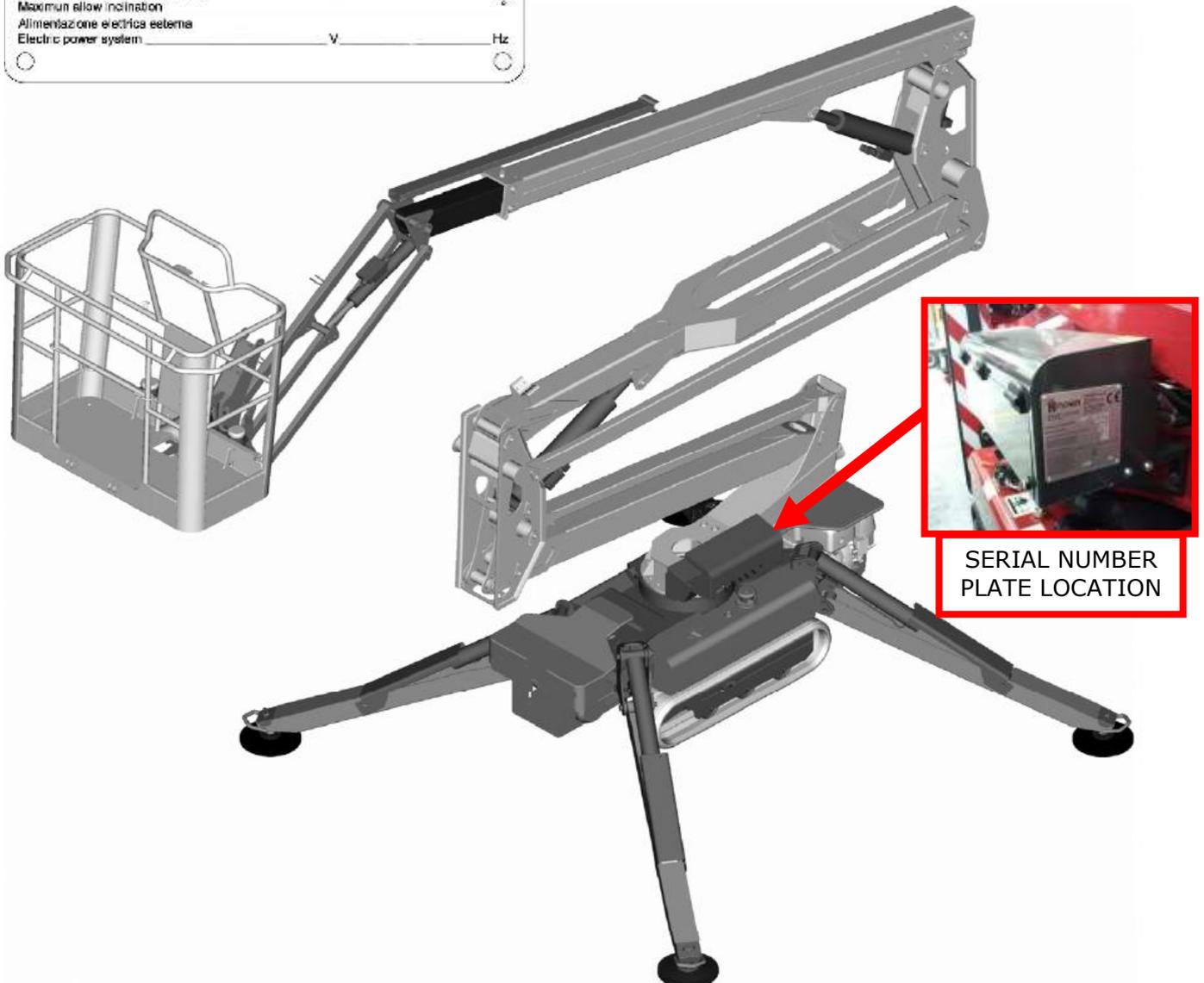
2.3.2 LL20.10 3S PERFORMANCE WORKING AREA - 230 KG CAPACITY



2.4 SERIAL NUMBER LOCATION

A serial number plate is affixed on to the frame of the machine. The following illustrations showing its location.

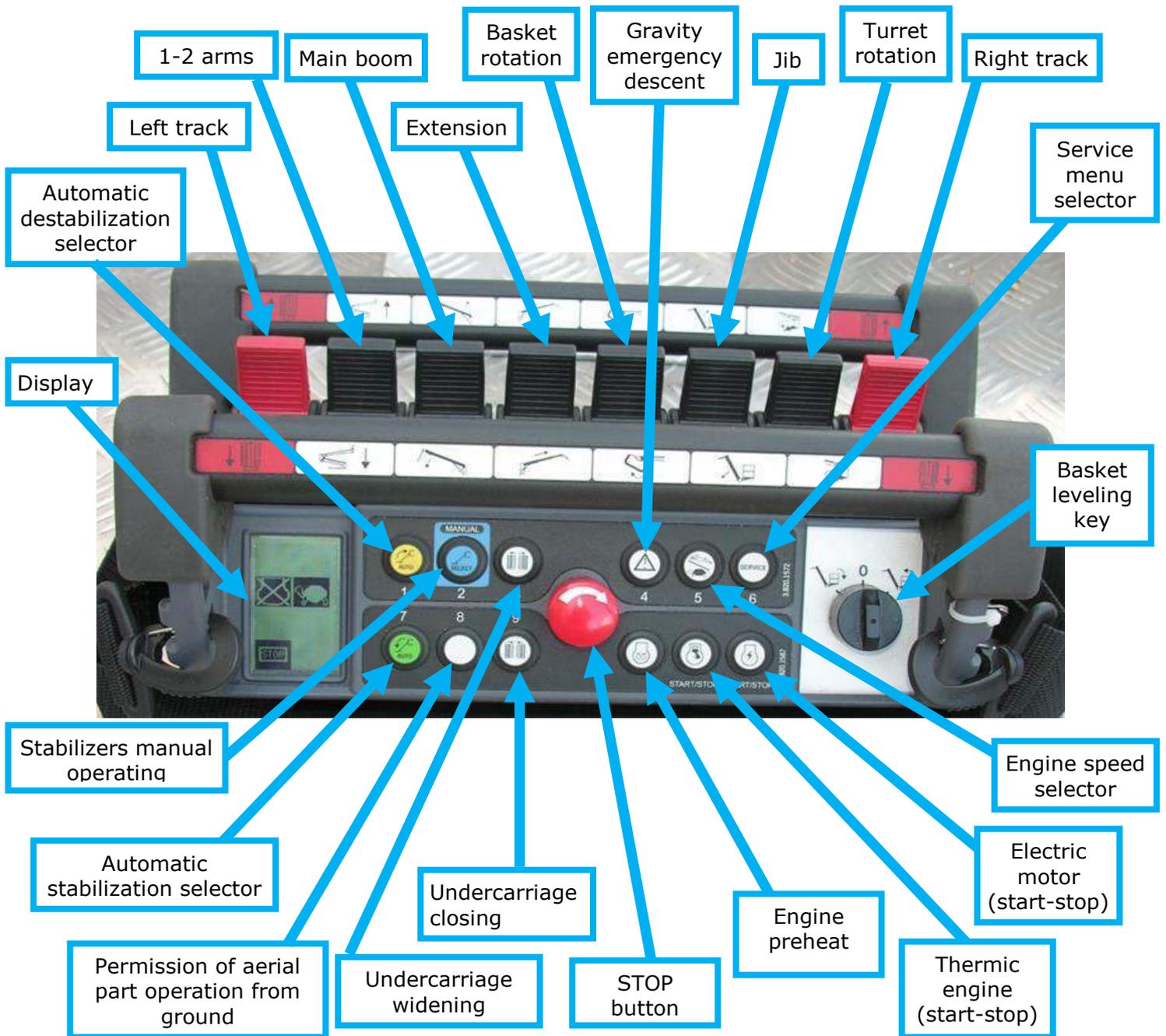
 Miniescavatori - Carri cingolati Minidumper - Piattaforme aeree Pale compatte	HINOWA S.p.A. Via Fontana 37054 NOGARA (VR) ITALIA Tel. +39-0442 539100 Fax. +39-0442 539075	
	Modello / Model PLE _____ Matricola / Serial n° _____ Anno di costruzione / Year of construction _____ Massa PLE / Weight PLE _____ kg Pressione max impianto idraulico / Hydraulic circuit max pressure _____ bar Portata / Capacity max _____ kg <small>Compreso n°2x80 Kg cinghie + 40 kg di attrezzature / Include n°2x80Kg cinghie + 40 Kg equipment</small> Velocità max. vento ammessa / Max wind speed allow 12.5 m/s Forza manuale max ammessa / Max manual strength allow 400 N Inclinazione max telaio ammessa / Maximum allow inclination _____ ° Alimentazione elettrica esterna / Electric power system _____ V _____ Hz	



SERIAL NUMBER
PLATE LOCATION

3. SUMMARY OF REMOTE CONTROL FUNCTIONS

The remote control functions (commands and signals) of the LightLift 17.75 3S and 20.10 3S Performance are briefly summarized below.



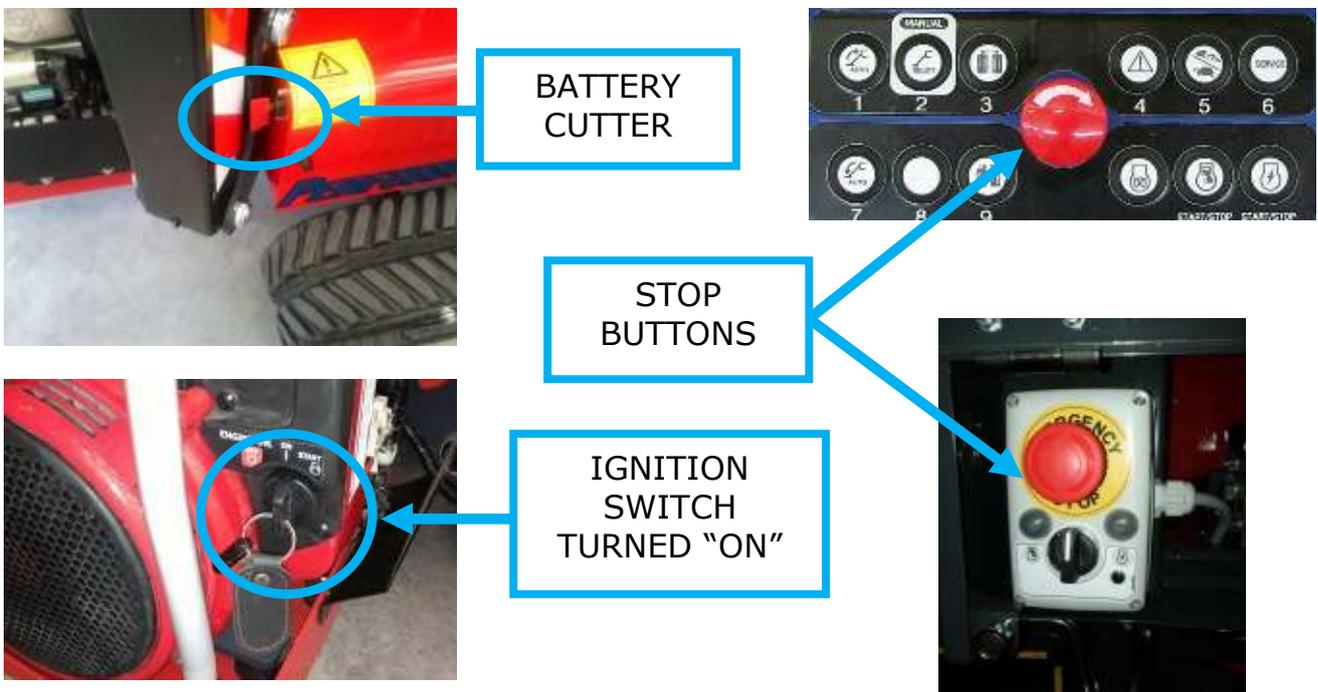
The remote control is critical for the machine: it displays all the information on the platform status and any error message in case of incorrect use of the controls. It is also possible to access the SERVICE menu, which indicates any anomalies or malfunctioning of machine components.



The icons on the display appear in 8 different positions, as illustrated above.

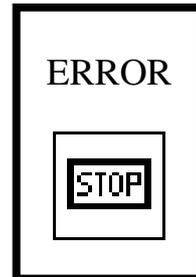
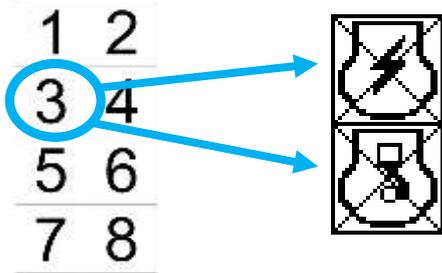
**4. MACHINE IGNITION
(FOR LL17.75/4 and LL20.10/3 read APPENDIX 9)**

To start up the machine, the battery cutter switch must be active, both the stop buttons (the first on the remote control and the second on the ground control box) must be released and ignition switch on the engine has to be turned ON without start the engine.



To start the engine press remote control "thermic engine" button, to start the electric motor press "electric motor" button. With cold temperatures with petrol engine it is recommended to press the preheat button after engine start and wait 20 seconds before to start any movement. To stop the engine it is possible to press a stop button or to press once again the button of engine

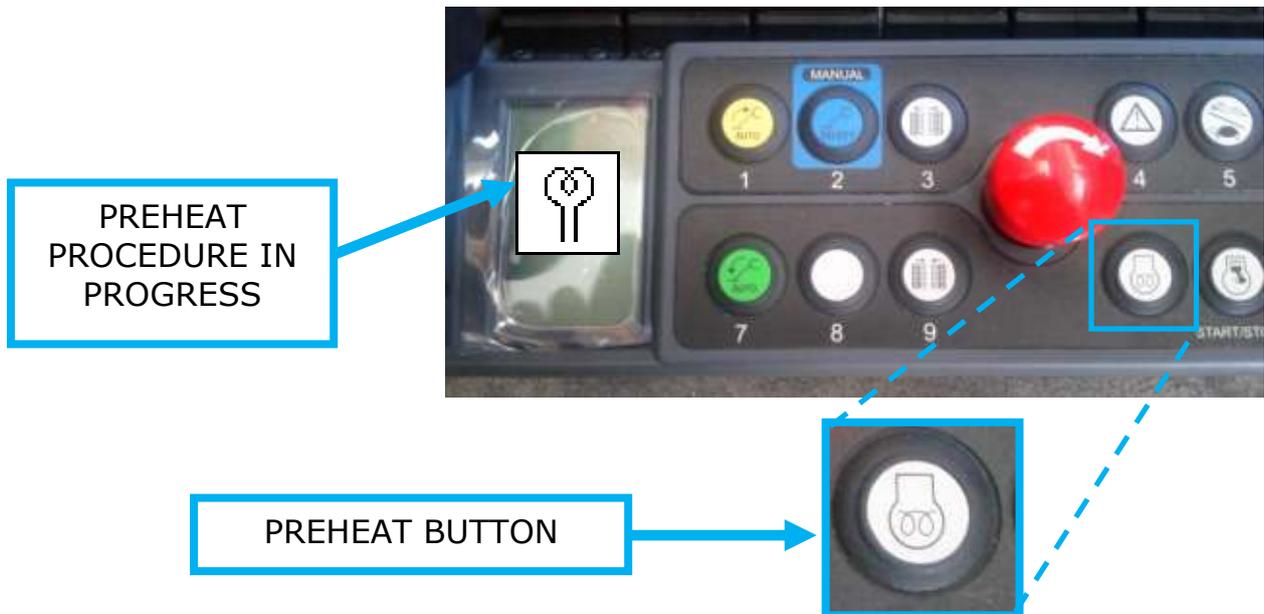
start. The display shows always in position 3 the motor selected, in case this motor has been stopped the icon will be marked with an "X".



If the operator tries to start up the machine with a stop button pressed, the "ERROR STOP" message will appear as illustrated here on side.

4.1 GASOLINE ENGINE PRE-HEATING

In case platform is equipped with gasoline engine, it is possible to pre-heat the engine, increasing the rpm.



Pushing the "PREHEAT" button on the remote control engine runs for 20 seconds at 2200 rpm and the display visualizes the icon "PREHEAT PROCEDURE IN PROGRESS".

While preheating is in progress, any movement normally working at 2200 rpm would work at 2200 rpm.

In case an aerial part movement working at 1500 or 3600 rpm is selected, engine changes rpm to 1500 or 3600 and the heating procedure ends.

In case a track movement working at 1500 or 3600 rpm is selected, engine changes rpm to 1500 or 3600 rpm, then it returns to 2200 rpm when movement is released.

In case the power system is Lithium the rpm are different but the behavior will be the same.

While preheating is in progress it's not possible to move outriggers or to widen the undercarriage.

5. OPERATION AND SAFETY FEATURES OF THE MACHINE

The LL 17.75 3S and 20.10 3S Performance aerial platform are divided into two main parts:

1. Ground part or undercarriage part
2. Aerial part

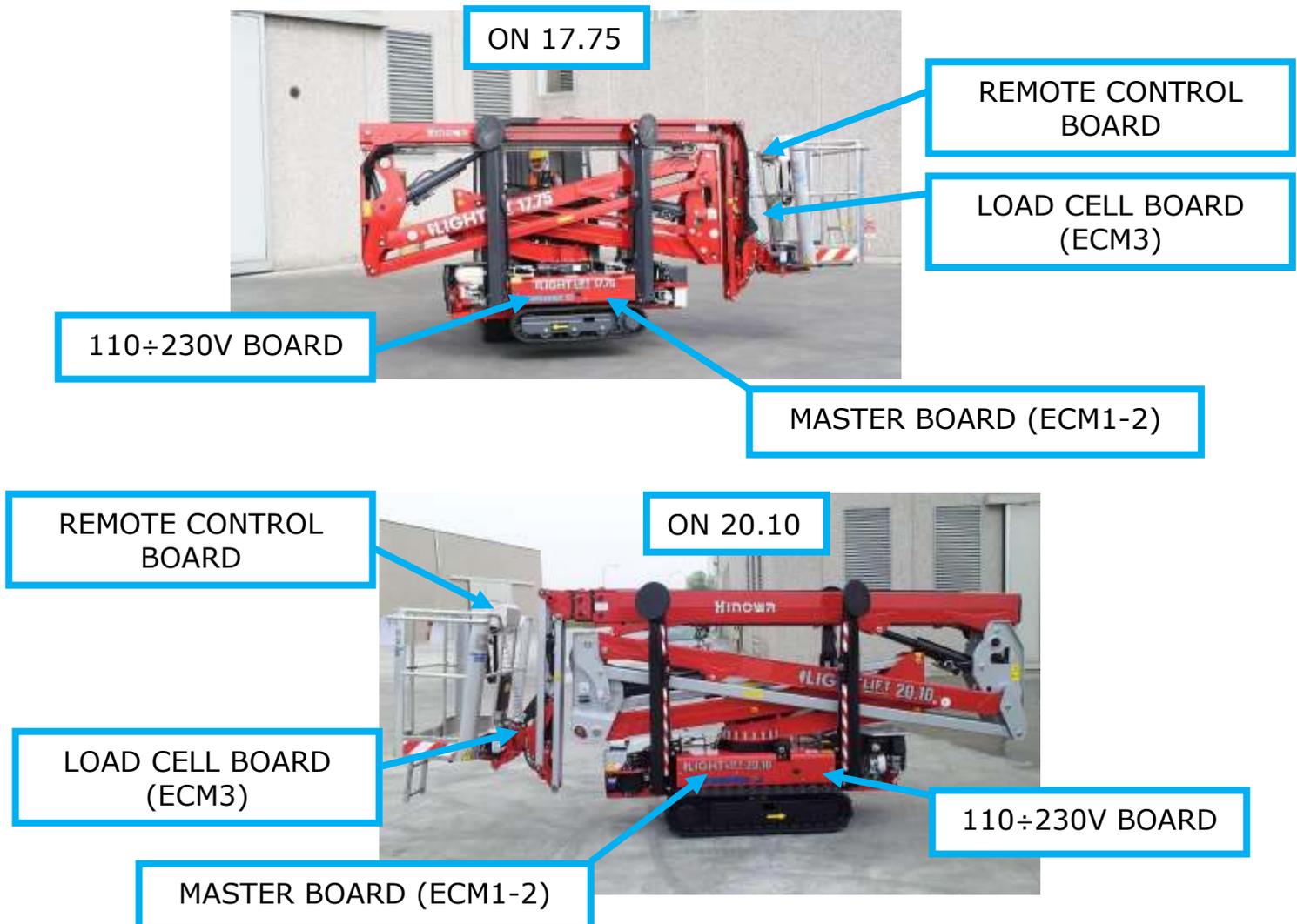
Operating in travel or stabilization mode, we are controlling the ground part; on the other hand, moving the booms or the turret rotation we are controlling the aerial part.

The ground or aerial part movements are managed by a control module composed by different boards (indicated in the picture below) that interact each other and with sensors or actuators installed in the machine. The load cell board (ECM3) on the jib arm controls the weight in the basket and communicates by CAN BUS with the master board (ECM1-2) located in the electric component compartment on the ground part.

Another board (110÷230V BOARD) manages the functioning of the electric motor and the charging of the battery when the machine is connected to the 110÷230V network.

This board communicates directly with the master board (ECM1-2).

A small board is located into the remote control (REMOTE CONTROL BOARD).



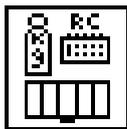
5.1 FUNCTIONING OF THE GROUND PART

5.1.1 TRACKS OPERATION

To allow tracks movement all the outriggers must be lifted from the ground. When the operator is at the ground it is enough to act on the 2 outer red joysticks to move the tracks. If the remote control is on the basket, it is necessary to press the pedal (if pedal option is active) and act on the joystick at the same time.

It's possible to drive the tracks with the jib either closed or open in order to move the machine on inclined slopes as well. To open the jib with machine not stabilized, none of the outriggers can touch the ground and the operator must control the machine from ground with remote control in hand (the remote control cannot be in the support). It is enough to act on the joystick to move the jib. If a joystick of another aerial part movement is operated an error message appears on the display ("JIB ONLY").

If there are more than 40 Kg weight in the basket or the remote control is in its support in the basket, it is not possible to move the jib and on the display appears an error message icon "REMOTE CONTROL OR LOAD ON BASKET".



"REMOTE CONTROL OR LOAD
ON THE BASKET" ICON



THE TRANSLATION WITH JIB
CLOSED IS POSSIBLE FROM
GROUND OR BASKET.



THE TRANSLATION WITH
OPENED JIB IS POSSIBLE
ONLY WITH OPERATOR AT THE
GROUND.

MOVEMENT SPEED SELECTION FOR THE GROUND PART

Button 5 on remote control allows the operator to select the speed of the ground part movement. To modify the movement speed, the machine changes the rpm of the engine (electronically controlled). On the machine equipped with the double speed drive gear motors, it is available one speed more (HARE) acting on the chamber of the drive gear motors (slow gear- fast gear). Pushing button 5 to select the speed, the speed icon will appear in position 4 of the display. If no movement is made the engine keeps the minimum speed (1500 rpm for gasoline engine).

THERMIC ENGINE (GASOLINE – DIESEL)

- a) TURTLE:  The engine runs at 1500 rpm (1850 on diesel).
- b) NORMAL:  The engine runs always at 3600 rpm for the undercarriage part but the drive gear motors keep the slow speed (max 1,8 km/h).
- c) HARE:  OPTIONAL: If equipped with double speed drive gear motors the engine runs always at 3600 rpm for the undercarriage part and the drive gear motors switch to high speed (max 3,6

NOTE: Auxiliary electric motor works always at minimum speed (1500 rpm).

LITHIUM SYSTEM

- a) TURTLE:  The engine runs at 1050 rpm.
- b) NORMAL:  The engine runs always at 2550 rpm for the undercarriage part but the drive gear motors keep the slow speed.
- c) HARE:  OPTIONAL: If equipped with double speed drive gear motors the engine runs always at 2550 rpm for the undercarriage part and the drive gear motors switch to high speed.

AUTOMATIC SPEED CONTROL FOR STABILITY REASON

LL17.75 and LL20.10 are provided with a special system that automatically reduces tracks speed or stops the movement in case of stability risks.

This control depends automatically on different factors:

- Weight in the basket
- Jib opened or closed
- Tracks widened or not
- Slope inclination gradient in axles X and Y

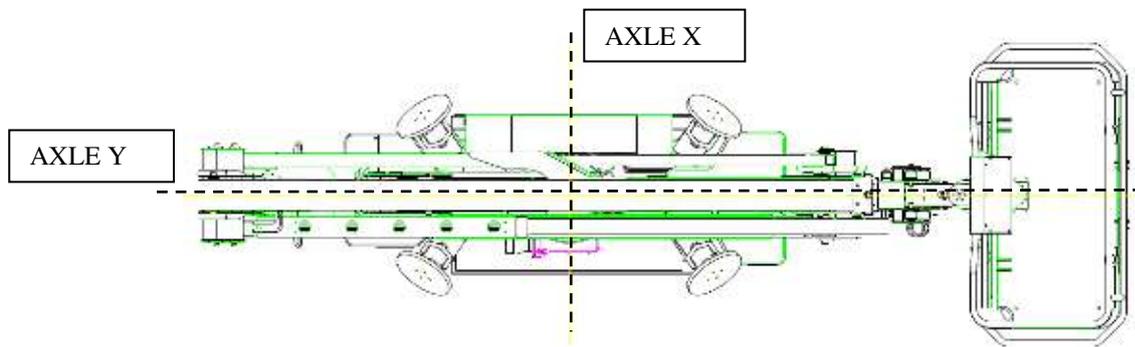
The consequence of a stability emergency is, with increasing severity:

- a) Tracks speed reduction
- b) Tracks movement stopped, display icon →



Moreover the buzzer on the remote control could be activated.

WARNING: To move the tracks when the machine is stopped by those conditions it's necessary to **press button 8** on remote control, a counter-down of 10 seconds will be activate on the display and in the meantime tracks movement is allowed in turtle speed with beeper ON. During that by-pass the operator can bring machine back to stability condition.



SPEED CONTROL POSSIBLE CONDITIONS ON THE LL17.75

JIB OPEN	Not possible to select HARE	X or Y > 5°		TURTLE	
		Y > 7°		TURTLE + BUZZER	
		Y > 13°		BUZZER + MOVEMENT STOPPED+ ALARM ICON	
		UNDERCARRIAGE CLOSED	X > 6°	TURTLE + BUZZER	
			X > 10°	BUZZER + MOVEMENT STOPPED+ ALARM ICON	
		UNDERCARRIAGE WIDENED	X > 10°	TURTLE + BUZZER	
X > 15°	BUZZER + MOVEMENT STOPPED+ ALARM ICON				

JIB CLOSED	Weight inside basket ≤120Kg Possible to select HARE	X or Y >8°		TURTLE	
		Y>10°		TURTLE + BUZZER	
		Weight inside basket ≤40kg	Y>16°	BUZZER + MOVEMENT STOPPED + ALARM ICON	
		Weight inside basket >40kg≤120Kg	Y>13°	BUZZER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE CLOSED	X>6°	TURTLE + BUZZER	
			X>10°	BUZZER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE OPEN	X>10°	TURTLE + BUZZER	
	X>15°		BUZZER + MOVEMENT STOPPED + ALARM ICON		
	Weight inside basket >120≤230Kg Not possible to select HARE	X or Y >5°		TURTLE	
		Y>7°		TURTLE + BUZZER	
		Y>13°		BUZZER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE CLOSED	X>6°	TURTLE + BUZZER	
			X>10°	BUZZER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE OPEN	X>10°	TURTLE + BUZZER	
			X>15°	BUZZER + MOVEMENT STOPPED + ALARM ICON	
	Weight inside basket >230Kg		MAX WEIGHT ALARM + MOVEMENT STOPPED		

SPEED CONTROL POSSIBLE CONDITIONS ON THE LL20.10

JIB OPEN	Not possible to select HARE	X or Y >6°		TURTLE	
		Y>13°		TURTLE + BEEPER	
		Y>20° BASKET DOWNSTREAM OR Y>16° BASKET UPSTREAM		BEEPER + MOVEMENT STOPPED+ ALARM ICON	
		UNDERCARRIAGE CLOSED	X>8°	TURTLE + BEEPER	
			X>10°	BEEPER + MOVEMENT STOPPED+ ALARM ICON	
		UNDERCARRIGE WIDENED	X>10°	TURTLE + BEEPER	
			X>15°	BEEPER + MOVEMENT STOPPED+ ALARM ICON	

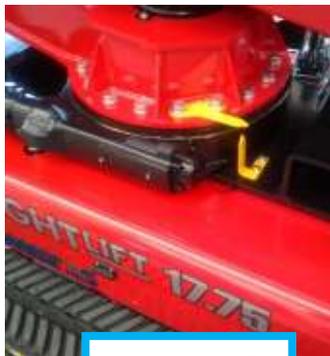
JIB CLOSED	Weight inside basket ≤120Kg Possible to select HARE	X or Y >6°		TURTLE	
		Y >13°		TURTLE +BEEPER	
		Y >20° BASKET DOWNSTREAM OR Y >16° BASKET UPSTREAM		BEEPER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE CLOSED	X >8°	TURTLE + BEEPER	
			X >10°	BEEPER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE OPEN	X >10°	TURTLE + BEEPER	
			X >15°	BEEPER + MOVEMENT STOPPED + ALARM ICON	
	Weight inside basket >120≤230Kg Not possible to select HARE	X or Y >6°		TURTLE	
		Y >10°		TURTLE + BEEPER	
		Y >15°		BEEPER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE CLOSED	X >8°	TURTLE + BEEPER	
			X >10°	BEEPER + MOVEMENT STOPPED + ALARM ICON	
		UNDERCARRIAGE OPEN	X >10°	TURTLE + BEEPER	
			X >15°	BEEPER + MOVEMENT STOPPED + ALARM ICON	
Weight inside basket >230Kg			MAX WEIGHT ALARM + MOVEMENT STOPPED		

5.1.2 OUTRIGGER MOVEMENT

It is possible to move the outriggers only when the machine is closed and aligned, or when the photocells receive the signal reflected in the reflector installed on the jib arm of the machine (see figure below). When the machine is aligned, the alignment symbol appears in position 6 of the display.



With machine closed and aligned, the symbol appears on the display and it is possible to move the outriggers



ON 17.75

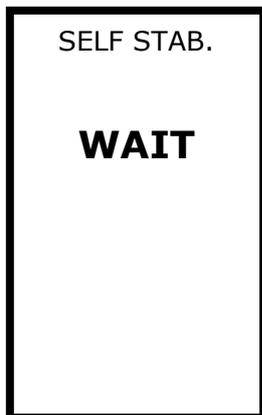
There are 2 arrows on the machine useful as visual reference point for the operator when the machine is closed and aligned. The picture here on the left side illustrates the arrows when the machine is aligned, i.e. when it is possible to move the outriggers.



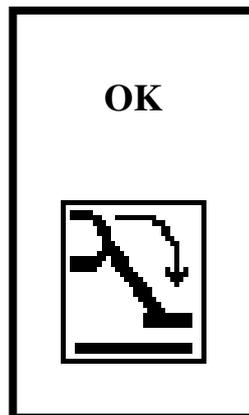
ON 20.10

SELF STABILIZATION

To automatically stabilize and destabilize the machine it is necessary that the aerial part is perfectly closed and aligned and that the relevant icon is visualized in position 6 of the remote control. It is then enough to press and hold button 7 of the remote control "automatic stabilization" and wait for the OK indication on the remote control (with remote control in the basket it's necessary also to press the pedal), at this point the platform is ready for the aerial part operation and the icon of machine stabilized appears in position 5 on the display. During stabilization phase the display shows "WAIT".



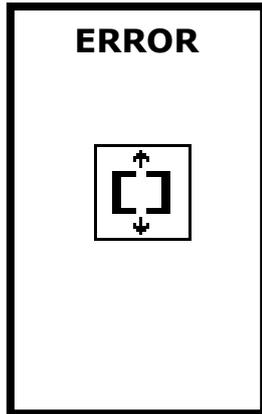
SELF STABILIZATION UNDER WAY



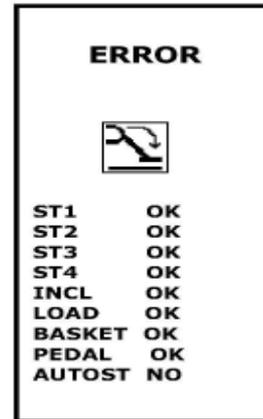
SELF STABILIZATION COMPLETED



MACHINE STABILIZED



SELF STABILIZATION IMPOSSIBLE BECAUSE THE MACHINE IS NOT PERFECTLY CLOSED AND ALIGNED



SELF STABILIZATION PROCEDURE NOT COMPLETED PROPERLY OR BUTTON RELEASED UNTIL THE "OK". IT IS NECESSARY TO DO IT AGAIN WAITING FOR THE "OK" ON THE DISPLAY.

SELF DESTABILIZATION

To proceed with the self destabilization it is necessary that the aerial part is perfectly closed and aligned and that the relevant icon is visualized in position 6 of the remote control. To proceed with the self destabilization it is enough to press and hold button 1 of the remote control "automatic destabilization". During destabilization phase the display shows "wait".

To identify the position of completely closed outriggers there are two pressure switches on the hydraulic part manifold, one for the right side and one for the left side. When both the outriggers of the same side are at end run, the hydraulic oil pressure reaches the maximum value because the max pressure valve releases. Consequently the pressure switches informs the ECM1-2 that the position of complete closure of the outrigger's cylinders.

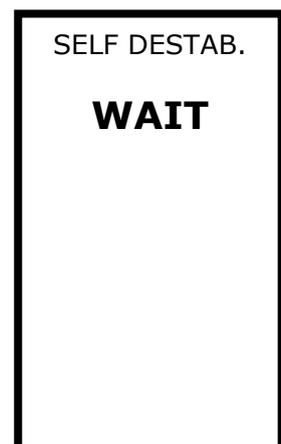


ON 17.75

PRESSURE SWITCH



ON 20.10



SELF DESTABILIZATION UNDER WAY

MANUAL STABILIZATION

It is possible to move one outrigger at time using the remote control; this operation may be very useful in case it is necessary to place one outrigger in a particularly narrow zone.

To proceed with the manual operation of the outriggers it is necessary that the aerial part is perfectly closed and aligned.

Press button 2 "outrigger manual operation", the display shows the following message:



At this point it is enough to press and hold button 7 near the lower arrow to low the outrigger, while pressing button 1 near the upper arrow it is possible to lift outrigger n. 1.

The menu is recursive, pressing again button n. 2 it is possible to move outrigger n. 2, with a further pressure of button 2 it is possible to move outrigger n. 3 and in the end outrigger n. 4. Pressing again button 2 the icons reappear.

When one or more outriggers have been positioned in the working zones, use the self stabilization to stabilize the machine.

It is also possible to stabilize the machine using the manual operation of the outriggers, but it is faster and safer to always use the automatic stabilization.

However, in case the operator wants to proceed with the manual stabilization it is necessary to control that all the outriggers have the flashing lights indicating cylinder is touching the ground, afterwards control the correct leveling through the spirit level. It is also important to pressurize the cylinders of the outriggers lowering them as latest movement.

When the machine has all the outriggers correctly lowered on the ground and is perfectly leveled, the "MACHINE STABILIZED" icon appears on the display.

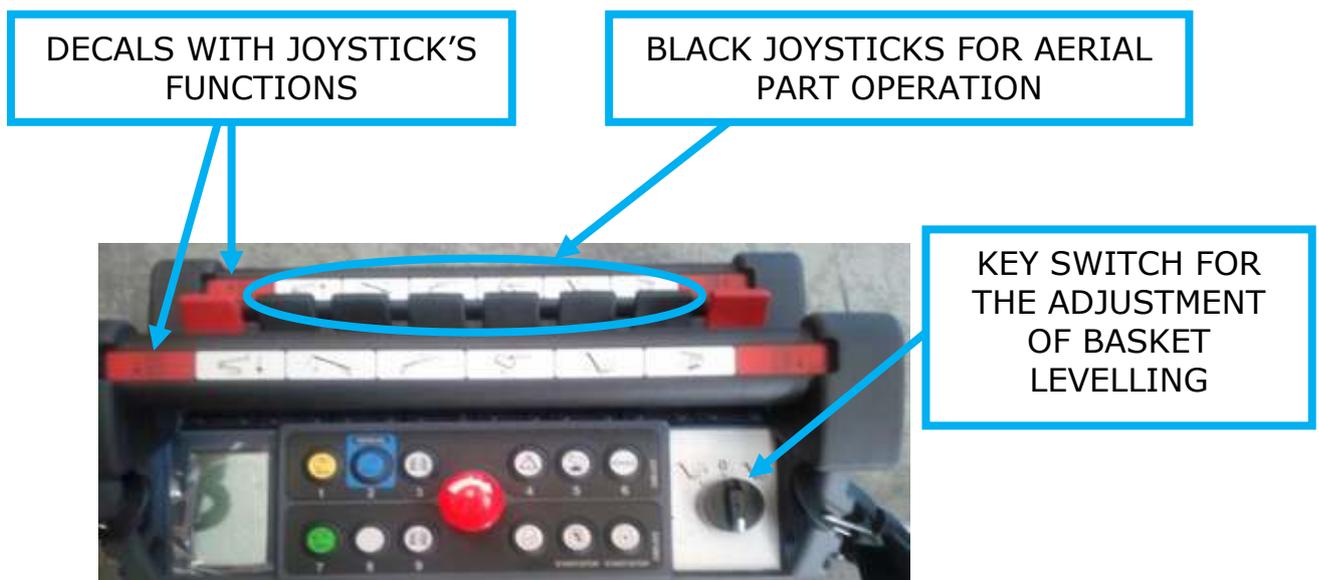


5.2 FUNCTIONING OF THE AERIAL PART

The movement of the aerial part is possible only when the machine has been stabilized, i.e. when the stabilized machine icon is present in position 5 of the display. To move the aerial part with the remote control, it must be positioned in its support in the cage, a magnet placed in the support excites a sensor located in the remote control.

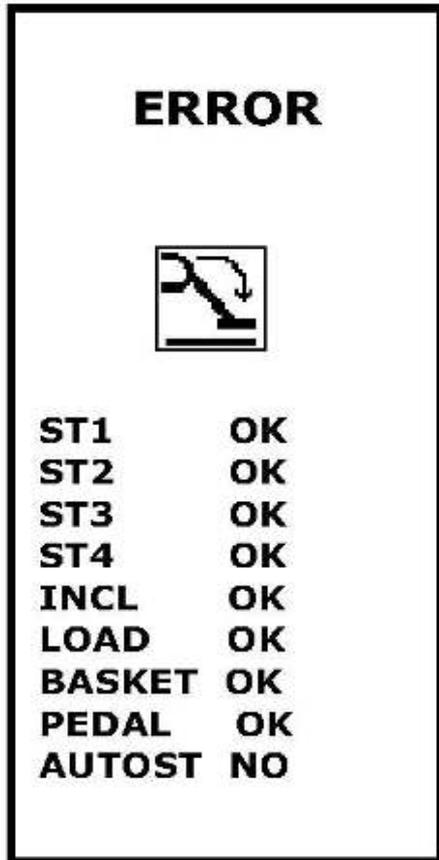
To operate the aerial part it is enough to place the remote control in the basket support, press the pedal (only if option pedal is active) and move the black joysticks connected to the movements of the aerial part; there is a decal indicating the function near every joystick.

To level the basket all the safeties conditions necessary for the aerial part operation have to be respected. The basket leveling adjustment function is carried out keeping turned rightwards or leftwards the key switch of the "basket leveling" on the remote control.



It is possible to move more than one joystick at the same time, however the possibility to carry out two or more functions at the same time may depend on different factors, as for example the weight of the basket, the position of the booms, etc..

In case a joystick is moved with machine not in safety an error message appears on the display indicating which condition is not respected; OK message indicates that the condition is respected, while NO message specifies which condition is stopping the aerial part operation.



- ST1-ST2-ST3-ST4 indicate the 4 micro switches on the outriggers, so the display will visualize OK when the outrigger is properly on the ground, while NO will be visualized when the outrigger is not resting on the ground.
- INCL indicates the inclination of the machine. If NO is visualized on the display it means that the machine is not stabilized within the degrees of tolerance detected by the electronic level (2°).
- LOAD indicates the status of the weight in the basket. NO will be visualized if the basket is overloaded. In this case, the icon with the balance will appear in position 7 of the display.



- BASKET indicates if the remote control is positioned in the specific support in the basket.
- PEDAL (optional): pedal has to be pressed to move the aerial part.
- AUTOST: self stabilization procedure not finished properly, see chapter 5.1.2 "Self stabilization".

ROTATE AERIAL PART AND LOWER FIRST ARM

Rotate the aerial part and lower the first arm are not always possible, as the lower part of the first arm may impact against the engine's carter if the turret is almost completely rotated. In practice, in order to rotate the turret completely the first arm needs to be lifted enough to avoid contact, in the same way, to lower the first arm this must not be above the engine's carter.

The control module communicating with a position switch installed on the first arm (picture on the side), recognises if the first arm is lifted enough to completely rotate the turret.

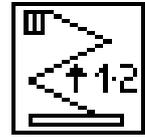


The control module communicating with a rotation proximity sensor installed on the ball-bearing ring secured to the turret, is also able to recognise if the turret is in a position that may cause contact between the engine's carter and the first arm.



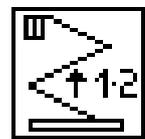
If the operator, using the remote control, rotates the aerial part with the first arm not raised enough to avoid contact between the first arm and the engine's carter, before the contact the rotation movement is disabled.

If the rotation joystick is released and activated again to try to impact the lower part of the first arm against the engine's carter, the movement is automatically disabled and the remote control will show the operator the icon to the side, indicating that the first/second arm needs to be lifted in order to continue rotation.



If the operator, using the remote control, lowers the first arm with turret in a position that allows contact between the first arm and the engine's carter, before contact the movement is automatically disabled.

If the first arm joystick is released and activated again to try to impact the first arm against the engine's carter, the movement is automatically disabled and the display will show to the operator the icon to the side, indicating that indicating that the first/second arm could not be lowered.



NOTE: those controls are not actives using the manual levers on the ground control position.

5.3 STOP BUTTONS

The Light Lift 17.75 3S and 20.10 are equipped with two stop buttons: one on the ground part and one on the remote control.

If ground or remote control stop buttons are used to stop the engine (thermic or electric) with platform closed and aligned (icon in position 6 on display) an intermittent acoustic signal will notify the operator that the ignition switch is still turned ON. It is also possible to stop the engine by pressing "electric motor" button or "thermic engine" button.

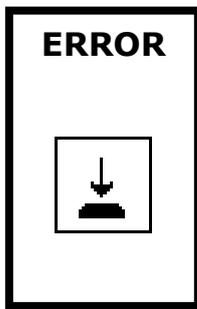


STOP BUTTONS

5.4 PEDAL (OPTIONAL)

On some markets is required the presence of the pedal, to move the aerial part; this function guaranty a double control on the movements, preventing unintentional movements and it is available as option also for the markets where it is not explicitly required. It's also possible to activate or de-activate the pedal.

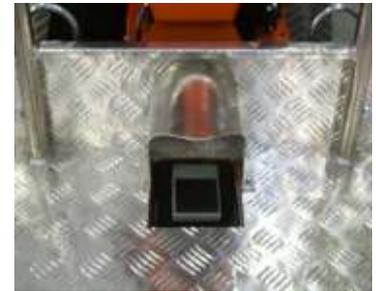
Pedal (if equipped) has to be pressed during the operation of the aerial part, otherwise the movements are impossible. In case a joystick is moved and the pedal is not pressed an error message informs the operator and the "PEDAL NOT PRESSED" icon appears on the display in position 7. In case the operator is not moving any joystick for more than 7 seconds, the pedal has to be released and pressed again, otherwise it's not possible to do any machine movement.



ERROR MESSAGE
"PEDAL NOT PRESSED"



INDICATION OF NOT-
PRESSED PEDAL



PEDAL IN THE
BASKET

6. EMERGENCY OPERATION

The machine is designed to allow movements also in emergency situations like mechanical or electrical breakdowns, unexpected operator illness, etc. In all these cases, it is always possible to intervene to lower the basket to the ground safely.

Depending on the movement, emergency descent can be carried out from either the basket or the ground. Below is detailed list of all potential cases and the relative solutions for emergency descent of the basket.

NOTE: Remember, while the platform is operating, ground personnel must be present at all times.

The ground control box containing the aerial part movement's levers is located on the right side of the 17.75 and on the left side of the 20.10.



GROUND CONTROL BOX
CONTAINING THE AERIAL
PART VALVE BLOCK

EMERGENCY TOOLS LOCATION

In order to fulfill the following emergency operations, machine is equipped with emergency tools, that should be founded in the main carter as indicated by the picture below.

MAIN CARTER ON THE LEFT SIDE OF THE PLATFORM 17.75



MAIN CARTER ON THE RIGHT SIDE OF THE PLATFORM 20.10



REGULATION KNOB
only for 17.75/100
CODE: 05977600



SAFETIES BY-PASS KEY
and, only for 17.75/100,
CONTROL POSITION KEY
SELECTOR
CODE: 1651290015



KEY FOR THE CARTER
CONTAINING THE
HYDRAULIC VALVE BLOCK
FOR THE AERIAL PART
CODE: 07298800²⁸

6.1 EMERGENCY OPERATIONS OF THE AERIAL PART

The main goal of the emergency procedure for the aerial part is to take to the ground the operator staying in the basket.

6.1.1 GRAVITY EMERGENCY DESCENT

SITUATIONS FOR USE IT:

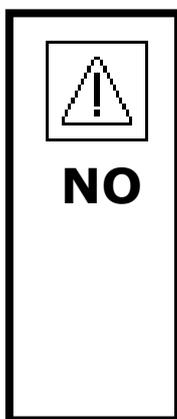
- *Engine and/or electric motor not working*: The hydraulic system is not under pressure because the engine is not working. This situation could be caused by an engine breakdown, a lack of fuel (heat engine), interruption in the electric power supply (electric motor) etc...
- *Machine not stabilized*: The control module has prevented the movement of the aerial part because of, for example, the loss of load of one of the outriggers.

CONDITIONS REQUIRED:

- *Electrical system functioning properly.*

PROCEDURE:

Keep pressed button 4 on the remote control for the emergency descent and at the same time use the joystick referring to the arm to close. Movements possible with gravity emergency descent are 1st cylinder closure, 2nd cylinder closure and jib closure (joystick with downward blue arrow).



Considering this is a gravitational descent it's not possible to lift the arms and it's not possible to move the basket rotation, the turret rotation and the extension closure, these movements (joystick with downward red arrow) can be carried out with the hand pump (Chapter 6.1.4). If the operator uses the joystick to move one movement not allowed by gravity emergency descent an error message will appear on the display (image above).

NOTE: The gravity emergency descent could not be attempted with the stop button pressed on the remote control or at the ground.

6.1.2 OPERATIONS FROM GROUND CONTROL POSITION

SITUATIONS FOR USE IT:

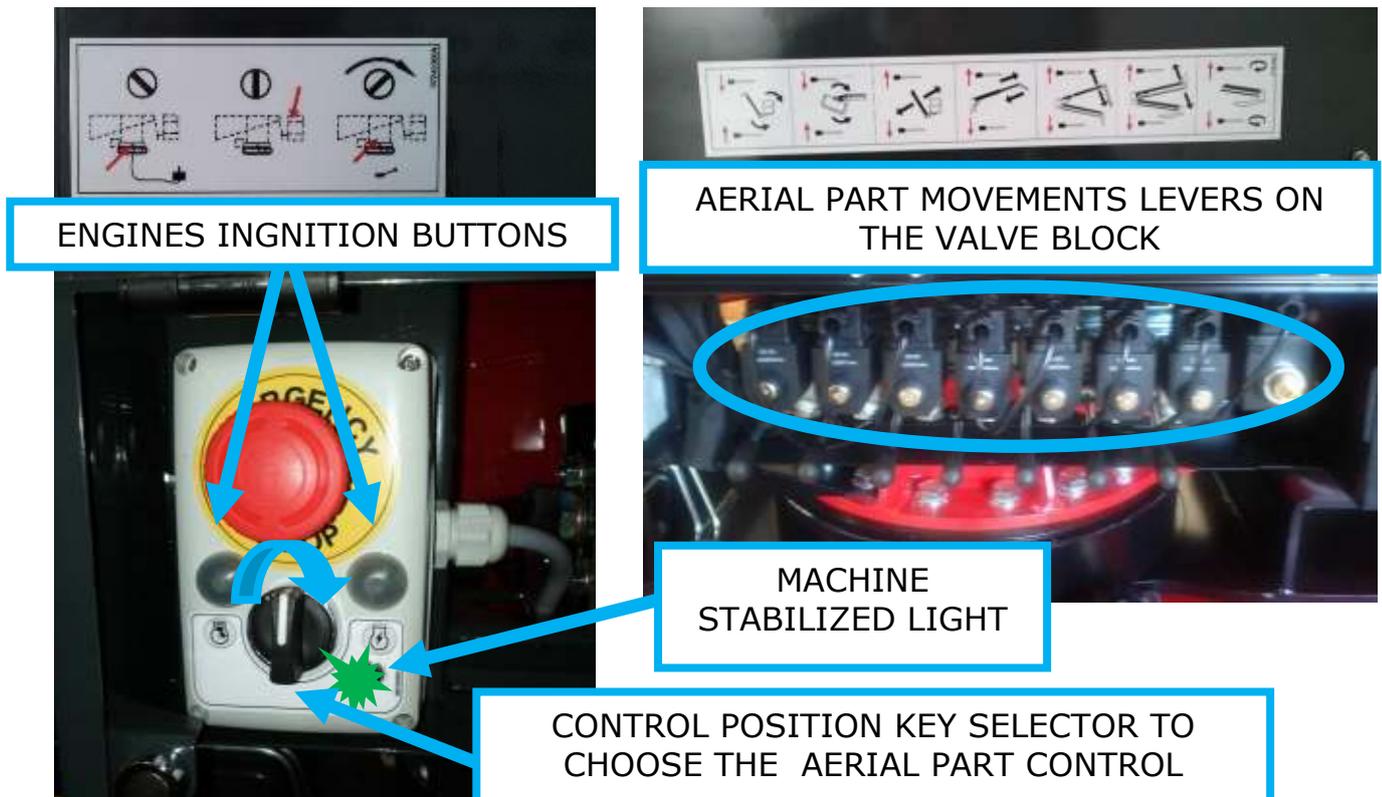
- *Operator illness*
- *Remote control breakdown*

CONDITIONS REQUIRED:

- *Engine and/or electric motor working properly*
- *Electrical system functioning properly*
- *Machine stabilized (machine stabilized icon active)*

The main purpose of using the ground control position is to rescue the operator in the basket or to move the aerial part without an operator in the basket and in any case without remote control at the ground.

To control the aerial part from the ground, it is necessary to keep turned rightward the control position selector key indicated in the picture below to choose the aerial part control position). Then, if all the safety conditions necessary for moving the aerial part are respected, the green light near the control position key selector will be ON. Once that one of the 2 motors (thermic or electric) are running it will be possible to control the aerial part using the levers on the valve block as indicated in the picture below.



NOTE: In case the carter contain the hydraulic valve block for the aerial part with its levers is closed, open it with the proper key that is located as indicated in chapter 6.

For 17.75/100 it's necessary to use the key (CODE 1651290015) to use the control position key selector.

6.1.3 EMERGENCY DESCENT WITH SAFETIES BY-PASS

In particular cases of need, the Hinowa LL17.75 and 20.10 are equipped with a safeties by-pass allowing the aerial part movement even if there is no consent by all the safety devices.

SITUATIONS FOR USE IT:

- Gravity emergency descent is not possible due to the presence of obstacles.
- Need to close and align the machine after the gravity emergency descent

CONDITIONS REQUIRED:

- Engine and/or electric motor working properly
- Electrical system functioning properly

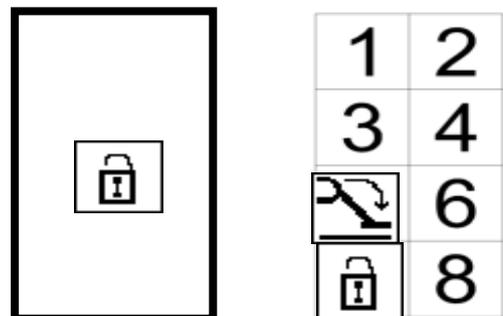


The safety device by-pass can be carried out by using the safeties bypass key switch on the electrical components box located under the main carter. Turning the safeties bypass key switch leftwards (see the decal) the safety devices of the aerial part are by-passed.

The operator must keep the key turned during the safeties by-pass. Then moving the remote control joysticks it is possible to control the aerial part movements.

As soon as the safeties are by-passed the display will show only one icon indicating an opened padlock for few seconds.

This icon will appear in position 7 of the display, while in position 5 will appear the icon "machine stabilized".



ATTENTION:

- To by-pass the safety devices is an extremely dangerous operation and must be carried out only by qualified personnel and only in emergency situations.
- The control module records time, date and all the operations carried out during the by-pass; Hinowa personnel could visualize the complete list and movements carried out during the safeties by-pass.
- The safeties by-pass is an extremely dangerous operation, normal conditions have to be restored as soon as a safe position has been reached.

NOTE: In order to fulfill this emergency operation, the proper key is located as indicated in chapter 6.

6.1.4 EMERGENCY DESCENT FROM THE GROUND WITH HAND PUMP (FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

SITUATIONS FOR USE IT:

- Engine and/or electric motor not working (for engine emergency start see chapter "6.3 - Engines emergency start")
- Electrical system out of order

The only reason why to use of the emergency descent from the ground is a machine breakdown. Any other use is prohibited.

To obtain the movement desired, oil has to be manually pumped while using the ground controls for the arm movements.

It is absolutely prohibited to make different operations than the ones specified above, like open the extension arm, lift the jib, move the outriggers and in general any operation that may compromise the stability of the machine.

To carry out emergency descent under the conditions described above, follow the procedure below.

In case of the aerial part proportional valve is screw type please follow the procedure "A" (for 17.75/100)

In case of the aerial part proportional valve is button type please follow the procedure "B" (from 17.75 from /200 and for 20.10)



SCREW TYPE
PROPORTIONAL
VALVE FOR
AERIAL PART
ON 17.75/100



BUTTON TYPE
PROPORTIONAL
VALVE FOR
AERIAL PART
ON 17.75 FROM
/200 AND ON
20.10



PROCEDURE "A" FOR AERIAL PART SCREW TYPE PROPORTIONAL VALVE ON 17.75/100

- a) Turn OFF the ignition switch .
- b) Take the regulation knob of the proportional valve from the main carter and insert it in the specific adjustment screw of the proportional valve.
- c) Screw in the knob completely.



REGULATION KNOB



SCREW PROPORTIONAL VALVE

- d) Shift the deviator on the manual pump into the position for aerial part movement by following the indications on the label located near the pump (picture below)



ON 17.75



HAND PUMP MOVEMENT



ON 20.10



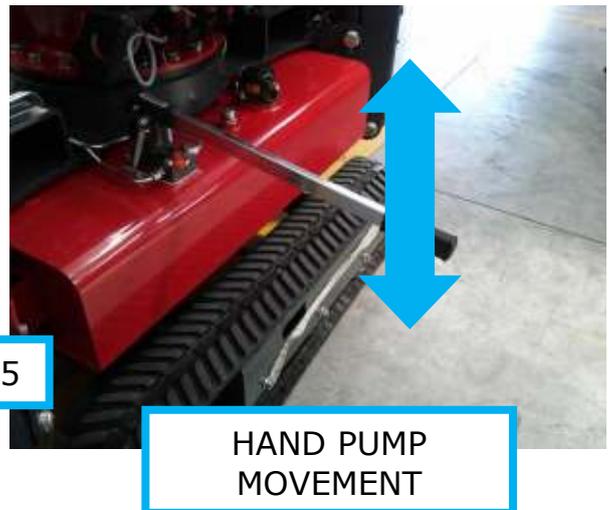
e) Use the ON-OFF levers inside the ground control box, following the indications on the label near the controls; at the same time, use the hand pump to send oil to the movement. The sequence of movements is: - extension arm closure - jib closure - 1 cylinder closure - 2 cylinder closure.



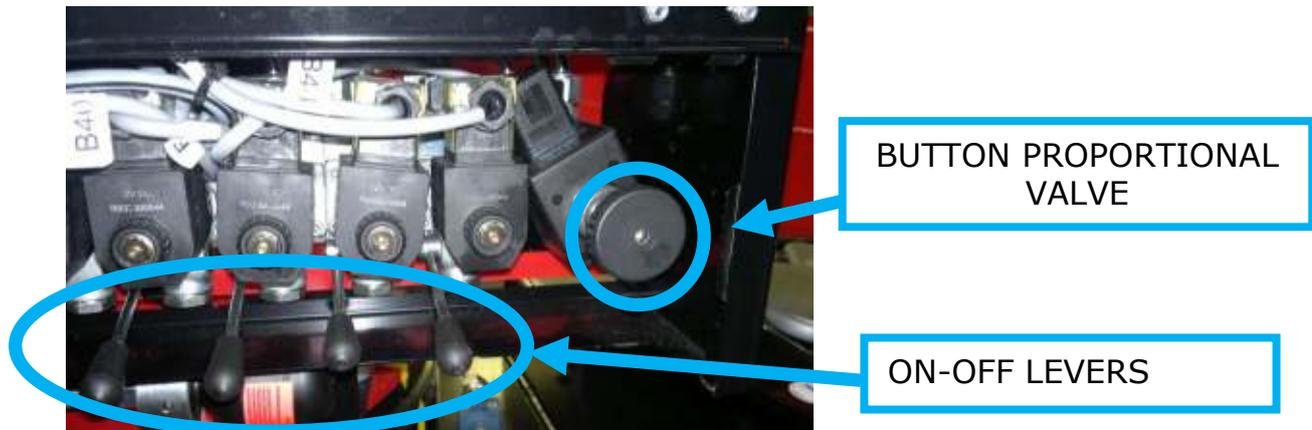
f) After the descent operation, unscrew completely the proportional valve, remove the knob and replace it in its original position.

PROCEDURE "B" AERIAL PART FOR BUTTON TYPE PROPORTIONAL VALVE ON 17.75 FROM /200 AND 20.10

- a) Turn OFF the ignition switch .
- b) Shift the deviator on the manual pump into the position for aerial part movement by following the indications on the label located near the pump (picture below)



c) Push the button on the proportional valve keeping it pressed while attempting the required movement as indicated at point d).



d) Use the ON-OFF levers inside the ground control box, following the indications on the label near the controls, while the proportional valve button is pressed; at the same time use the hand pump to send oil to the movement. The sequence of movements is: - extension arm closure – jib closure – 1 cylinder closure – 2 cylinder closure.

NOTE: In case the ground control box is closed, open it with the proper key that is located as indicated in chapter 6.

6.2 EMERGENCY MOVEMENTS OF THE GROUND PART

The reason why to use the ground emergency procedure is to close the outrigger and displace the platform to clear an area or load the platform on a truck/trailer.

6.2.1 TRACK MOVEMENT WITH SAFETIES BY-PASS

SITUATIONS FOR USE IT:

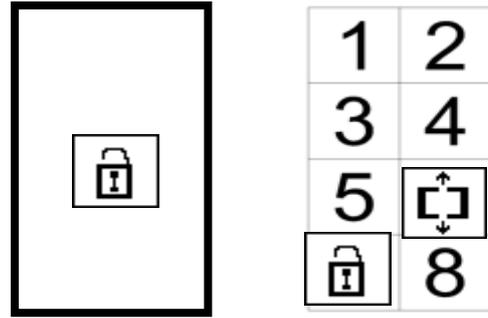
- *Breakdown of an outrigger micro switch*: an outrigger micro switch is out of order and the signal is closed even if the outrigger is not touching the ground. In this case tracks are not moving.



The safety device by-pass can be carried out by using the safeties bypass key switch on the electrical components box located under the main carter. Turning the safeties bypass key switch rightwards (see the decal) the safety devices of the ground part are by-passed. The operator must keep the key turned during the safeties by-pass and at the same time to use the tracks joystick for translate.

As soon as the safeties are by-passed the display will show only one icon indicating an opened padlock for few seconds.

This icon will appear in position 7 of the display, while in position 6 will appear the icon "machine aligned".



ATTENTION:

- To by-pass the safety devices is an extremely dangerous operation and must be carried out only by qualified personnel and only in emergency situations.
- The control module records time, date and all the operations carried out during the by-pass; Hinowa personnel could visualize the complete list and movements carried out during the safeties by-pass.
- The safeties by-pass is an extremely dangerous operation, normal conditions have to be restored as soon as a safe position has been reached.
- The safeties by-pass of the undercarriage enables only tracks movements; for safety reason it is not possible to move the outrigger cylinders.

NOTE: In order to fulfill this emergency operation, the proper key is located as indicated in chapter 6.

6.2.2 OUTRIGGERS MOVEMENT WITH THE MANUAL PUMP

SITUATIONS FOR USE IT:

- *Engine and/or electric motor not working (for engine emergency start see chapter "6.3 - Engines emergency start")*
- *Electrical system out of order*

Attention: Carry out the operations described below only after having closed the aerial part and only to close the outriggers in order to put the machine in transport configuration.

In case of the ground part proportional valves are the screw type follow the procedure "C" (for 17.75 until serial number 012L7)

In case of the ground part proportional valves are the button type follow the procedure "D" (for 17.75 from serial number 013L7 and for 20.10)



SCREW TYPE
PROPORTIONAL
VALVE FOR
GROUND PART



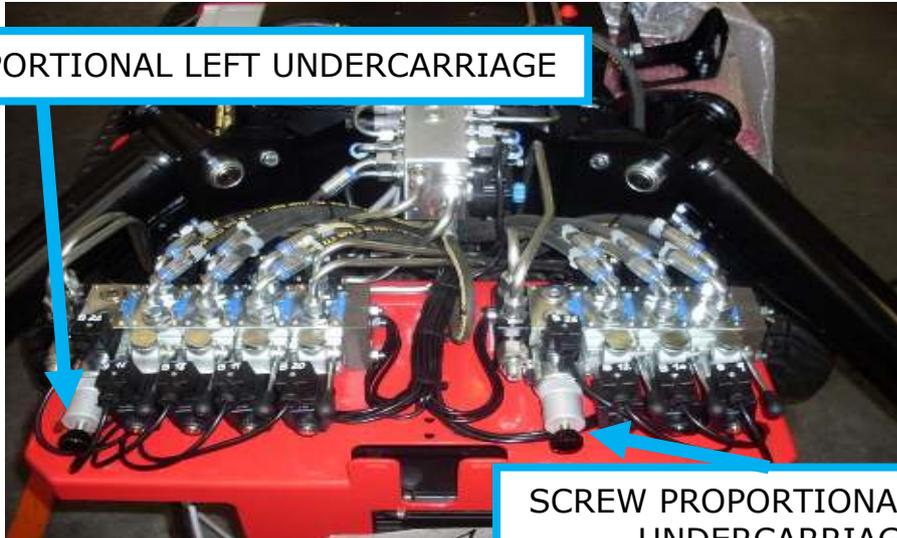
BUTTON TYPE
PROPORTIONAL
VALVE FOR
GROUND PART



PROCEDURE "C" GROUND PART SCREW TYPE PROPORTIONAL VALVE ON 17.75 UNTILL SERIAL NUMBER 012L7

- a) Check that the platform is completely closed and aligned.
- b) Fully but delicately tighten the black handles of the proportional valves located on the two valve blocks of the undercarriage.

SCREW PROPORTIONAL LEFT UNDERCARRIAGE



SCREW PROPORTIONAL RIGHT UNDERCARRIAGE

c) In order to move the right side of the undercarriage, move the deviator of the hand pump in the corresponding position; then manually screw the aerial part/undercarriage right part deviator using the black cap in the picture below, in order to send oil to the right ground part.



AERIAL PART/UNDERCARRIAGE
RIGHT PART DEVIATOR



HAND PUMP
DEVIATOR

ON 17.75



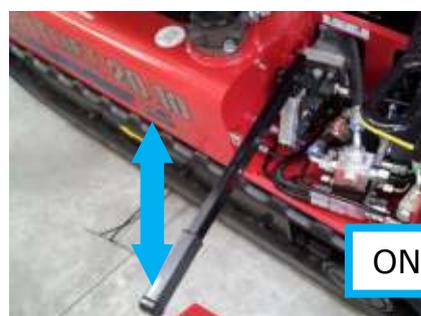
ON 20.10



d) Use the levers of the right undercarriage valve block to activate the desired movement while using the hand pump to send oil to the movement (see picture).



ON 17.75



ON 20.10

e) To move the left undercarriage, move the deviator on the manual hydraulic pump into the corresponding position.



ON 17.75

HAND PUMP
DEVIATOR



ON 20.10

f) Use the levers of the left undercarriage valve block to activate the desired movement while using the hand pump to send oil to the movement (see picture below).



ON 17.75



ON 20.10

g) When the emergency operation is finished unscrew the aerial part/ undercarriage right part deviator and unscrew the screw proportional valves of the undercarriage valve blocks.

PROCEDURE "D" GROUND PART BUTTON TYPE PROPORTIONAL VALVE
ON 17.75 FROM SERIAL NUMBER 013L7 AND 20.10

- a) Check that the platform is completely closed and aligned.
- b) In order to move the right side of the undercarriage, move the deviator of the hand pump in the corresponding position; then manually screw the aerial part/undercarriage right part deviator using the black cap in the picture below, in order to send oil to the right ground part.



AERIAL PART/UNDERCARRIAGE
RIGHT PART DEVIATOR



HAND PUMP
DEVIATOR

ON 17.75



ON 20.10



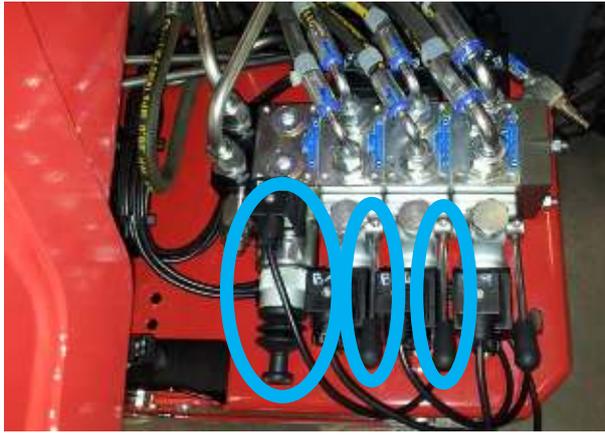
c) Push the button on the proportional valve keeping it pressed while activating the required movement as indicated at point d). Push button on the left side to move outrigger 1 and 2, Push button on the right side to move outrigger 3 and 4.

BUTTON PROPORTIONAL LEFT UNDERCARRIAGE



BUTTON PROPORTIONAL RIGHT UNDERCARRIAGE

d) Use the levers of the right undercarriage valve block to activate the desired movement while the proportional valve button is pressed; at the same time use the hand pump to send oil to the movement (see picture).



ON 17.75



ON 20.10

e) To move the left undercarriage, move the deviator on the manual hydraulic pump into the corresponding position.



ON 17.75

HAND PUMP
DEVIATOR



ON 20.10

f) Use the levers of the left undercarriage valve block to activate the desired movement while the proportional valve button is pressed; at the same time hand pump have to be used to send oil to the movement (see picture below).



ON 17.75



ON 20.10

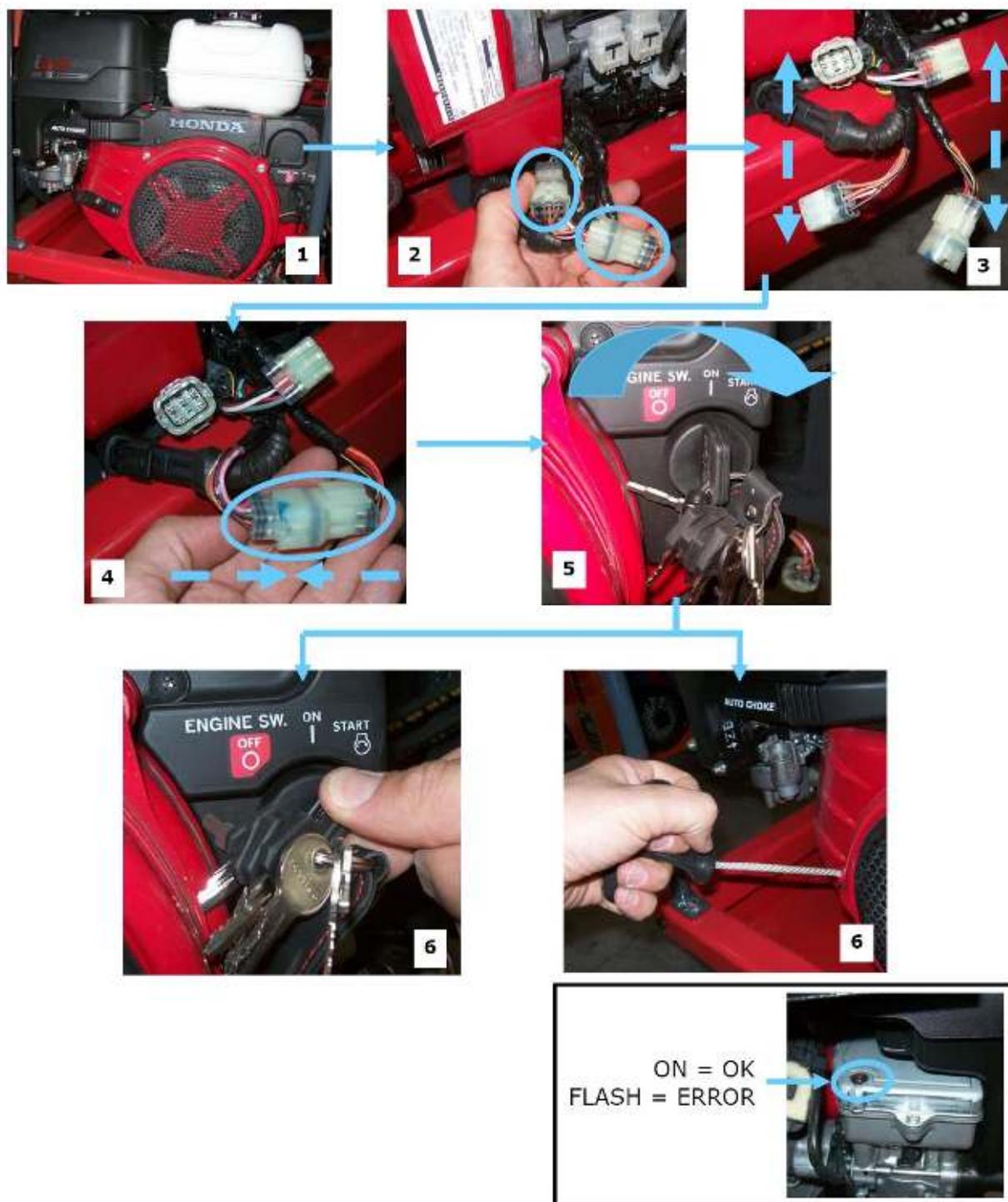
g) When the emergency operation is finished unscrew the aerial part/undercarriage right part deviator.

6.3 ENGINES EMERGENCY START PROCEDURES

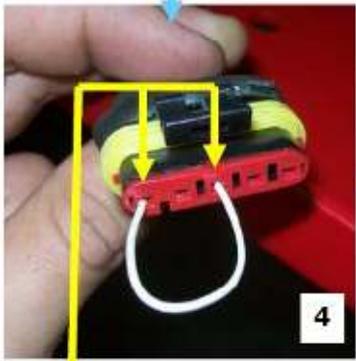
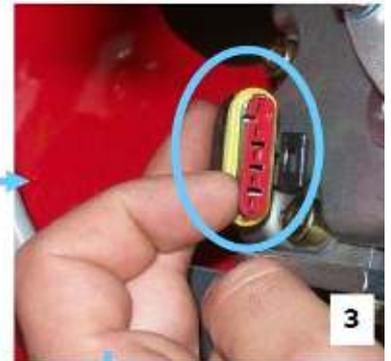
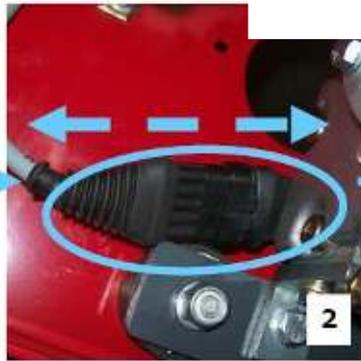
The following procedure shows how to separate engine from the platform system. It could be useful in the followings cases:

- To verify if the engine is out of order
- To handle manually the machine's hydraulics (by the proportional valves and/or deviator as showed in chapter 6.1.4 and 6.2.2) as indicated by the previous procedures but using the engine instead of the hand pump

HONDA iG440 EMERGENCY START



HATZ 1B40 EMERGENCY START (FOR 17.75 DIESEL)



PIN 1 & PIN 3



PERKINS 402.05 EMERGENCY START (FOR 20.10 DIESEL)



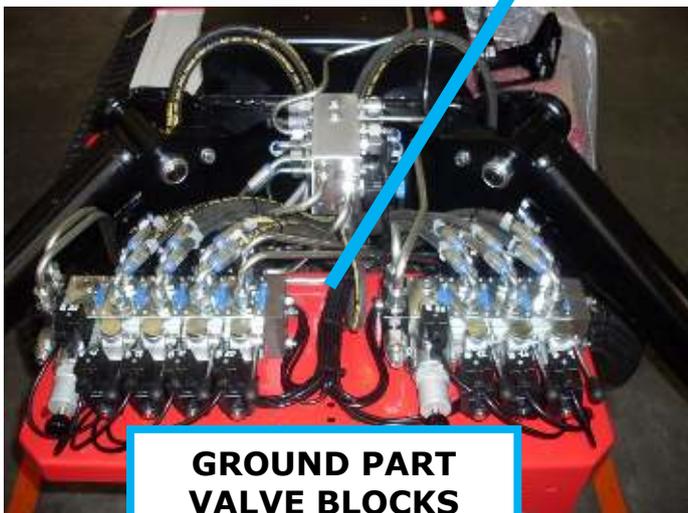
7. HYDRAULIC SYSTEM LL 17.75 3S AND 20.10 3S PERFORMANCE (FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

7.1 COMPONENTS LOCATION

**HYDRAULIC
COLLECTOR ON
20.10**



**HYDRAULIC
COLLECTOR ON
17.75**



**GROUND PART
VALVE BLOCKS**



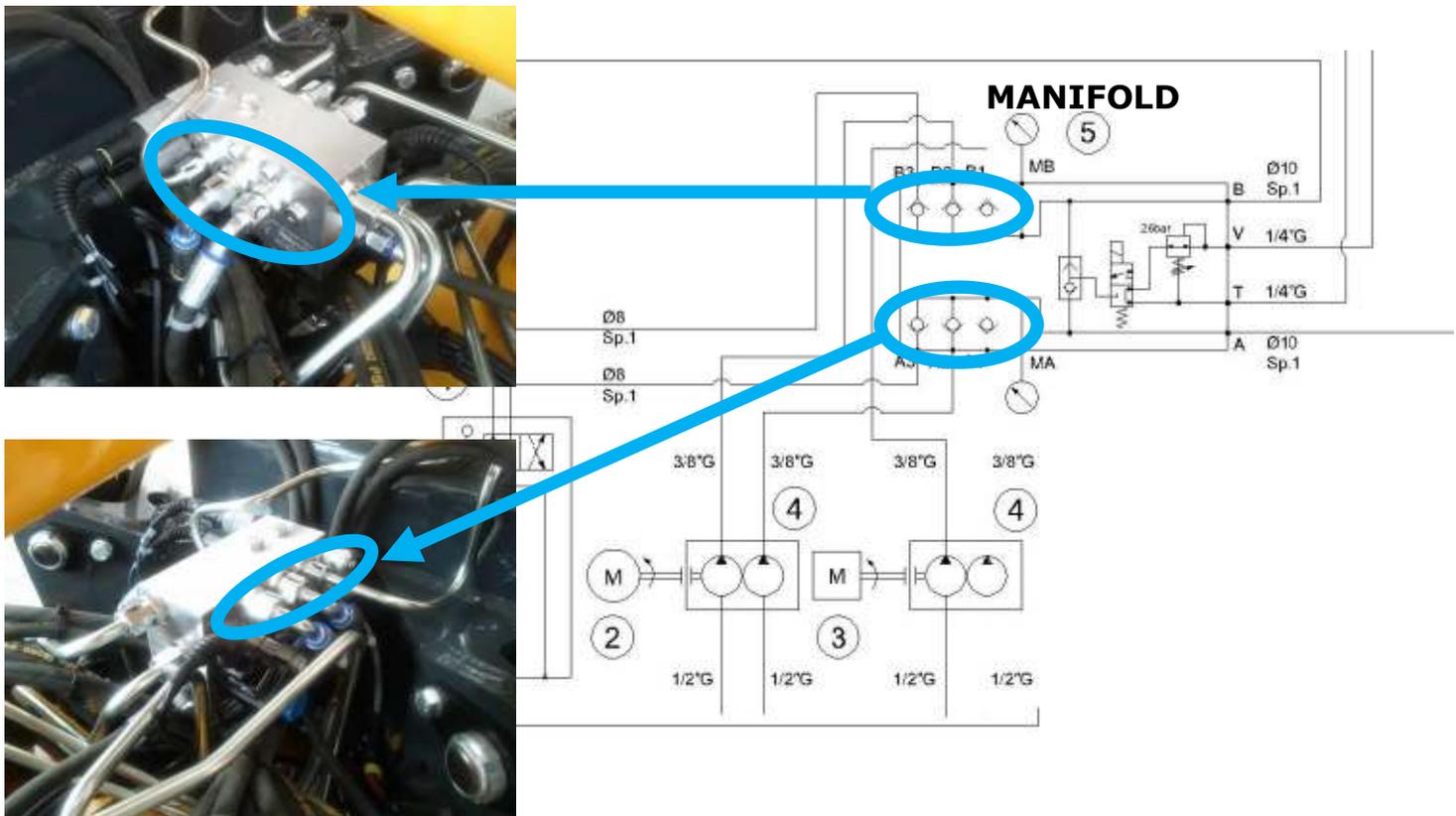
**AERIAL PART
VALVE BLOCK**

Please see appendix 1 for a description of the hydraulic system. The numbers in brackets identify the components of the hydraulic circuit.

The Light Lift 17.75 3S and 20.10 3S Performance platform hydraulic system are powered through three pump units:

1. Pumps unit (4) connected to the internal combustion engine (3)
n.2 4cc/rev pumps each calibrated at maximum speed (3600 rpm).
2. Pumps unit (4) connected to the electric motor (2)
n.2 3,15cc/rev pumps each calibrated at minimum speed (1500 rpm).
3. Emergency hand pump (1). Since there is only one pump, a deviator (1) is installed on the output line to select which one of the two lines should be fed with oil.

The outlet lines of the pump units are conveyed through a **manifold** (5) into two main outlet tubes A and B. Six one-way valves avoid that oil under pressure returns to the tank through an unused pump unit.

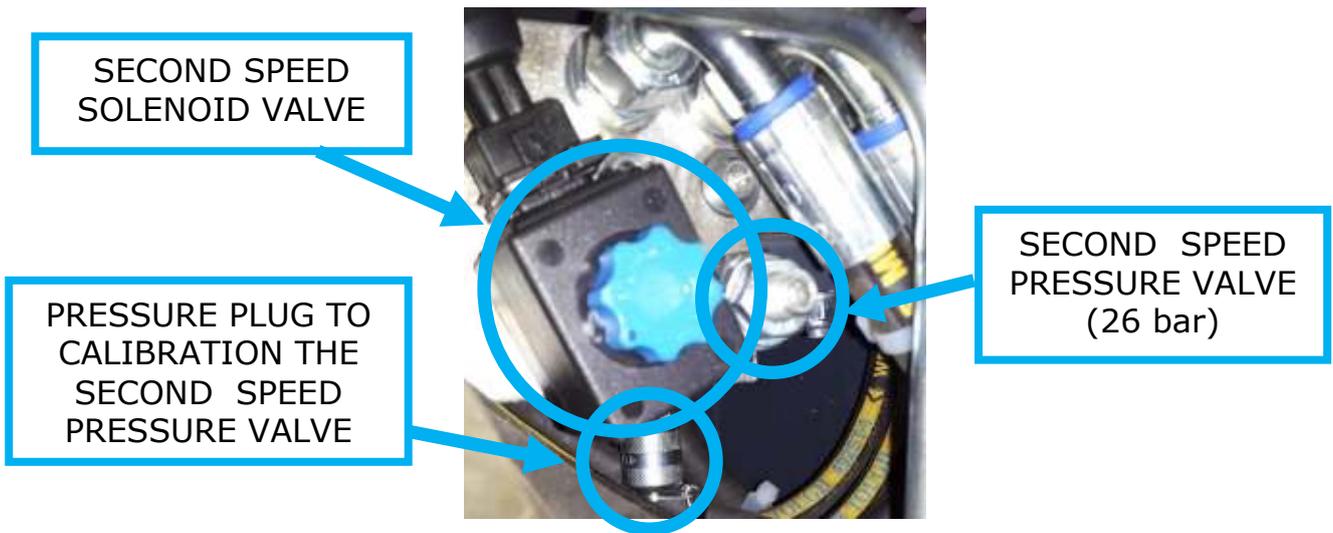
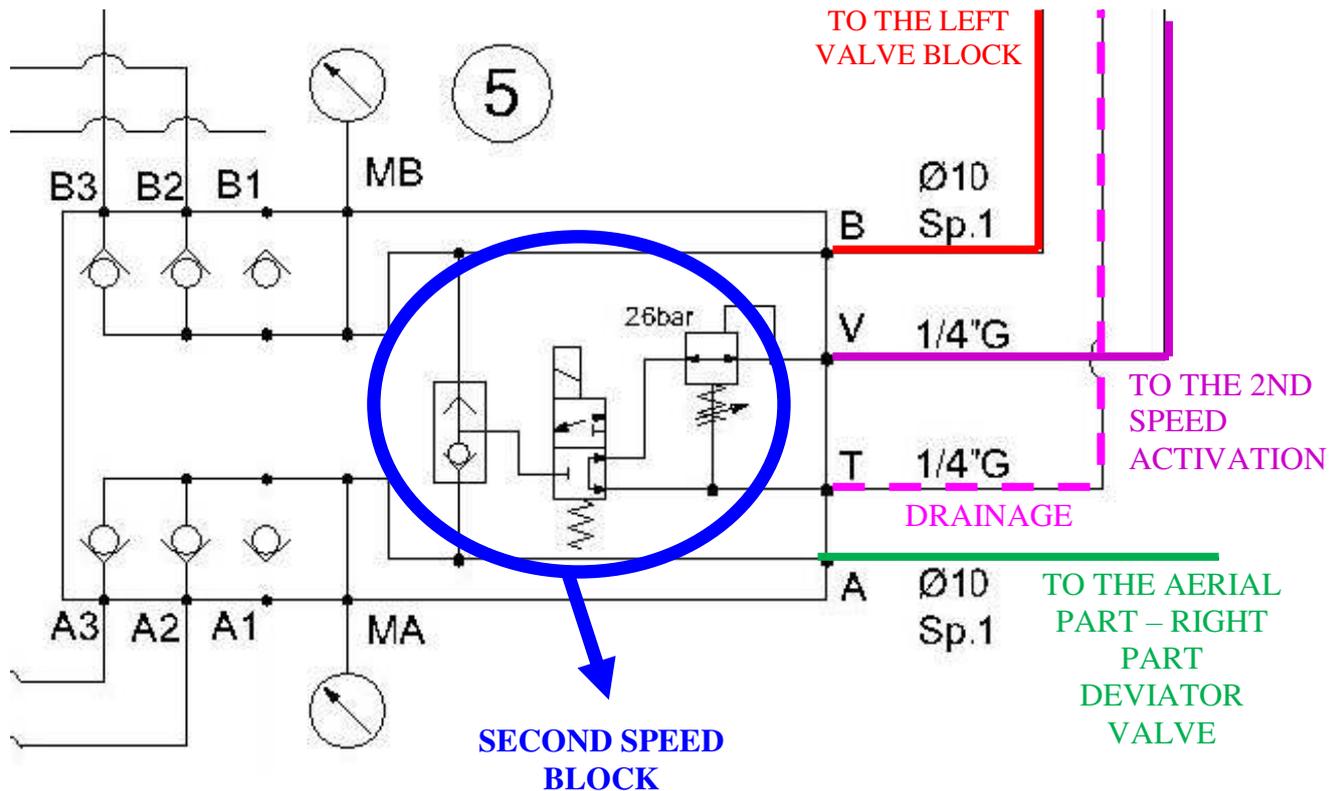


"B" line sends oil under pressure to the left-hand undercarriage valve block (8). "A" line sends oil under pressure to the deviator valve (14). This valve is commanded directly by the control module to send oil under pressure to the valve block of the right-hand undercarriage (9) or to the valve block of the aerial part movement (18).

NOTE: If the coil of the deviator valve (14) is not energized, oil powers the aerial part of the machine. Coil is energized every time aerial part movements are not allowed.

Deviator valve normally (when not fed) send oil to aerial part valveblock, so that it feeds right side ground valveblock only when its coil is energized. Its coil is energized (oil to the right side ground part) when machine is ON but not stabilized (or not respecting all the conditions to allow aerial part movements) and with engine/electric motor running. For instance, deviator coil is energized when, with engine or electric motor running, all outriggers are touching the ground but remote control is not placed on its support.

SECOND SPEED CONTROL AND AUTO2SPEED (OPTIONALS)



On 17.75 second speed is optional, where installed is equipped with auto2 speed.
On 20.10 second speed is standard.

If the platform is equipped with the double speed drive gear motors, manifold (5) will contain also the system that activates the second translation speed. Selecting the second speed from the remote control (HARE icon), the control module will send an electrical signal to energize the coil of the second speed solenoid valve.

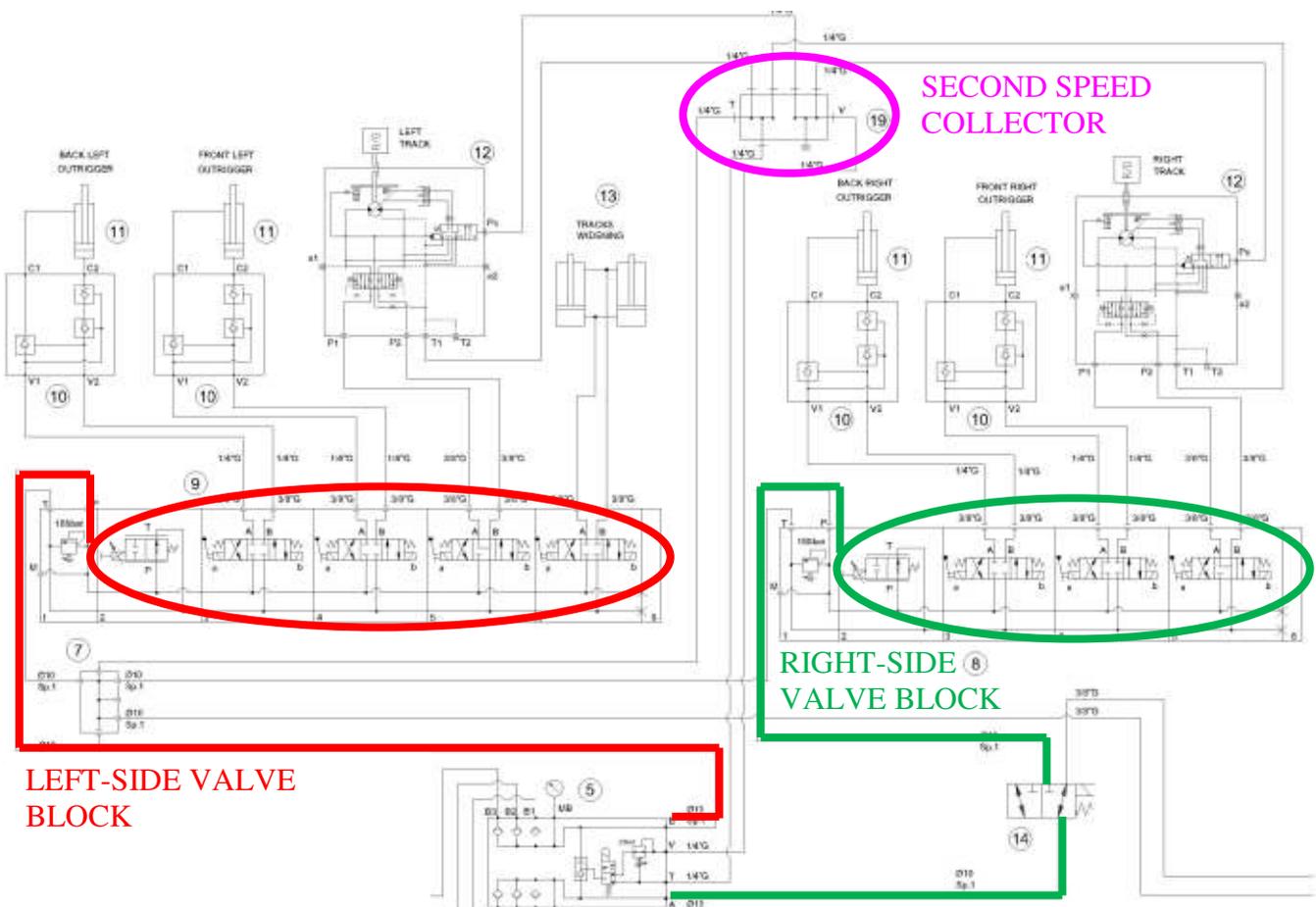
In this way, an oil signal (green line in the picture here above) will reduce the chamber of the drive gear motors, i.e. it will change the gear and increase the tracks speed.

If the pressure in the line increases because a greater driving force is required, the maximum pressure valve will allow the automatic reduction of the gear and then of the tracks speed (Auto2speed system).

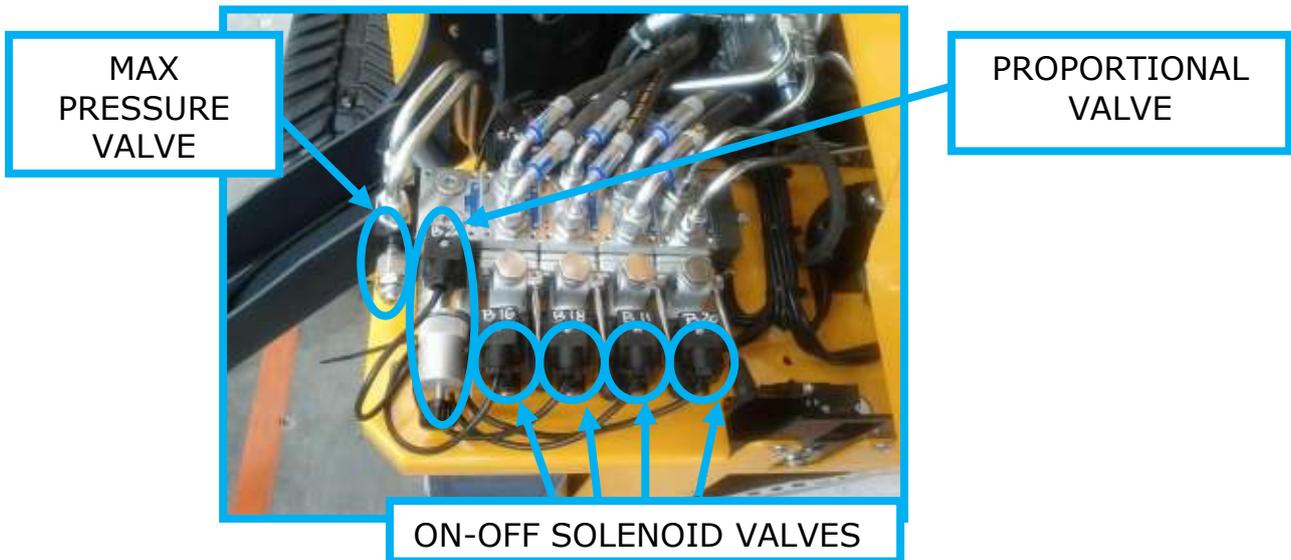
7.2 GROUND PART FUNCTIONING

The functioning of the ground part is limited by the conditions listed here below:

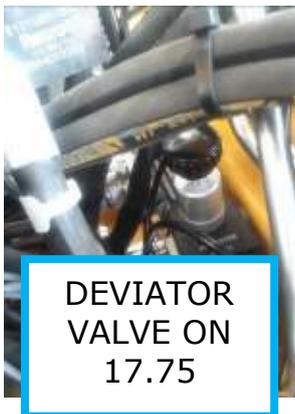
- It's possible to move the outriggers only when the machine is closed and aligned, i.e. when the photocells receive the signal reflected in the reflector. In this case, the icon for the aligned machine is active on the remote control display.
- Tracks movement is possible only when all the outriggers are lifted from the ground, moreover or machine must be closed and aligned (photocells signal) or jib must be opened (micro switch).



The ground part is controlled by 2 valve blocks (right side and left side), both equipped with a maximum pressure valve, a proportional valve and the elements for moving each one movement.



Oil from line "B" is sent to the left-side ground part valve block (8). Here, through a proportional valve managed by the control module and the ON-OFF solenoid valves (one per movement), it commands the two left-side outriggers, the hydraulic drive gear motor for left track and the cylinders for widening the tracks. When the proportional solenoid valve is not fed, it sends oil directly to the drainage and then to the tank. The maximum pressure inside the valve block is controlled by a maximum pressure valve (calibrated at 165 bar).



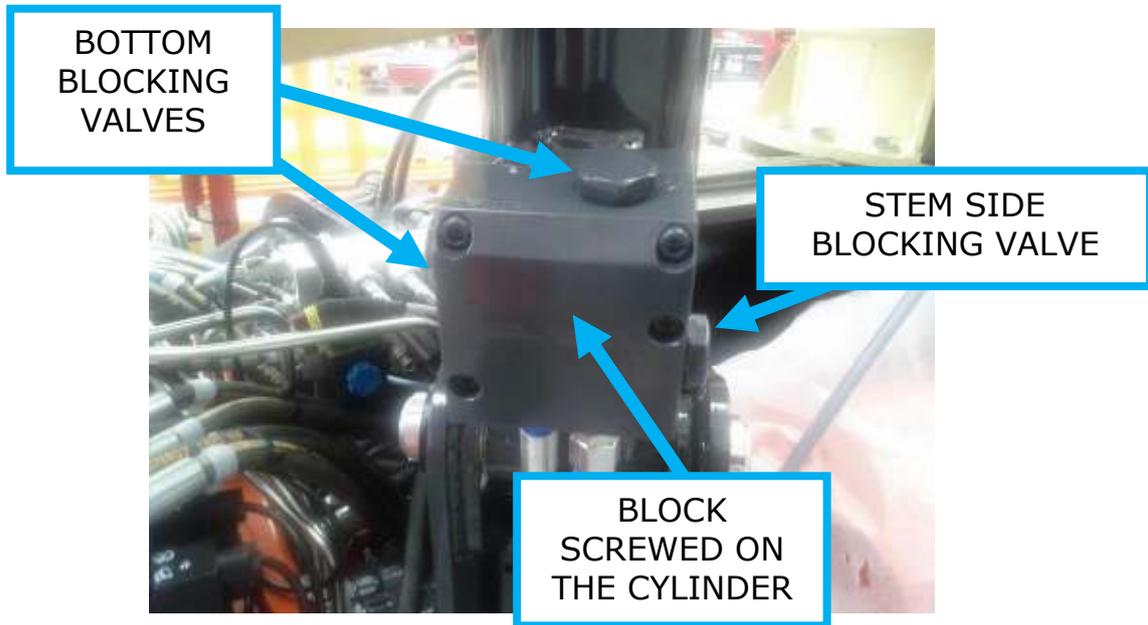
Oil from line "A", when the coil of the deviator valve (14) is energized by the control module, is sent to the right-side, hydraulic undercarriage valve block (9). Here it commands the two right-side outriggers and the hydraulic drive gear motor for right track through a proportional valve managed by the control module and ON-OFF solenoid valves (one per movement). The deviator valve is not fed only when all the aerial part safety conditions are respected or ignition switch is turned OFF or the battery cutter is disconnected.



OUTRIGGERS FUNCTIONING

The outrigger cylinders are controlled directly by the valve block. When the outrigger is lowered, oil is maintained under pressure on the bottom side by two piloted blocking valves installed in series and located in the block screwed on the cylinder. A blocking valve ensures no leaking from the stem side.

During the intermediate steps of auto-stabilization and auto-destabilization, so when two or three outriggers are touching the ground, the engine automatically works at minimum speed (even if we set "HARE" or "N") to avoid sudden movements of the machine in the stabilizing phase.



DRIVE GEAR MOTORS FUNCTIONING

Drive gear motors allow forward or backward movements according to the direction of oil intake established by the valve blocks. Each drive gear motor is equipped with a brake that is activated only during the stop position, i.e. when there is no oil pressure. When the forward or backward movement is activated, the brake is deactivated through oil under pressure and is managed by an unidirectional valve with two lines.

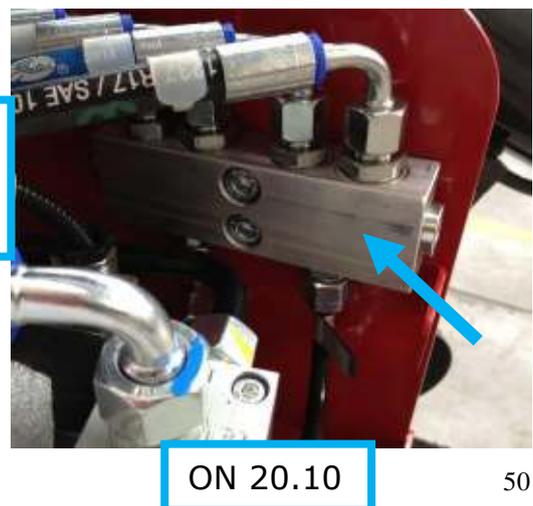
For drive gear motors functioning, the engine is set at maximum speed with the selector in position "N" on the remote control and minimum speed with the selector in the "TURTLE" position.

If the platform is equipped with the double speed drive gear motors "HARE" selection is available.

When "HARE" is selected oil signal is sent, passing through the second speed valve and the second speed collector, to the drive gear motor where it's chamber is reduced (change gear), making the tracks running faster.



SECOND SPEED COLLECTOR



If the pressure in the line increases because a greater driving force is required (ex. uphill or tracks rotation), the maximum pressure valve calibrated at 26 bar allows the automatic reduction of the gear and then of the tracks speed. This system is called Auto2speed and it allows to manage automatically the power required, providing on demand a greater force with a slower speed. Please consult paragraph "SECOND SPEED CONTROL WITH AUTO2SPEED" in the previous pages for schematics details.

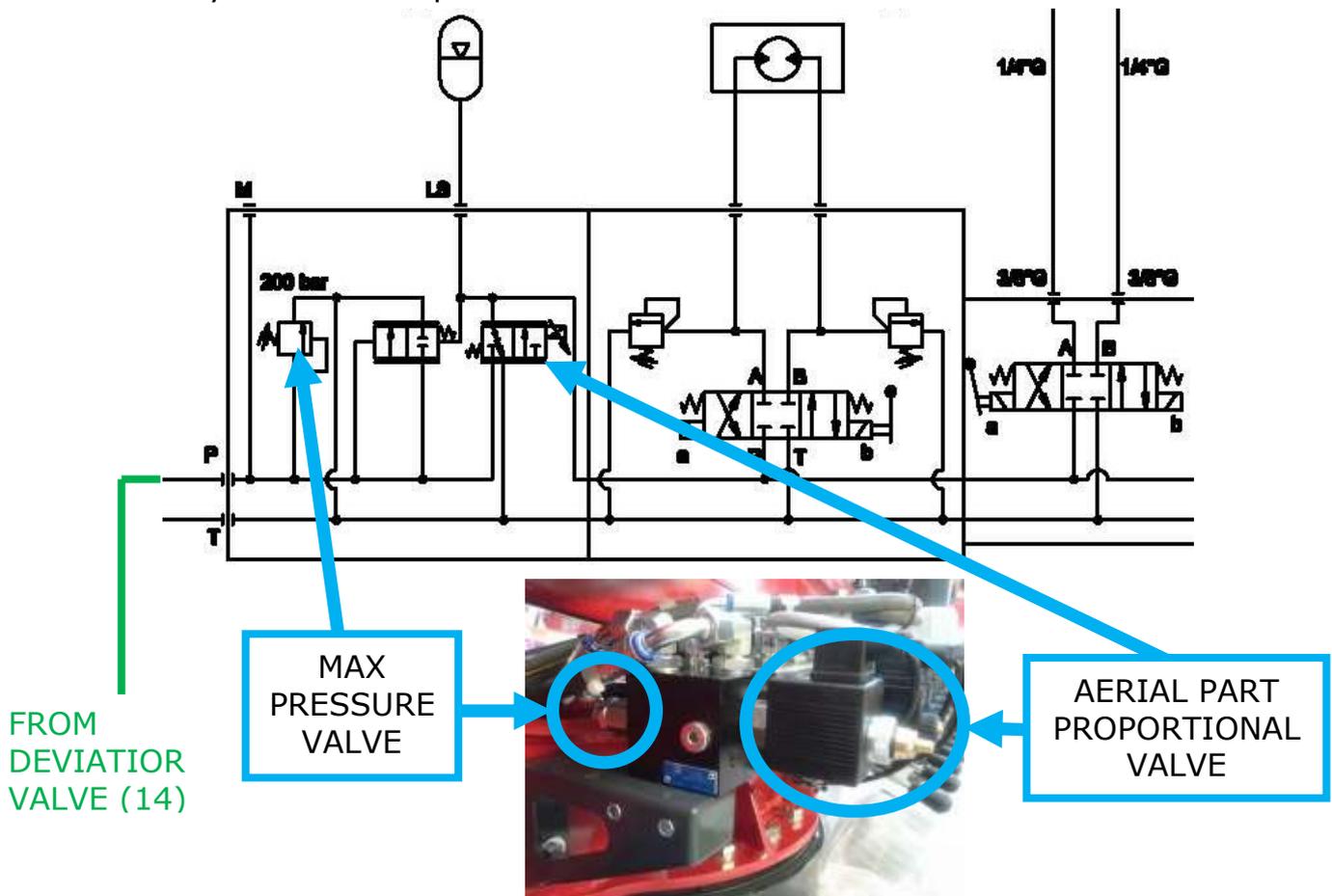
UNDERCARRIAGE WIDENING

The widening and narrowing of the tracks is done through a double-acting cylinder controlled directly by the valve block.

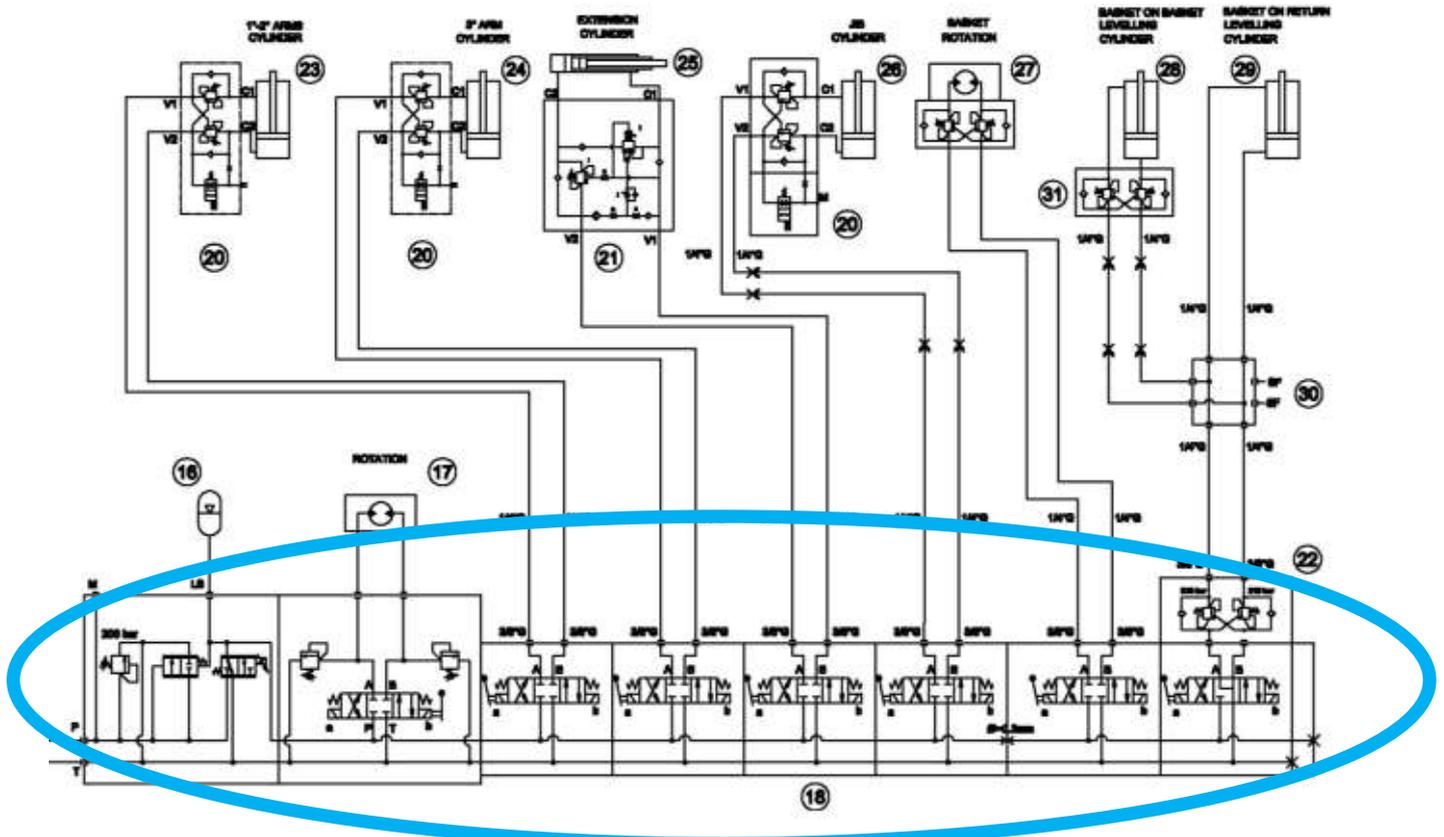
For widening the undercarriage the engine is set at maximum speed with the selector in position "N" on the remote control and minimum speed with the selector in the "TURTLE" position.

7.3 AERIAL PART FUNCTIONING

"A" line is connected to a deviator valve (14). When the control module allows movement of the aerial part, it does not energize the deviator valve (14), which diverts oil flow toward the aerial part valve block (18). This condition is signaled to the operator by the "stabilized machine" icon on the remote control display. A compensated proportional solenoid valve controlled by the control module controls oil flow going to the aerial part valve block (18). When the proportional solenoid valve is in a stop position, it sends oil directly to the drainage and then to the tank. The maximum pressure inside the system is controlled by a maximum pressure valve.



Oil in the aerial part valve block controls, the rotation motor for the aerial part rotation (17) the cylinder for moving 1st and 2nd arm (23), the cylinder for moving the 3rd arm (24), the extension arm cylinder (25), the jib cylinder (26), the basket rotation motor (27) and the basket leveling circuit (28-29) through a compensated proportional valve installed and the ON-OFF solenoid valves (one per movement) in the aerial part valve block.



AERIAL PART VALVE BLOCK



The cylinder for the 1st and 2nd arms (23), the cylinder for the 3rd arm (24) and the jib cylinder (26), are equipped two double piloted balance valves and a solenoid valve for gravity emergency descent. The 3rd arm cylinder (24) has also an internal sensor for the piston position. The piloted balance valves also carried out the function of a block and anti-shock valve. The solenoid valve for the gravity emergency descent is instead controlled by the control module pressing the "gravity emergency descent" button on the remote control (see chapter 6.1.1).

It allows the opening of a calibrated passage that connect the bottom of the cylinder to the tank, passing through the ON-OFF solenoid valves, if these valves are energized through the joysticks on the remote control, oil can flow and return to the tank. This is possible because in this way the seal on the cylinder is by-passed. It can therefore be closed due to the effect of gravity (weight).

The extension arm cylinder (25) is equipped only with one piloted balance valve, therefore it cannot be lowered with gravity.

The basket rotation motor (27) is equipped with a circuit with double piloted balance valve.

The basket leveling circuit (28-29) is equipped with two separate cylinders that form a closed circuit, by which the basket is kept leveled during the functioning of the third arm. Maintaining the pressure inside the cylinder chambers is guaranteed by a double piloted balance valve. There are also two anti-cavitation valves that prevent the intake of air if the operator acts on the basket leveling, thereby varying the balance between the stroke of the moving cylinder and the exhaust cylinder.

FIRST AND SECOND ARM FUNCTIONING

The first and second arms are moved by only one cylinder that is controlled directly by the aerial part valve block.

This cylinder can move two arms through a connecting arm system.



CONNECTING ARM SYSTEM

The cylinder is equipped two double piloted balance valves and an emergency solenoid valve.

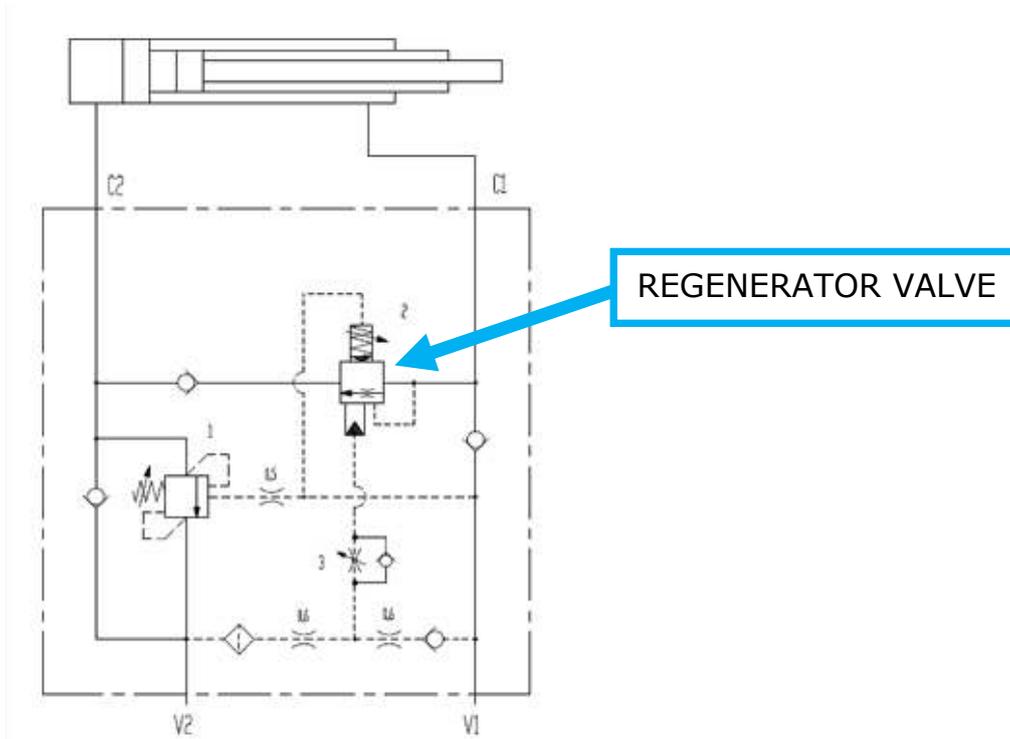
THIRD ARM FUNCTIONING

The third arm is moved by only one cylinder that is controlled directly by the aerial part valve block. The cylinder is equipped two double piloted balance valves and an emergency solenoid valve.

EXTENSION ARM FUNCTIONING

The extension arm is moved by an internal cylinder that is controlled directly by the aerial part valve block. The cylinder is equipped with a piloted balance valve and a regenerator. The difference between the bottom chamber and the

stem chamber section along the extension arm cylinder could cause unbalanced oil flows. To maintain balanced speeds the extension arm is equipped with a regenerator valve that carries out the recycling of one part of oil flow while the extension arm is commanded to open, therefore it compensates oil flows and balances the speeds. The extension arm regenerator valve system is illustrated here below.



JIB FUNCTIONING

The jib is moved by one cylinder controlled directly by the aerial part valve block. The cylinder is equipped two double piloted balance valves and an emergency solenoid valve.

BASKET LEVELLING OPERATION

Basket leveling during the movement of the first and second arms and the jib occurs mechanically through a parallelogram system.

When working with the third arm, the basket is leveled hydraulically using two cylinders with chambers connected in parallel: The first, with the moving function, is located on the connecting arm of the third arm, while the second is located under the basket and functions as an exhaust cylinder.

Oil pushed from the first cylinder through the movement of the third arm is sent to the second cylinder, which is equipped with two double piloted balance valves (one per chamber).

If it should be necessary to modify the position of the basket, it is possible to send or remove oil to the two chambers of both cylinders. Obviously, this implies an alteration of balance between the quantity of oil in the circuit and the chambers connected in parallel. For this reason, there are two double piloted balance valves with the function of maximum valve and two unidirectional valves functioning as anti-cavitation valves.

The engine is always set at minimum rpm.

BASKET ROTATION FUNCTIONING

Basket rotation occurs through a rotation motor equipped with two double piloted balance valves (one per chamber).

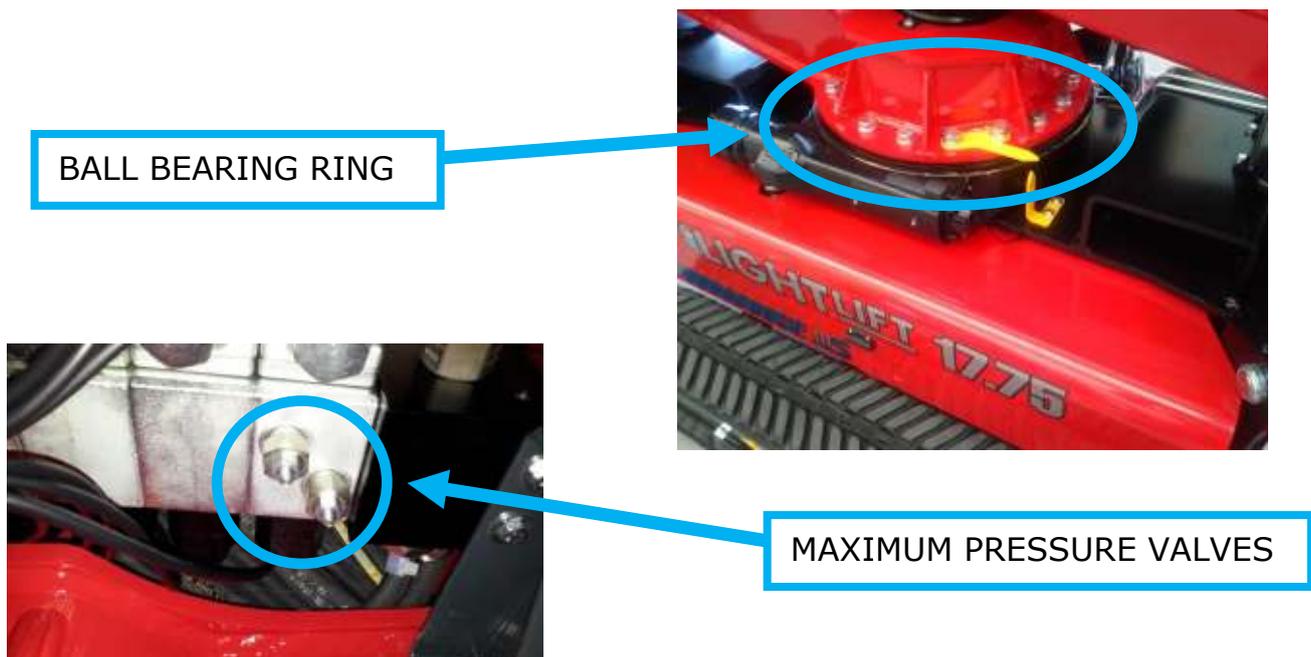
The maximum rotation possible is 62° in both directions for a total of 124°.

The engine is always set at minimum rpm.

AERIAL PART ROTATION FUNCTIONING

The movement occurs through a rotation motor connected directly to the ball-bearing ring. The engine is always set at minimum rpm.

Two maximum pressure valves calibrated are installed on the two rotation feed lines.



8 ELECTRICAL SYSTEM

The description of the electrical system in this booklet is general and the only purpose is illustrate the logics of the machine. For further detailed please consult the wiring diagram, useful in case of technical assistance.

8.1 CAN-BUS SYSTEM

The electrical system works with a CAN BUS system, where:

CAN = Controller Area Network

BUS is the channels for peripherals

This is essentially a communication system among different electronic control units in the machine. They interact with each other and with sensors and actuators located on the platform. The CAN communication protocol is standardized by ISO 11898-1 (2003). The main concept of this protocol is that the signal among different units is fractioned into packets (frames) before being sent. In this way communications can be managed by simply using 2 wires (High and Low) with obvious advantages in terms of space and damages risk of the cables. To send a signal one wire is driven with higher voltage (5V) and it is so called H (High) while the other is driven with lower voltage (0V) and it is so called L (Low).

When no signal is being sent both wires float around 2,5V. Any electrical noise can affect the high or the low wire but never both, so communication could not be corrupted.

The electrical system boards are designed and constructed according to specific standards for automotive components and are therefore equipped with self-protection systems.

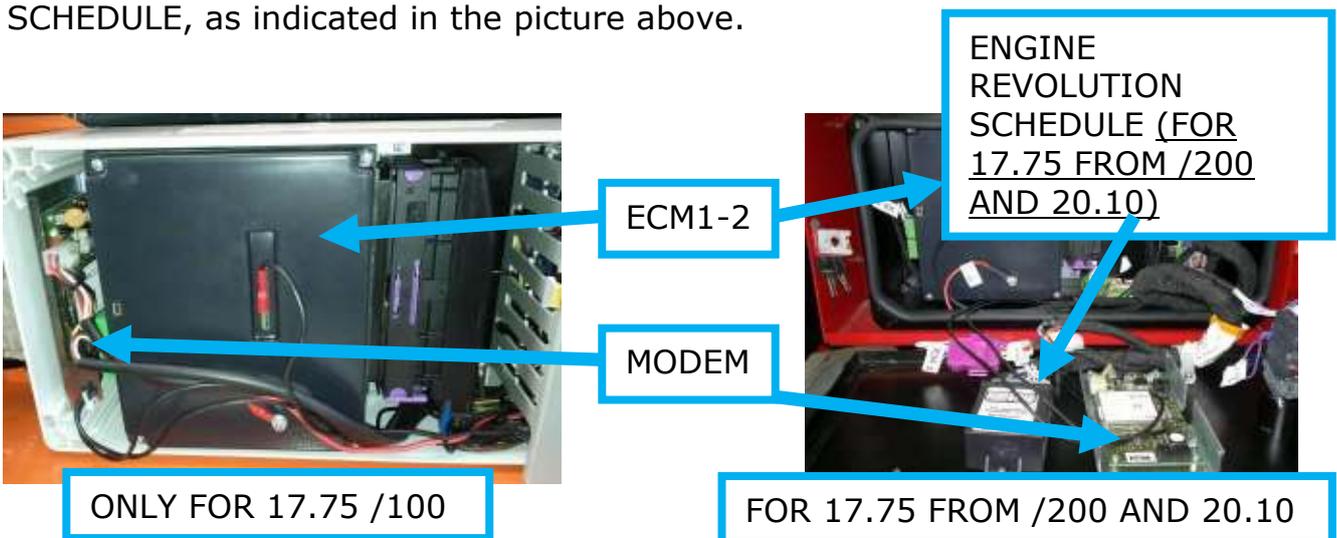
We can identify the 3 main boards communicating in CAN BUS:

- a) MASTER BOARD - ECM1-2 (positioned in the main carter at the base)
- b) LOAD CELL BOARD - ECM3 (positioned in the jib arm box)
- c) REMOTE CONTROL BOARD (positioned inside the remote control)

CAN BUS system is composed also by the other components here below detailed.

Inside the main carter at the base of the platform, aside the ECM1-2 or fixed on the box cover, is also located the MODEM, as indicated in the picture below.

For 17.75 from /200 and for 20.10, inside the same main carter, fixed on the box cover aside the MODEM, is also located the ENGINE REVOLUTION SCHEDULE, as indicated in the picture above.



Inside the 3rd arm cylinder there is a sensors that detect the position of the cylinder, this sensor communicate in CAN BUS with the main control module by the main CAN line.



Only for 17.75 /100, the 3rd arm cylinder position sensor communicates with the ECM1-2 through the schedule located in the box on the connecting arm between the 2nd and 3rd arms (2nd ARM BOX SCHEDULE).



2nd ARM BOX
SCHEDULE (ONLY FOR
17.75 /100)

Only for 17.75 /100, inside the jib arm box, where is installed the ECM3, is also located the JIB CONNECTOR SCHEDULE, as indicated in the picture below.

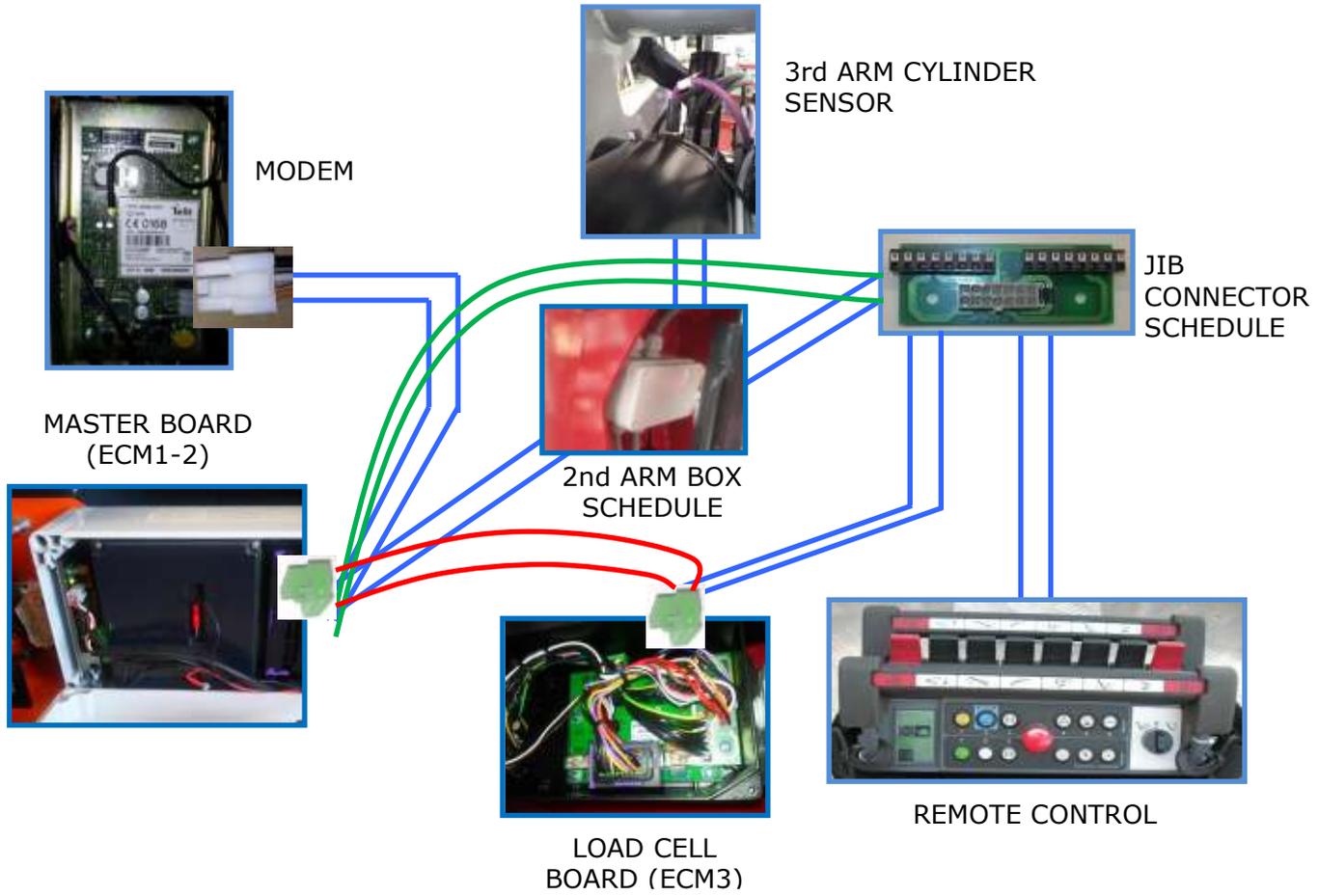


JIB
CONNECTOR
SCHEDULE
(ONLY FOR
17.75 /100)



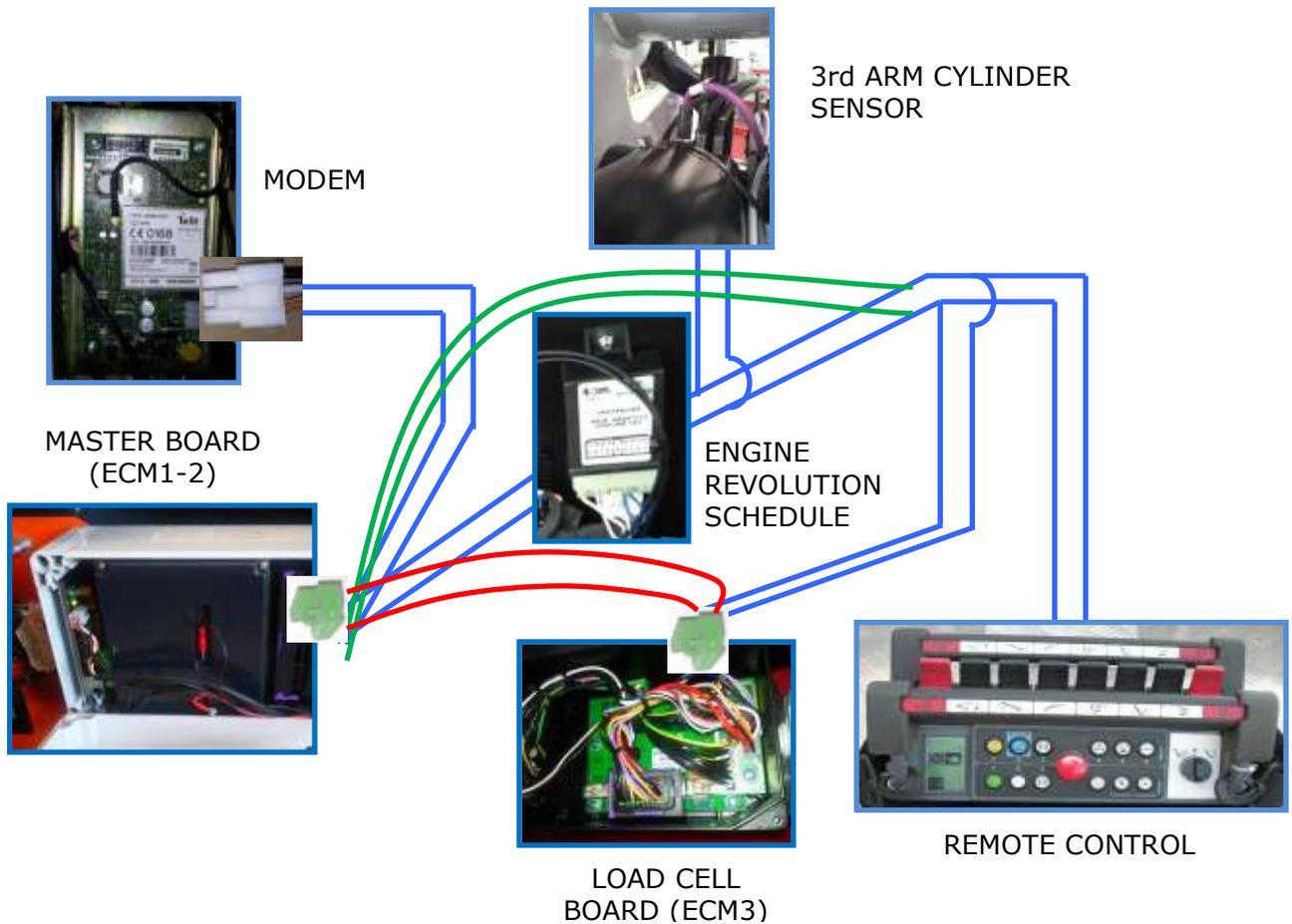
8.2 CAN BUS DEVICES CONNECTION SCHEME

(ONLY FOR 17.75 / 100)



CAN BUS system connections

(FOR 17.75 FROM /200 AND 20.10)



CAN BUS system connections

8.3 SAFETY DEVICES NOT IN CAN-BUS

The machine has also safety devices that are not part of the CAN line and that communicate with the ECM1-2, or directly or through ECM3. These features are:

- a) Tracks widening sensor switches: they are 2 sensors installed on the cylinders that detect their position enabling ECM1-2 to know the tracks widening position and allowing the AUTOMATIC SPEED CONTROL function.
- b) Rotation proximity sensor on the ball-bearing ring: it's a detector of the ball-bearing ring position that enables the ECM1-2 to know the position of the machine turret and to prevent contact between arms and the outriggers.



- c) Outrigger ground switch: these are 4 switches (one each outrigger) that detect if the outrigger is touching the ground or not.



- d) Jib arm switch: it detects if the jib arm is perfectly closed or opened. It has a double control line normally closed. The electric signal enters in ECM3 and is transmitted by Can-Bus to the ECM1-2.



- e) First arm switch: it detects if the first arm is perfectly closed or not. It has a double control line normally closed. The electric signal enters in the ECM1-2.



- f) Accelerometers: welded on the ECM1-2, they detect the inclination of the machine on the ground, in order to allow the movement of the aerial part or not. The inclination tolerance is 1° on both axes.



- g) Photocells: when they receive the signal by the reflector (machine closed and aligned), they close the line and send a signal to the ECM1-2. At this point it is possible to move the outriggers.



- h) Pedal: it's a simple ON-OFF signal going inside ECM3. The signal is ON when the pedal is pressed. It's possible to activate or deactivate the pedal option



- i) Load sensor: it's an extensimeter sensor that gives a double electric signal to the ECM3. These signals are compared and communicated using CAN BUS to the ECM1-2.



- j) Emergency button on the remote control: when the remote control is connected on the basket cable, its emergency button double signal is linked to the ECM3. When the remote control is connected at the ground cable, its emergency button works in single signal and it communicates with the ECM1-2.



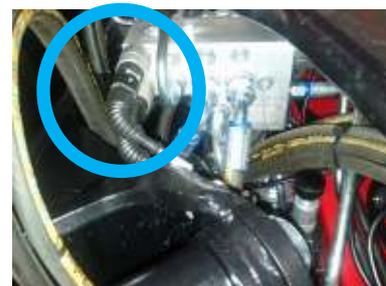
- k) Emergency button on the ground: it's a double signal button that communicate to the ECM1-2.



- l) Emergency securities by-pass: it's a double ways safeties bypass key switch with double switches each way that communicate with the ECM1-2. The key need to be kept turned otherwise it will return to central position.



- m) Pressure sensors: they are two pressure sensors installed on each hydraulic line that give the signal the maximum pressure reached to the ECM1-2.



- n) (ONLY FOR LL20.10) Ropes sensor switch: It detect the ropes integrity. The electric signal enters in the ECM1-2



8.5 ELECTRONIC BOARDS LIGHT MEANINGS

The master board (ECM1-2) is composed by two modules, the front module called ECM2 and the back module called ECM1.



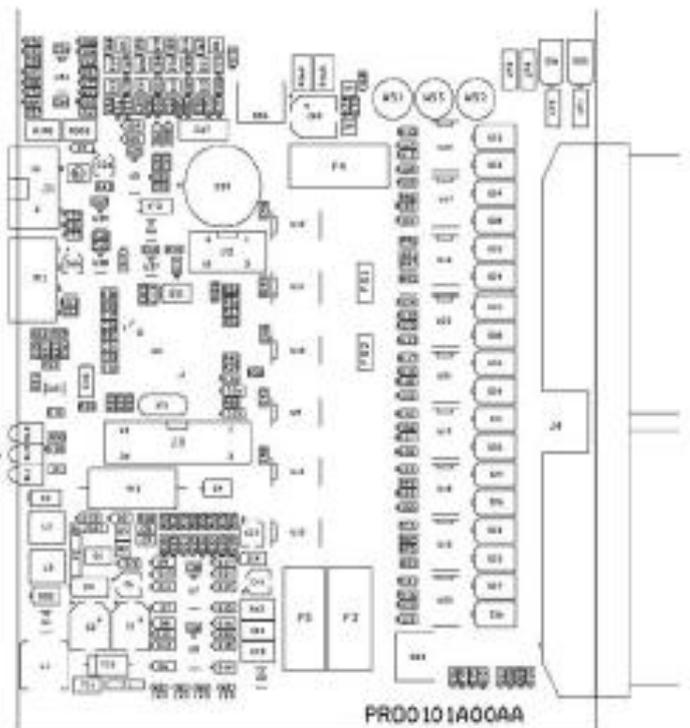
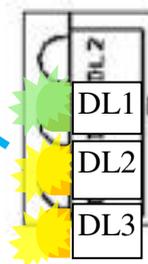
8.5.1 ECM2 (MASTER BOARD FRONT MODULE) LED CODE :

With LED steady ON

DL1 green LED ON: Power +5V to MASTER BOARD FRONT MODULE CPU

DL2 yellow LED ON: All the outriggers are lifted from the ground or machine is closed and aligned (photocells signal)

DL3 yellow LED ON: All the outriggers are touching the ground or all the outriggers are lifted from the ground



8.5.2 ECM1 (MASTER BOARD BACK MODULE) LED CODE :

With LED steady ON

DL1 green LED ON: power +5V to safety channel "A" CPU

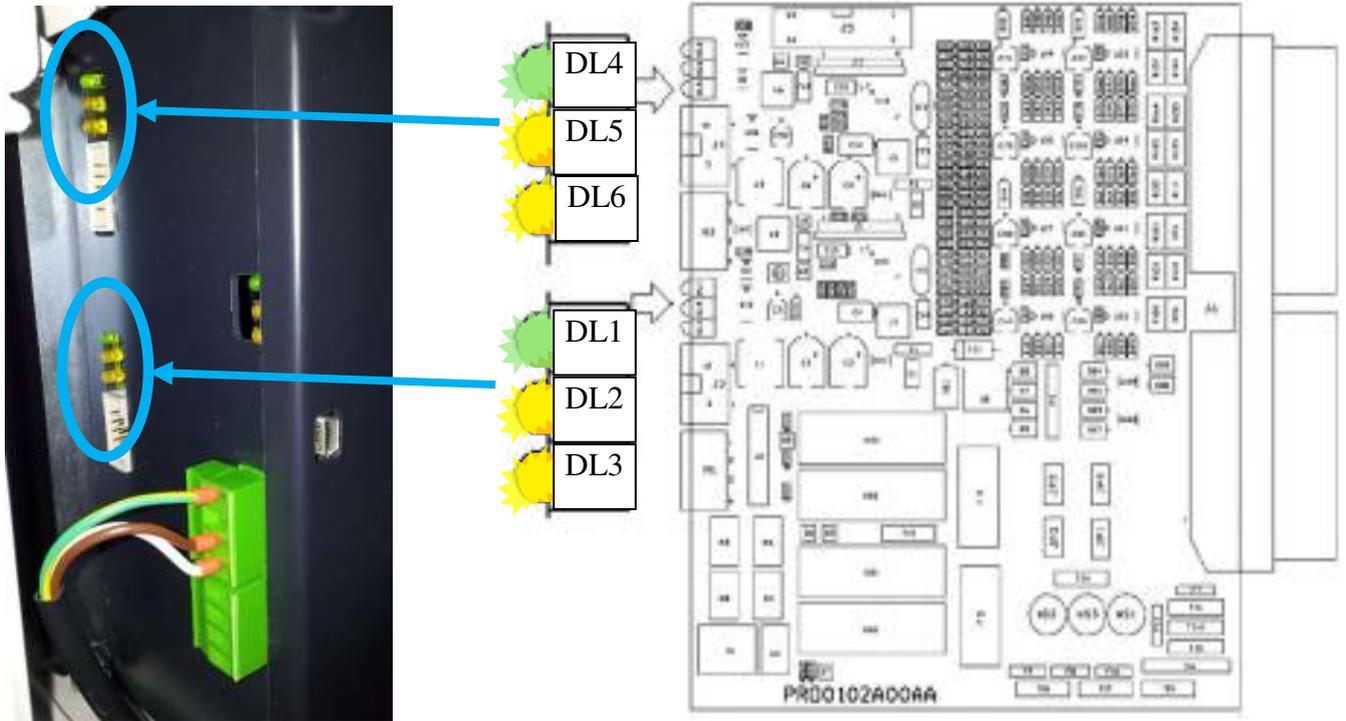
DL2 yellow LED ON: safety relay for tracks functions channel "A" CPU closed

DL3 yellow LED ON: safety relay for aerial functions channel "A" CPU closed

DL4 green LED ON: power +5V to safety channel "B" CPU

DL5 yellow LED ON: safety relay for tracks functions channel "B" CPU closed

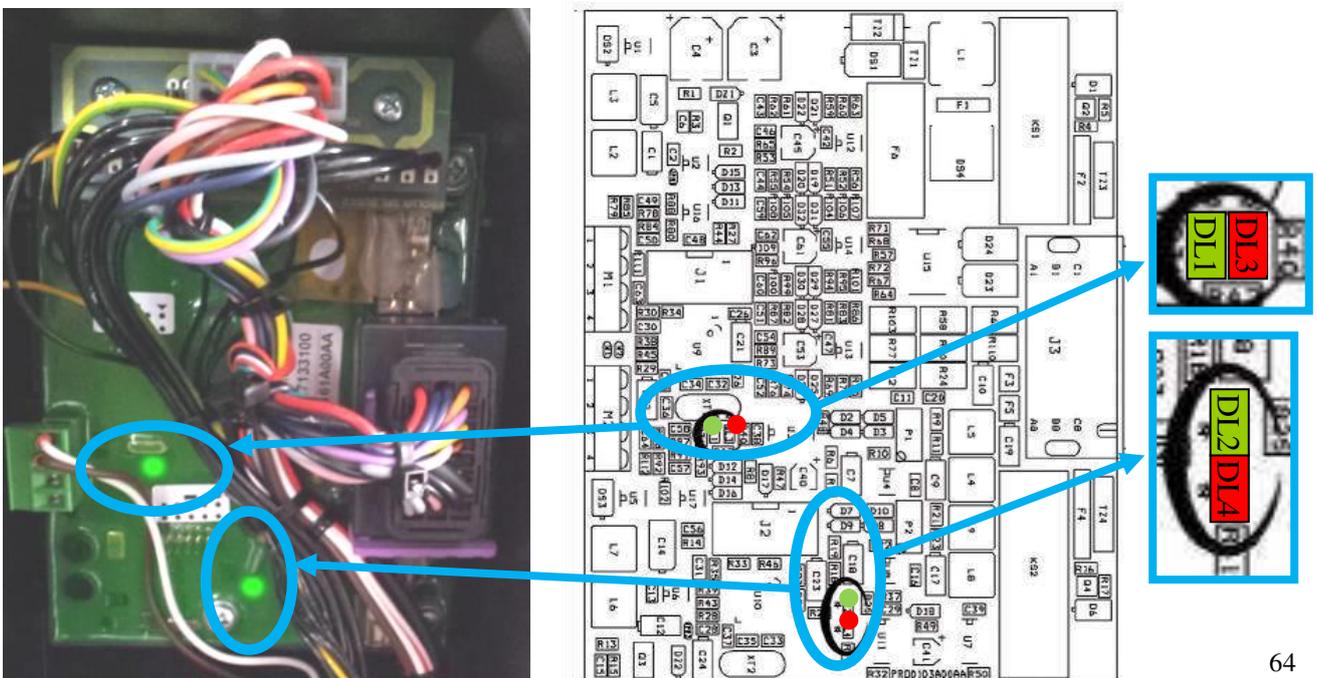
DL6 yellow LED ON: safety relay for aerial functions channel "B" CPU closed



8.5.3 ECM3 (LOAD CELL BOARD) LED CODE :

DL1/DL3 and DL2/DL4 blinking green/red: load cell board not calibrated

DL1-DL2 green LED steady ON (from LL17/4 and LL20/3 only green LED blinking): load cell board calibrated (even if out of range)



8.5.4 110÷230V BOARD LED CODE

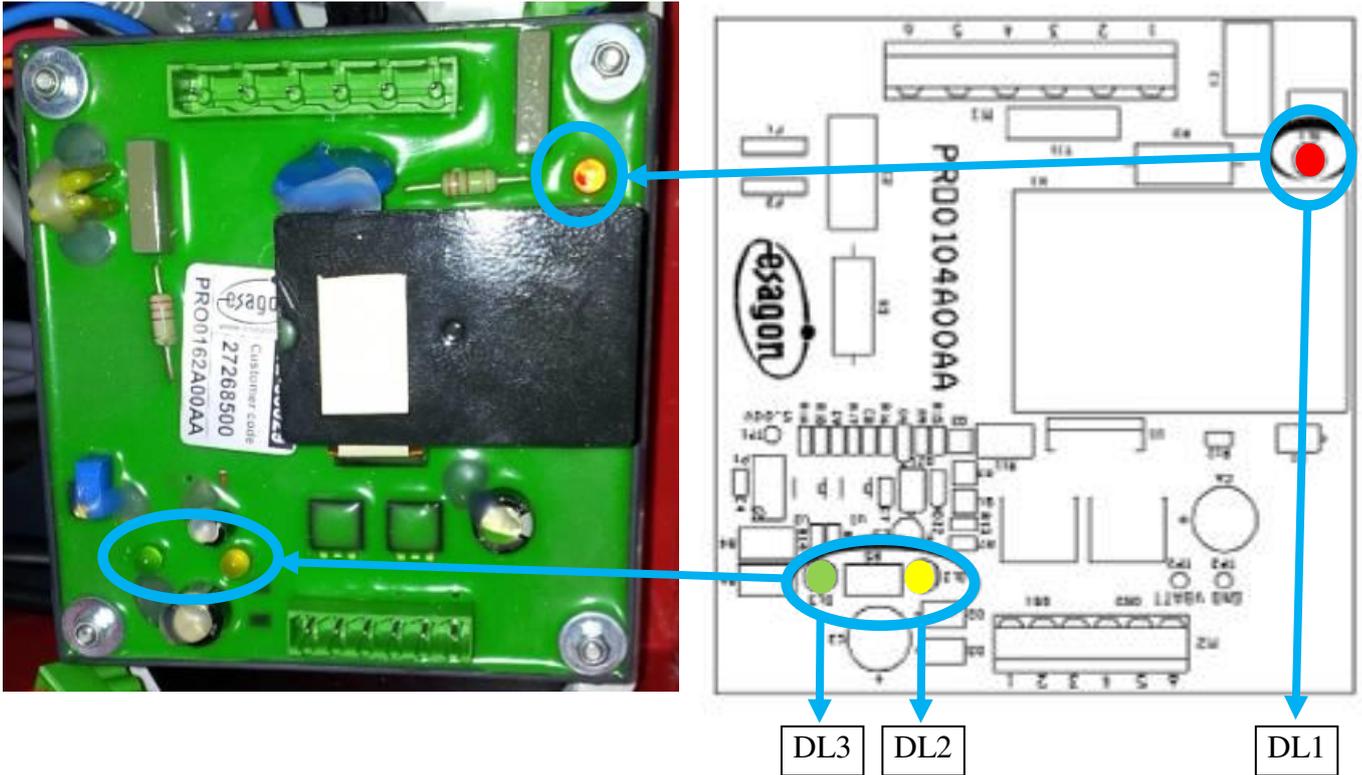
(FROM LL17.75/4 and LL20.10/3 read APPENDIX 9):

DL1 red LED steady ON: electric motor ON

DL2 yellow LED permanently OFF or blinking: Charging completed, battery in maintaining

DL3 green LED steady ON: 12V feeding from the electronic transformer (switching) ON

DL3 green LED flashing : current required is too high (it could be due to battery level too low)



8.5.5 MODEM LED CODE:

DL1 green LED steady ON: power ON

DL2 blue LED flashing each 1 seconds: Net signal searching

DL2 blue LED flashing each 3 seconds: Line ready



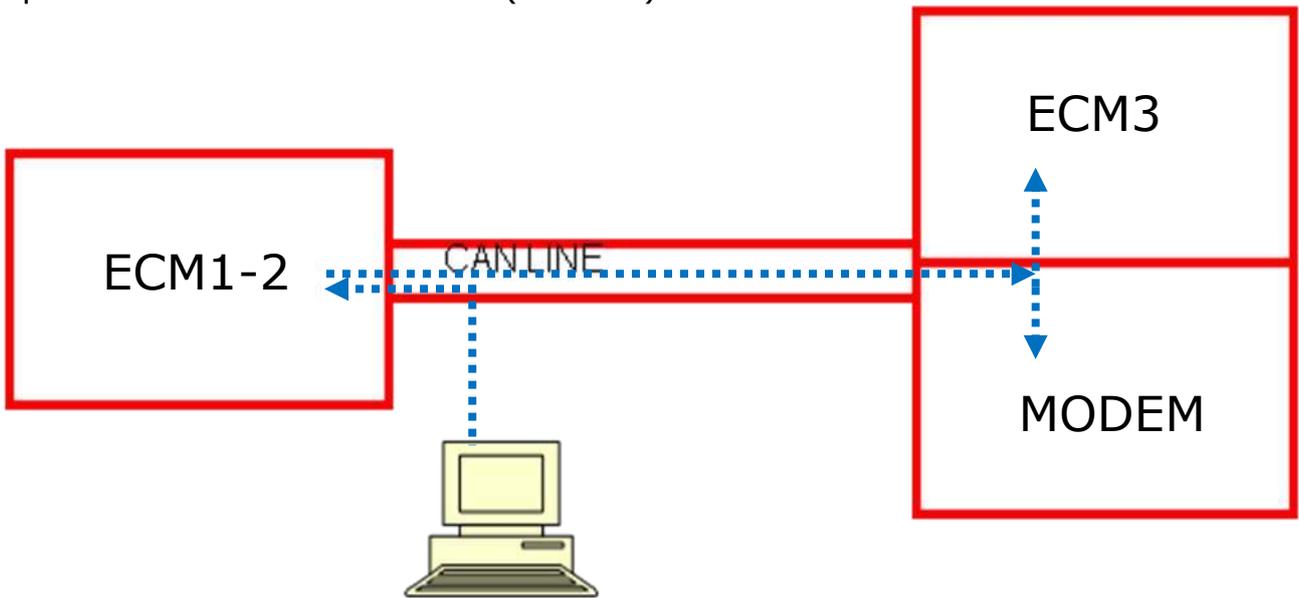
9 ELECTRONIC BOARDS REPLACEMENT AND SETTING

The following electronic boards need to be programmed once they are replaced:

- ECM1-2 - Master board
- ECM3 - Load cell board
- Modem

9.1 ELECTRONIC BOARDS SOFTWARE UPLOADER

The software for all the above mentioned electronic boards is normally uploaded on the master board (ECM1-2).



To fulfill the electronic boards software uploading on the master board (ECM1-2) by CAN BUS it's necessary to have installed on the laptop the software RamHino (starting from 5.0 version).

To connect the laptop to the machine is necessary the optional connection kit and to follow the specific procedure.

The necessary connection kit is composed by:

- Peak tool and drivers (CODE 26582800) →



- RamHino cable tool (CODE 17162500) →



CONNECTING THE CABLES AND ACTIVATING THE SYSTEM

At the base of the platform, without opening the main carter, just open the slot and connect the plug to the appropriate connector.



Activate the system connecting the battery cutter and turn ON the ignition switch .



OPENING SOFTWARE UPLOADER

Open the program RamHino (starting from 5.0 version) from your laptop and go to the last page called Software Uploader.

For any further details look at the RamHino training brochure.

9.2 ELECTRONIC BOARDS SOFTWARE INSTALLATION

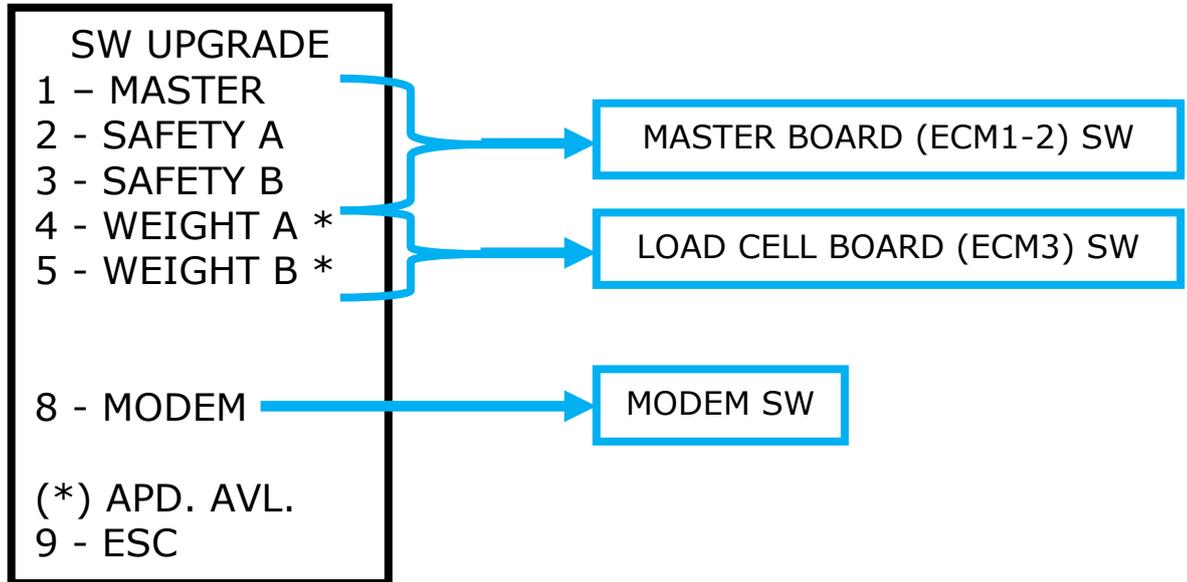
In case the master board (ECM1-2) has been replaced it's necessary to install its software with the software RamHino (starting from 5.0 version).

In case the load cell board (ECM3) or the modem have been replaced, they need to be activated installing the proper software, these software could be founded into the master board (ECM1-2) following the procedure here below described.

To install the software, it's necessary to enter into the menu FIRMWARE and so following the here below reported menu path through the remote control SERVICE menu

6-SERVICE / 7-SETUP / 5-PASSWORD / 1883 / 9-ESC / 3-EXTRA / 2-FIRMWARE

Please note that as indicated it be necessary to introduce the password 1883.



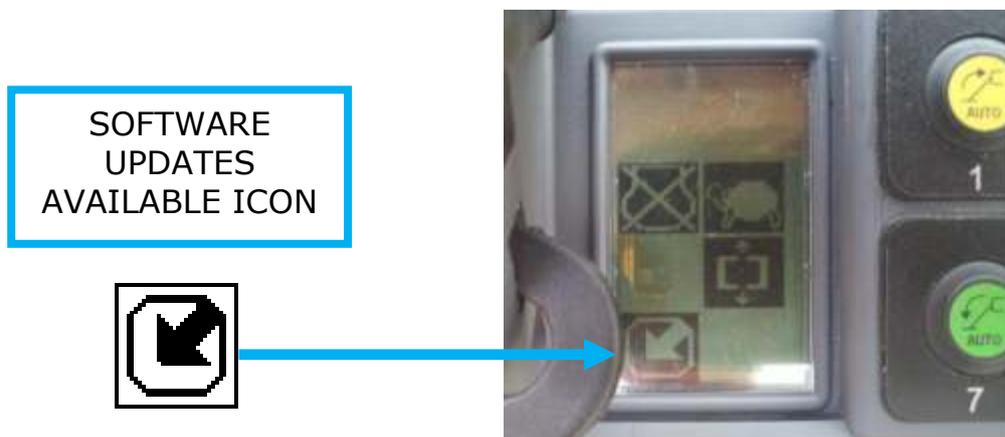
If on the master board (ECM1-2) has been uploaded a software newer than the one currently installed on the relevant electronic board, on the SW UPGRADE frame an asterisk appears near the relevant board.

From this frame, choosing from the list (SAFETY A, SAFETY B, WEIGHT A, WEIGHT B and MODEM), it is so possible to install that software.

9.3 ELECTRONIC BOARDS SOFTWARE UPDATING

In case of on the master board (ECM1-2) has been uploaded an updated software release, for master board (ECM1-2) itself or for whatever electronic board, different from the current software release, on the remote control display right-down corner it is visualized a special icon, as follows.

Of course on the menu FIRMWARE the presence of an updated software (also for the master board) is indicated by an asterisk.



From the remote control will be possible to install the electronic boards software as described here above on chapter 9.2.

9.4 MASTER BOARD (ECM1-2) PARAMETERS SETTING

After the software installation it's necessary to set all the parameters in the master board (ECM1-2), following the dedicate procedure.

The parameters that must be settled are listed below.

- Language
- Machine Version
- Date and time
- Ramps (See appendix 4)
- Currents (See appendix 4)
- Activation/De-activation beeper

NOTE: After installing the master board (ECM1-2) on the platform will be necessary to set the accelerometers.

This procedure is described in details in appendix 6.

9.5 LOAD CELL BOARD (ECM3) PARAMETERS SETTING (FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

After replacing the load cell board or the load cell sensor on the platform it's necessary to calibrate the load cell board.

This procedure is described in details in appendix 5.

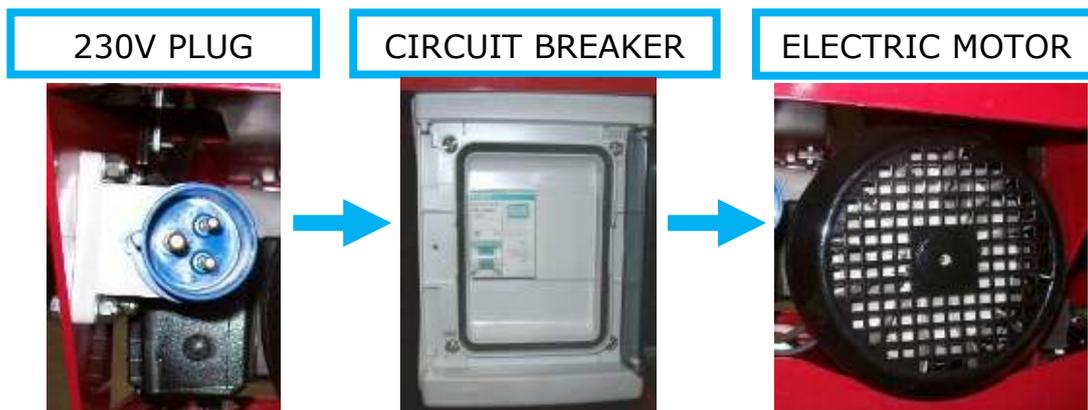
NOTE: Weight system calibration procedure, even if basket maximum capacity is 230 Kg, requires a 200 Kg max load setting, then the system automatically gets the 230 Kg limit. Therefore to calibrate the system it must be put in the basket 200 Kg to make the max load setting.

10 POWER SUPPLY AND ELECTRIC MOTOR

10.1 ELECTRIC MOTOR

The electric motor works only when the machine is connected to the electric network (110÷230 V). To start the electric motor it is necessary to:

- connect the 110÷230V plug of the machine to the electric network
- activate the thermic switch (circuit breaker)
- start the motor by pressing the electric motor start button (on the remote control or at the ground).

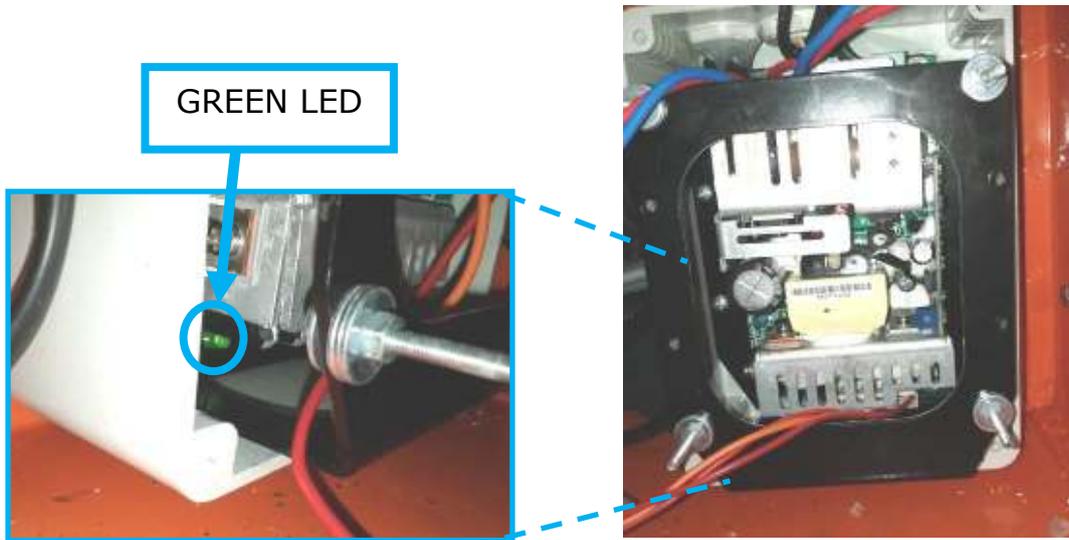


10.2 BATTERY CHARGE SYSTEM (FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

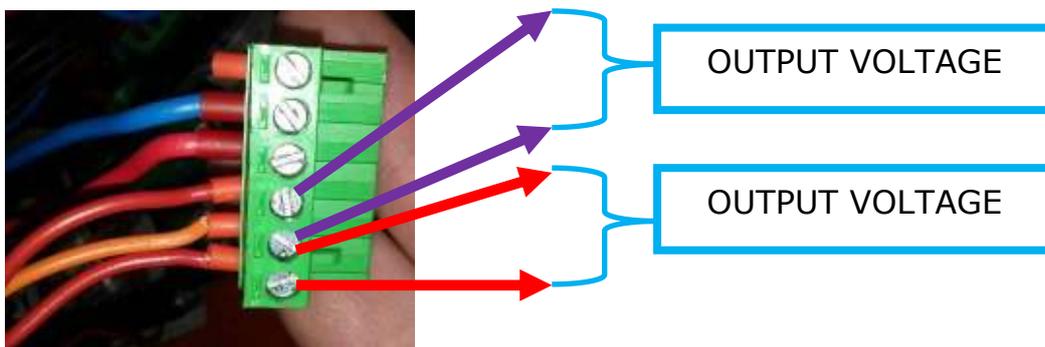
The charge of the battery is carried out by the battery charge system, that is composed by the 110÷230V board and the electronic transformer, both located in a box under the main carter. The 110÷230V board powers also the electric motor.



The output Voltage from the electronic transformer doesn't depend on the electric network Voltage or frequency, output is calibrated by Hinowa at 12,7 V DC. On the lower side of the electronic transformer there's a green LED that is lighted when the electronic transformer is active.



The output Voltage DC can be check measuring the Voltage between the two pins here below indicated, while the green connector (picture here below) is disconnected.



In case of need the Voltage output can be regulated by the trimmer screw indicated in the picture here below.



OUTPUT VOLTAGE
REGOLATION TRIMMER

If the recharging current required by the battery is too high, the electronic transformer interrupts the charge process for a while, when the absorption will be decreased it will start again the charge, then on the 110÷230V board green LED will be flashing. In this case the charge process will be intermitten and therefore longer.

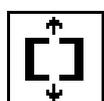
The nominal maximum current is 10A, but it depends on several conditions.

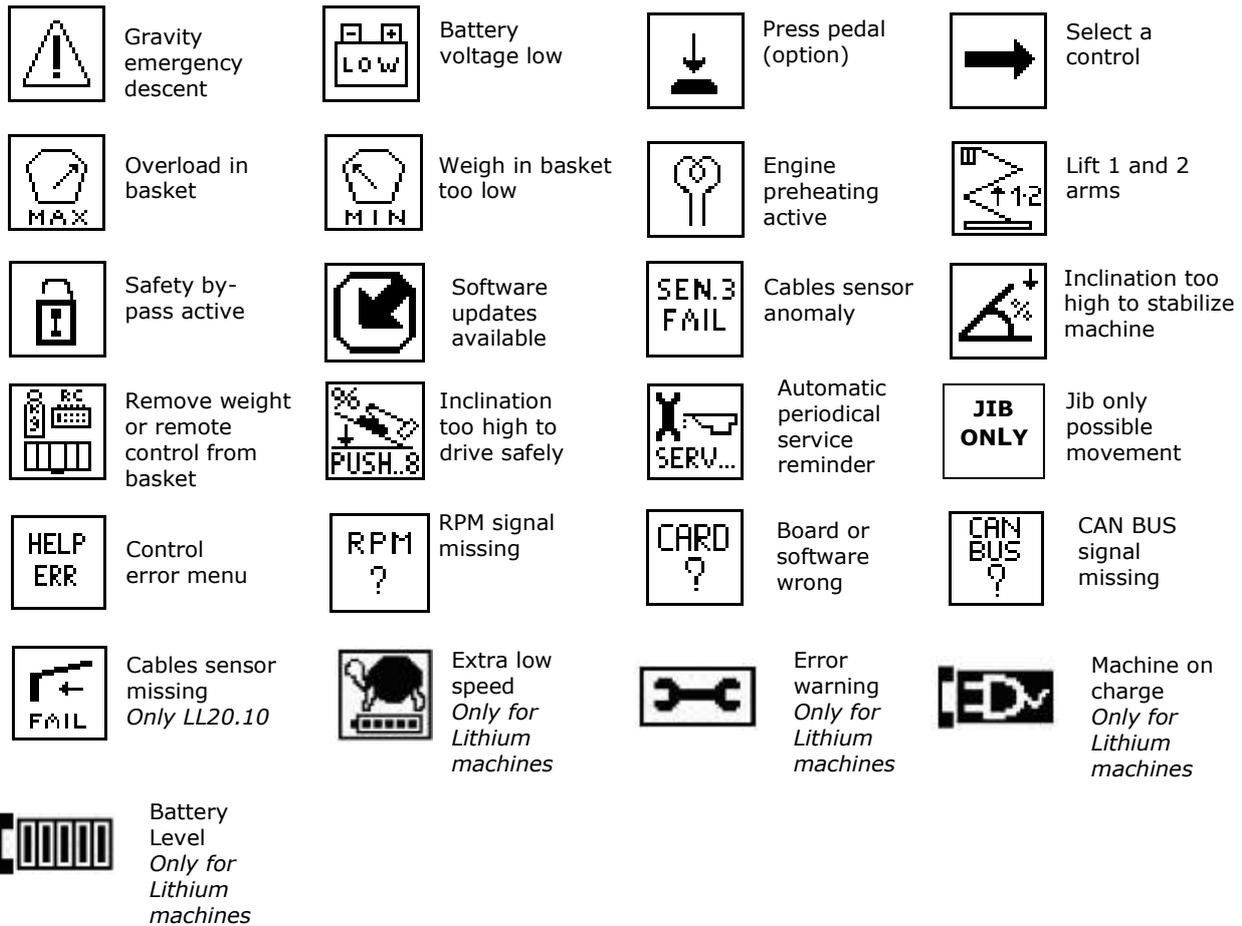
11 REMOTE CONTROL

The general functions of the remote control and its use are illustrated in Chapters 3, 4, 5 and 6 of this booklet. The remote control contains the interactive display with self-diagnosis, signaling of breakdowns and operational suggestions.

11.1 DISPLAY ICONS

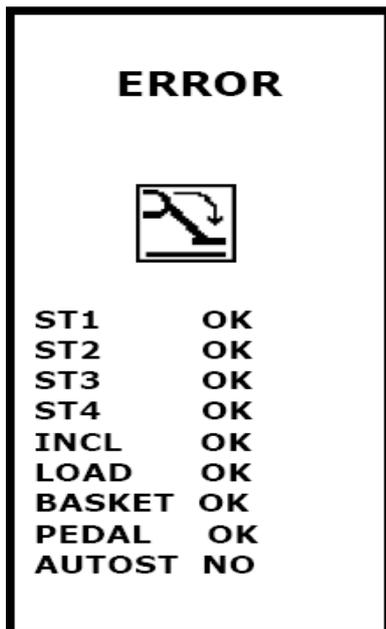
The display indicates the status of the machine and the operating mode selected. A list of all possible icons that may appear on the display follows:

	Machine stabilized		Lift outrigger from the ground		Heat engine selected		Electric motor selected
	Thermic engine running		Electric motor running		Machine closed and aligned		Close aerial part
	Minimum speed		Standard speed		Maximum speed for the tracks		Stop pressed



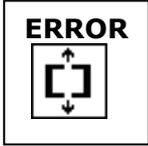
11.2 ERROR MESSAGES – SELF DIAGNOSIS

When the operator attempts to make a movement that is not allowed by current operating conditions, the display will visualize an auxiliary screen to inform the operator of the reason why it is not possible to make the movement.



One of the most important error displays regards the aerial part movements; this visualization describes efficaciously and promptly why the aerial part movement has been prohibited. The display is the one in the picture on the side, the meaning of the different points is described in chapter 5.2

Below are the possible alarm messages:

	Close and align the machine		Inclination too high to move tracks.		Error in sensor on 3 arm cylinder
	It is necessary to lift 1-2 arms		Overload in basket		Movement not allowed by gravity emergency descent
	Control Error menu		A stop button is pressed		It is possible to move only the JIB
	Press the pedal Option		Move up from the ground the outriggers		Error in sensor on extension arm Only LL20.10

All these anomaly icons help the operator during operation and prevent waste of time for machine stop.

11.3 DIAGNOSTICS ON THE DISPLAY

In addition to immediate self-diagnosis, the display may also visualize the actual diagnostics of the machine in real time to verify the correct functioning of the various devices.

It is also possible to choose different languages for the menu, the indication here below are for English language.

These operations allow only the visualization of the status or the change of status of the various sensors and devices, but it is in no way possible to carry out operations that modify the calibrations and safety devices of the machine.

Pressing button 9 allows access to the SERVICE menu, followed by a list of 9 alternatives that are detailed below:

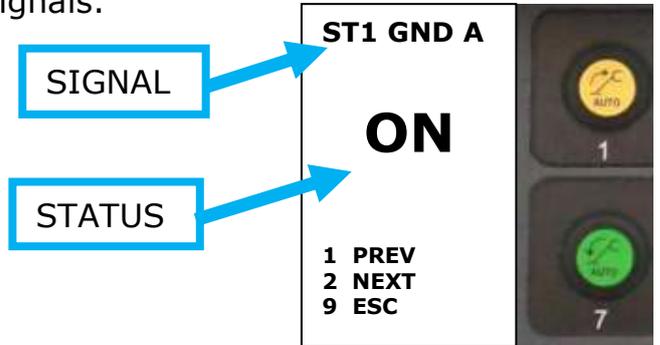


V00.1LJ: Software version of the master board (ECM1-2)
LL17 LITH: Machine model settled

1. INPUT MENU

In this menu it is possible to visualize the status (or changes of status) of all the devices that give an input signal to the ECM1-2. In this way it is possible to identify, in case of machine malfunction, which device is not sending correctly its status and so check it directly to fix the malfunction. From "SERVICE" menu, pressing button 1 of the remote control, we enter in INPUT menu, where it is possible to verify the status of the input signals.

The picture on the side shows an example of what appears on the display, pressing button 1 (PREV) reverts to the previous signal of the list, pressing button 2 (NEXT) goes to the next and pressing 9 (ESC) exits returning to the SERVICE menu.



Below, all the menu voices are listed with the indications of the corresponding signal, the meaning of every voice is also detailed. The voices list could be used also for other platform models, therefore those not used for LL17.75 and LL20.10 must not be considered.

ST1 GND A	ON	Outrigger n.1 on the ground – the switch is released and A line is closed
	OFF	Outrigger n.1 lifted – the switch is pressed and A line is opened
ST1 GND B	ON	Outrigger n.1 on the ground – the switch is released and B line is closed
	OFF	Outrigger n.1 lifted – the switch is pressed and B line is opened
FREE A1	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B1	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
ST2 GND A	ON	Outrigger n.2 on the ground – the switch is released and A line is closed
	OFF	Outrigger n.2 lifted – the switch is pressed and A line is opened
ST2 GND B	ON	Outrigger n.2 on the ground – the switch is released and B line is closed
	OFF	Outrigger n.2 lifted – the switch is pressed and B line is opened
FREE A3	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B3	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
ST3 GND A	ON	Outrigger n.3 on the ground – the switch is released and A line is closed
	OFF	Outrigger n.3 lifted – the switch is pressed and A line is opened
ST3 GND B	ON	Outrigger n.3 on the ground – the switch is released and B line is closed
	OFF	Outrigger n.3 lifted – the switch is pressed and B line is opened
FREE A5	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B5	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER

ST4 GND A	ON	Outrigger n.4 on the ground – the switch is released and A line is closed
	OFF	Outrigger n.4 lifted – the switch is pressed and A line is opened
ST4 GND B	ON	Outrigger n.4 on the ground – the switch is released and B line is closed
	OFF	Outrigger n.4 lifted – the switch is pressed and B line is opened
FREE A7	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B7	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
BYPASAE A	ON	The aerial part safeties are deactivated through the safeties bypass key switch (emergency condition) – line "A" of the aerial part safeties by-pass is closed.
	OFF	The aerial part safeties are activated (normal working condition) – line "A" of the aerial part safeties by-pass is opened
BYPASAE B	ON	The aerial part safeties are deactivated through the safeties bypass key switch (emergency condition) – line "B" of the aerial part safeties by-pass is closed.
	OFF	The aerial part safeties are activated (normal working condition) – line "B" of the aerial part safeties by-pass is opened
BYPASCB A	ON	The ground part safeties are deactivated through the safeties bypass key switch (emergency condition) – line "A" of the ground part safeties by-pass is closed.
	OFF	The ground part safeties are activated (normal working condition) – line "A" of the ground part safeties by-pass is opened
BYPASCB B	ON	The ground part safeties are deactivated through the safeties bypass key switch (emergency condition) – line "B" of the ground part safeties by-pass is closed.
	OFF	The ground part safeties are activated (normal working condition) – line "B" of the ground part safeties by-pass is opened
EM GRND A	ON	Stop button on the ground is released – "A" line of the stop button is closed
	OFF	Stop button on the ground is pressed – "A" line of the stop button is opened
EM GRND B	ON	Stop button on the ground is released – "B" line of the stop button is closed
	OFF	Stop button on the ground is pressed – "B" line of the stop button is opened
FOTO A	ON	Photocell A receives the signal from the reflector (Aerial part closed and aligned)
	OFF	Photocell A does not receive the signal from the reflector (Aerial part opened)
FOTO B	ON	Photocell B receives the signal from the reflector (Aerial part closed and aligned)
	OFF	Photocell B does not receive the signal from the reflector (Aerial part opened)
PROXIMITY	ON	Turret is not almost completely rotated, contact is close, the 1 st -2 nd arm is not above the engine
	OFF	Turret is almost completely rotated, contact is open, the 1 st -2 nd arm is above the engine
EM.R.C.GND	ON	The stop button on ground remote control is released.
	OFF	The stop button on ground remote control is pressed or the ground remote control is disconnected
ST12 CLOSED	ON	The pressure switch of outriggers 1 and 2 closes the contact – the outriggers are at end run and the max pressure valve is opened
	OFF	The pressure switch contact of outriggers 1 and 2 is opened – the outriggers are open, partially open or already closed
ST34 CLOSED	ON	The pressure switch of outriggers 3 and 4 closes the contact – the outriggers are at end run and the max pressure valve is opened
	OFF	The pressure switch contact of outriggers 3 and 4 is opened – the outriggers are open, partially open or already closed

TEMP ALRM A <i>Option reserved for some markets</i>	ON	The temperature external probe reached the maximum value – “A” line of the temperature probe is closed
	OFF	The temperature external probe hasn't reached the maximum value – “A” line of the temperature probe is open
TEMP ALRM B <i>Option reserved for some markets</i>	ON	The temperature external probe reached the maximum value – “B” line of the temperature probe is closed
	OFF	The temperature external probe hasn't reached the maximum value – “B” line of the temperature probe is open
POS.I ARM	ON	The switch of 1-2 arm position is released, contact is close, the 1 st -2 nd arm is open
	OFF	The switch of 1-2 arm position is pressed, contact is open, the 1 st -2 nd arm is closed
TRACK OPEN	ON	Tracks are in wide position. Widening cylinders switches are pressed, contact is closed.
	OFF	Tracks are not in full wide position. Widening cylinders switches are released, contact is open.
FREE CO		DO NOT CONSIDER
EMRG. COMM	ON	The control position key selector for aerial part operation from the ground is activated (emergency condition)
	OFF	The control position key selector for aerial part operation is released (normal working condition)
MICROROPES <i>To consider only for LL20.10</i>	ON	The cables of the extension are OK. The control switch of the cables on extension is released and the line is closed (normal working condition)
	OFF	At list one cable on the extension is out of order. The control switch of the cables on extension is pressed and the line is open (emergency condition)
START M.TE	ON	The ground button for engine start is pressed
	OFF	The ground button for engine start is released
MOTOR TEMP. <i>To consider only for LL20.10</i>	ON	The engine reached the max functioning temperature (emergency condition – the engine remains at min)
	OFF	The engine maintains the correct functioning temperature (normal working condition)
MOTOR PRES. <i>To consider only for LL20.10</i>	ON	The engine oil pressure is inadequate (emergency condition – engine turns off)
	OFF	The engine oil pressure is OK
START M.EL	ON	The ground button for electric motor start is pressed
	OFF	The ground button for electric motor start is released
GND/BASKET	ON	The control position key selector is positioned on “basket”
	OFF	The control position key selector is positioned on “ground”
MICROJIB A	ON	The JIB is closed – the control switch is released and “A” line is closed
	OFF	The JIB is open – the control switch is pressed and “A” line is open
MICROJIB B	ON	The JIB is closed – the control switch is released and “B” line is closed
	OFF	The JIB is open – the control switch is pressed and “B” line is open
PEDAL / SKY A	ON	The pedal is pressed and if Skyguard is installed its bar is pressed– the pedal electric line is closed and the Skyguard electric line A is closed
	OFF	The pedal is released or if Skyguard is installed its bar is released – the pedal electric line is open or the Skyguard electric line A is open
SKYGUARD B	ON	If Skyguard is installed its bar is pressed– the Skyguard electric line B is closed
	OFF	If Skyguard is installed its bar is released – the Skyguard electric line A is open

EM.BASK. A	ON	The stop button on remote control in basket is released – "A" line is closed
	OFF	The stop button on remote control in basket is pressed or the ground remote control is disconnected – "A" line is open
EM.BASK. B	ON	The stop button on remote control in basket is released – "B" line is closed
	OFF	The stop button on remote control in basket is pressed or the ground remote control is disconnected – "B" line is open
FREE A	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE A	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE A	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE A	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE A	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
FREE B	ON	DO NOT CONSIDER
	OFF	DO NOT CONSIDER
R.C. BASKET	ON	The remote control is in the support in basket
	OFF	The remote control is not in the support in basket
INCLIN. X	0	Indicates the inclination of the machine on the X axis in tenth of degrees (accelerometer A)
	0	Indicates the inclination of the machine on the X axis in tenth of degrees (accel B)
INCLIN. Y	0	Indicates the inclination of the machine on the Y axis in tenth of degrees (accelerometer A)
	0	Indicates the inclination of the machine on the Y axis in tenth of degrees (accel B)
LOAD A	94	Indicates the weight in Kg in the basket on line A
LOAD B	95	Indicates the weight in Kg in the basket on line B
FREE	0	DO NOT CONSIDER
POS. 3	2398	Indicates the opening of the 3 arm cylinder in tenths of a millimeter
MOTOR RPM	2200	Only diesel version: Indicates the engine RPM read by rpm sensor
CURRENT A	2,5	Indicates (in tenth of mA) the current ECM1-2 is sending to the aerial part proportional valve or to the left-side undercarriage proportional valve (values less that 5 not relevant)
CURRENT B	45,3	Indicates (in tenth of mA) the current ECM1-2 is sending to the right-side undercarriage proportional valve (values less that 5 not relevant)
CURRENT C	0	DO NOT CONSIDER

TEMPERAT.	37,6	Indicates the temperature of the ECM1-2 in °C
SUPPLY (V)	12,1	Indicates the batteries voltage, or the output voltage from the battery charger
BATTERY %	100	Only for Lithium version: indicates the % level of charge of the pack.

2. LANGUAGE

MENU LANGUAGE	
1 - ITALIAN	
2 - GERMAN	
3 - ENGLISH	
4 - FRENCH	
5 - SPANISH	
9 ESC	

To enter the language menu from SERVICE menu press button 2, through this menu it is possible to select the language to be visualized in the different displays. The languages available are those listed on the display on the side (Italian, German, English, French, Spanish), to change the language it is enough to press the button with the number corresponding to the language desired and then press button 9.

3. ERRORS

From the SERVICE menu, pressing button 3 accesses the menu of errors that allows a rapid identification of potential malfunctioning of some devices.

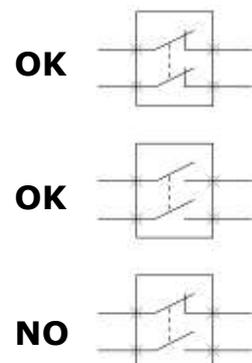
The malfunctions highlighted by this list refer to devices with 2 safety lines, where the signals of the two lines are not coherent.

<p>ERRORS</p> <p>ST1 GND OK</p> <p>ST2 OPEN OK</p> <p>ST2 GND NO</p> <p>ST2 OPEN OK</p> <p>ST3 GND OK</p> <p>ST3 OPEN OK</p> <p>ST4 GND OK</p> <p>ST4 OPEN NO</p> <p>1 PREV</p> <p>2 NEXT</p> <p>9 ESC</p>	
--	--

Once entered in the menu it is possible to visualize 5 different pages selecting them through buttons 1 and 2; it is always possible to exit from the errors menu selecting button 9.

As already mentioned the errors menu underlines only the discordance between the two lines (A and B) of the same control, therefore if for example an outrigger switch is OK, does not mean that the switch is working properly but only that the two signals are accordant. The diagram on the side indicates when a double line signal gives OK or NO in the errors menu.

OK indication means that the signals accordance, NO indication means that the signals have a discordant value, in this case the icon HELP ERROR may automatically appear on the display, as showed on the side.



**HELP
ERR**

Below all the pages of the errors menu are listed with the meanings of the different voices.

PAGE 1

ERRORS	
ST1 GND	OK
FREE	OK
ST2 GND	NO
FREE	OK
ST3 GND	OK
FREE	OK
ST4 GND	OK
FREE	NO
1 PREV	
2 NEXT	
9 ESC	

ST1 GND	Control switch if outrigger n. 1 is on the ground
FREE	DO NOT CONSIDER
ST2 GND	Control switch if outrigger n. 2 is on the ground
FREE	DO NOT CONSIDER
ST3 GND	Control switch if outrigger n. 3 is on the ground
FREE	DO NOT CONSIDER
ST4 GND	Control switch if outrigger n. 4 is on the ground
FREE	DO NOT CONSIDER

PAGE 2

ERRORS	
BYPASA	OK
BYPASC	OK
EM.GRD	NO
FOTO	OK
TEMP. A	OK
1 PREV	
2 NEXT	
9 ESC	

ESSICAE	Safeties bypass key switch for aerial part safeties by-pass
ESSICCA	Safeties bypass key switch for ground part safeties by-pass
EM GROUND	Stop button switch on the ground
PHOTO	Photocells - Indicates if the photocells have the same signal
ALL. TEMP <i>Option</i> <i>reserved for</i> <i>some markets</i>	External temperature sensor

PAGE 3

ERRORS	
MICRJI	OK
EM.BAS	OK
FREE	NO
FREE	OK
FREE	OK
FREE	OK
ACCEL.	OK
LOAD.	OK
ROTAT.	OK
1 PREV	
2 NEXT	
9 ESC	

MICROJIB	Control switch if the jib arm is perfectly closed
EMNAV	Stop button switch on remote control in basket
FREE	DO NOT CONSIDER
ACCEL	Inclination sensors in the master board (ECM1-2)
LOAD	Load cell
ROTA	DO NOT CONSIDER

PAGE 4

This page indicates the correct presence of the signals in the CAN BUS line of the different connected devices. The indication shall always be OK, if the indication is NO it means that the device is not communicating by CAN BUS line and therefore it is not considered in function by the other devices.

CAN TIMOUT	
SAFETY	OK
REMOTE	OK
CIL1-2	OK
CIL3	OK
LOAD	OK
ROTAT.	OK
1 PREV	
2 NEXT	
9 ESC	

SAFETY	Safety lines
REMOTE	Remote control
CIL1-2	Do not consider
CIL3	Position sensor for 3 arm cylinder
LOAD	Controlling load cell board (ECM3)
ROTA	Do not consider

PAGE 5

LITH ERR	
BATT:	0
INVER:	0
CARIC:	0
BMS ? : 2	
V MIN:	3130
T MIN:	14
V AVG:	3220
1 PREV	
2 NEXT	
9 ESC	

This page, even being visualized in all the Light Lift 3S versions, is of value only for the versions with Lithium batteries power supply, called Light Lift 3S Lithium. Do not consider it for the other versions.

BMS ?	1 means first generation, 2 means second generation
V MIN	Voltage of the minimum voltage cell
T MIN	Temperature of the minimum temperature among the cells
VAVG	Average voltage of the cells

4. RAMPS

This menu is restricted to Hinowa staff.

5. CURRENTS

This menu is restricted to Hinowa staff.

6. WORKING HOURS

This menu allows entering in the display to the side which indicates the working hours of the machine. Both heat engine and electric engine working hours are displayed

WORK. HOURS	
ENGINE	435
ELEC. MOT	64
9 ESC	

7. SETUP

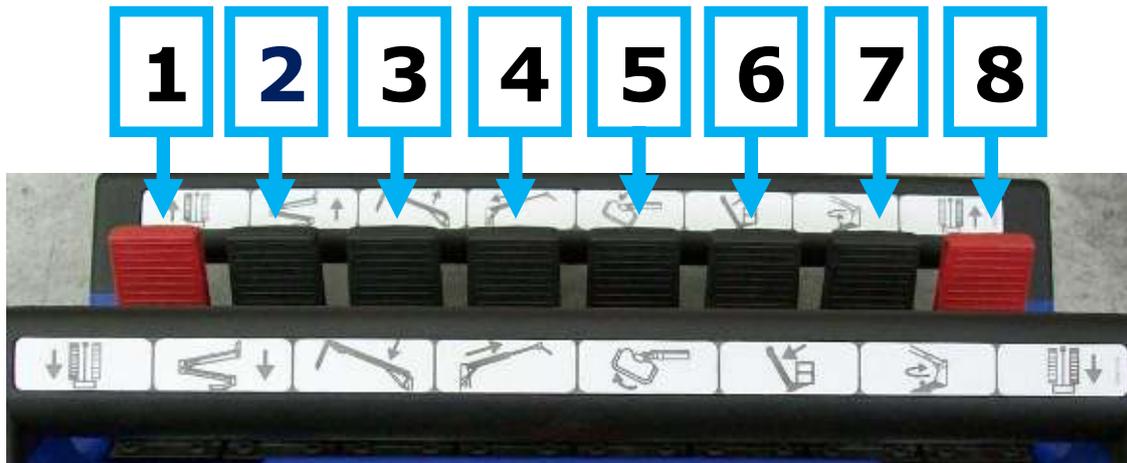
This menu is restricted to Hinowa staff.

8. JOYSTICK

It allows verifying the correct functioning of all the Joysticks; to enter the Joystick menu from SERVICE menu press button 8.

The visualization will be as in the picture on the side, at this point it is enough to move joystick n. 1 to check the functioning. Press buttons 1 and 2 to visualize the desired joystick. The indication has to be "0" with released joystick, while it has to be circa 127 with joystick at end run, both forward and backward. The value growth has to be proportional to the movement of the joystick.

JOYST 1	
0	
1 PREV	
2 NEXT	
9 ESC	



11.4 FUNCTIONING OF THE REMOTE CONTROL ON THE GROUND

In case of exhibitions or demonstrations or in case of particular emergency situations, it is possible to move the aerial part connecting the remote control on the ground.

To do that operation it's necessary the OPTIONAL CABLE+JUMPER KIT (COD. 17264200), composed by double connector curled cable for the remote control and jumper connector (necessary to close the STOP lines).



ATTENTION: it is forbidden to use the ground remote control if the operator is in the basket, except for emergency reasons.

To connect the remote control on the ground, please follow the instructions below:

1. Make sure that the ignition switch is turned OFF and on that the remote control display without there isn't any indication
2. Disconnect the remote control from the cable on the basket and screw the jumper connector on the same cable.
3. Fit the REMOTE CONTROL ON THE GROUND CABLE on the remote control support and on the ground through the lot of the main carter (ring nut on the slot connector must be screwed counterclockwise).



- Turn the control position selector key located under the emergency button following the indications of the sticker, in order to select the ground control position.



- Turn ignition switch ON, so the machine is ready to be used. From this position at the ground it's possible to move both the aerial part and the undercarriage part.

ATTENTION: In case there is more than 50 kg in the basket it is necessary press and hold down button 8 of the remote control to enable the aerial part movement.



NOTE: For 17.75/100 it's necessary to use the key (CODE 1651290015) to use the control position key selector.

11.5 LOAD CELL

The load cell system is composed by two units: the load cell board (ECM3) and the load cell sensor.

The load sensor is located under the basket and is composed by two sensors giving a double signal to the ECM3.

The ECM3, located on the jib arm, elaborates and compares the double signal to verify that both the lines indicate the same value within a certain tolerance. If this condition is respected and if the load is less than the maximum allowed (CE 230 kg, ANSI 500 lbs), the ECM3 communicates the information to the master board (ECM1-2) through CAN-BUS line. Otherwise in case of overcharge or lines discordance it's not possible to move the aerial part, an icon appears on the display.

If necessary, it's possible to calibrate the ECM3, memorizing the values detected charging in the basket suitable calibrated weights. This procedure is described in details in appendix 5.

12. POWER SYSTEM

(FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)

Honda iGX440 petrol engine or Hatz 1B40 diesel engine are fitted together with an electric motor, they are managed directly by control software. For this reason, no accelerator cable has been installed on the platform.

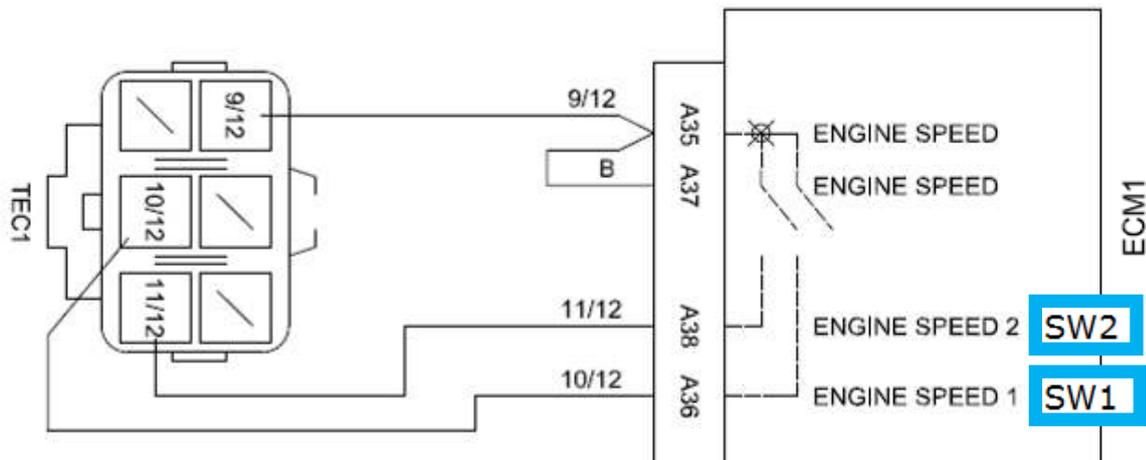
12.1 GASOLINE ENGINE HONDA IGX440

Description code	GCAWK
Design	4 strokes, overhead camshaft
Ignition system	CDI
Ignition timing (at no load)	10B.T.D.C./1400rpm 13B.T.D.C./3600rpm
Fuel used	Unleaded gasoline with a pump octane rating 86 or higher
Fuel tank capacity	5,9 l
Spark plug	BKR7E E (NGK),K22PR-UR (DENSO)
Number of cylinders	single cylinder inclined by 15
Displacement	438 cm ³
Bore per Stroke	88/76 mm
Cooling system	Forced air
Maximum horsepower	11,2 kW at 3600 rpm
Recommended maximum operation bhp	8,0 kW at 3600 rpm
Maximum torque	29,8 N*m at 2500 rpm
Minimum fuel consumption	328 g/KW*h
Compression ratio	8,1:1
Lubricating system	Forced splash type
Oil capacity	1,10 l
Starting system	Recoil and starter motor
Stopping system	Ignition primary circuit open
Carburetor	Horizontal type butterfly valve
Air cleaner	Dual element type
Governor	STR (self turning regulator) governor

The ECM1-2 is interfaced with an electronic unit applied on the Honda engine carburetor which, through a step by step electric motor, regulates and keeps the rpm constant acting directly on the butterfly valve.

Hinowa ECM1-2 communicates with the Honda electronic unit controlling two contacts through which predetermined rpm are set. In the specific instance, calling the two contacts as SW1 and SW2, the following conditions occur:

SW1	SW2	RPM
OFF	OFF	1500
ON	OFF	2200
OFF	ON	3600



ECM1 = MASTER BOARD FRONT MODULE
 TEC1 = GREY ENGINE CONNECTOR

The configuration of the rpm is calibrated through a special program directly in Hinowa. If the carburetor is replaced, a new parameterization of the electronic unit of the motor is required.

Below we list the different rpm regime considering the different movement selected by the operator:

HONDA IGX 440 RPSM SETTING		
TURTLE	NORMAL/ HARE	MOVEMENT (*)
1500	N3	1st and 2nd arm UP
1500	2200	1st and 2nd arm DOWN
1500	2200	3rs and 4th arm UP
1500	1500	3rs and 4th arm DOWN
1500	3600	Extension arm OUT
1500	3600	Extension arm IN
1500	1500	Aerial part rotation
1500	1500	Basket rotation
1500	1500	Basket leveling
1500	2200	Jib UP
1500	2200	Jib DOWN
1500	3600	Tracks forward or backward
1500	3600	Tracks OPEN
1500	3600	Tracks CLOSE
1500	3600	Aerial contemporary lifting movements
1500	2200	Aerial contemporary lowering movements
1500	1500	Aerial contemporary movements including Basket leveling or rotation
1500	1500	Aerial contemporary movements including third arm lifting for the second half part of the ascent
2200	2200	Auto stabilization with maximum 1 outrigger at the ground

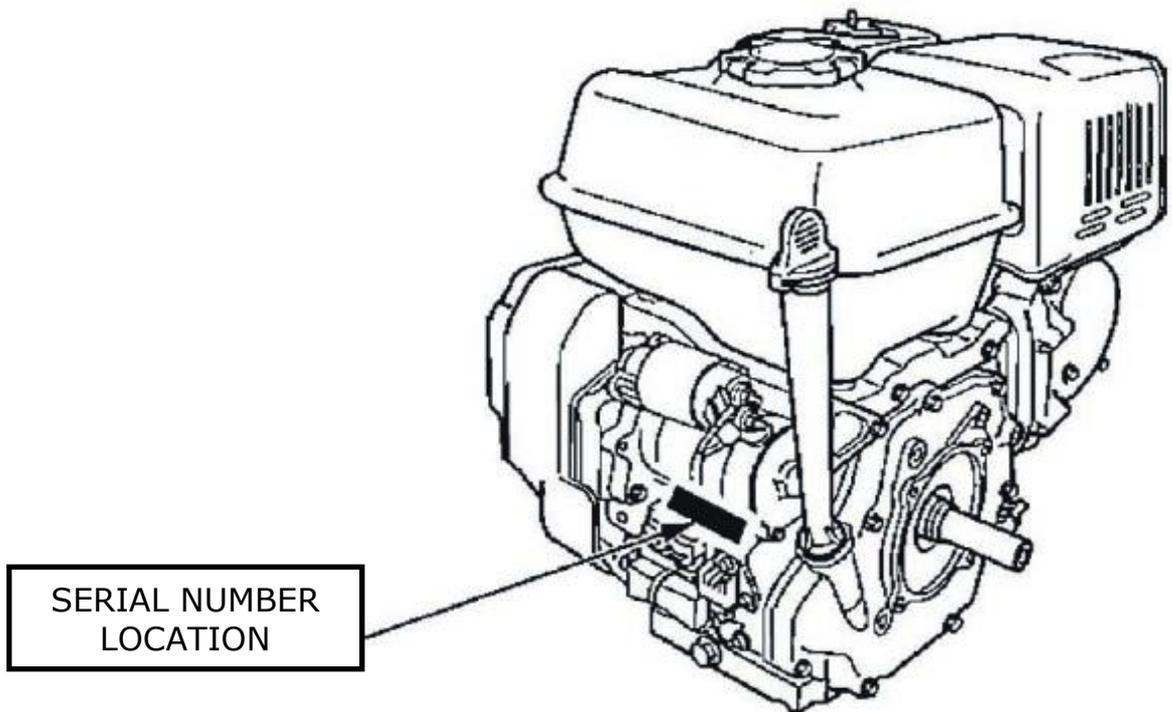
1500	1500	Auto stabilization with 2 or 3 outriggers at the ground
2200	2200	Auto stabilization with all outriggers at the ground
3600	3600	Auto destabilization with all outrigger lifted from the ground
1500	1500	Auto destabilization with at least 1 outrigger at the ground

(*) The setting indicated here above is indicatory

NOTE: the electric motor works always at minimum speed (1500 rpm).

SERIAL NUMBER LOCATION

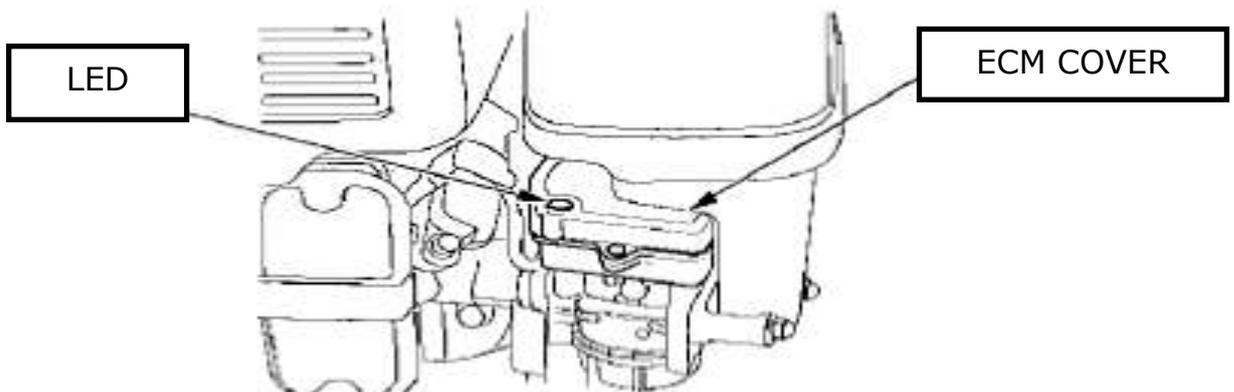
The serial number is stamped on the cylinder barrel.
Refer to this when ordering parts or making technical inquiries.



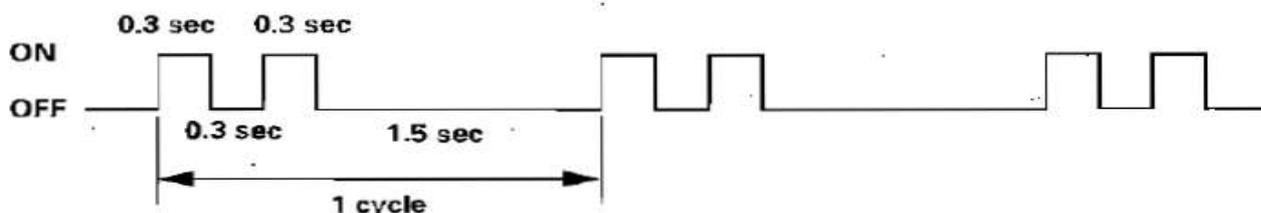
TROUBLESHOOTING

SELF-DIAGNOSIS AS INDICATED BY THE LED

When the battery is disconnected, self-diagnosis with the LED is not possible.



The LED for a failure flashes periodically, as shown in the following figure.
 Example: in the case of "2 flashes" the sequence of 0.3 sec. ON > 0.3 sec. OFF > 0.3 sec. ON > 1.5 sec. OFF is repeated as a cycle.



HONDA IGX 440 QUICK TROUBLESHOOTING

LED Status	Possible problems	Engine behavior
LED illumination	<ul style="list-style-type: none"> • None (Electrical system is normal) 	Normal
2 flashes	<ul style="list-style-type: none"> • Insufficient oil • Oil level switch failure • Wire harness connecting oil level switch and Engine control unit failure • Engine control unit failure 	While engine is running: Engine stops At start up: Engine may not start
4 flashes	<ul style="list-style-type: none"> • Engine temperature sensor failure • Wire harness connecting engine temperature sensor and Engine control unit failure • Engine control unit failure 	While engine is running: Engine continues to run At start up: Engine does not start
6 flashes	<ul style="list-style-type: none"> • Power coil failure • Wire harness connecting power coil failure and Engine control unit failure • Engine control unit failure 	While engine is running: Engine stops At start up: Engine does not start
8 flashes	<ul style="list-style-type: none"> • Program failure 	While engine is running: Engine stops At start up: Engine does not start
LED is not lighted	<ul style="list-style-type: none"> • Battery failure • 3A or 30A fuse blown • Combination switch failure • Wire harness failure • Engine control unit failure 	While engine is running: Engine stops At start up: Engine does not start

(*1): The engine may or may not stop, depending on the program in the Engine control unit.

(*2): Rewriting of the program is needed. Contact your Honda engine valve block.

(*3): If the faulty engine temperature sensor is detected while engine is running, the engine does not stop and the LED does not flash. After the engine is stopped, the engine does not start until the faulty engine temperature sensor is solved.

FIRST OPERATION

Check fueling from fuel tank to carburetor.



Lose drain screw.
Let fuel drain.



Pull recoil 3 or 4 times.
Check fuel coming from fuel tank.
If fuel is not coming from fuel tank
proceed to replace fuel filter in fuel tank.

Fuel filter replacement



SECOND OPERATION IF PROBLEM IS ON ENGINE

Spark checking



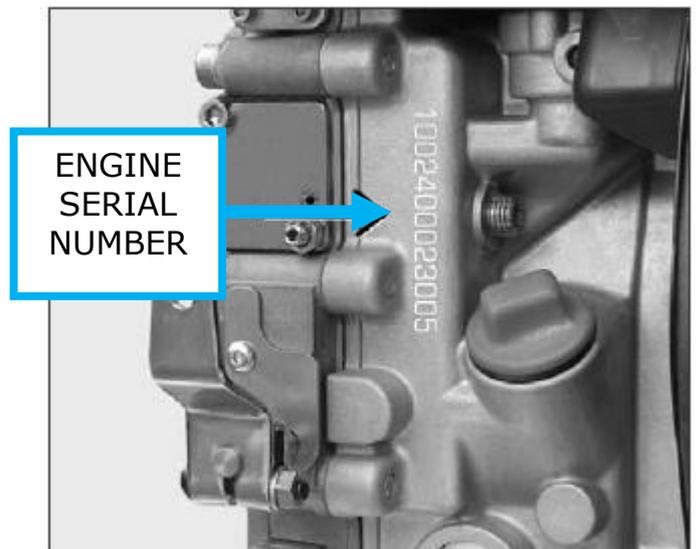
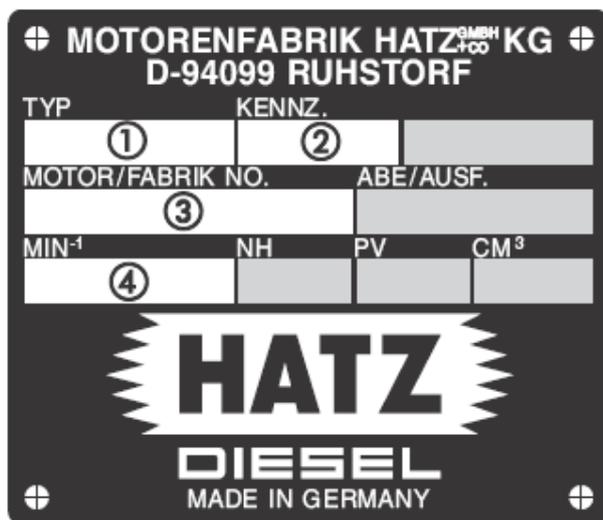
Changing the engine control unit.



12.2 DIESEL ENGINE HATZ 1B40 (FOR 17.75 DIESEL)

Design	4 stroke
Injection	Direct
Number of cylinders	1
Displacement	462 cm ³
Bore/Stroke	88/76 mm
Fuel tank capacity	5 l
Cooling system	Air
Lubricating oil pressure (oil temperature 100C)	2,5 bars at 3000 rpm
Lubricating oil capacity (with oil sump)	3,2 l
Max lubricating oil consumption (after running in)	1% of fuel consumption at full load
Direction of rotation, power take-off end	Anti-clockwise
Valve clearance 10-30C	0,10 mm
Weight (incl. fuel tank, air cleaner, exhaust silencer, recoil starter and electric starter)	Approx. 55 Kg

TYPE PLATE



The type plate is placed on the noise crankcase insulating hood and includes the following engine information:

1. engine type
2. code (only for special equipment)
3. engine number (also stamped on crankcase)
4. max. engine speed

For any offer as well as spare parts orders it is necessary to mention these data (also see spare parts list).

A sensor located in the Hatz engine detects the rpm and communicates them to the ECM1-2. The ECM1-2, according to the rpm information received from the sensor and according to the movement selected by the operator, controls a solenoid that regulates the rpm.

SOLENOIDE FOR
RPM CONTROL



RPM SENSOR

The configuration of the rpm is calibrated through the engine revolution schedule.

Below we list the different rpm regime considering the different movement selected by the operator:

HATZ 1B40 RPM SETTING		
TURTLE	NORMAL/ HARE	MOVEMENT (*)
1850	3600	1st and 2nd arm UP
1850	2200	1st and 2nd arm DOWN
1850	2200	3rs and 4th arm UP
1850	1850	3rs and 4th arm DOWN
1850	3600	Extension arm OUT
1850	3600	Extension arm IN
1850	1850	Aerial part rotation
1850	1850	Basket rotation
1850	1850	Basket leveling
1850	2200	Jib UP
1850	2200	Jib DOWN
1850	3600	Tracks forward or backward
1850	3600	Tracks OPEN
1850	3600	Tracks CLOSE
1850	3600	Aerial contemporary lifting movements
1850	2200	Aerial contemporary lowering movements
1850	1850	Aerial contemporary movements including Basket leveling or rotation
1850	1850	Aerial contemporary movements including third arm lifting for the second half part of the ascent
2200	2200	Auto stabilization with maximum 1 outrigger at the ground
1850	1850	Auto stabilization with 2 or 3 outriggers at the ground
2200	2200	Auto stabilization with all outrigger at the ground
3600	3600	Auto destabilization with all outrigger lifted from the ground
1850	1850	Auto destabilization with at least 1 outrigger at the ground

(*) The setting indicated here above is indicatory.

NOTE: the electric motor works always at minimum speed (1500 rpm).

12.3 DIESEL ENGINE PERKINS 402.05 (FOR 20.10 DIESEL)

Design	4 stroke, naturally aspired
Injection	Indirect
Cylinders and arrangement	In-Line two cylinder
Displacement	507 cm ³
Bore/Stroke	67/72 mm
Fuel tank capacity	10 l
Compression Ratio	23,5:1
Rotation that is viewed from the flywheel	Counterclockwise
Maximum Operating speed (rpm)	3600 rpm
Firing Order	01-feb
Valve Lash Setting (Inlet)	0.20 mm (0.008 inch)
Valve Lash Setting (Exhaust)	0.20 mm (0.008 inch)

ENGINE IDENTIFICATION

Perkins engines are identified by a serial number. This number is shown on a serial number plate that is mounted above the fuel injection pump on the right hand side of the engine block.

An example of an engine number is

GP*****U000001M.

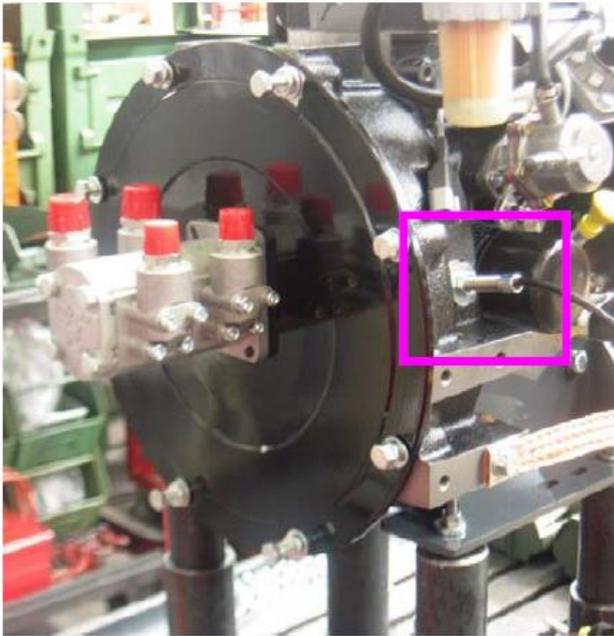
GP _____ Type of engine
 U _____ Built in the United Kingdom
 ***** _____ The list number of the engine
 000001 _____ Engine Serial Number
 M _____ Year of Manufacture

Perkins dealers or Perkins distributors need all of these numbers in order to determine the components that were included with the engine. This permits accurate identification of replacement part numbers.

SERIAL NUMBER PLATE



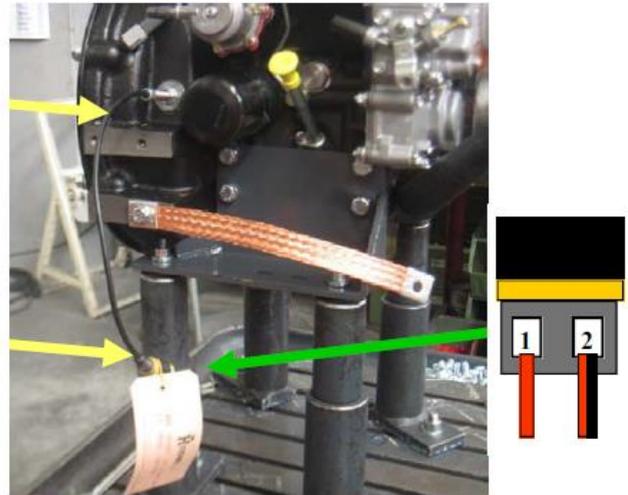
PERKINS RPM CONTROL SYSTEM



Mount the proximity cod.26514900 sure that inside see the hole on the reduction of the tooth crown, screw until you come into abutment with the sensor, make a mark and unscrew for a ride, then pull the nut to secure it.

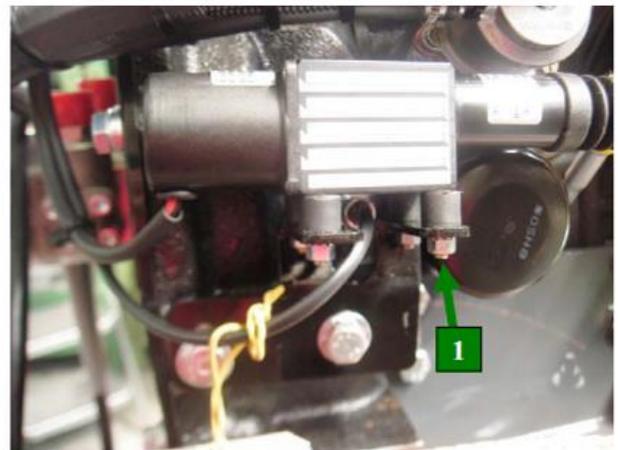


Take the wire and cut proximity 350mm, thread a a sheath L = 300 and mount connector 2-way super seal female leads of the connector (1) red and black wire on the (2).



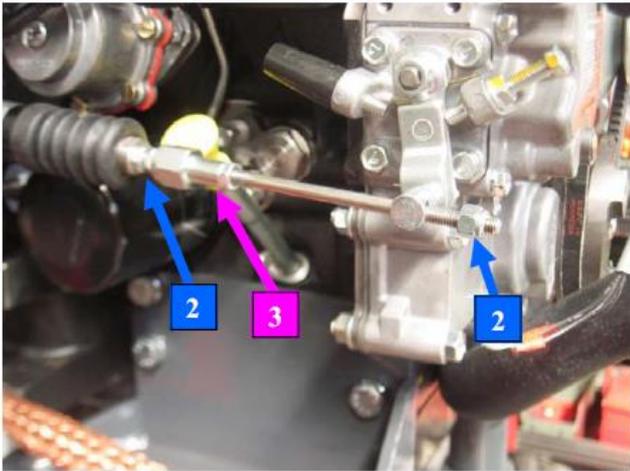
Take No. 1 throttle servo cod.26551500, No. 1 piston mounting bracket Electrical cod.06551300, n° 1 articulation, No. 4 vibration $\phi 12$, 5 H = 10 cod.06551400, n° 1 threaded rod accelerator cod.06471400, No. 1 stud for accelerator cod.06471500 and n° 2 screws 5/16 X 3/4.

1. Slightly flared the 4 threaded holes of the servo command, cut one side of the fillets of vibration to about 5-6MM.

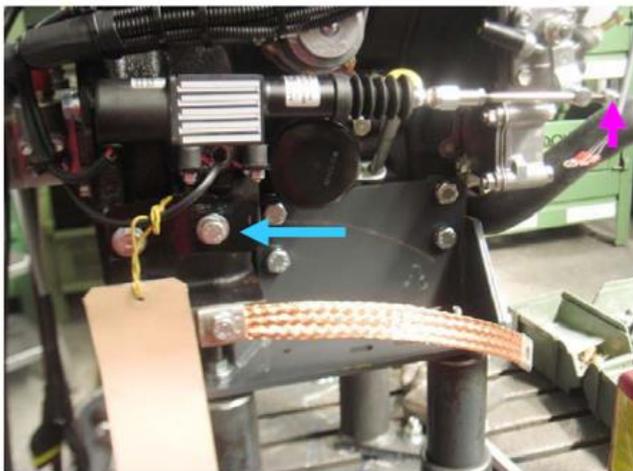


2. Put a little 'of fat on the joint where she works and a M6 nut low.

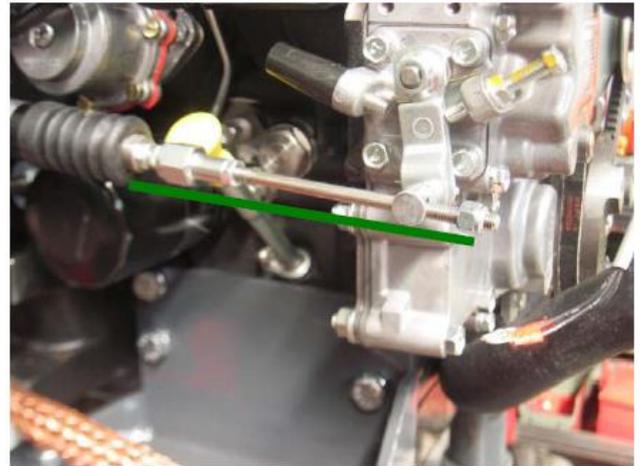
3. Mount it on the servo control and tighten until bottom.



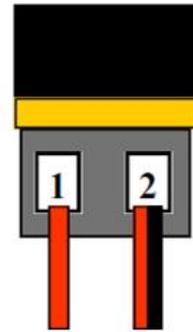
4. Cut to 10mm bolt for the throttle, tighten and tighten down with nut M6.
5. Orientate the bracket with 2 screws + washer 5/16X3/4 flat. Removing one at a time to put the thread lock and pull.



6. Mount the actuator and record it in line, check the operation with the help of a battery.



7. Wires 2 on the actuator to a sheath L = 250 and a connector with 2-way super-seal door males. The red wire on connector (2) and black wire on connector (1).



The configuration of the rpm is calibrated through the engine revolution schedule.

Below we list the different rpm regime considering the different movement selected by the operator:

PERKINS 402.05 RPM SETTING		
TURTLE	NORMAL/ HARE	MOVEMENT (*)
1500	3600	1st and 2nd arm UP
1500	2200	1st and 2nd arm DOWN
1500	2200	3rs and 4th arm UP
1500	1500	3rs and 4th arm DOWN
1500	3600	Extension arm OUT
1500	3600	Extension arm IN
1500	1500	Aerial part rotation
1500	1500	Basket rotation
1500	1500	Basket leveling
1500	2200	Jib UP
1500	2200	Jib DOWN
1500	3600	Tracks forward or backward
1500	3600	Tracks OPEN
1500	3600	Tracks CLOSE
1500	3600	Aerial contemporary lifting movements
1500	2200	Aerial contemporary lowering movements
1500	1500	Aerial contemporary movements including Basket leveling or rotation
1500	1500	Aerial contemporary movements including third arm lifting for the second half part of the ascent
2200	2200	Auto stabilization with maximum 1 outrigger at the ground
1500	1500	Auto stabilization with 2 or 3 outriggers at the ground
2200	2200	Auto stabilization with all outriggers at the ground
3600	3600	Auto destabilization with all outrigger lifted from the ground
1500	1500	Auto destabilization with at least 1 outrigger at the ground

(*) *The setting indicated here above is indicatory*

NOTE: the electric motor works always at minimum speed (1500 rpm).

12.4 LITHIUM VERSION – ELECTRIC MOTOR FOR BATTERY PACK

LL17.75 fit a 48V battery pack, LL20.10 fit a 72V battery pack

Number of cells in the battery pack:	15 cells for 48V, 22 cells for 72V
Rated voltage of each cell:	3,2 Volt
Max cell voltage:	3,65 Volt
Min cell voltage:	2,5 Volt
Features of the complete pack:	48 V – 90/100 Amps/h, 72 V – 90/100 Amps/h
Charge cycles:	2000 cycles
Cathode:	Lithium Iron Phosphate (LiFePO ₄)
Anode:	Graphite
Memory effect:	NO

BATTERY CHARGER

Type:	110V or 230 V (±10%) - 50/60 Hz
Indicative time to charge:	4 hours – 2 hours to have l'80% of Single-phase supply voltage CE 230V (ANSI 110V) ±10%
<u>Max output current for 48 Volt</u>	CE 25 Amps (ANSI 18 Amps)
<u>Max output current for 72 Volt</u>	CE 30 Amps (ANSI 13 Amps)
Operating temperature range	from -20 to +50 C
Efficiency	90%
Type of protection	IP65

Battery charger codes:

48 Volt battery charger	
Led Light	Meaning
Red	1 st charge step –maximum current possible to the cells
Red Flashing	2 nd charge step – Cells under charge with reduced current
Yellow	3 rd charge step – Cells under light charge
Yellow flash	4 th charge step – Balancing and maintaining
Green/Red flash	Error – The battery pack is disconnected (contactor open)

72 Volt battery charger	
Led Light	Meaning
Red	1 st charge step –maximum current possible to the cells
Yellow flash	2 rd charge step – Cells under light charge
Green	3 th charge step – Balancing and maintaining
Green/Red flash	Error – The battery pack is disconnected (contactor open)

ELECTRIC SYSTEM:

48/72 V for the batteries system and inverter– 12 Volt for the machine

ELECTRIC MOTOR:

48 Volt – Three-phase – 2000 Watt

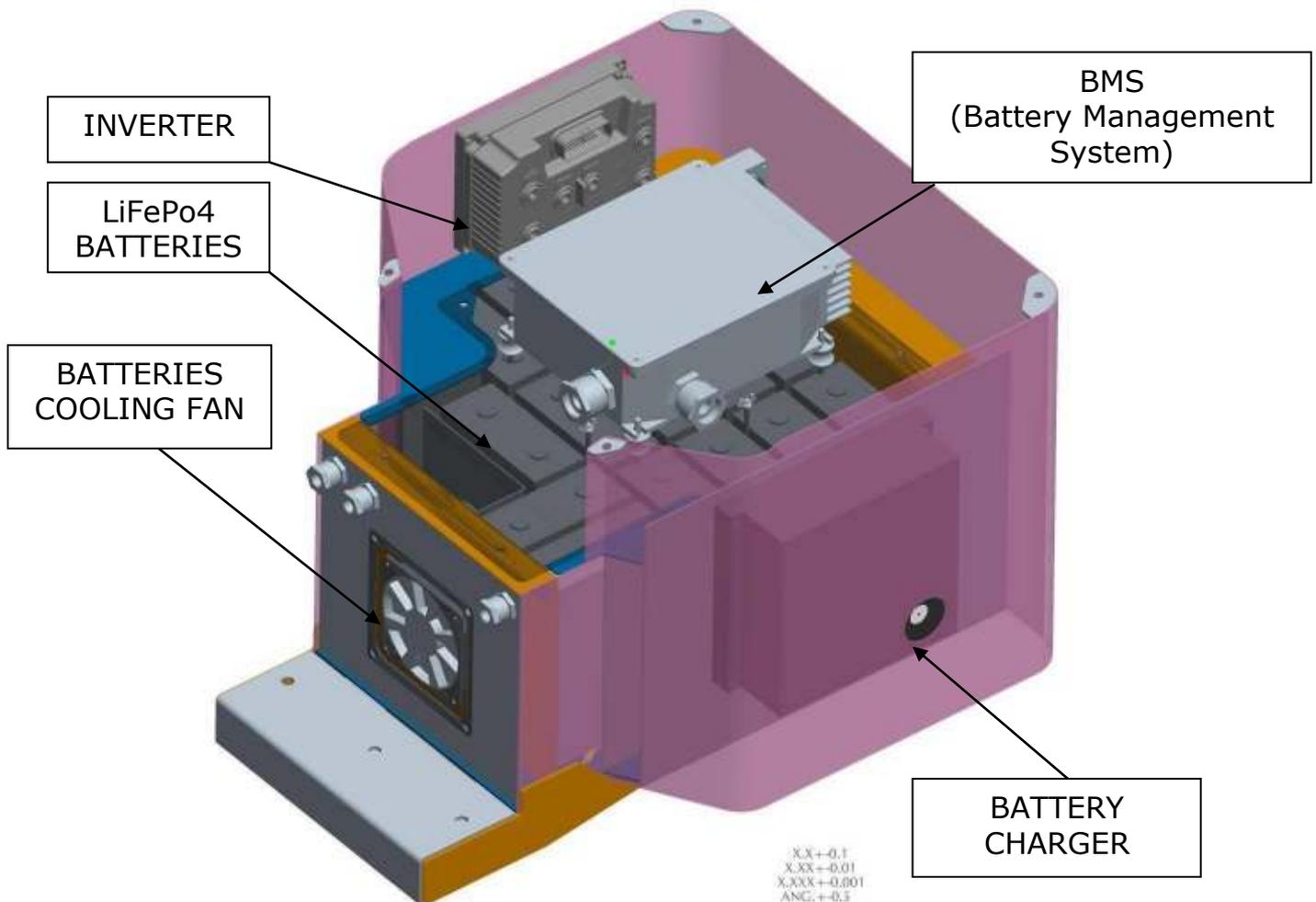
72 Volt – Three-phase –3500 Watt

DIAGNOSTICS AND FAULT CODES

The main devices forming the lithium batteries power system are equipped with self-diagnosis with fault codes which indicate to the operator which is the possible anomaly on the machine. The devices with self-diagnosis are:

- Inverter
- BMS
- Battery charger

In the Lithium system specific training are listed with the meanings of the fault codes of the individual devices.



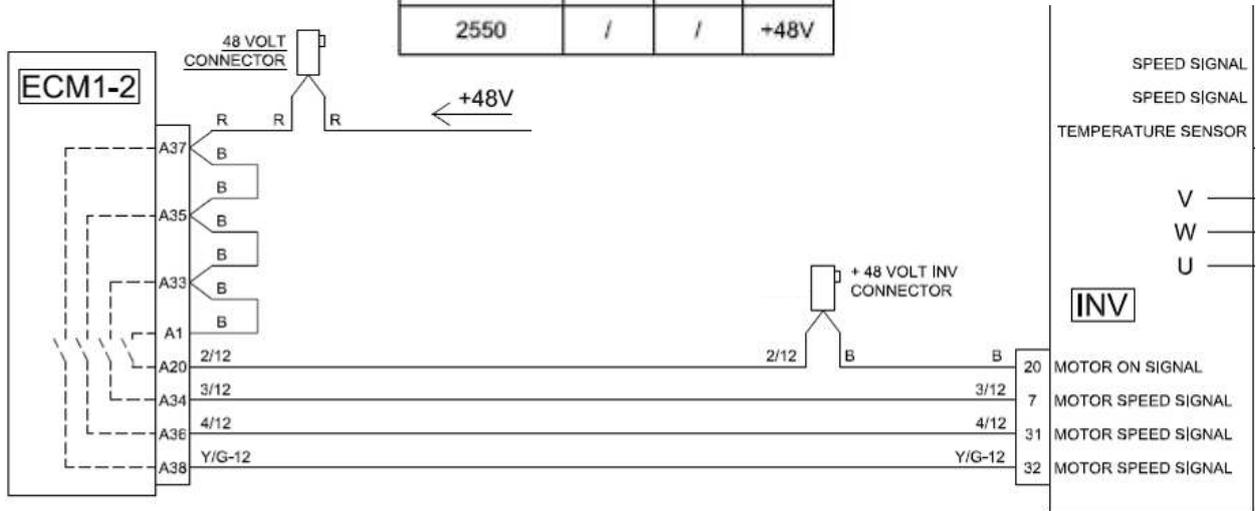
The here above image represent the 48V battery pack.
For further details about lithium system consult the specific manual.

The configuration of the rpm is calibrated through the inverter system.
If the inverter is replaced, a new parameterization is required.

Hinowa ECM1-2 communicates with the inverter controlling three contacts through which predetermined rpm are set. In the specific instance the contacts are the followings:

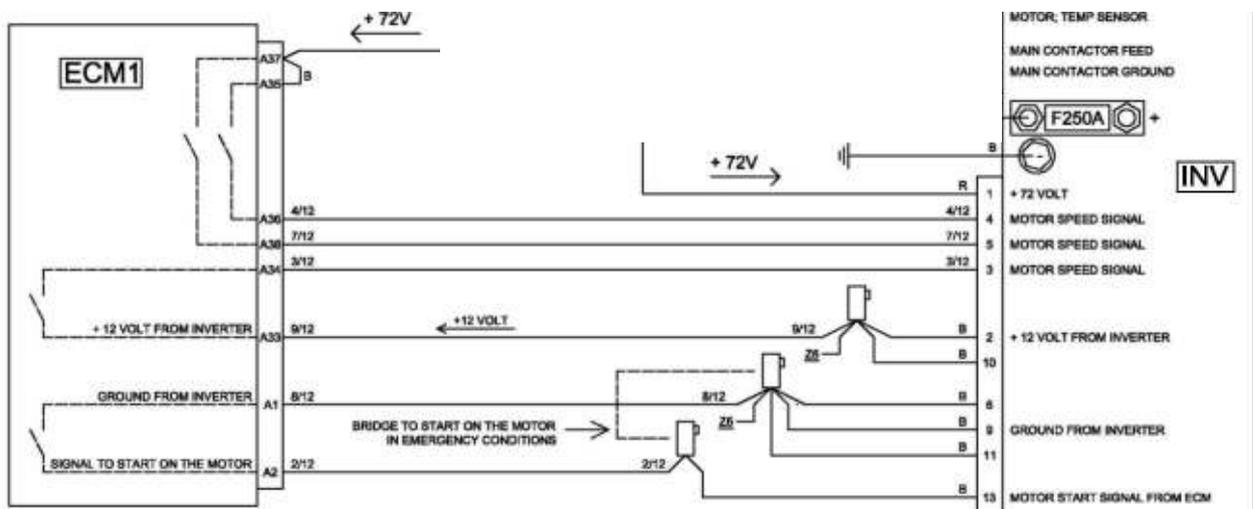
FOR 48 V BATTERY PACK (LL17.75)

MOTOR RPM	PIN 7	PIN 31	PIN 32
750	/	/	/
1050	/	+48V	+48V
1500	/	+48V	/
2250	+48V	/	/
2550	/	/	+48V



FOR 72 V BATTERY PACK (LL20.10)

MOTOR RPM	PIN3	PIN4	PIN5
750	/	/	/
900	/	+72V	+72V
1350	/	+72V	/
2100	+12V	/	/
2550	/	/	+72V



Below we list the different rpm regime considering the different movement selected by the operator 48V Lithium system.

LITHIUM 48V RPM SETTING (LL17.75)			
ENERGY SAVING	TURTLE	NORMAL/HARE	MOVEMENT (*)
325	750	2250	1st and 2nd arm UP
325	750	1350	1st and 2nd arm DOWN
325	750	2100	3rs and 4th arm UP
325	750	1350	3rs and 4th arm DOWN
325	1050	2100	Extension arm IN / OUT
325	750	1350	Aerial part rotation
325	750	1050	Basket rotation or leveling
325	750	1050	Jib UP / DW
325	1050	2100	Tracks forward or backward
325	1050	2100	Tracks OPEN / CLOSE
325	1050	2100	Aerial contemporary lifting movements
325	750	1350	Aerial contemporary lowering movements
325	2100	2100	Auto stabilization with maximum 1 outrigger at the ground
325	2100	2100	Auto stabilization with 2 or 3 outriggers at the ground
325	2100	2100	Auto stabilization with all outrigger at the ground
325	2100	2100	Auto destabilization with all outrigger lifted from the ground
325	1050	1050	Auto destabilization with at least 1 outrigger at the ground

() The setting indicated here above is indicatory and could also change depending on aerial contemporary movements*

ENERGY SAVING mode decrease the speed is automatically activated by the Lithium system when the charge level (SOC) is less than 10%.

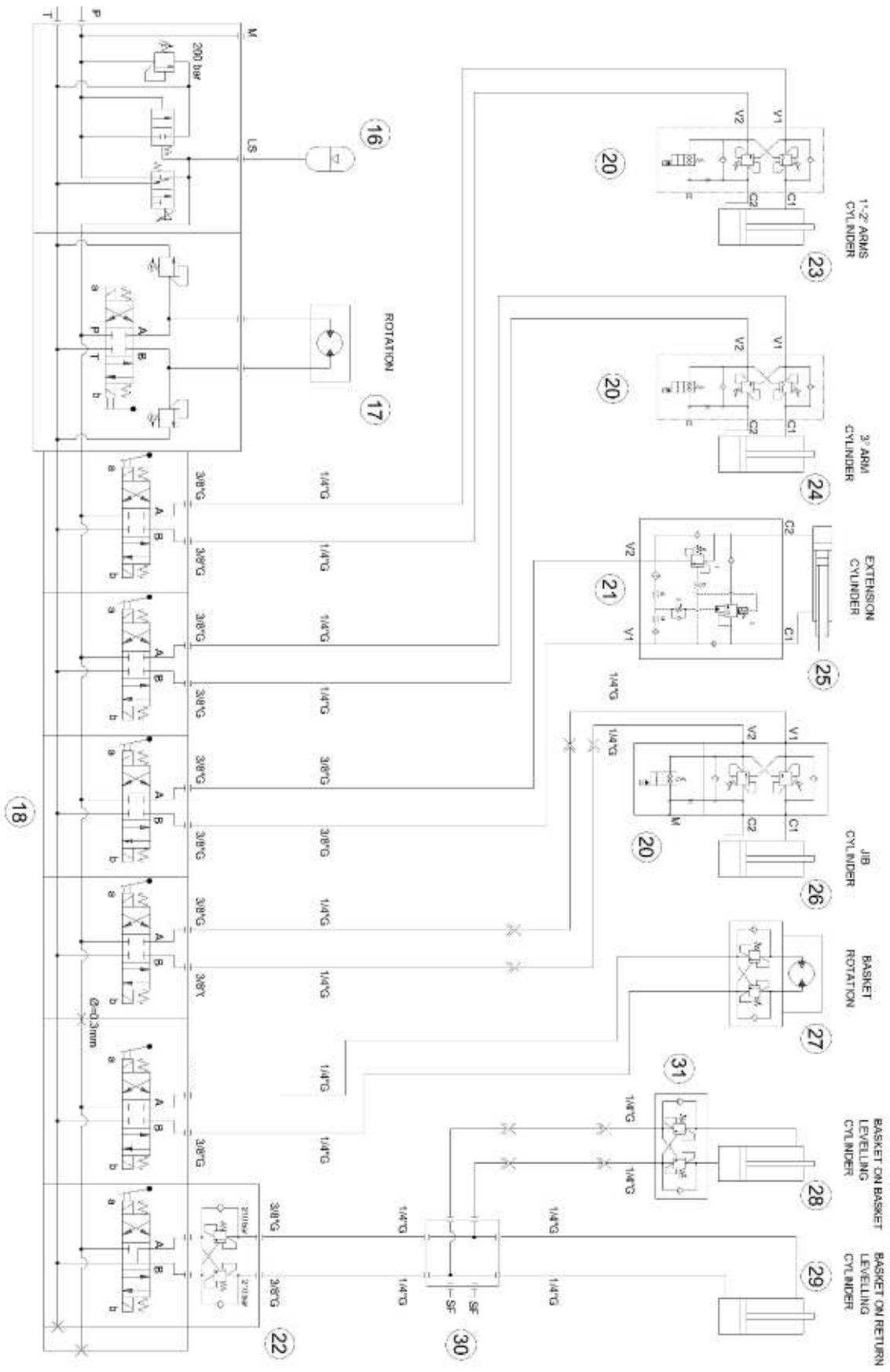
Below we list the different rpm regime considering the different movement selected by the operator 72V Lithium system.

LITHIUM 72V RPM SETTING (LL20.10)			
ENERGY SAVING	TURTLE	NORMAL/HARE	MOVEMENT (*)
450	1200	2550	1st and 2nd arm UP
450	900	1500	1st and 2nd arm DOWN
450	900	1800	3rs and 4th arm UP
450	900	1200	3rs and 4th arm DOWN
450	1200	2550	Extension arm IN / OUT
450	900	1500	Aerial part rotation
450	900	1200	Basket rotation or leveling
450	900	1200	Jib UP / DW
450	1200	2550	Tracks forward or backward
450	1200	2550	Tracks OPEN / CLOSE
450	1200	2550	Aerial contemporary lifting movements
450	900	1500	Aerial contemporary lifting movements
450	1800	1800	Auto stabilization with maximum 1 outrigger at the ground
450	1800	1800	Auto stabilization with 2 or 3 outriggers at the ground
450	1800	1800	Auto stabilization with all outrigger at the ground
450	1800	1800	Auto destabilization with all outrigger lifted from the ground
450	1200	1200	Auto destabilization with at least 1 outrigger at the ground

() The setting indicated here above is indicatory and could also change depending on aerial contemporary movements*

ENERGY SAVING mode decrease the speed is automatically activated by the Lithium system when the charge level (SOC) is less than 10%.

HYDRAULIC SYSTEM (2nd part- AERIAL PART)



HYDRAULIC SYSTEM LIGHTLIFT (CAPTION)

GROUND PART

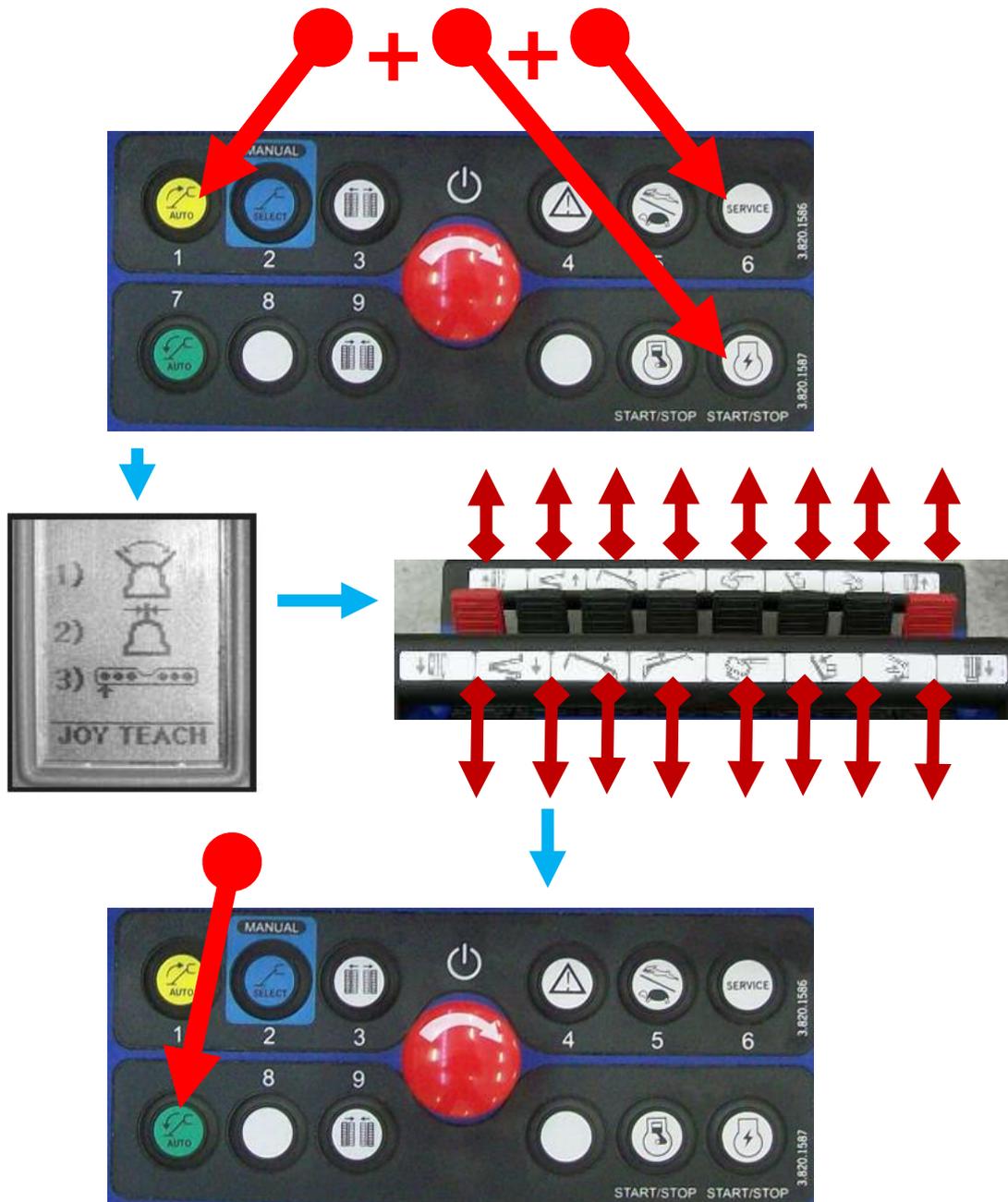
1	HAND PUMP
2	ELECTRIC MOTOR 2.2 kW 4 poles IP55
3	GASOLINE ENGINE IGX440
3	DIESEL ENGINE 1B40 10HP
4	DOUBLE PUMP
5	MANIFOLD
6	WASTE FILTER
7	WASTE COLLECTOR
8	DISTRIBUTOR
9	DISTRIBUTOR
10	OUTRIGGER BLOCK VALVE
11	OUTRIGGER CYLINDER
12	GEAR REDUCTOR
13	TRACKS WIDENING CYLINDER
14	DEVIATOR VALVE

AERIAL PART

16	ACCUMULATOR
17	ROTATION MOTOR
18	DISTRIBUTOR
19	COLLECTOR
20	ARMS BALANCING DOUBLE VALVE
21	EXTENSION BALANCING VALVE
22	BALANCING DOUBLE VALVE
23	FIRST-SECOND ARM CYLINDER
24	THIRD ARM CYLINDER
25	EXTENSION CYLINDER
26	JIB CYLINDER
27	BASKET ROTATION MOTOR
28	BASKET ON BASKET LEVELING CYLINDER
29	BASKET ON RETURN LEVELING CYLINDER
30	CLOSE CIRCUIT DEVIATION BLOCK
31	LEVELING BALANCING DOUBLE VALVE

APPENDIX 2 REMOTE CONTROL JOYSTICK REPLACEMENT

Teach In: must be carried out when one of the joystick is replaced. Switch OFF the system. Now keep pressed the two outermost buttons on the right side of the keyboard together with the top outermost button on the left for 7 seconds. On the display will appear "JOY TEACH" and the instruction to calibrate the joystick. To do this, move each joystick completely down and then completely up. To end the TEACH IN mode, centre all the joystick and press button "7" once. The remote control switches back into normal mode and the display clears.



APPENDIX 3 CAN-BUS DIAGNOSTICS AND TROUBLESHOOTING

1 DISPLAYED ICONS

If an icon of the followings appears on the display check as indicated here below



THIS IS NOT A CAN-BUS ERROR

Check error menu: check from the display into the ERROR MENU pushing 6 – SERVICE and then 3 – ERRORS, then skipping the pages it will be showed the devices error status, where there's a NO means that the signal from two lines of that device are not according each other, so check it and check its connections



Electronic board or software wrong: check if the platform's devices are compatibles with installed software, if necessary contact Hinowa with the serial number and the release number of the installed software



CAN BUS signal missing: check the connection as indicated at the step 4 of the present procedure



2nd cylinder sensor missing: check the connector of the position sensor on 3rd arm and the sensor itself, check also the battery charge level, in case of low battery level let the engine run for some minutes, then check if this alarm disappears



Battery low level alarm: it could appear especially after the engine start, check the battery level and eventually charge.

2 CAN TIMEOUT MENU'

As soon as you have CAN BUS error shown on the display, check the error list on page 4, pushing the buttons 6 – SERVICE → 3 – ERRORS and then pushing 2 times NEXT till page 4 CAN TIMEOUT, the display will show the following screen on (left side) with the followings meaning (right side)

CAN TIMEOUT	
SAFETY	OK
REMOTE	OK
CIL1-2	OK
CIL3	OK
LOAD	OK
ROTA	OK
1 PREV	
2 NEXT	
9 ESC	

SAFETY	Safety lines on master board (ECM1-2) software error
REMOTE	Remote control error
CIL1-2	Do not consider
CIL3	Position sensor for 3 arm cylinder error
LOAD	Load cell board (ECM3) error
ROTA	Do not consider

This page with OK indicates the correct presence of the signals in the CAN BUS line of the different connected devices. The indication shall always be OK, if the indication is NO it means that the device is not communicating properly by CAN BUS line.

If it results some NO within this error page, try to check the connection, afterward if it doesn't fix the problem check and eventually replace the device, if otherwise there are only OK it's requires to go on with a software check.

3 SOFTWARE CHECK

Only ff the problems occurred after a software updating, check if the platform's devices are compatibles with the new software, in this case, if necessary contact Hinowa with the serial number and the release number of the software install.

4 CAN BUS DEVICES AND CONNECTIONS CHECK

If you didn't fix the problem it's requires going on with CAN BUS devices and connections check that requires the following schematics:

- CAN BUS DEVICES CONNECTIONS (here below)
- CAN BUS DEVICES POSITION (here below)
- CAN NETWORK page "E3" of the electric wiring diagram

MODEM DISCONNECTION CHECK

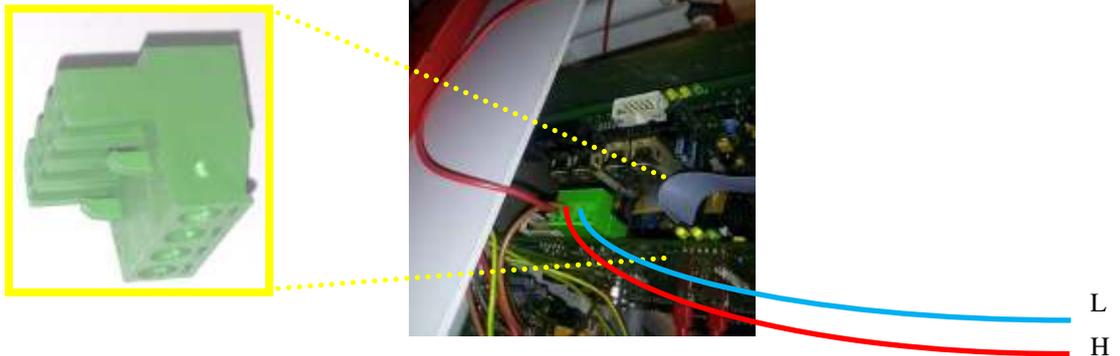
Disconnecting the modem machine should work as well, if the CAN BUS problems will disappear once the modem is disconnected it will means that we have found the cause.

CONNECTIONS CHECK

The blue lines on CAN BUS DEVICES CONNECTIONS here below indicate the CAN BUS devices interconnections.

With ignition switch turned OFF and the battery cutter disconnected, connect 2 external wires to create an alternative CAN BUS line from green connectors (example picture here below) of ECMs and disconnect the original wires. To know which are the

CAN BUS contacts on the devices, consult the relative page on the electric wiring diagrams



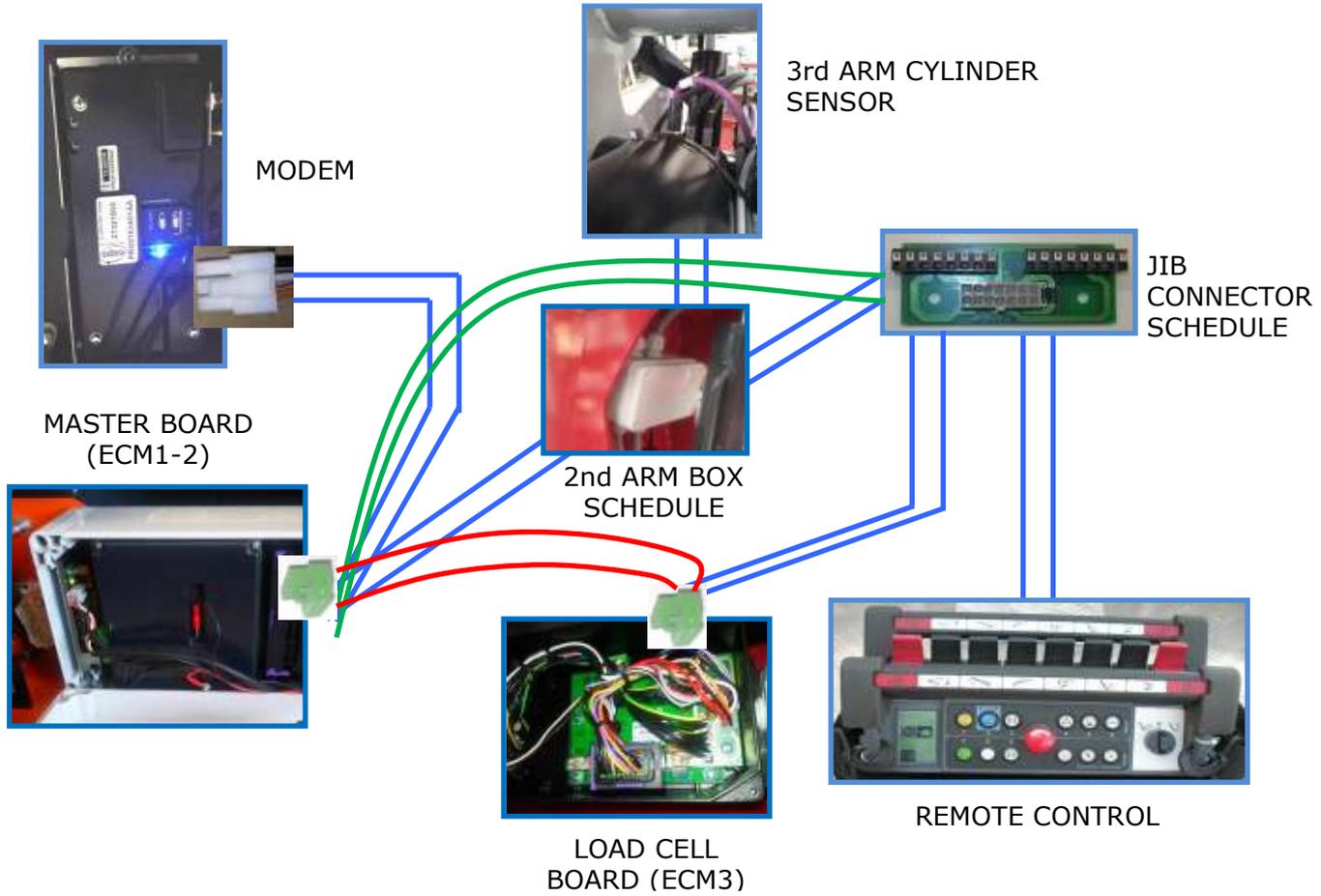
Anytime that you have replaced a connection, connecting the battery cutter and turning ON ignition switch , check if CAN BUS error disappear. This operation is necessary to check not only the continuity of the wires but also the status, because it could happen that a wire is scratched so even maintaining the continuity it introduces a disturb into the signal

NOTE: Exchanging the wires H and L the system doesn't work, so it's important to replace each connection as was originally.

PROCEEDING EXAMPLE: Always changing the connections configuration with battery cutter disconnected, connect two external wires (red lines here below) between ECM1-2 and ECM3, disconnecting the original wires on this tract, then check the status: if with this configuration the error doesn't disappear means that the failure is on a device, otherwise if the error disappears it means that the failure was in the original connections (it could be possible that it appears "SEN 3 FAIL" →2nd cylinder sensor missing). Then, in case we detected the problem on the connection, replacing the original connections and substituting only the connection between ECM1-2 and the JIB CONNECTOR SCHEDULE with and external couple of wires (green lines here below), check the status, if the error appear it means that the failure was on this tract original connection, otherwise if the error disappear check the other possible tracts.

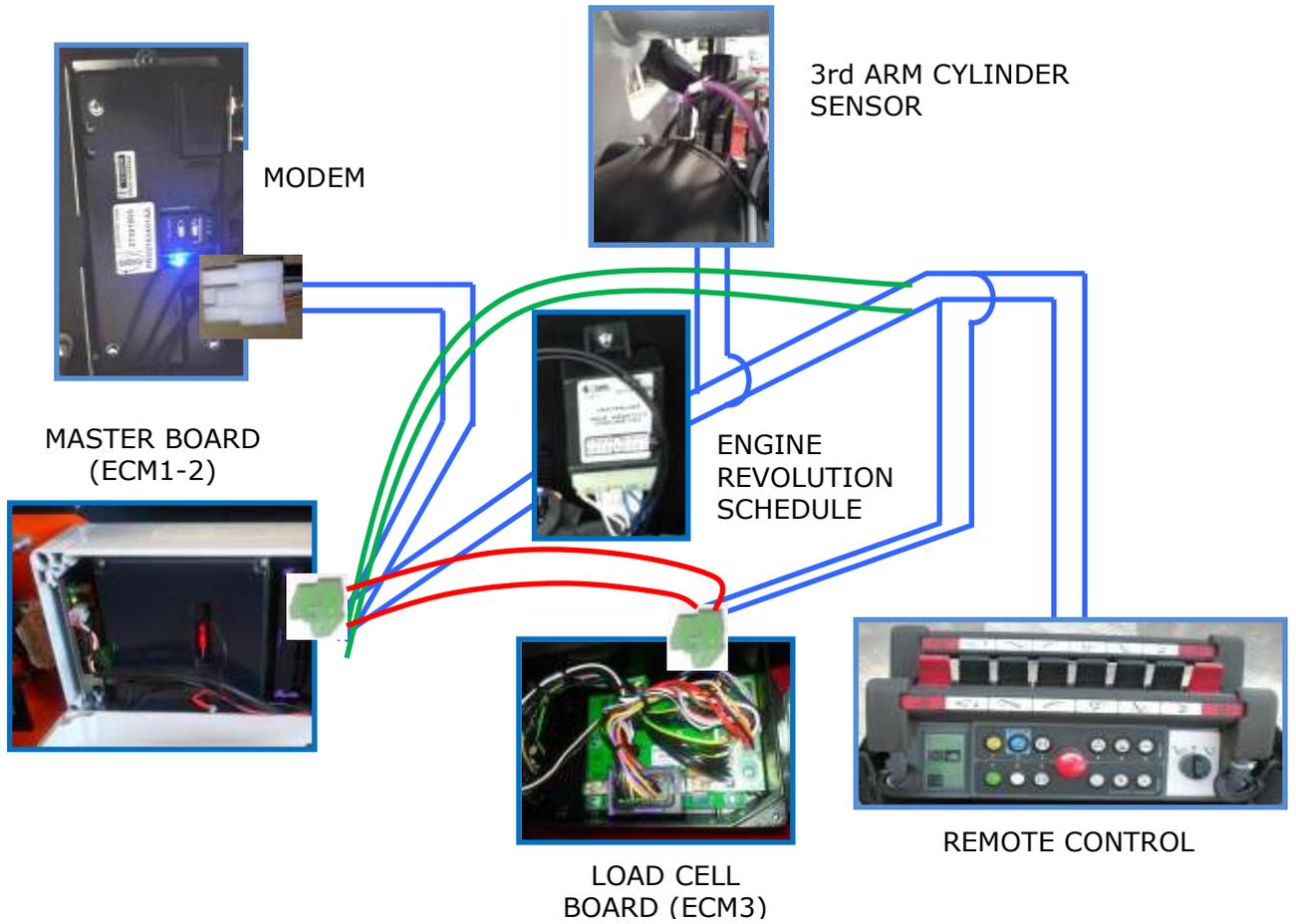
CAN BUS DEVICES CONNECTIONS (BLUE LINES)

(ONLY FOR 17.75 /100)



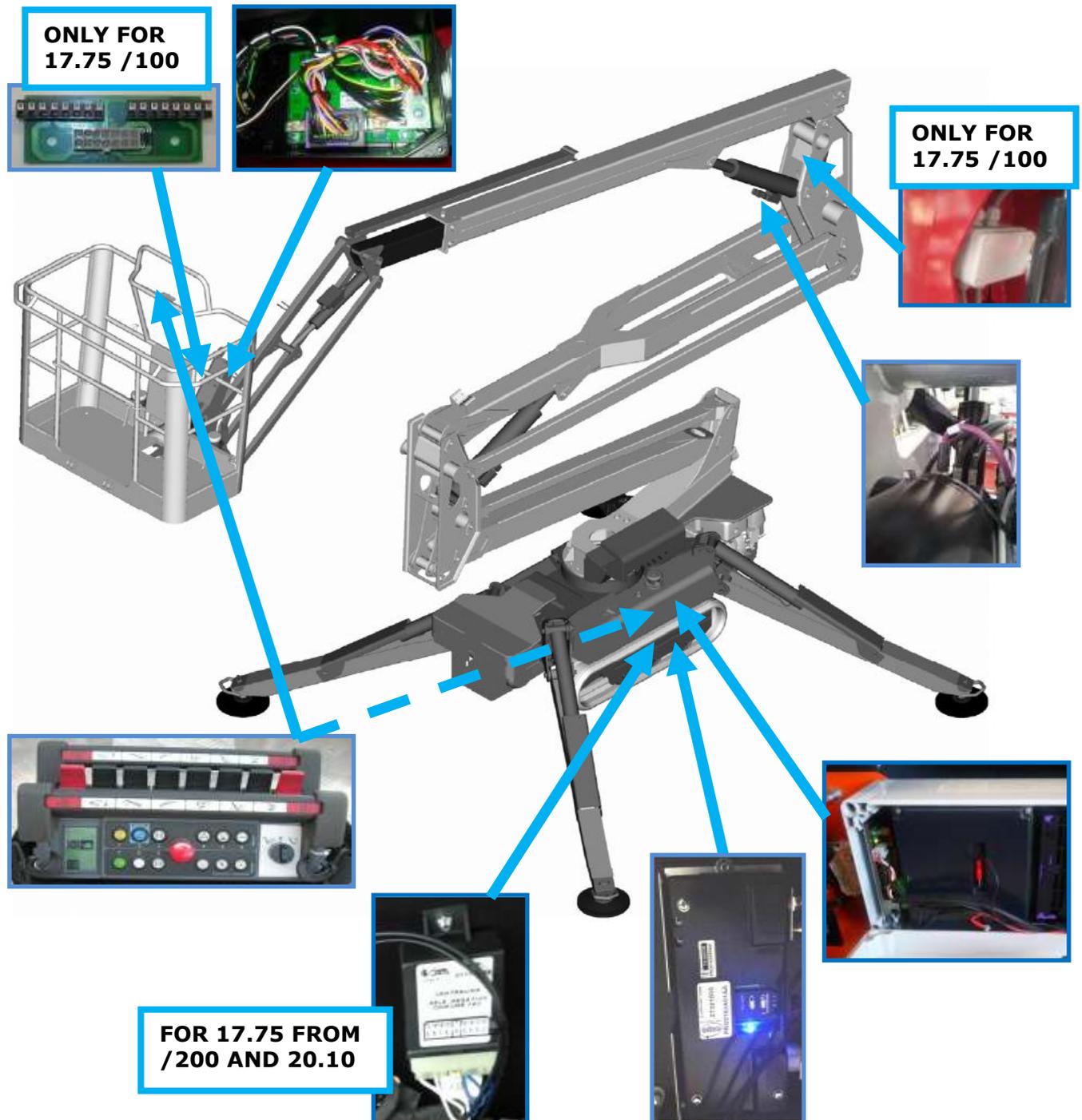
CAN BUS system connections

(FOR 17.75 FROM /200 AND 20.10)



CAN BUS system connections

CAN BUS DEVICES POSITIONS



After checking, if the problem comes out from the device it's required to change the device, if the problem comes out from the connection it's required to change the wires.

NOTE: Evaluate that if you have already changed more than one spares of the same device, in this case the problem could be caused for example by water going inside the box, so take a look to possible traces of oxidation on the contacts, in this case isolate better the box. Be careful that the jib box cover has a direction to be assembled, if assembled in the wrong direction water goes inside.

APPENDIX 4 CURRENTS AND RAMPS SETTING

Each Hinowa platform is individually calibrated by Hinowa to set comfortable and safe movement's speeds and accelerations.

This calibration is achieved by setting the movement currents and ramps, in practice controlling the current curve given to the proportional valve of the corresponding valve block.

The values of currents and ramps are stored into the master board (ECM1-2) and they are written on the platform datasheet.

In case of master board (ECM1-2) replacement, after have programmed the master board (ECM1-2) with the proper software, those parameters must be settled again, please contact Hinowa with the platform serial number to the proper setting.

CURRENT DEFINITION

The currents values of one movement are the currents given to the proportional valve to open it (overcoming the closure spring force) allowing oil flow, they are expressed in mA (milliampere)

In particular the maximal current defines the movement speed and must be settled taking care of the law limit achieving a safe and smooth handling of the platform.

There is a limit flow rate of the proportional valve that even increasing the current setting could not be overcome.

The minimal current is the value given to the proportional valve when the movement begins.

CURRENTS SETTING

The currents of each movement could be read into the current menu, pressing button 6 SERVICE → 5 CURRENT and then pressing button 1 and 2 to scroll the different movement. To set the current have to be followed the procedure "Performance parameters setting"

In case of need ask Hinowa with the platform serial number to be informed about the specific parameters setting originally settled on your platform.

CURRENTS ARE DEFINED BY HINOWA AND CANNOT BE CUSTOMIZED.

CURRENT ADJUSTING

In case of a movement seems to be too slow or too fast, please take note of the time took to complete it and contact Hinowa.

Here follows the time table belonging to each movement, WE UNDERLINE THAT IT COULD BE USE ONLY AS AN INDICATION AND IN ANY CASE IT DOESN'T AUTHORIZE ANYBODY TO CHANGE THE PLATFORM PARAMETER.

MOVEMENT	TIME LIMITS
EXTENSION ARM OPENING	21"-23"
EXTENSION ARM CLOSING	16"-18"
ROTATION (HALF CYCLE)	41" - 43"
JIB CYLINDER OPENING	14"-16"
JIB CYLINDER CLOSING	11"-13"
BASKET ROTATION	7"-9"
BASKET LEVELING CYLINDER OPENING	37"- 39"
BASKET LEVELING CYLINDER CLOSING	27"- 29"
I-II ARM CYLINDER OPENING	28"- 30"
I-II ARM CYLINDER CLOSING	27"- 29"
III ARM CYLINDER OPENING	29"- 31"
III ARM CYLINDER CLOSING	31" - 33"

RAMPS DEFINITION

Ramps are settled to calibrate the delay, in acceleration and deceleration, between the joystick movement and the corresponding platform movement, defined in tenth of second, therefore ramps influence the smooth of the movement's designing the controlling curve.

In particular the acceleration ramp define the delay between the joystick pression and the begin of the movement, therefore must be settled in order to achieve a comfortable handling of the platform.

The deceleration ramp defines the delay between the joystick release and the stop of the movement, therefore has to be settled in order to achieve a safe and comfortable handling of the platform.

RAMPS SETTING

The ramps setting of each movement could be red into the ramp menu, pressing button 6 SERVICE → 4 RAMP and then pressing button 1 and 2 to scroll the different movement. To set the ramp have to be followed the procedure, "*Performance parameters setting*".

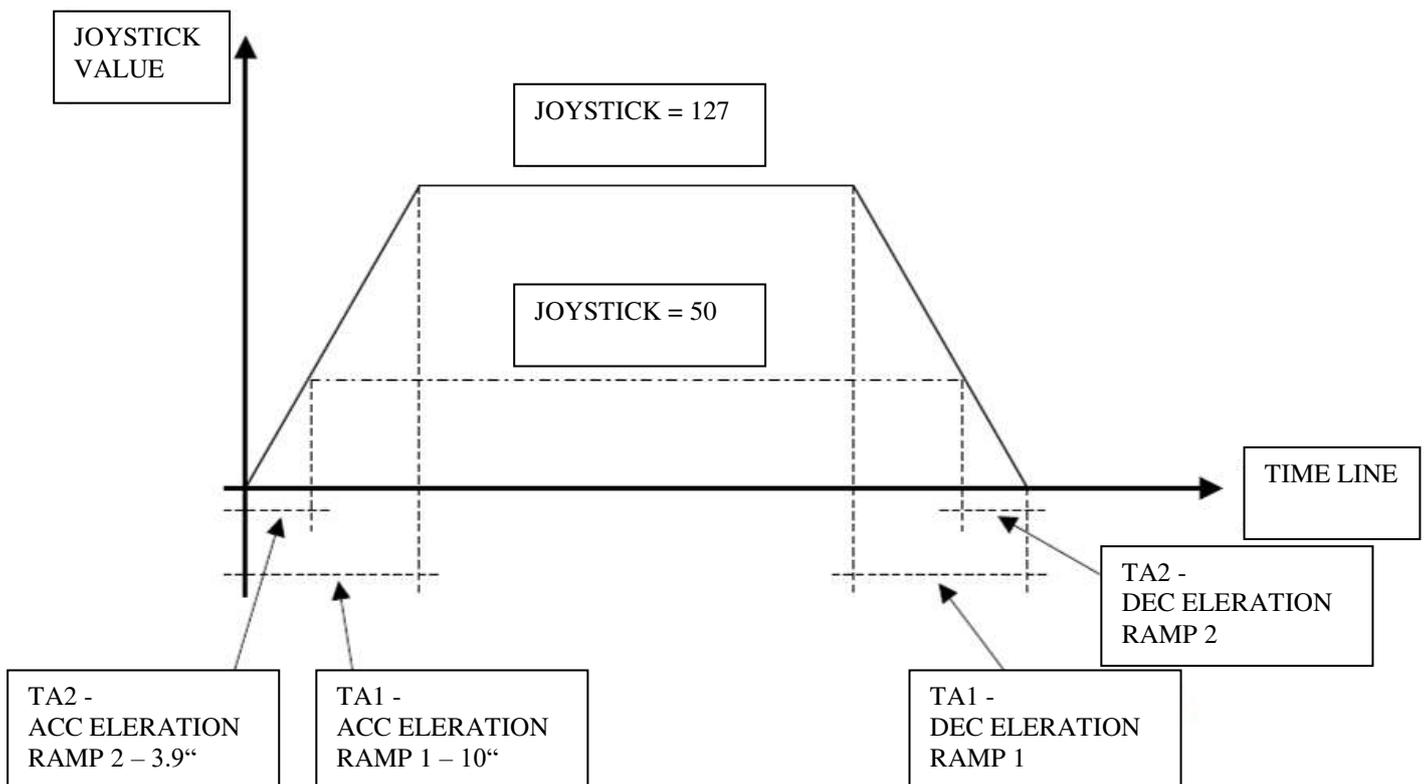
In case of need ask Hinowa with the platform serial number to be informed about the specific parameters setting originally settled on your platform.

RAMPS ARE DEFINED BY HINOWA AND CANNOT BE CUSTOMIZED.

RAMP GENERATION

The ramps generation system filter the raw value read by the joysticks and produce the acceleration and deceleration ramps.

Ramps fix the duration of the acceleration/deceleration (in tenth of second), in practice ramps define the time that must take the current to reach its maximum value (ramp of acceleration) or to return to its least (ramp of deceleration) value.



From the graph above we can see that the ramp determinates the curve inclination and therefore the acceleration. In practice the time of TA1, 10", is developed completely to reach the maximum value of the joystick equal to 127 steps. With the same ramp setting, for inferior positions of the joystick the inclination of the curve doesn't change, in fact the time (TA2=3.9.") is proportional to the step value of the joystick (50 step). Concerning the ramp of deceleration have to be applied the same consideration. When joystick changes the direction from Up to Down and vice versa, the system will complete the ramp of deceleration of the first direction before starting the ramp of acceleration in the new direction.

**APPENDIX 5
LOAD CELL SYSTEM CALIBRATION PROCEDURE
(FROM LL17.75/4 and LL20.10/3 read APPENDIX 9)**

This operation is required when the load cell has lost the references for the maximum loads or null loads, this may be due to voltage surges that have damaged the load cell board (ECM3). This events is very infrequent, for construction the load cell board (ECM3) must absolutely keep the programming parameters except in case of external factors. The calibration is required also after having replaced the load cell sensor located under the basket or the load cell board (ECM3).

NOTE: Weight system calibration procedure, even if basket maximum capacity is 230 Kg, requires a 200 Kg max load setting, then the system automatically gets the 230 Kg limit. Therefore to calibrate the system it must be put in the basket 200 Kg to make the max load setting.

PROCEED AS FOLLOWS:

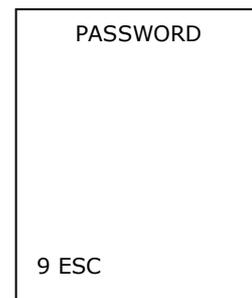
- 1 Power the remote control turning ignition switch ON

START CALIBRATION:

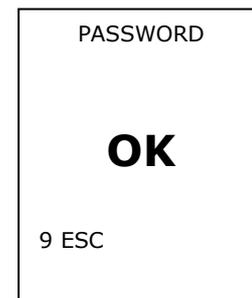
2 Take the remote control in hand and take a position on the ground, not in the basket. In this position, press button 9 for SERVICE menu on the remote control and look at the information that appear on the display.

- 3 Press button 7 (SETUP).

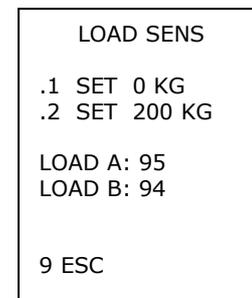
4 Press button 5 (PASSWORD). The screen on the side appears on the remote control display.



5 Press buttons 5726 in order. The screen on the side appears with "OK" on the remote control display. If this does not happen press button 9 (EXIT) and return to point 4 of the procedure.



6 Press button 9 (EXIT) and afterwards button 6 (LOAD SENS). At this point the screen on the side appears on the remote control display.



7 With basket empty press button 1 (SET 0KG) and wait for about 5 seconds.

8 Position a load of 200 kg in the basket. Wait for about 5 seconds and press button 2 on the remote control (SET 200KG).

9 Wait for 5 seconds, press button 9 (EXIT). Turn ignition switch OFF.

10 Feed the machine and control the correct adjustment of the system.

APPENDIX 6 ACCELEROMETERS CALIBRATION PROCEDURE (TILT SENSOR RESET)

This operation is required when the master board (ECM1-2) has lost the references for the accelerometers or the need to replace the master board (ECM1-2) itself.

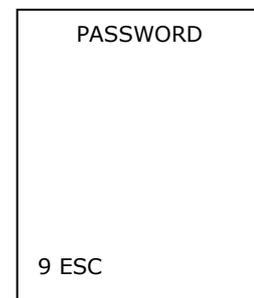
PROCEED AS FOLLOWS:

IMPORTANT: to do this operation it's important that motors are switched OFF, just turn ignition switch ON to feed the ECM1-2. TO RESET ACCELEROMETERS MACHINE HAS TO BE PERFECTLY LEVELED IN BOTH AXLES. Visual bubble level has to be perfectly in the green area.

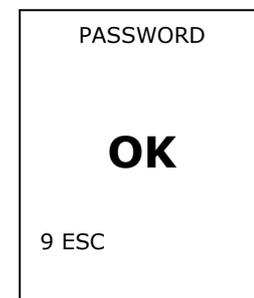
- 1 Power the remote control turning ignition switch ON

START CALIBRATION:

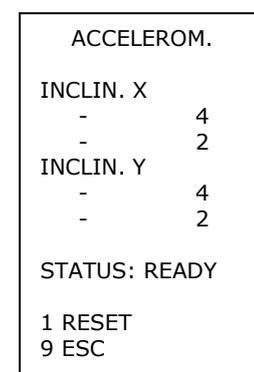
- 2 Press button 6 (SERVICE) in the remote control
- 3 Press button 7 (SETUP).
- 4 Press button 5 (PASSWORD). The screen on the side appears on the remote control display.



- 5 Press buttons 4658 in order. The screen on the side appears with "OK" on the remote control display. If this does not happen press button 9 (EXIT) and return to point 4 of the procedure.



- 6 Press 1 to enter in the menu accelerometer.
- 7 Press 1 to reset the accelerometers. Check that the value of both the axle showed in the display becomes zero, otherwise press button 1 again until both values are about zero. In case that the outriggers are not at the ground it will be shown "NOT READY" and reset will not be possible



- 8 Press 3 times button 9 to go back to standard menu view.
- 9 Turn ignition switch OFF.
- 10 Feed the machine and control the correct adjustment of the system.

APPENDIX 7 (FROM 17.75/200 AND FOR 20.10) LIGHT INDICATION ON ELECTROVALVES

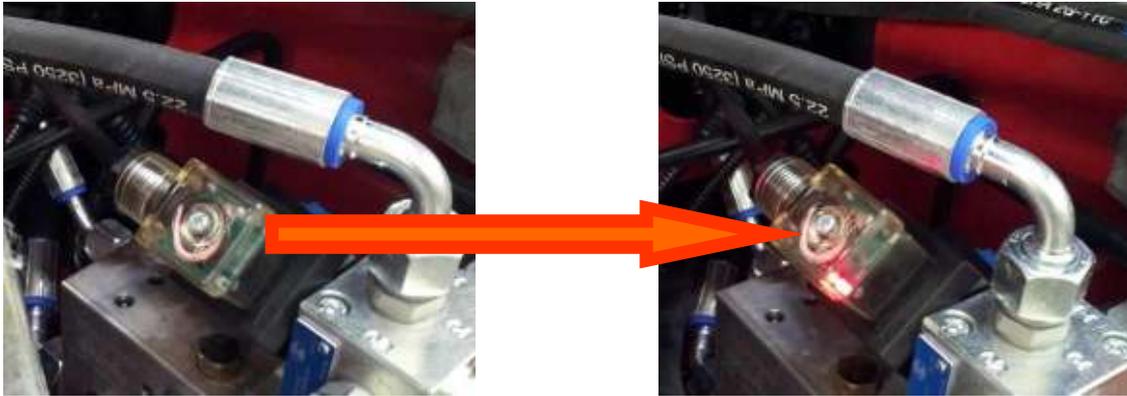
On Light Lift 17.75 from /200 and on Light Lift 20.10 the aerial and ground ON/OFF valves and also the hydraulic deviator valve are equipped with a light to indicate their status.

ON-OFF valves are lighted while they are electrically fed, doesn't matter the correspondent proportional valve or deviator status.

The hydraulic deviator valve is lighted when is fed, so when it convey the oil to the ground part.

The hydraulic deviator valve is normally giving the oil to the aerial part, its condition are here below listed.

- System switched OFF → Deviator to aerial part
- System switched ON with machine stabilized → Deviator to aerial part
- System switched ON with machine not stabilized → Deviator to ground part

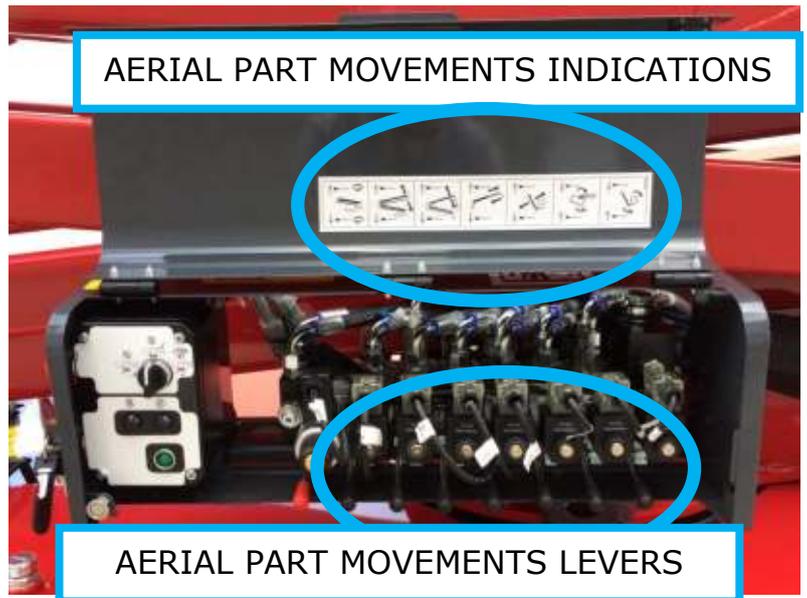
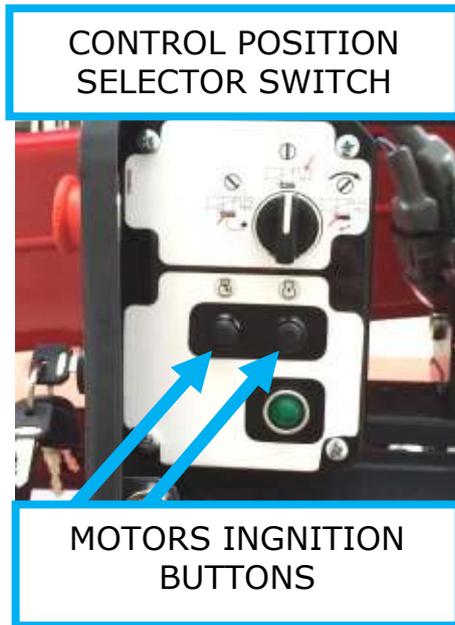


APPENDIX 8 – REMOTE CONTROL STOP BUTTON BY-PASS

With machine stabilized while remote control is connected to its basket connector with stop button pressed, in case of an emergency it's possible to by-pass it keeping turned rightward the control position selector and switching ON one motor by its ignitions button.

With lithium machines, control position selector kept turned rightward will also get the electric motor running.

While control position selector is kept pressed it's possible to move the aerial part acting on the aerial part valveblock levers, as soon as control position selector or remote control stop button are released, the motor will switch OFF immediately.



APPENDIX 9 FREQUENTLY ISSUES SOLVING

1) Dead display

- Turn ignition switch OFF and disconnect the battery cutter. Switch ON them after a few seconds (first battery cutter). Wait 10 seconds for start up and check display. If you read "download" wait 15 minutes and display should start up. If not go ahead.
- Check if master board (ECM1-2) is feed (at least one LED must be ON). If no lights check master board (ECM1-2) feed and battery. If there are lights go ahead.
- Check remote control connector, remote cable, especially feed on wire 1 (12V) and ground on wire 7 (Page E3 wiring diagram).
- Check that control position key selector is in the proper position
- Connect remote control at the ground cable (*see chapter 11.4*) and verify its functioning. If it's working means that the problem is on the electric lines to platform basket cable or on the control position key selector or switches. If also at the ground remote control is not working there's a possible problem on remote control.

2) "PREOPERATING" on the remote control display:

- If you read "preoperating" turn ignition switch OFF and disconnect the battery cutter. Switch ON them after a few seconds (first battery cutter). Wait 10 seconds for start up and check display.
- If you read "download" wait 15 minutes and display should start up.

- If the display doesn't start up check the remote control connector and remote cable, especially CAN BUS wires 5 and 6 (Page E3 wiring diagram).
- Check the whole CAN BUS line from ground to platform (Page E3 wiring diagram).
- Connect remote control at the ground cable and verify its functioning. If it's working the problem is on the electric lines to platform basket cable or on the control position key selector or switches. If also at the ground remote control is not working there's a possible problem on CAN BUS system, check with the CAN BUS troubleshooting (see *appendix 3*).
- If there's no failure found out on the CAN BUS system, the problem could be on remote control or on ground master board (ECM1-2).

3) "JIB ONLY" system doesn't work:

- If with machine destabilized on the display doesn't appear the icon "JIB ONLY" check that the aerial part is completely close, check also SERVICE-INPUT signal "POS 3" status (see chapter 11.3) that indicates the opening of the 3 arm cylinder.
- If the icon "JIB ONLY" is on display check if there is more than 40 kg on the basket or the remote control is on the basket (see chapter 5.1.1).

4) Self-stabilization system doesn't work:

- Check alignment icon in the display.
- Make sure photocells and reflector are clean
- Make sure alignment is correct on the machine (alignment arrow and arms completely closed). If alignment icon still OFF check SERVICE-INPUT signals "FOTO A" and "FOTO B" status (see chapter 11.3).
- If doing self-stabilization display keeps say "WAIT" close manually the proportional valves and do the stabilization again. If with the valves closed it's working fine you need to put higher CURRENT "STAB DOWN-sw" using procedure of current setting (see *procedure - Performance parameters setting*). If after increasing the current stabilization is still not working check the valve blocks coil and if there are ECMs output to the coils (Page M wiring diagram), otherwise probably there is an hydraulic problem, check one way valves in hydraulic pumps collector and pressures as indicated in the use and maintenance manual.
- If automatic stabilization is not stabilizing machine with proper leveling (checking bubble level) verify in SERVICE-INPUT signals "INCLIN X" and "INCLIN Y" (see *chapter 11.3*). If they are signing the

correct value (less than 10 each one) testing physically the leveling with an external level on the machine base. If values are not correct do accelerometer reset procedure with the correct leveling of the machine (*see appendix 6*) and then test the system. If it lose the calibration or still not working master board (ECM1-2) possibly needs to be replaced.

5) Operator stopped with aerial part, no gravity emergency descent possible (because of obstacles under platform):

- Emergency hydraulic procedure from the ground (*see chapter 6.1.2*) or aerial part safeties by-pass with the proper key (*see chapter 6.1.3*). Machine needs to be closed and aligned.
- Destabilize machine.
- Stabilize again machine.
- Check machine functions.

6) Aerial part not moving (Error list):

- Check the icon appears on the display or the error list (*see chapter 5.2*) and identify where the problem is.

7) "HELP ERROR" alarm visualized on the display:

- Press SERVICE button.
- Press button 3 for ERRORS (*see chapter 11.3*).
- Verify the error self diagnosis.

8) "STOP" icon visualized on the display:

- Verify the stop buttons status (must be both released).
- Verify in the SERVICE-INPUT menu the signals EM.BASK and EM GRND are ON, if one is OFF following the wiring diagram identify which stop button has a problem (*see chapter 11.3*), than check switches and wires.

9) "SEN 3 FAIL" icon visualized on the display::

- If this is happening after engine starting, there is probably battery level low. Charge the battery.
- If battery is ok verify wires connector on the 3rd arm cylinder and wires to the 2nd ARM BOX (*see chapter 8.2*) and (Page E3 wiring diagram).

10) "CARD?" or "CAN BUS?" icons visualized on the display:

- Check CAN BUS system as described in CAN BUS troubleshooting on the present training (*see appendix 3*).

11) Rahm System is not working:

- Verify serial number and password.
- Verify to write serial number in capital letter and password in small letters.
- Ask if possible to put machine outdoor and try again.
- Ask to check if modem is flashing slowly (*see chapter 8.5.5*) as it should if there is net signal, otherwise problem is network itself.
- Remove the modem white connector (feed) and put it back to reset it. Try again to call the machine.
- Go into SERVICE menu pressing 6-SERVICE, 7-SETUP, 3-EXTRA, 4-MODEM and check as follows

MEANINGS

- STATUS : INIT. → Initialisation, modem is not ready to communicate
READY → Modem is ready to communicate
- SIM : NO → SIM CARD not present (STATUS will be INIT.)
OK → SIM CARD present
- RSSI : 0÷100 → SIM CARD operator signals,
need to be over 50 to had a good connection
- BER : 0÷100 → network line signals

12) Thermic engine not starting:

- Check display and eventual STOP icon.
- Check proportional valves are unscrewed.
- Check Honda engine ECM diagnosis with flashing code (*see chapter 12*).
- Check engine fuses and wires connectors.
- Check hydraulic oil filter, air filter, gasoline or diesel filter, in case also the sediment cup as indicated in the engine use and maintenance manual.
- Isolate engine from machine following the relative procedure (*see chapter 6.3*) to identify if it's an engine problem.

13) Electric motor stalled:

- Check if the cable is too long or too thin, cable section has to be at list 10 m long with section of 4 mm².
- Check the circuit breaker (*see chapter 10.1*).
- Verify condensator status inside motor box.
- Verify input-output voltage from 110÷230V BOARD (page Q2 drawings).

14) Lithium system doesn't work properly:

- Follow the Lithium troubleshooting.

APPENDIX 10 MK2 UPDATINGS

MK2 updatings have been introduced from LL17.75/4 and from LL20.10/3.

MAIN KEY ON GROUND CONTROLS BOX

MK2 machines have no key on engine, also MK2 lithium machines have no key on lithium pack, the main key is on ground control box.



NEW AERIAL PART HYDRAULIC VALVEBLOCK AND NEW CONTROL POSITION KEY SELECTOR BOX

Inside the ground control box, the aerial part hydraulic valveblock has been changed, the new one works without any accumulator and its proportional valve is controlled by a red lever.

Aside the aerial part hydraulic valveblock, the new control position key selector box is made of steel.



ELECTRIC MOTOR WITH DISENGAGER AND ACTIVATION RELAY

The 110÷230V board is not installed anymore, its function has been replaced by one relay, installed on thermic switch box (circuit breaker box), that controls the electric motor activation/deactivation.

Electric motor is equipped with a disengager.



NEW CHARGING SYSTEM

The electronic transformer has been changed, the new one is installed without box inside the carter aside the 12V battery, so that transformer box is not anymore installed.

New electronic transformer has a fixed output tension of 14 Volt DC, not depending on the electric network tension or frequency, its output current is automatically regulated till a maximum of 15 Amp.



NEW ELECTRIC PLUG

The 110÷230V fixed plug used to connect the machine to the electric network has been replaced by an UNFIX plug.



NEW 12V BATTERIES

New 12V battery is AGM (Absorbent glass mat) and START&STOP technology, with capacity 60Ah.



NEW LOAD CELL SYSTEM

Load cell sensor and load cell board (ECM3) are different from the one installed till LL17.75/300 and LL20.10/200.

New parts code are:

Load cell sensor (from LL17.75/400 and LL20.10/300) → part code 17669800

Load cell board (from LL17.75/400 and LL20.10/300) → part code 17770300

With new load cell system, calibration procedure consist only in "0 Kg" calibration, not "200 Kg" calibration.

NEW HONDA ENGINE ON LL17.75 FROM /400

From LL17.75/400 gasoline version is equipped with Honda engine iGX390 coupled with pumps unit 3,15cc/rev each.



Design	4 strokes, overhead camshaft
Ignition system	CDI
Ignition timing	variable ignition timing
Number of cylinders	single cylinder inclined by 25°
Displacement	389 cm ³
Bore per Stroke	88/64 mm
Cooling system	forced air
Net power	8,7 kW at 3600 rpm
Continuous net power	7,0 kW at 3600 rpm
Maximum net torque	26,4 N*m at 2500 rpm
Fuel consumption at continuous net power	3,5 L/h at 3600 rpm
Compression ratio	8,2:1
Lubricating system	butterfly valve type
Oil capacity	1,1 l
Starting system	Recoil and starter motor
Stopping system	Ignition primary circuit open
Carburetor	Floating valve type
Air cleaner	Dual element type
Governor	STR (self turning regulator) governor

Below we list the different rpm regime considering the different movement selected by the operator:

HONDA IGX 390 RPSM SETTING		
TURTLE	NORMAL/HAR	MOVEMENT (*)
1500	N3	1st and 2nd arm UP
1500	2350	1st and 2nd arm DOWN
1500	2350	3rs and 4th arm UP
1500	1500	3rs and 4th arm DOWN
1500	3500	Extension arm OUT
1500	3500	Extension arm IN
1500	2350	Aerial part rotation
1500	1500	Basket rotation
1500	1500	Basket leveling
1500	2350	Jib UP
1500	2350	Jib DOWN
1500	3500	Tracks forward or backward
1500	3500	Tracks OPEN
1500	3500	Tracks CLOSE
1500	3500	Aerial contemporary lifting movements
1500	2350	Aerial contemporary lowering movements
1500	1500	Aerial contemporary movements including Basket leveling or rotation
1500	1500	Aerial contemporary movements including third arm lifting for the second half part of the ascent
2350	2350	Auto stabilization with maximum 1 outrigger at the
1500	1500	Auto stabilization with 2 or 3 outriggers at the ground
2350	2350	Auto stabilization with all outriggers at the ground
3500	3500	Auto destabilization with all outrigger lifted from the
1500	1500	Auto destabilization with at least 1 outrigger at the

NEW OUTRIGGERS LIGHTS

New outrigger warning lights are bigger than old version and led.



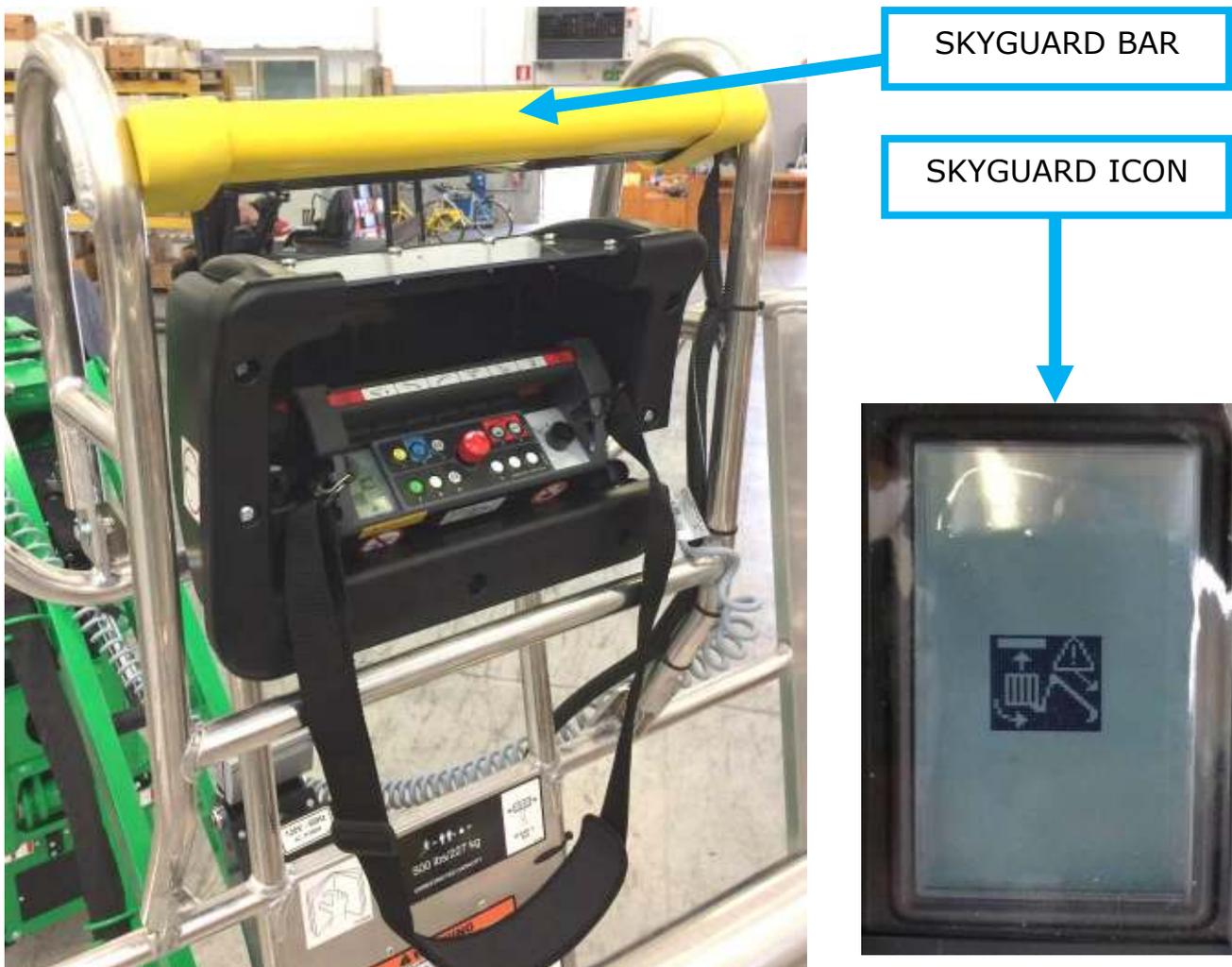
NEW BASKET WITH NEW REMOTE CONTROL SUPPORT AND WHEELS

New basket is equipped with a new design remote control support and with four wheels to be better displaced when removed.



SKYGUARD OPTIONAL

New basket, electric installation and software are predisposed for anti-entrapment system, called SKYGUARD.



When SkyGuard is installed and its function activated by the relevant menu, if its bar is just pressed while making some aerial part movement, all of the aerial part movements will be immediately stopped.

In case of machine was carrying on certain aerial part movements (not for all the movements), it will also carry out the same movement on the opposite side, for instance if the operator press the SkyGuard bar while he was opening the telescope, the machine will automatically close the telescope for a certain time and then stop.

In order to allowed again the aerial part movements, it's necessary to press and release after a few seconds the remote control emergency stop.

When it's installed and activated, if SkyGuard bar is kept pressed for a while, when tracks or outriggers are moving, those movements will be stopped, as soon as the bar is release those movements will be allowed again.

Once that the bar has been pressed, the SkyGuard icon is displayed, as indicated here above and then on the bottom left corner of the display, to

make it disappear it must be pressed and released the remote control emergency stop.

In case of need the SkyGuard function could be bypassed by keeping pressed the button n.8 of the remote control, this operation allows to move the machine only in the case to have the bar always pressed, or stuck, but it will not allow the movements if the bar has been pressed and released.

NOTE: Skyguard could be activated or deactivated with the relevant password by the MENU/OPTIONAL/SKYGUARD.