

# ***TECHNICAL TRAINING***

## ***DIAGNOSTIC LEVEL II***



***H21TX-H23TPX-H25TPX  
HB62-HB68J-HB76J***

## How to use this document?

**MAINTENANCE AND REPAIR OPERATIONS ON YOUR HAULOTTE MACHINE  
MUST BE DONE ONLY BY TRAINED ,EXPERIENCED AND AUTHORIZED TECHNICIANS**

*You have between the hands the summary given during the HAULOTTE technical training It will enable you to find information necessary for the maintenance and the repair of your HAULOTTE machine .*

*Thanks to the guide below you will reach the required chapter quickly.*

### **Chapter 1: Main features and functions**

It is a resume of the information contained in the user manual delivered with the machine: components, overall dimensions, working zone , commands, etc...

### **Chapter 2: Study of the electric schematics**

You will find there the elements as following:

- A summary of the standardized symbols used by HAULOTTE Group
- The complete wiring diagram of the studied model
- The non exhaustive list of the electric looms and electronic boards
- Localization of the main safety units (tilt , limit switches, sensors,transducers...)
- Logical equations of operation: by function, to diagnose the main dysfunctions

### **Chapter 3: Study of the hydraulic schematics**

You will find there the elements as following:

- a summary of the standardized symbols used by HAULOTTE Group
- the complete hydraulic diagram of the studied model
- a localization of the main hydraulics manifold (proportional block , on/off movements block)

### **Chapter 4: Adjustments**

This is the adjustments and calibrations, hydraulics and electric, necessary to the good maintenance of the material. You will find as well the methods of adjustment with table values.

### **Chapter 5: Guide of breakdown**

Quick summary of the step to be followed for possible sources of breakdown.

In case of any defect or any dysfunction you will be able to identify the elements in question; whatever they are electric or hydraulic.

### **Chapter 6: Summary of the versions**

This manual treats of the latest version, however this summary table enables you to find the former versions of the material (electric and hydraulics).

### **Chapter 7: Special functions**

This chapter gathers all the functions and adjustment specific to carry out on the machine. There does not exist for all the materials and depends on the studied model.

It must be the subject of a special attention of your share because an intervention badly carried out can deteriorate the good performance of the machine and thus consequently the safety of the users.

Only a technician HAULOTTE or approved by HAULOTTE Services is able to carry out this kind of intervention.

On this chapter, some special adjustment (sensors) are also explained prior to calibration (depends on the model)

### **Chapter 8 : List of schematics**

This chapter lists all schematics (electric/hydraulic) of all models and some layout if required

**REVISION**

Revision	Edition	Subject	Created by	Validated by	Modified by	Translated by	Language
00	03-11	creation	MGD	FLH		MGD	FR/EN
01	07-13	Add new overload adjustment and accelerator engine coil	MGD	FLH		MGD	EN/FR
04	12-13	Add Diag Pad info + console alarm list	MGD	Central R&D	MGD	MGD	EN
05	02-14	Add chapter schematics			MGD		EN
06	07- 14	Add latest tips on options like ASB (Active Shield Bar)			MGD		EN

# SUMMARY

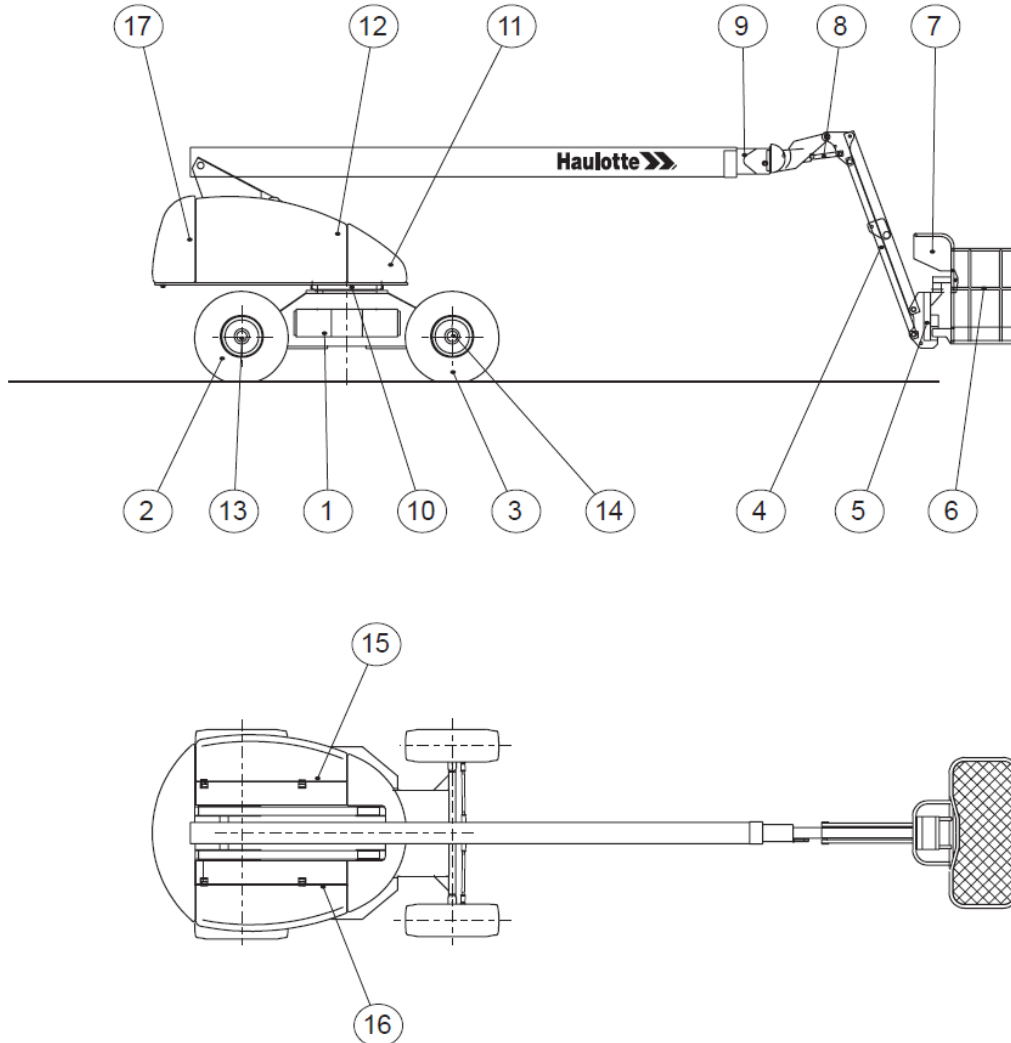
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# 1. MAIN FEATURES AND FUNCTIONS

## 1.1. CHARACTERISTICS

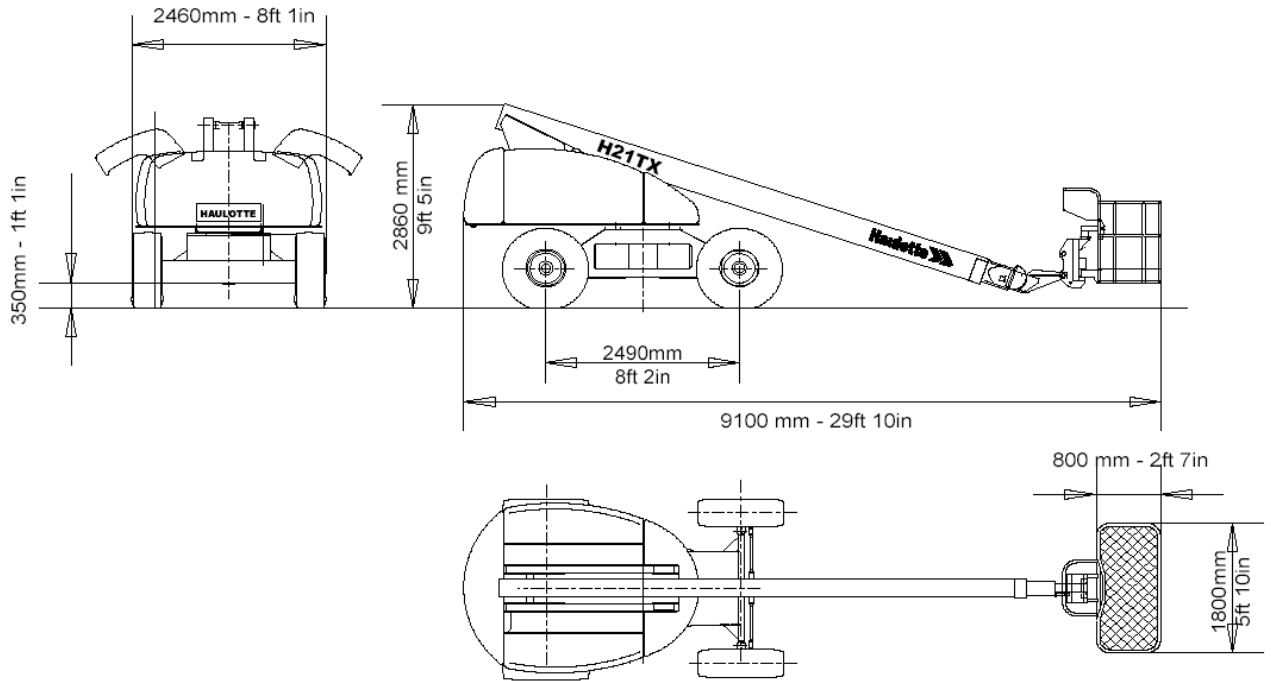
### 1.1.1. MAIN COMPONENTS



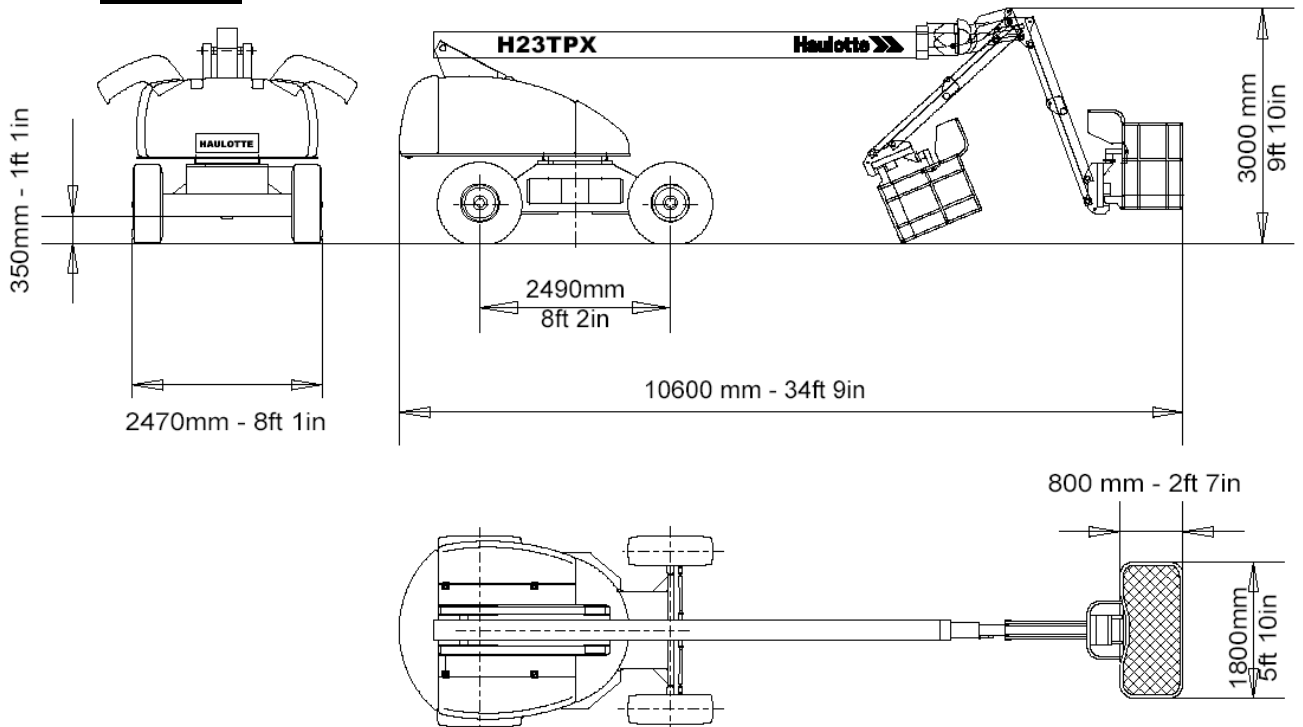
- 1 - drive chassis
- 2 - front drive wheels
- 3 - rear drive (4x4 version) and steer wheels
- 4 - jib
- 5 - platform support with load limiter
- 6 - platform
- 7 - platform control panel
- 8 - compensation receiver jack
- 9 - three-piece boom
- 10 - slew ring
- 11 - turntable
- 12 - covers
- 13 - hydraulic travel motors and reducer
- 14 - hydraulic travel motors and reducer (4x4 version)
- 15 - right compartment (diesel tank and hydraulic reservoir, control panel)
- 16 - left compartment (motor + pump + starting battery)
- 17 - counterweight.

**1.1.2. OVERALL DIMENSIONS**

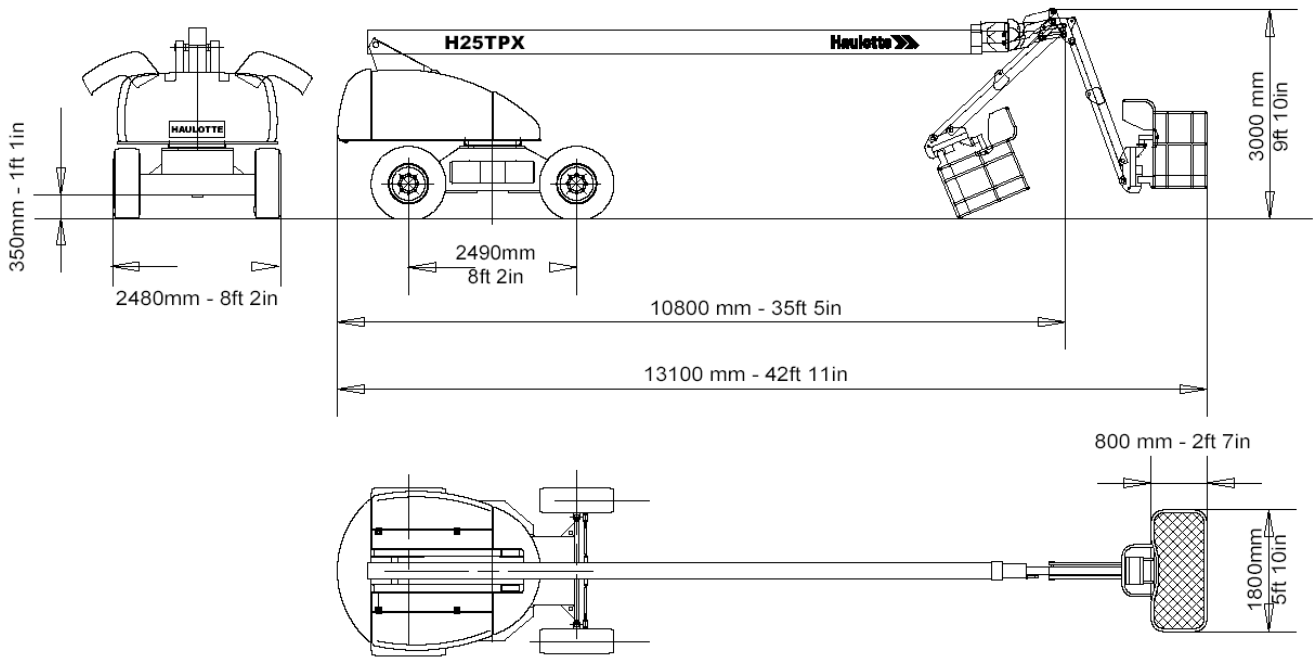
**H21TX**



**H23TPX**



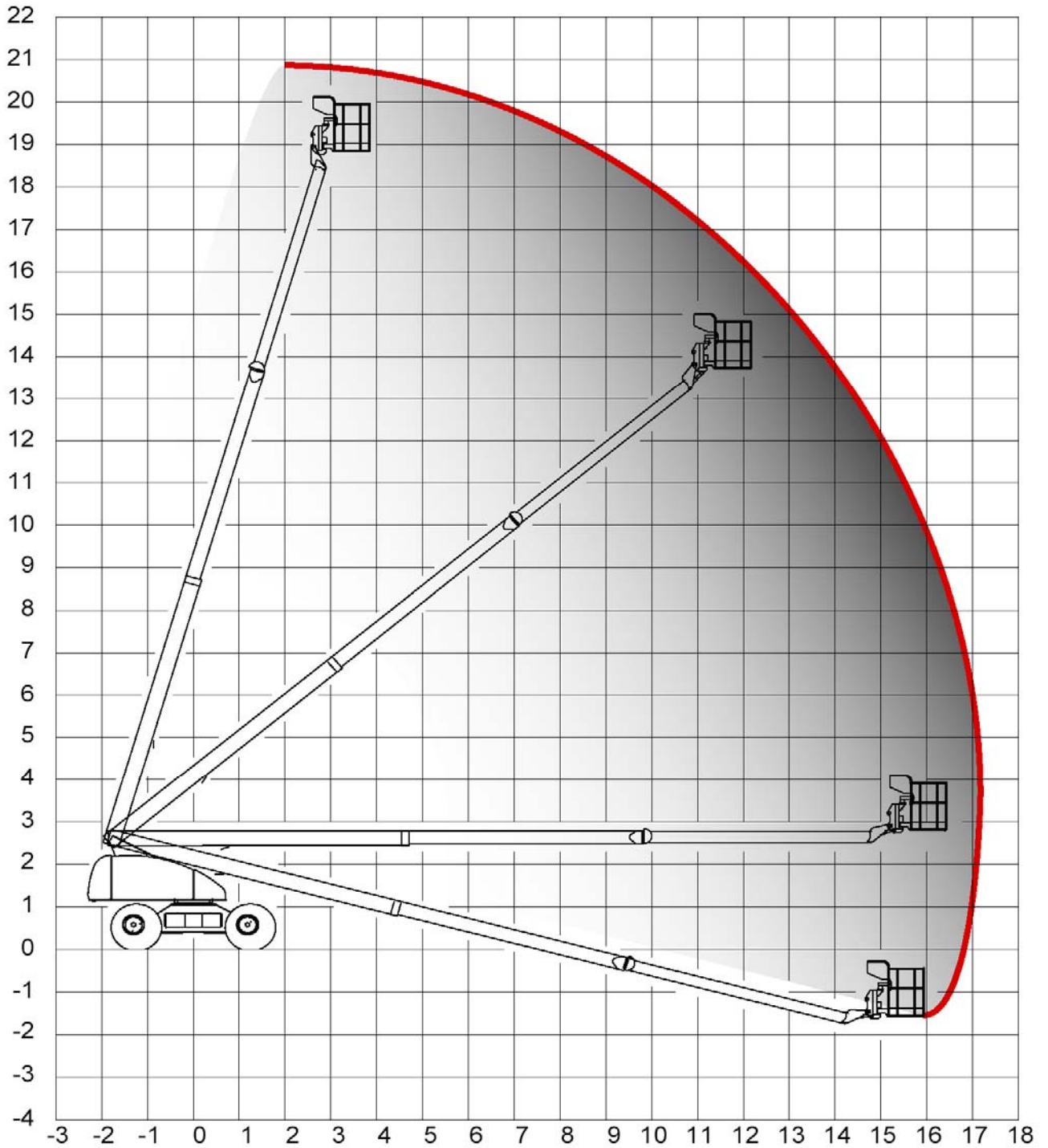
**H25TPX**



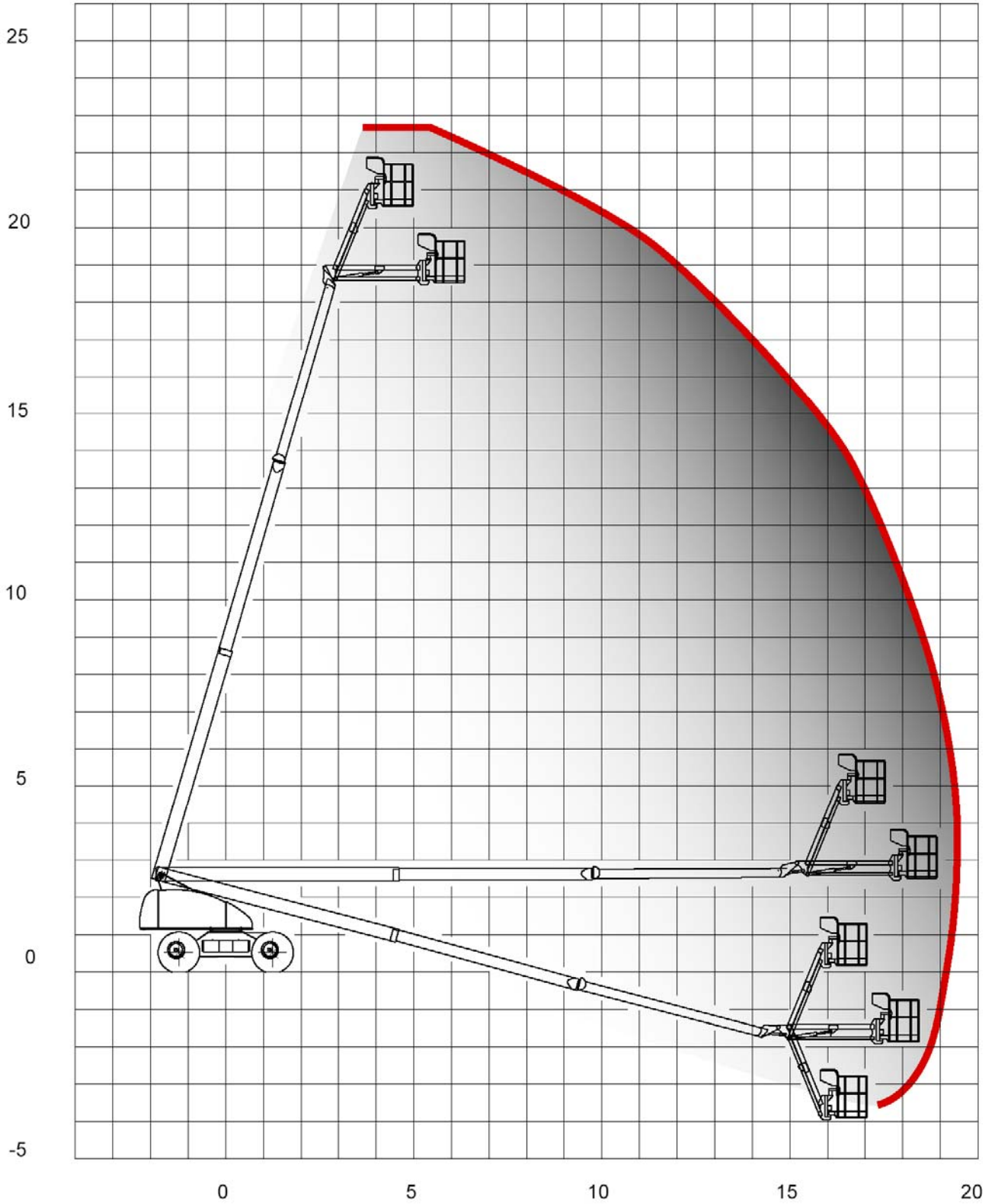


**1.1.3. WORKING ZONES**

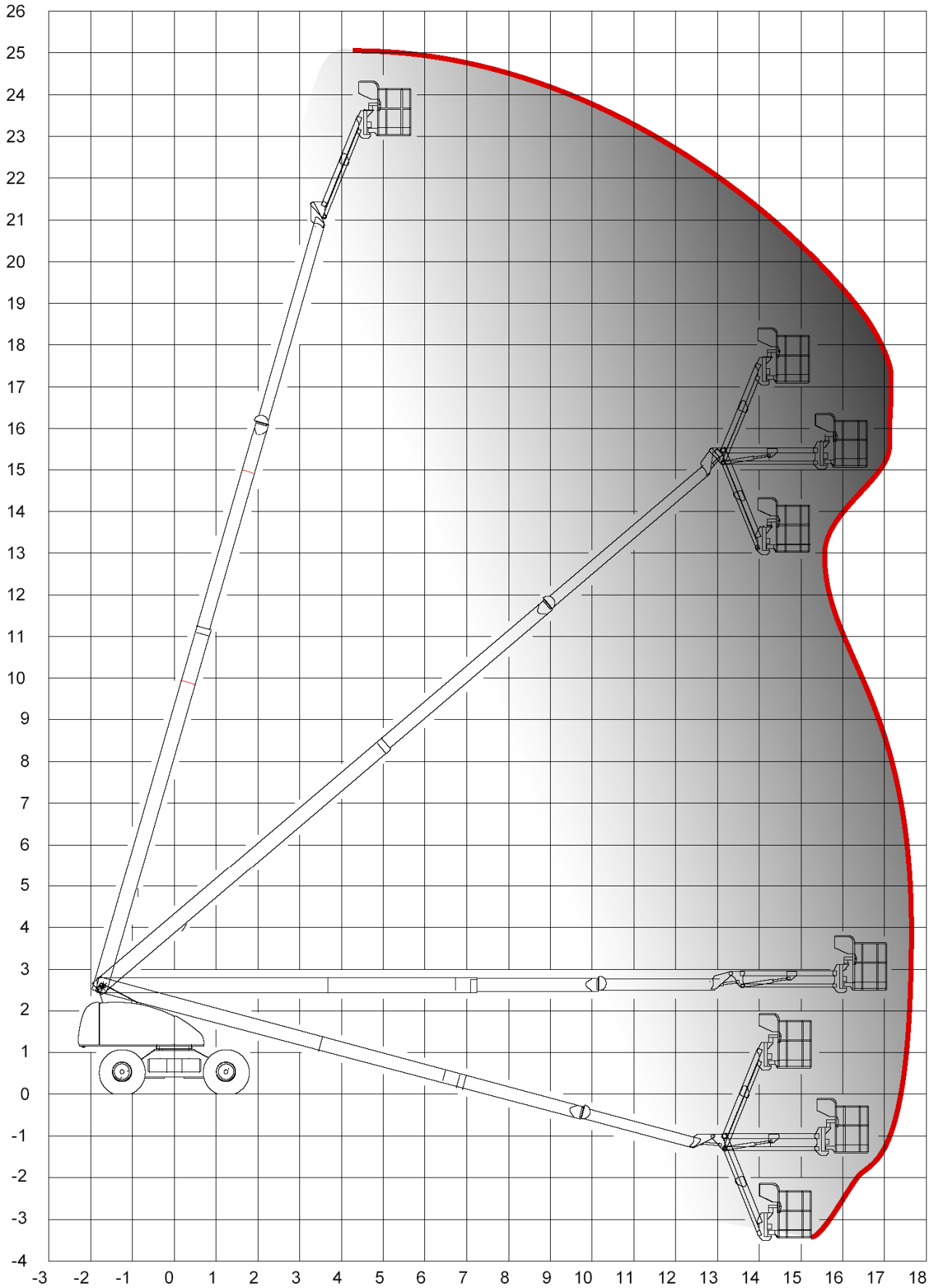
**H21 TX**



## H23 TPX



**H25 TPX**



### 1.1.4. TECHNICAL DATAS

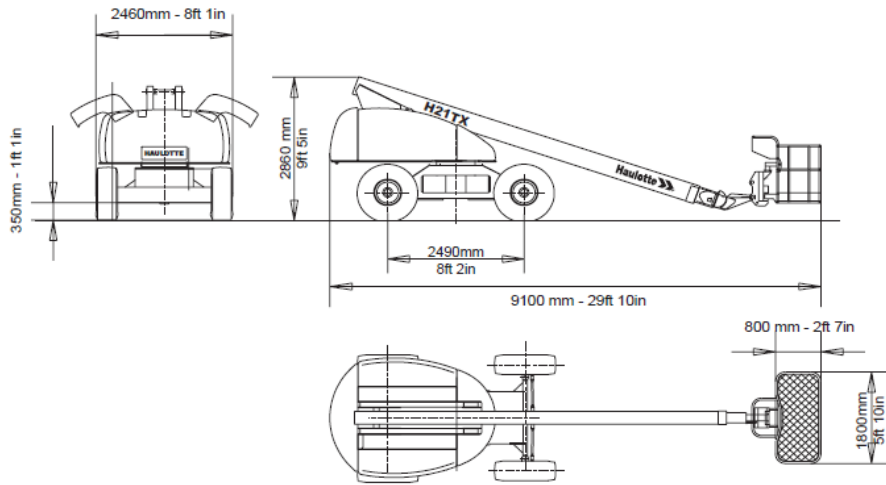
<i>DESIGNATIONS</i>	<i>H21TX</i>
Load	230 kg including 2 people
Max manual side force	400 N (40 kg)
Max. wind speed	45 km/h
Floor height	18,8 m
Working height	20,8 m
Overall length	9,10 m
Overall width	2,46 m
Overall height	2,86 m
Wheel base	2,49 m
Ground clearance	350 mm
Max. reach	16,65 m
Boom range	+75° -15°
Telescoping (stroke)	4,76 m
Turntable rotation	Continuous
Reducer	22.4
Max. slope in travel	40%
Pneumatic dimensions	15 R 22
Outer turning radius	6.15 m
Max. permitted tilt	5° (approx. 9%)
Hydraulic tank	150 l
Fuel tank	150 l
Total weight	11750 kg
Number of drive wheels	4
Number of steer wheels	2
Differential lock	YES
Hydraulic brakes	YES
Free-wheel enable	YES
Tightening torque:	
- wheel nuts	32 m.daN
- slew ring	21,5 m.daN
Vibrations:	
- foot level	< 0.5 m/s <sup>2</sup>
- hand level	< 2.5 m/s <sup>2</sup>
HATZ diesel motor	Type 3L41C
- Power	43,6 CH / 32,1 kW - 2400 rev/min
- Power, idling	33.3 CH / 22.9 kW - 1500 rev/min
- Consumption	240 g/kWh
- Consumption, idling	240 g/kWh
Hydraulic pump 45 cm <sup>3</sup> /rev	85 l/min maxi (LOADSENSING)
Hydraulic pressure:	
- General	240 bars
- Travel	240 bars
- Steering	240 bars
- Rotation	100 bars
- Equipment	240 bars
Travel speed	PV=1,5 km/h - GV=5 km/h
Max. load on one wheel	6010 kg (5894 daN)
Max. pressure on floor	with 230 kg in platform
- hard floor (concrete)	12,5 daN/cm <sup>2</sup>
- loose ground (packed earth)	6,5 daN/cm <sup>2</sup>
Start battery	1 x 12 V - 95 A.h
Supply voltage	12 V
Acoustic power	99 dB(A)
Noise level at 10 meters	66,5 dB(A)

DESIGNATIONS	H23TPX
Load	230 kg including 2 people
Max manual side force	400 N (40 kg)
Max. wind speed	45 km/h
Floor height	20,6 m
Working height	22,6 m
Overall length	10,60 m
Overall width	2,47 m
Overall height	3,00 m
Wheel base	2,49 m
Ground clearance	350 mm
Max. reach	19,05 m
Boom range	+75° -15°
Telescoping (stroke)	4,76 m
Turntable rotation	Continuous
Reducer	22.4
Max. slope in travel	40%
Pneumatic dimensions	15 R 22
Outer turning radius	6.15 m
Max. permitted tilt	5° (approx. 9%)
Hydraulic tank	150 l
Fuel tank	150 l
Total weight	13110 kg
Number of drive wheels	4
Number of steer wheels	2
Differential lock	YES
Hydraulic brakes	YES
Free-wheel enable	YES
Tightening torque: - wheel nuts - slew ring	32 m.daN 21,5 m.daN
Vibrations: - foot level - hand level	< 0.5 m/s <sup>2</sup> < 2.5 m/s <sup>2</sup>
HATZ diesel motor - Power - Power, idling - Consumption - Consumption, idling	Type 3L41C 43,6 CH / 32,1 kW - 2400 rev/min 33.3 CH / 22.9 kW - 1500 rev/min 240 g/kWh 240 g/kWh
Hydraulic pump 45 cm <sup>3</sup> /rev	85 l/min maxi (LOADSENSING)
Hydraulic pressure: - General - Travel - Steering - Rotation - Equipment	240 bars 240 bars 240 bars 100 bars 240 bars
Travel speed	PV=1,5 km/h - GV=5 km/h
Max. load on one wheel	6980 kg (6845 daN)
Max. pressure on floor - hard floor (concrete) - loose ground (packed earth)	with 230 kg in platform 13 daN/cm <sup>2</sup> 6,5 daN/cm <sup>2</sup>
Start battery	1 x 12 V - 95 A.h
Supply voltage	12 V
Acoustic power	99 dB(A)
Noise level at 10 meters	66,5 dB(A)

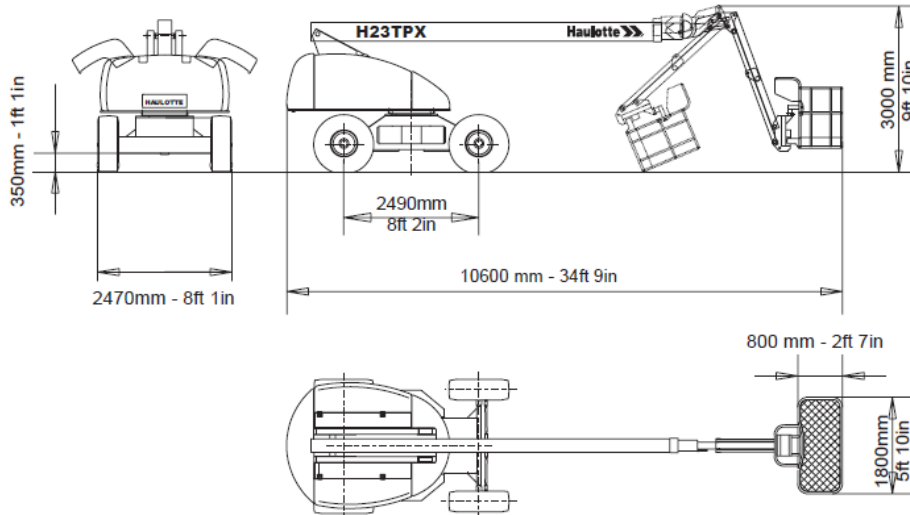
<b>DESIGNATIONS</b>	<b>H25TPX</b>
Load	230 kg including 2 people
Max manual side force	400 N (40 kg)
Max. wind speed	45 km/h
Floor height	23,3 m
Working height	25,3 m
Overall length	13,10 m
Overall width	2,48 m
Overall height	3,00 m
Wheel base	2,49 m
Ground clearance	350 mm
Max. reach	16,9 m
Boom range	+75° -15°
Telescoping (stroke)	4,76 m
Turntable rotation	Continuous
Reducer	22,4
Max. slope in travel	40%
Pneumatic dimensions	15 R 22
Outer turning radius	6.15 m
Max. permitted tilt	5° (approx. 9%)
Hydraulic tank	150 l
Fuel tank	150 l
Total weight	13720 kg
Number of drive wheels	4
Number of steer wheels	2
Differential lock	YES
Hydraulic brakes	YES
Free-wheel enable	YES
Tightening torque:	
- wheel nuts	32 m.daN
- slew ring	21,5 m.daN
Vibrations:	
- foot level	< 0.5 m/s <sup>2</sup>
- hand level	< 2.5 m/s <sup>2</sup>
HATZ diesel motor	Type 3L41C
- Power	43,6 CH / 32,1 kW - 2400 rev/min
- Power, idling	33.3 CH / 22.9 kW - 1500 rev/min
- Consumption	240 g/kWh
- Consumption, idling	240 g/kWh
Hydraulic pump 45 cm <sup>3</sup> /rev	85 l/min maxi (LOADSENSING)
Hydraulic pressure:	
- General	240 bars
- Travel	240 bars
- Steering	240 bars
- Rotation	100 bars
- Equipment	240 bars
Travel speed	PV=1,5 km/h - GV=5 km/h
Max. load on one wheel	6960 kg (6830 daN)
Max. pressure on floor	with 230 kg in platform
- hard floor (concrete)	13 daN/cm <sup>2</sup>
- loose ground (packed earth)	6,5 daN/cm <sup>2</sup>
Start battery	1 x 12 V - 95 A.h
Supply voltage	12 V
Acoustic power	99 dB(A)
Noise level at 10 meters	66,5 dB(A)

## 1.2. OVERALL DIMENSIONS

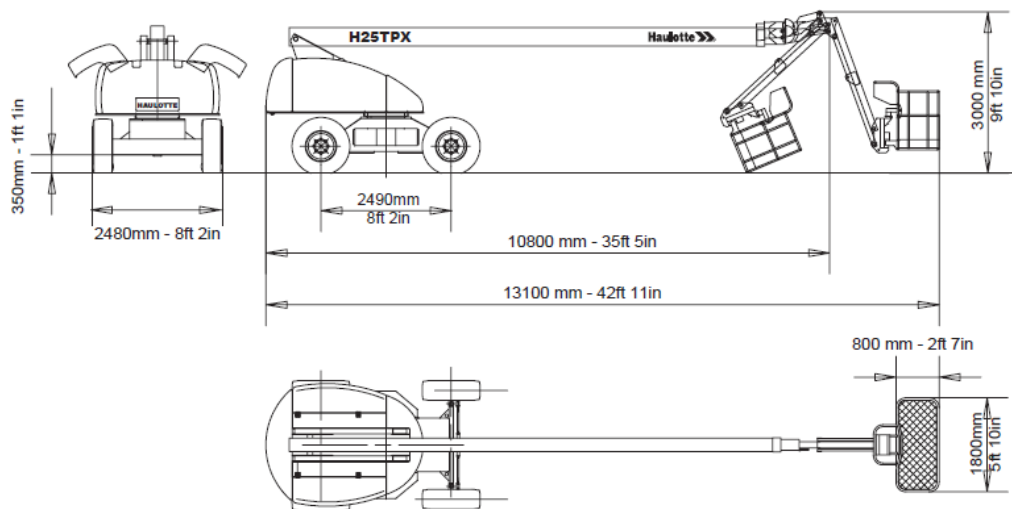
### 2.5.1 - H21TX overall dimensions



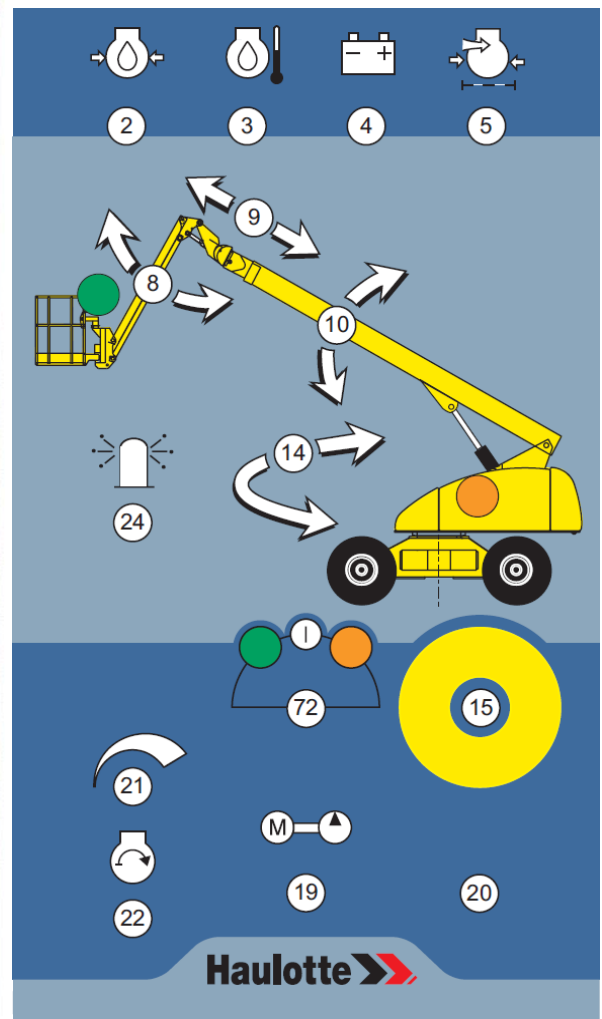
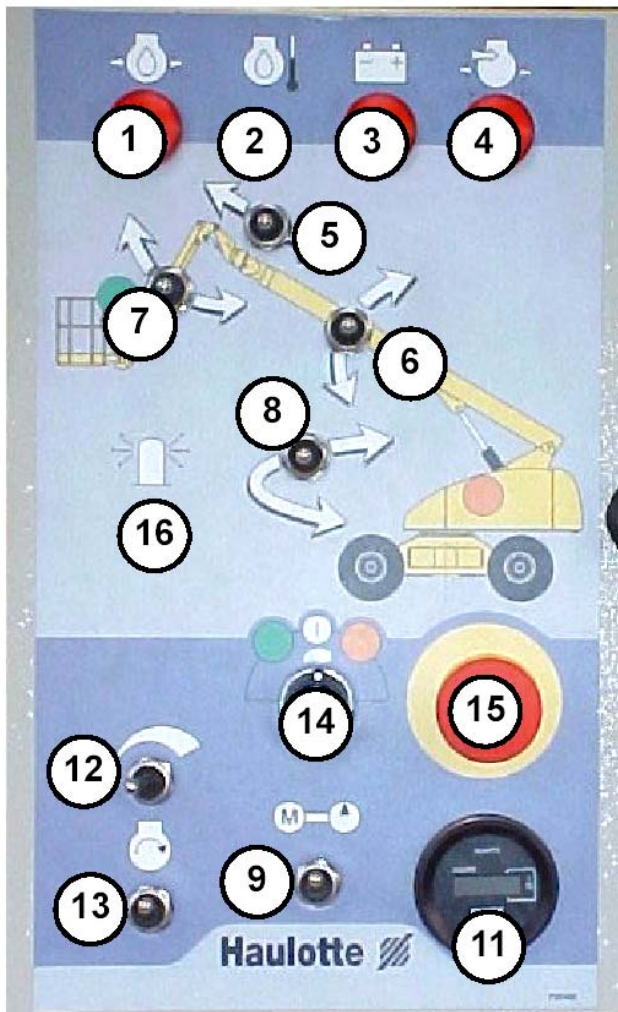
### 2.5.2 - H23TPX overall dimensions



### 2.5.3 - H25TPX overall dimensions



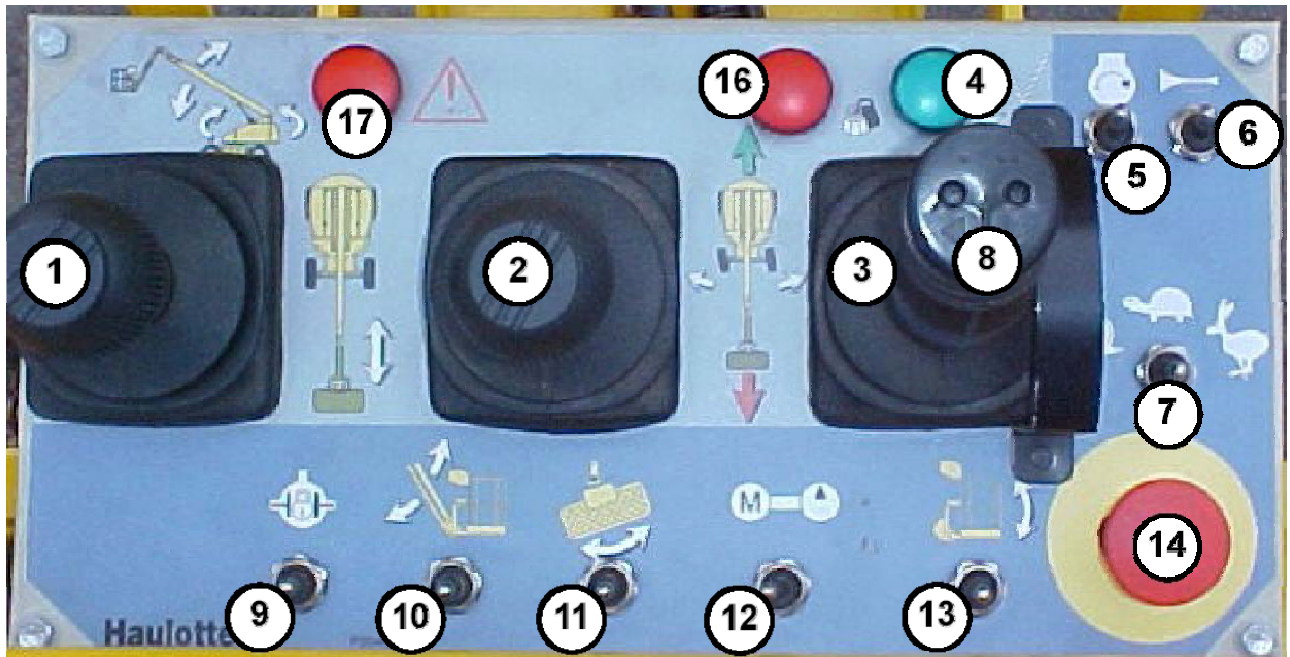
### 1.3. COMMANDS CONTROL BOX



The turntable control station includes the following elements:

- 1 - Motor oil pressure light indicator
- 2 - Motor temperature light indicator
- 3 - Battery charge indicator
- 4 - Filter blocking indicator
- 5 - Boom telescoping control
- 6 - Boom lifting control
- 7 - Jib control
- 8 - Turntable rotation control
- 9 - Emergency unit control
- 11 - Hour-meter
- 12 - Motor state switch
- 13 - Motor start button
- 14 - Turntable station / stop / platform station selection
- 15 - Emergency stop button
- 16 - Flashing light control
- 17 - 220 V single phase - 16 A power supply plug
- 18 - Tilt sensor




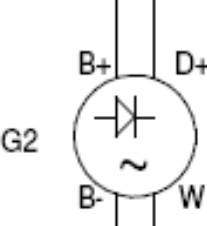
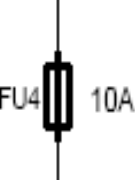
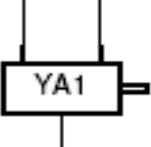



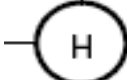


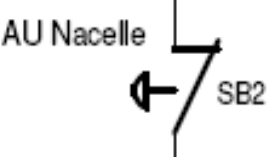
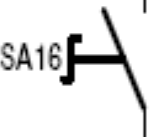
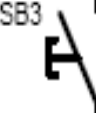
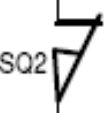
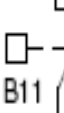
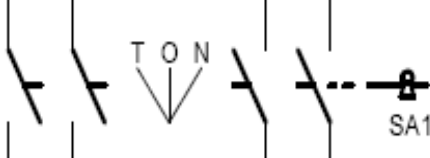




1. Boom lifting and rotation controller
2. Telescoping controller
3. Travel controller
4. Power on light indicator
5. Start switch
6. Horn switch
7. Low, medium and high speed
8. Steering indicator
9. Differential blocking switch
10. Jib switch
11. Platform rotation switch
12. Emergency control
13. Compensation switch
14. Emergency stop button
15. 220 V single phase 16 A plug
16. Platform overload indicator
17. Fault indicator

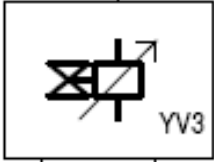
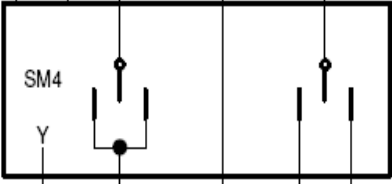
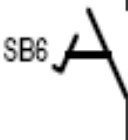


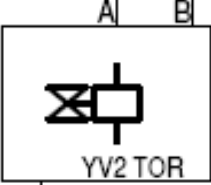

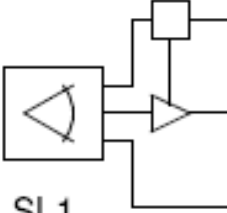



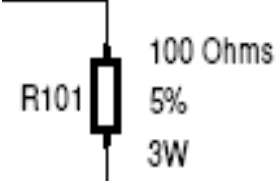
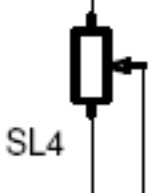
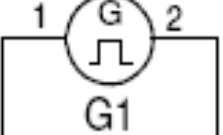
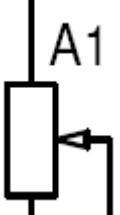

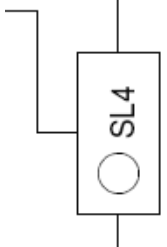

## 2. ELECTRICAL PART

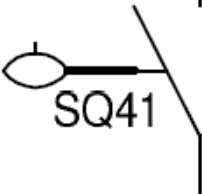
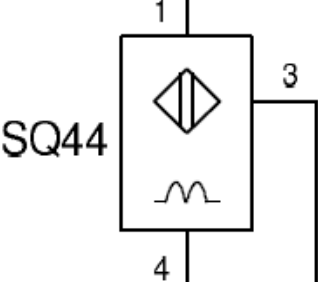
### 2.1. SYMBOLS USED

	<p>Battery with one element</p>
	<p>Alternator</p>
	<p>Fuse (Here 10 amps)</p>
	<p>Coil winding roll</p>
	<p>Electric motor</p>
	<p>light</p>
	<p>Diode</p>
	<p>Hourmeter</p>

 <p>AU Nacelle SB2</p>	<p>Standard push-button of safety “mushroom-headed button”</p>
 <p>SA16</p>	<p>Rotary knob</p>
 <p>SB3</p>	<p>Push-button</p>
 <p>SQ2</p>	<p>Limit switch</p>
 <p>B11</p>	<p>Pressure switch</p>
 <p>T O N SA1</p>	<p>Key selector with 3 positions (T turret, O neutral, N platform)</p>
 <p>SA2</p>	<p>Toggle switch with 2 positions</p>
 <p>YV1</p>	<p>Electrovalve</p>
 <p>KP1</p>	<p>relay</p>
 <p>HA1</p>	<p>horn</p>

	<p>Proportional electrovalve</p>
	<p>Controller/joysticks</p>
	<p>Foot pedal switch</p>
	<p>buzzer</p>
	<p>"light"</p>
	<p>Electrovalve "ON/OFF » ( bang-bang)</p>
	<p>Tilt sensor ( ramp detection)</p>
	<p>Angle sensor (reach limitation)</p>

	<p>Contact « mercury » (angle detection)</p>
	<p>Resistor (here value 100 ohms, 3 Watts, tolerance of 5%)</p>
	<p>Length sensor (reach limitation)</p>
	<p>Pressure sensor (weighing)</p>
	<p>Angle sensor (weighing)</p>
	<p>Standard light "Led"</p>
	<p>Strain gauge</p>
	<p>Flexible blade switch (ILS) detection of the magnets on the telescopic boom/arm extension</p>

	Level detector (diesel tank)
	Proximity detector with impulses (detection teeth slew ring)

## 2.2. METHODOLOGY OF CONTROL

Note: during an intervention on a component or a loom, it is important to remember to switch OFF the power supply of the machine in order to avoid any risk.

### 2.2.1. ELECTRIC CONTINUITY CONTROL

The continuity check of a loom or an electric component determines the resistor of this device, in order to detect a possible interruption of continuity (open circuit, short-circuit...).

This control is carried out with a multimeter commutated in position Ohmmeter ( $\Omega$ ).

First of all, it is necessary to determine the terminals of the component or the cable to control and insulate them.

Then, connect the multimeter in order to record the value.

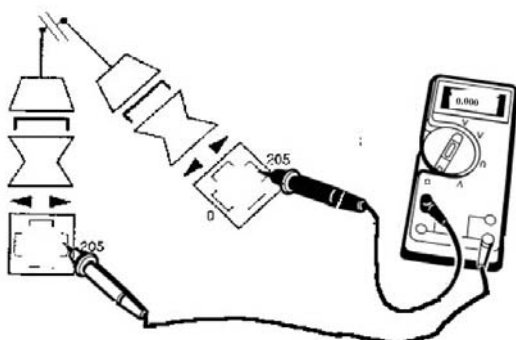
It must indicate a value of resistor close to  $0 \Omega$  if continuity is good.

In the contrary case (resistor which tends towards the infinite one :  $\infty$ ), continuity presents a defect.

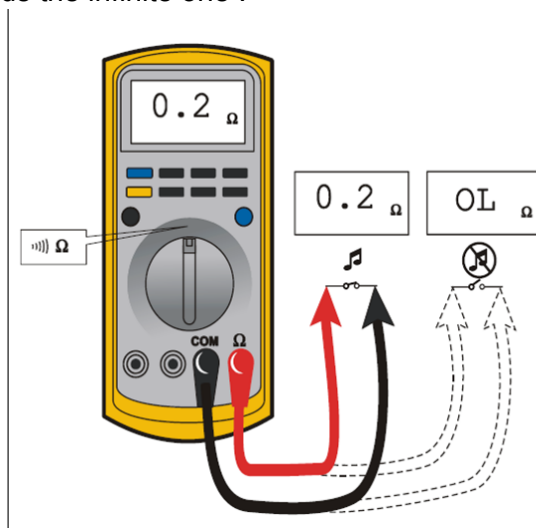
#### Control of insulation

At the contrary of continuity, insulation represents a non electric connection between the ground and the component

The test of insulation consists in obtaining the opposite result of that described for continuity, i.e. a value of the Ohmmeter which must tend towards the infinite one :  $\infty$



Exemple: test de continuité d'un faisceau électrique



### 2.2.2. CONTROL OF AN ON/OFF VALVE

Note: These tests are to be carried out when power is ON .

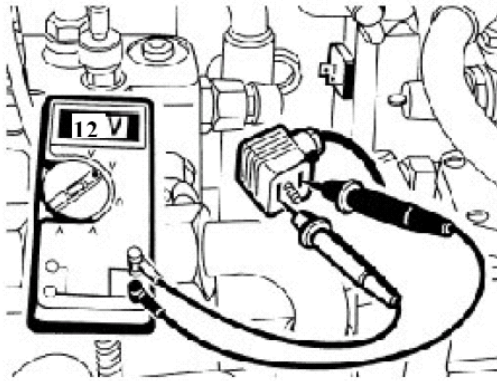
Also control the state of the terminals or any other connectors (oxidation...)

#### Control supply of the coil

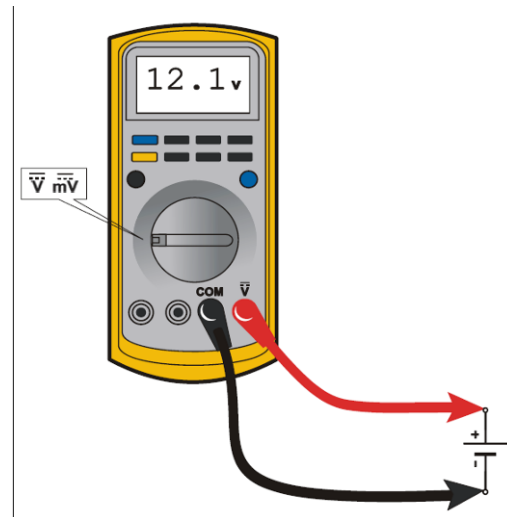
Disconnect the plug socket of supply of the valve in order to connect in derivation the multimeter on the terminals of the connector (see below).

Select the position to voltmeter (V), then activate the command to the valve which must be tested.

The voltage indicated by the voltmeter must be close to the tension of battery



*Contrôle de la tension d'alimentation du solénoïde*

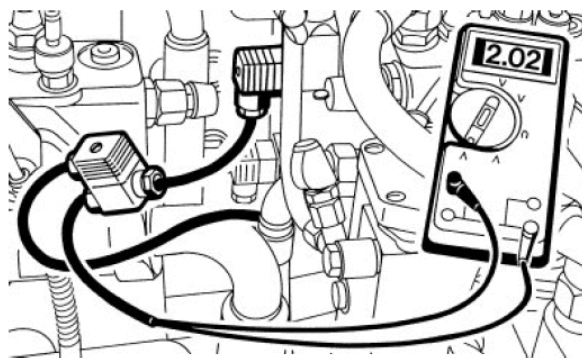


**Control intensity of the coil**

Disconnect the plug socket of supply of the valve in order to connect in series the multimeter on the terminals of the connector (example below).

Select the position Ammeter (A), then activate the command to the valve which must be tested.

The intensity indicated by the voltmeter must be of approximately 2A (to be checked according to the data manufacturer)



*Contrôle de l'intensité du solénoïde*



**Control resistance of the coil**

Disconnect the plug socket of supply of the valve in order to connect the multimeter on the terminals of the connector industry.

Select the position Ohmmeter ( $\Omega$ ), then compare the value measured with that of the data manufacturer.

In the event of nonconformity of the coil, to carry out its replacement



### 2.2.3. CONTROL OF COMPONENTS

- **Control of an electric relay**

Disconnect the relay, then locate its various terminals.

Control the resistor of the solenoid terminals 85 and 86 (see manufacturer datas) using a multimeter in Ohmmètre position.

If the resistor is null, change the relay.

If this test is OK, check continuity between terminals 30 and 87a and insulation between terminals 30 and 87

In the event of dysfunction, replace the relay.

- **supply control of the relay**

Locate the relay without disconnecting it and locating its various terminals.

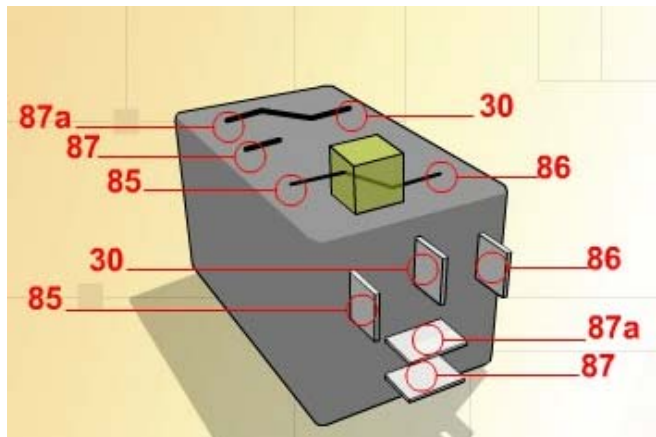
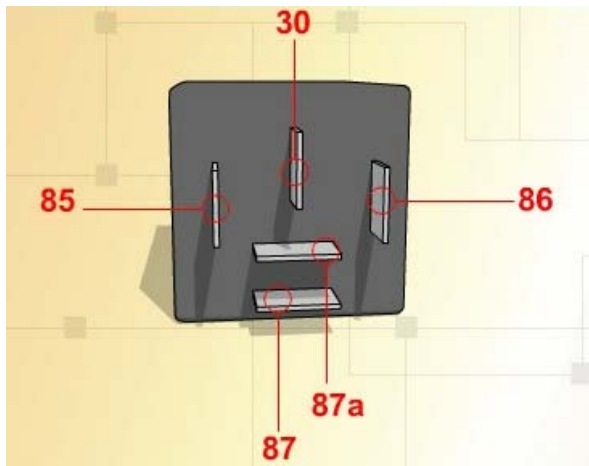
Control the continuity of terminal 86 with the ground

.(In the event of defect of continuity, check the concerned loom)

Connect the multimeter in position Voltmeter (V) between terminal 30 and the ground and thus control the power supply of the component (It must be close to the battery voltage Vbat)

Select the function of this relay and check the output voltage between terminal 87 and ground.

In the event of dysfunction, replace the relay



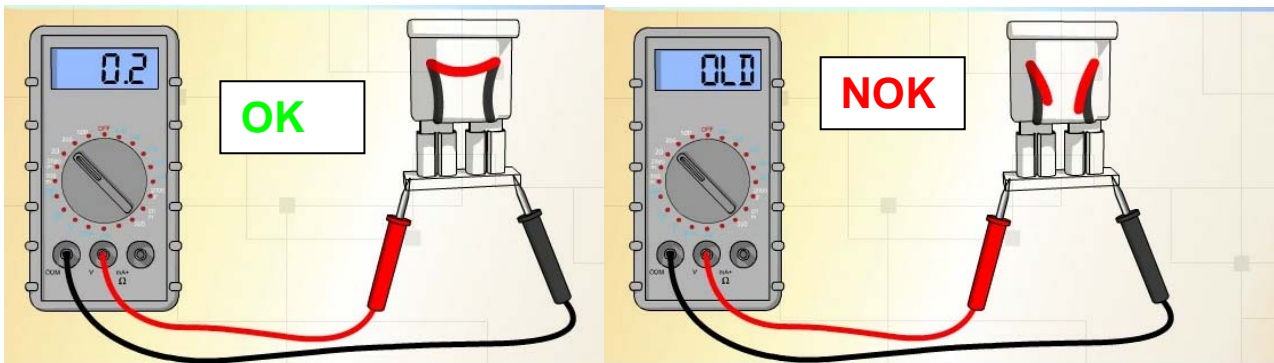
- **Control of a fuse**

**Color code**

Intensité	Couleur		
	Mini. fusible	Fusible	Maxi. fusible
3 A	Violet	Violet	
5 A	Beige	Beige	
7.5 A	Marron	Marron	
10 A	Rouge	Rouge	
15 A	Bleu	Bleu	
20 A	Jaune	Jaune	
25 A	Blanc	Blanc	
30 A	Vert	Vert	
40 A		Orange	Orange
50 A			Rouge
60 A			Bleu
70 A			Marron

**Fuse check**

Multimeter in  $\Omega$  position, it must indicate a value near 0



- **Control of a diode**

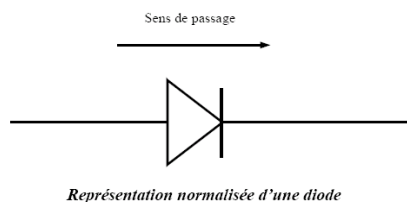
Locate the diode and disconnect it from the loom.

Control must be done with a multimeter in "diode" position.

Connect the multimeter on each terminal of the diode, in one direction then on the other.

In one direction, the diode should have no continuity, in the other it must beep

If the diode is beeping in both ways, replace it



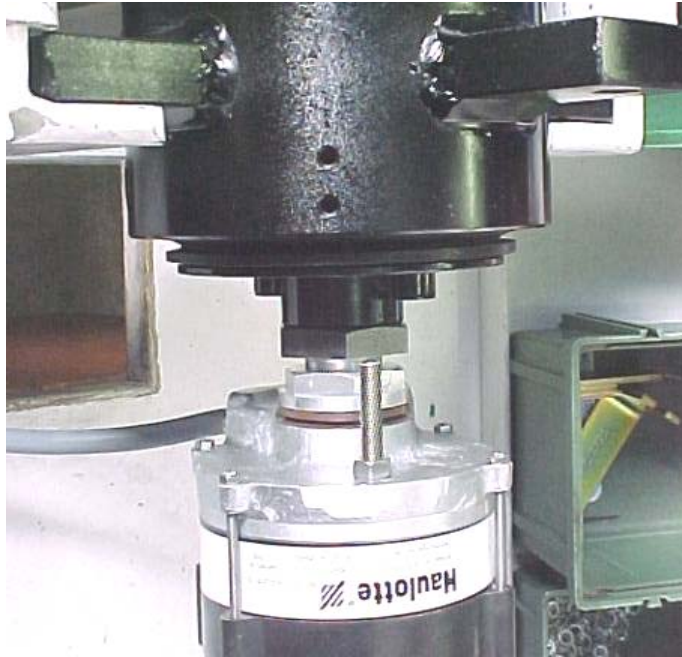
## 2.3. THE ELECTRICAL SCHEMATICS

see all versions at the end of this manual

### 2.3.1. THE MAIN PRINTED CIRCUIT (LOWER BOX)

See at the end of this manual

## 2.4. SLIP RING (2440309100)



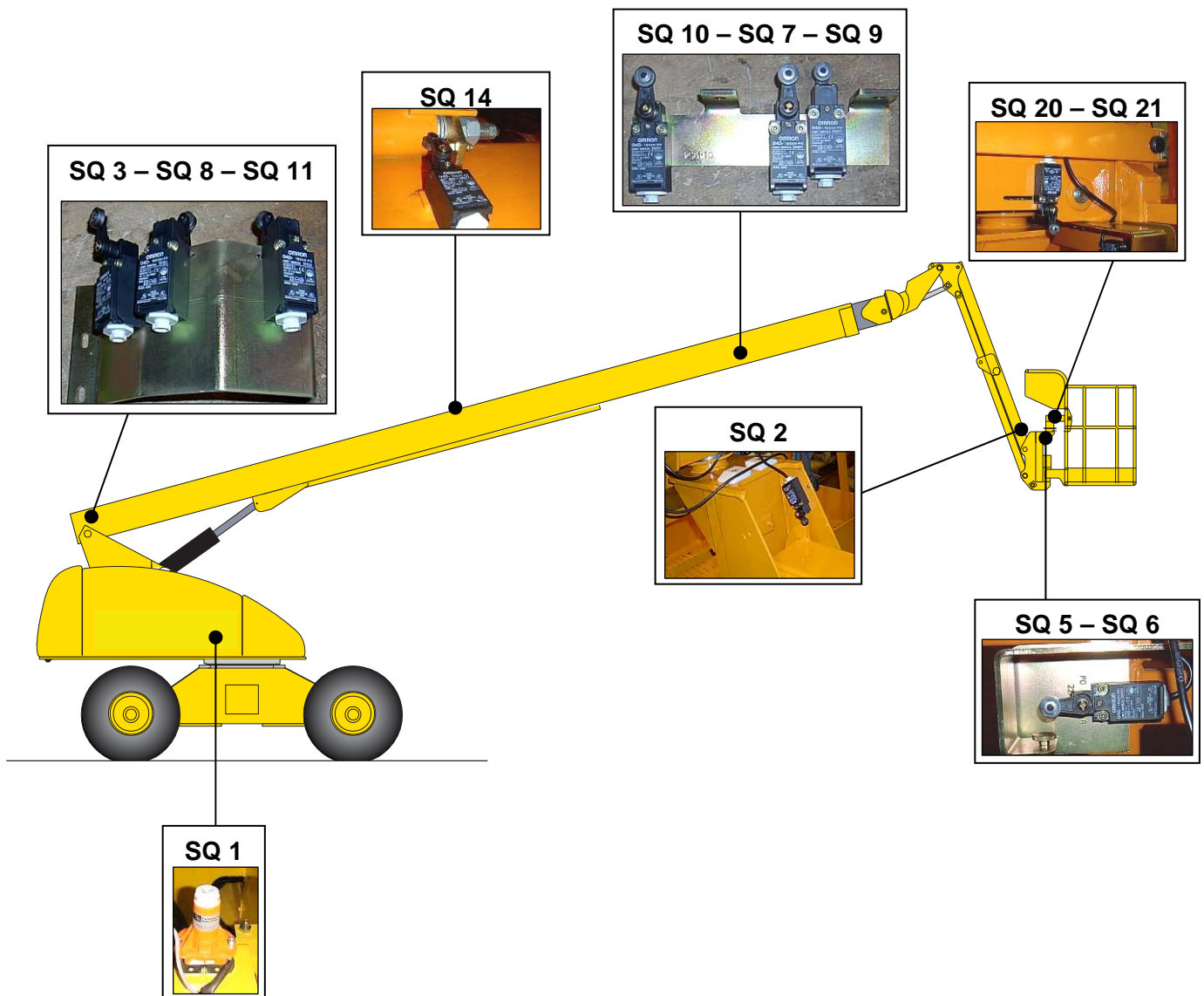
CABLE LABELS	VALVES	WIRES -COLOR
1		0 - orange
3	YV9	807 - red
4	YV8	813 - green
5	YV10	814a - white
6	YV12	814b - brown
8	+	201 - blue

Compensation

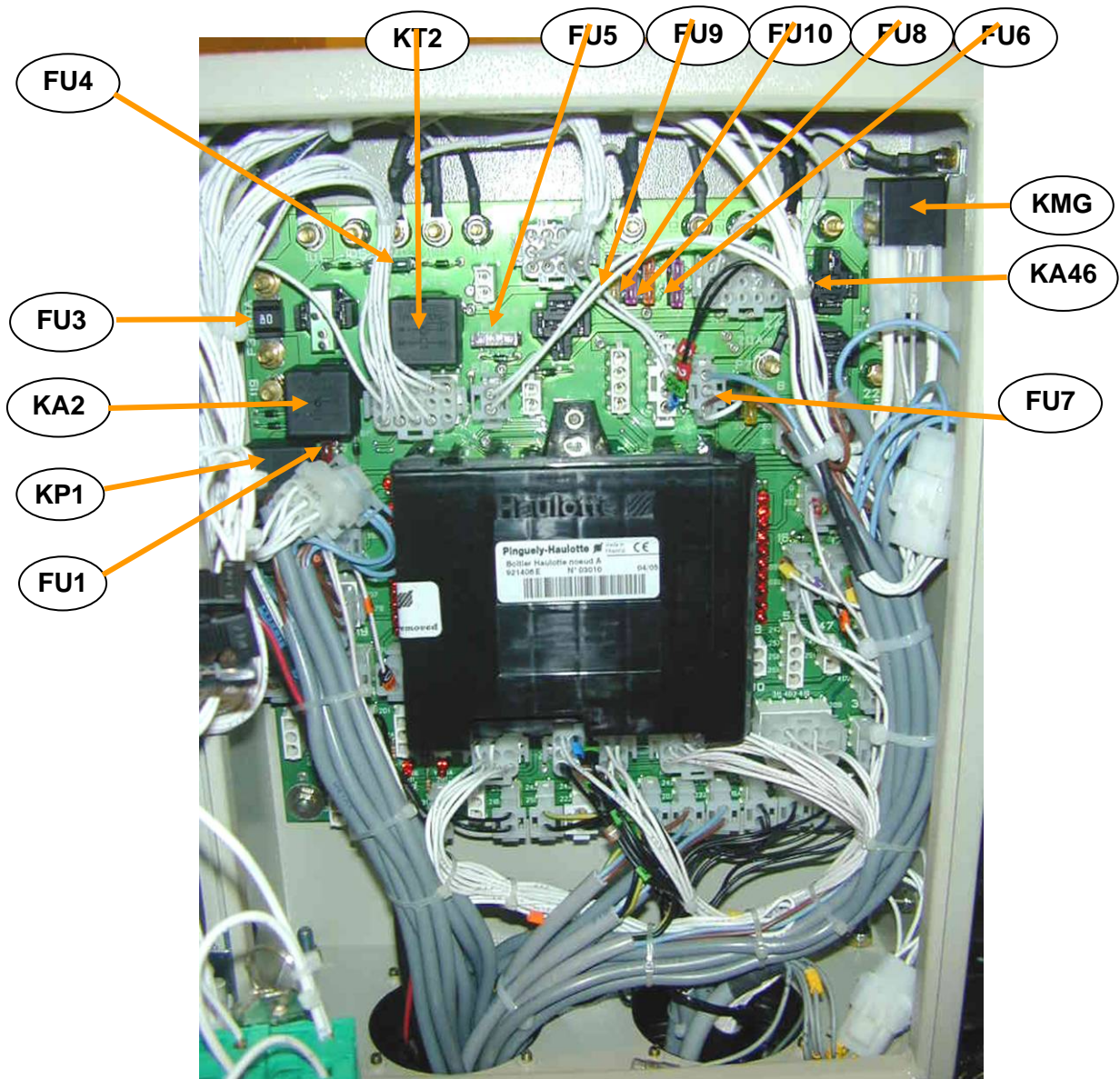
## 2.5. LOCALIZATION OF THE MAIN SAFETY COMPONENTS

### SENSORS

<b>SQ1</b>	Slope
<b>SQ2</b>	Jib
<b>SQ3</b>	boom
<b>SQ5</b>	Overload basket
<b>SQ6</b>	Overload basket
<b>SQ7</b>	telescope out of range (cut-off engine)
<b>SQ8</b>	boom angle out of range (cut-off engine)
<b>SQ9</b>	Telescopic boom IN detection
<b>SQ10</b>	telescope out of range (cut-off movement)
<b>SQ11</b>	boom angle out of range (cut-off movement descent)
<b>SQ14</b>	Cut-off engine on main broken rope
<b>SQ20</b>	basket rotation
<b>SQ 21</b>	Basket rotation



## 2.6. LIST OF COMPONENTS



In the following tables:

the column n°2 gives the coordinates of the components on different the sheets from the wiring schematics and makes it possible to find their position easily.

The first figure corresponds the number of page and to the second to the column (generally from 1 to 20) of the corresponding page

the column n°3 indicates the position on the connector of the printed circuit or the module if it is necessary

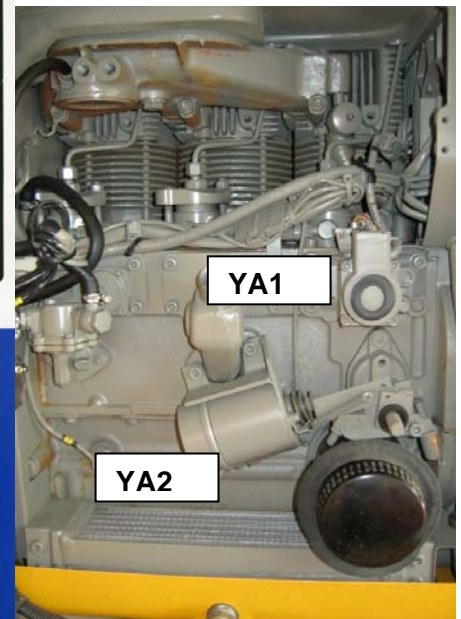
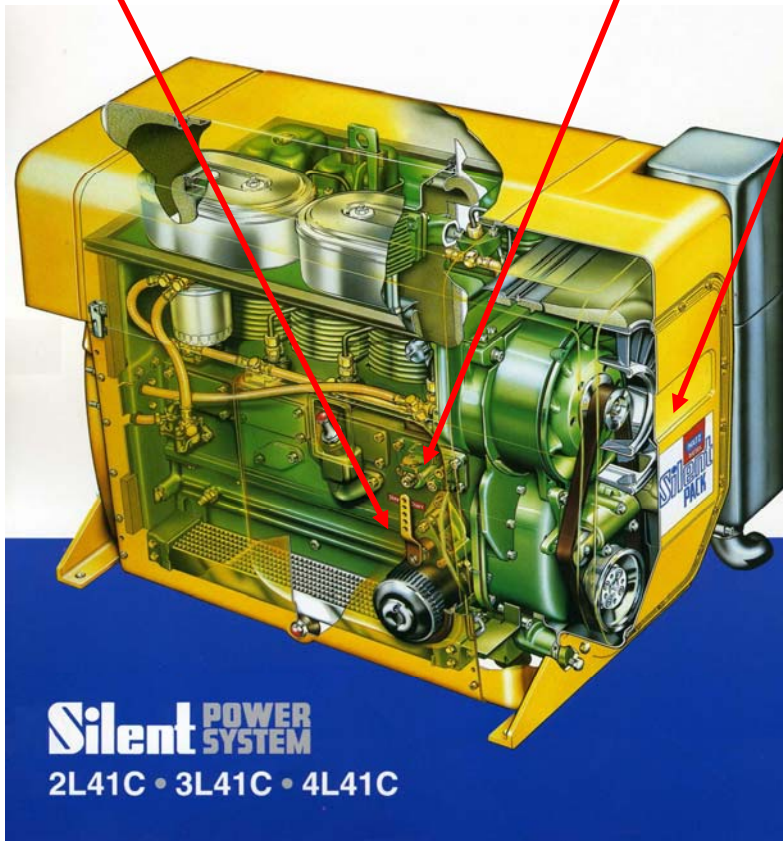
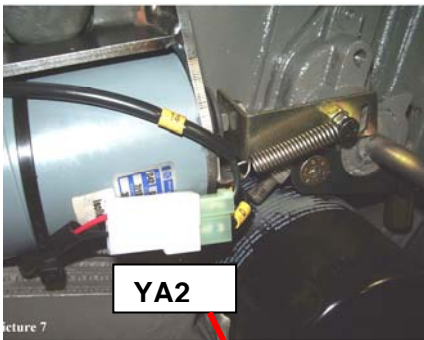
The state noted "0" corresponds to 0V, opened contact or not activated.

The state noted "1" corresponds to the tension of the circuit, closed or activated contact.

**2.6.1. ENGINE**

ENGINE ELEMENTS			
M3	01 - 6		Starter
G 2	01 - 11		Alternator
YA2	01 - 15		Accelerator
YA1	01 - 18		Start/stop engine valve coil
U1			Head ECU module
D+	04 - 19	27.1	Alternator (109 = 12V if alternator is powered)
U3	05 - 17	16.2/16.3	Hatz frequency relay (485 = 1 if engine is running)

Components inside Hatz engine



## 2.6.2. FUSES

FUSES			
FU1	01 - 18		Stop engine 10A (115)
FU4	02 - 2		+ main 30A (120)
FU5	02 - 7		+ turret 30 A(212)
FU6	02 - 9		+ platform 3A (211)
FU7	02 - 12		+ valves 20A (201) if a valve is supplied permanently: FU7 is destroyed
FU8	02 - 14		+ permanent 5A (242)
FU9	02 - 15		+ accessories 20A (905)
FU10	04 - 9		+ YV1 Load Sensing (302)
FU13	01 - 3		+ emergency pump 250A (100)

## 2.6.3. INPUTS

INPUTS			
SA 1	02 - 8		Selection (upper/lower control box)
SA 2	03 - 2	28.7	Accelerator (605)
SA 3	03 - 6	29.11	Differential lock (807)
SA 4	03 - 12	30.4 30.3	Basket rotation SA4a right (311) SA4b left (310)
SA 5	03 - 14	30.5 30.6	Basket compensation (upper control box) SA5a lift (401) SA5b descent (402)
SA 6	03 - 3	4.6 4.9	jib (lower control box) SA6b lift (406) SA6a descent (405)
SA 7	03 - 15	30.8 30.9	jib (upper control box) SA7a descent (409) SA7b lift (410)
SA 8	05 - 15	4.15 4.14	Telescopic boom (lower control box) SA8a extension (411) SA8b retraction (412)
SA 11	03 - 17	30.9 30.8	Selection of drive speed Low speed: 805=1 and 804=0 Medium speed: 805=0 and 804=0 High speed: 805=0 and 804=1
SA 13	05 - 16	28.1 28.2	Boom lift (lower control box) SA13a lift (504) SA13b descent (505)

SA 14	03 - 5	28.6 28.3	Compensation lower control box: SA14a lift (511) SA14b descent (510)
SA 15	05 - 14	28.4 28.9	Orientation (lower control box) SA 15a left (516) SA 15b right (517)
SA 19	02 - 7		Emergency pump lower control box (620)
SA 20	02 - 9		Emergency pump upper control box (620)
SB 1	02 - 7		Emergency stop turret (120)
SB 2	02 - 9		Emergency stop basket (102)
SB 3	03 - 18	4.12	Engine Start lower control box(117a)
SB 4	03 - 7	3.2	Engine Start upper control box (117b)
SB 5	03 - 19	29.12	Buzzer (901)
SB 6	03 - 8	29.13	Foot pedal (211a)
SM 4	05 - 9	29.5 29.6 29.2 29.4	Drive joystick SM4d right steering (703) SM4g left steering (705) Off neutral SM4ab (606) Y drive signal (612) FWD from 2.5 to 4.5 V REV from 2.5 to 0.5 V
SM 31	05 - 4	30.12 29.1 30.7	Orientation and boom lift joystick SM off neutral 31ab (420a) X signal orientation (512) Signal from 0.5 to 2.5 and 2.5 with 4,5V Y signal boom raising (403) Rise from 2.5 to 4,5V/ Descent from 2.5 to 0,5V
SM 2	05 - 7	30.13 30.15	Telescopic boom joystick SM off neutral 2ab (420b) Y signal (506) extension from 2.5 to 4,5V Retraction from 2.5 to 0, 5V



SENSORS			
SQ1	04 - 5	39.3	Tilt sensor (205 = 0 if in slope)
SQ2	04 - 6	3.3	jib (206 = 0 > jib with 0°)
SQ3	04 - 7	41.2	Boom (207 = 0 if boom unfolded)
SQ5 SQ6	04 - 3	30.2	Overload basket (214 = 0 if overload)
SQ7	04 - 8	43.2	Telescope: cut-off engine on reach limitation (115 = 0)
SQ8	04 - 9	44.2	Boom: cut-off engine on reach limitation (115b = 0)
SQ9	04 - 10	45.2	Telescope: detection of retraction (204 = 0 if out)
SQ10	04 - 11	37.2	Telescope: cut-off movement on reach limitation (218a = 0)
SQ11	04 - 12	36.2	Boom: cut-off descent on reach limitation (218b = 0)
SQ14	04 - 15	42.2	Cable/rope of telescope support : cut-off engine if broken (232 = 0)
B1	04.-19	27.2	Air filter clogging (110 = 0 if clogged filter)
B3	04 - 18	27.4	Pressure oil engine (112 = 0 if P> 0.5 bars)
B4	04 - 17	40.2	Temperature hydraulic oil (904 = 0 if Temp >80°C)

#### 2.6.4. OUTPUTS

RELAYS			
KP1	04 - 17		Engine start/stop (150)
KT2	04 - 18		Accelerator (605a)
KA2	04 - 19		Starter (146)
KA43	01 - 13		Relay alternator (109)
KMG	02 - 9		main relay (241)
KM4	02 - 7		Emergency pump relay (622)

VALVES			
YV 1	04 - 9	20	Load Sensing (303)
YV2	05.-16	12.1	Movements ON/OFF YV2a Jib (305)
		12.3	YV2b compensation, basket rotation, steering (415)
YV3	05 - 14	22.3	Boom lift (403a) Raise: from 50 to 75% of the tension of battery Descent: from 50 to 25% of the tension of battery
YV4	05 - 12	23.3	Telescope (506a) Extension : from 50 to 75% of the tension of battery Retraction: from 50 to 25% of the tension of battery
YV5	05 - 11	24.3	Turret slewing (512a) from 50 to 75% of the tension of battery
YV6 YV7	05 - 7	26.3 25.3	drive (612a) FWD: from 50 to 75% of the tension of battery REV from 50 to 25% of the tension of battery
YV8	03 - 17	8.11	High speed drive (813)
YV9	04 - 4	15.4/15.9	Differential lock front axle (807a)
YV10	03 - 15	8.9	high speed drive (814a)
YV12	03 - 16	8.12	Medium and high speed drive (814b)
YV13	04 - 3	15.4/15.9	Differential lock rear axle (807b)
YV15a	03 - 7	18	Rise compensation basket (401a)
YV15b	03 - 8	19	basket compensation descent (402a)
YV16a	03 - 12	33	rear steering Left (304a)
YV16b	03 - 13	32	Rear steering right (306a)
YV18a	03 - 6	17	Jib descent (407a)
YV18b	03 - 6	10	jib raise (408a)
YV19a	03 - 9	35	basket rotation left (310a)
YV19b	03 - 10	34	basket rotation right (311a)
YV20	03 - 3	9	Additional compensation (921a)
YV24	03 - 5	11	Selection rotation/compensation basket (399)
YV25	03.-11	13	Option generator (903a)

LIGHTS AND BUZZER			
HA1	04.-12	52.2/52.3	Buzzer (260 and 261)
HA2	05 -3	49.2	overload upper control box (253)
HA4	04 - 13	14	Buzzer lower control box(210)
HL1	01 - 13		Light alternator powered (109)
HL2	04 - 16	4.3	Light air filter clogging (110a)
HL4	04 - 15	4.1	Engine oil pressure (112a)
HL5	02.-15		Beacon (906) Option
HL6	02.-16		Work headlight (905) Option
HL7	02 - 19		Light powering upper control box (211)
HL8	04 - 5	53.2	Flashing light (262) Option
HL9	05 - 2	49.2	Light overload upper control box (253)
HL13	05 - 4	28.15	Light defect (914)

## 2.7. LOGICAL EQUATIONS OF OPERATION

These equations are for Std models for other versions, check with HAULOTTE services of your area for the differences

### 2.7.1. ENGINE

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Start	KA2=1	SA1 (side N or T) + SB3=1 or SB4=1 and anti-start-up EXT= 0 and D+= 1	engine already started	
	Anti-start-up EXT=1 then anti-start 2=1	SB3=1 or SB4=1	Movement in progress	

Two signals are sent to one second of variation in 699 then 698. In return the module of frequency sends 12V to the Head module if the engine is running.

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Engine power supply	KP1=1 + YA1=1	KA2=1 then 0 U3 (output 485 to 12 V)	engine failure + 6 seconds: D+=0 and B3=GND	SQ7/SQ8
			Clogged filter: B1=GND	
			Cable/rope broken : SQ14=0	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Accelerator	KT2=1 + YA2=1	SA1 (side N or T) + SB6=1 or SA2=1		

The accelerator remains ON during 0.5 second when released.

## 2.7.2. DRIVE

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Microspeed	YV1=1 + YV6=1 + YV7=1	SA1 (side N) + SQ2= 0 and SQ3=0 and SQ9=0 (unfolded machine) + SM4ab=1 and SB6 = 1		Limited maximum height

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Low speed forward	YV1=1 + YV6=1 + YV7=1	SA1 (side N) + SA11a = 0 and SA11b = 1 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 4,5V	SQ5=0 or SQ6=0 (statics) SQ1=0 (if unfolded)	
Low speed reverse	YV1=1 + YV6=1 + YV7=1	SA1 (side N) + SA11a = 0 and SA11b = 1 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 0,5V	SQ5=0 or SQ6=0 (statics) SQ1=0 (if unfolded)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Medium speed forward	YV1=1 + YV6=1 + YV7=1 + YV10=1 + YV12=1	SA1 (side N) + SA11a = 0 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 4,5V	SQ2=0 or SQ3=0 or SQ8=0 or SQ9=0 (unfolded machine)	
Medium speed reverse	YV1=1 + YV6=1 + YV7=1 + YV10=1 + YV12=1	SA1 (side N) + SA11a = 0 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 0,5V	SQ2=0 or SQ3=0 or SQ8=0 or SQ9=0 (if unfolded)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
High speed forward	YV1=1 + YV6=1 + YV7=1 + YV8=1 + YV10=1 + YV12=1	SA1 (side N) + SA11a = 1 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 4,5V	SQ2=0 or SQ3=0 or SQ8=0 or SQ9=0 (unfolded machine)	
High speed reverse	YV1=1 + YV6=1 + YV7=1 + YV8=1 + YV10=1 + YV12=1	SA1 (side N) + SA11a = 1 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 from 2,5V to 0,5V	SQ2=0 or SQ3=0 or SQ8=0 or SQ9=0 (unfolded machine)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Differential lock	YV9=1 + YV13=1	SA1 (side N) + SA3=1 and SA11a = 0	Selection high speed	
			Unfolded machine	

### 2.7.3. STEERING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Right	YV2b=1 + YV16a=1	SA1 (side N) + SB6=1 + SM4c=1 + YV1=1	SQ5=0 or SQ6=0 (statics)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Left	YV2b=1 + YV16b=1	SA1 (side N) + SB6=1 + SM4d=1 + YV1=1	SQ5=0 or SQ6=0 (statics)	

### 2.7.4. BOOM

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise Upper control box	YV1=1 + YV3=1	SA1 (side N) + SB6=1 and SM1ab=1 and SM31y between 2,5V and 4,5V	SQ1=0	
			SQ8=0	
			SQ5=0 or SQ6=0 (statics)	
Descent Upper control box	YV1=1 + YV3=1	SA1 (side N) + SB6=1 and SM1ab=1 and SM31y between 2,5V and 0,5V	SQ1=0	
			SQ11 = 0	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise Lower control box	YV1=1 + YV3=1	SA1 (side T) + SA13a=1	SQ8=0	Reduced speed if static overload
Descent Lower control box	YV1=1 + YV3=1	SA1 (side T) + SA13b=1		

### 2.7.5. TELESCOPING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Telescoping upper control box	YV1=1 + YV4=1	SA1 (side N) + SB6=1 and SM2ab=1 and SM2y between 2,5V and 4,5V	SQ1=0	
			SQ7/SQ10=0	
Telescoping lower control box	YV1=1 + YV4=1	SA1 (side T) + SA8=1	SQ1=0	Reduced speed if static overload
			SQ7/SQ10=0	

### 2.7.6. TURRET SLEWING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Orientation upper control box	YV1=1 + YV5=1	SA1 (side N) + SB6=1 and SM31ab=1 and SM31x between 2,5V and 4,5V	SQ1=0	Reduced speed if static overload
Orientation lower control box	YV1=1 + YV5=1	SA1 (side T) + SA15=1		

### 2.7.7. JIB

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
jib upper control box	YV1=1 + YV2a=1 + YV18b=1	SA1 (side N) + SB6=1 and SA7b=1	SQ1=0	
jib lower control box	YV1=1 + YV2a=1 + YV18b=1	SA1 (side T) + SA6=1		

### 2.7.8. COMPENSATION

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Compensation upper control box	YV1=1 + YV2b=1 + YV19b=1	SA1 (side N) + SB6=1 and SA5a=1 and SM31ab=0 and SM2ab=0	Any other movement in progress	
Compensation lower control box	YV1=1 + YV2b=1 + YV19b=1	SA1 (side T) + SA14=1	Any other movement in progress	
			Unfolded machine	

### 2.7.9. BASKET ROTATION

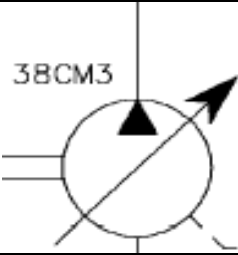
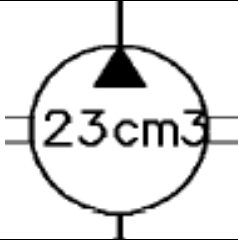
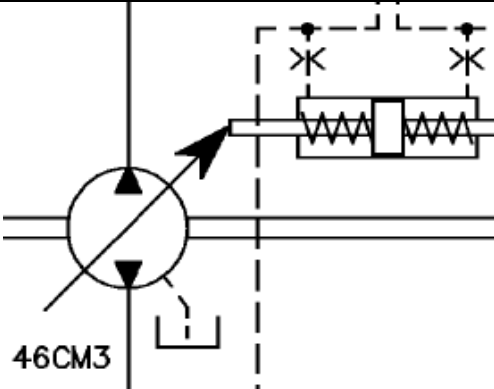
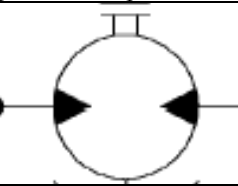
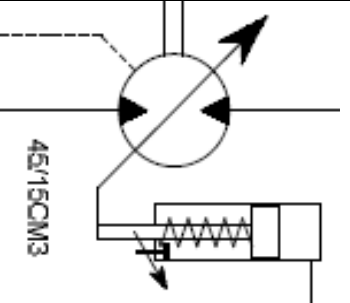

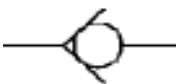
Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Right rotation upper control box	YV1=1 + YV2b=1 + YV19b=1 + YV20=1 + YV24=1	SA1 (side NR) + SB6=1 and SA4a=1	SQ5=0 or SQ6=0 (statics)	
			Lifting boom	
			Orientation	
Left rotation upper control box	YV1=1 + YV2b=1 + YV19b=1 + YV20=1 + YV24=1	SA1 (side NR) + SB6=1 and SA4a=1	SQ5=0 or SQ6=0 (statics)	
			boom lifting	
			Orientation	




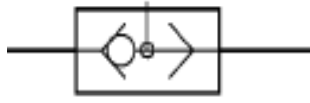
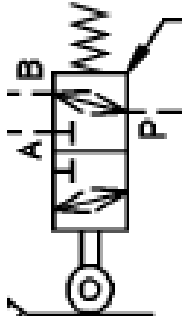
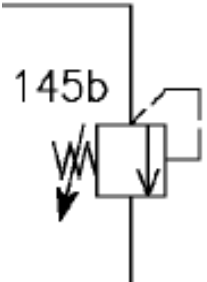
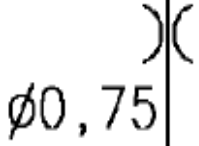
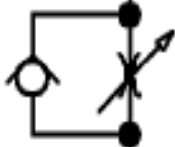
YV20 is commanded only during one second after the end of basket rotation


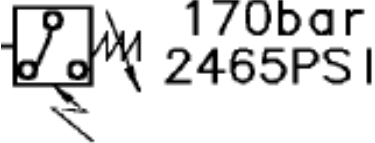
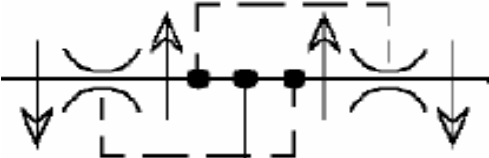
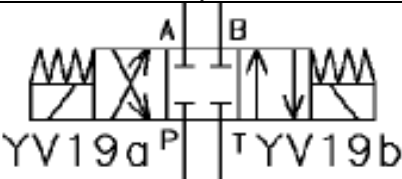
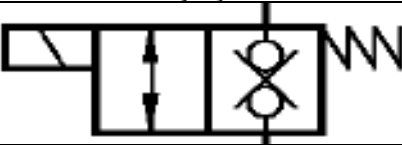
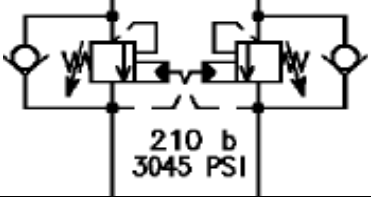
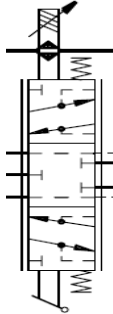
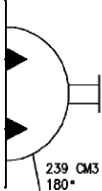
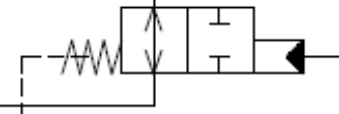


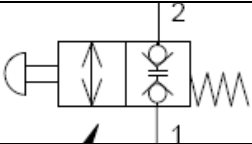
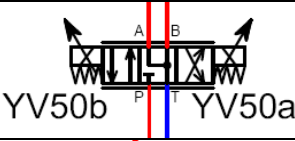

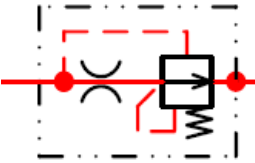
### 3. THE HYDRAULIC PART

#### 3.1. SYMBOLS USED

	<p>Pump with variable cc flow (here maximum 38 cc /rpm)</p>
	<p>Pump fixed cubic capacity flow (here 23 cc/rpm)</p>
	<p>Pump with variable flow (used for the hydrostatic transmission in closed circuits on HAULOTTE superior booms like HA32PX, HA41PX, H28TJ+, H43TPX)</p>
	<p>Hydraulic motor with 2 directions of drive (ex FWD/REV)</p>
	<p>Variable cubic capacity drive motor with 2 directions of drive 15cc for high speed drive 45 cc for low speed</p>
	<p>Filter (normally 10 microns)</p>
	<p>check valve</p>

	<p>check calibrated valve</p>
	<p>Priority valve /shuttle valve</p>
	<p>piloted check valve</p>
	<p>Circuit selector switch/shuttle valve</p>
	<p>Position hydraulic valve (used for the HA32PX/HA41PX)</p>
	<p>Adjustable pressure relief valve (here set at 145 bars/2104 psi)</p>
	<p>Fixed flow restrictor or spray nozzle (here diameter of 0.75 mm)</p>
	<p>Adjustable flow restrictor</p>

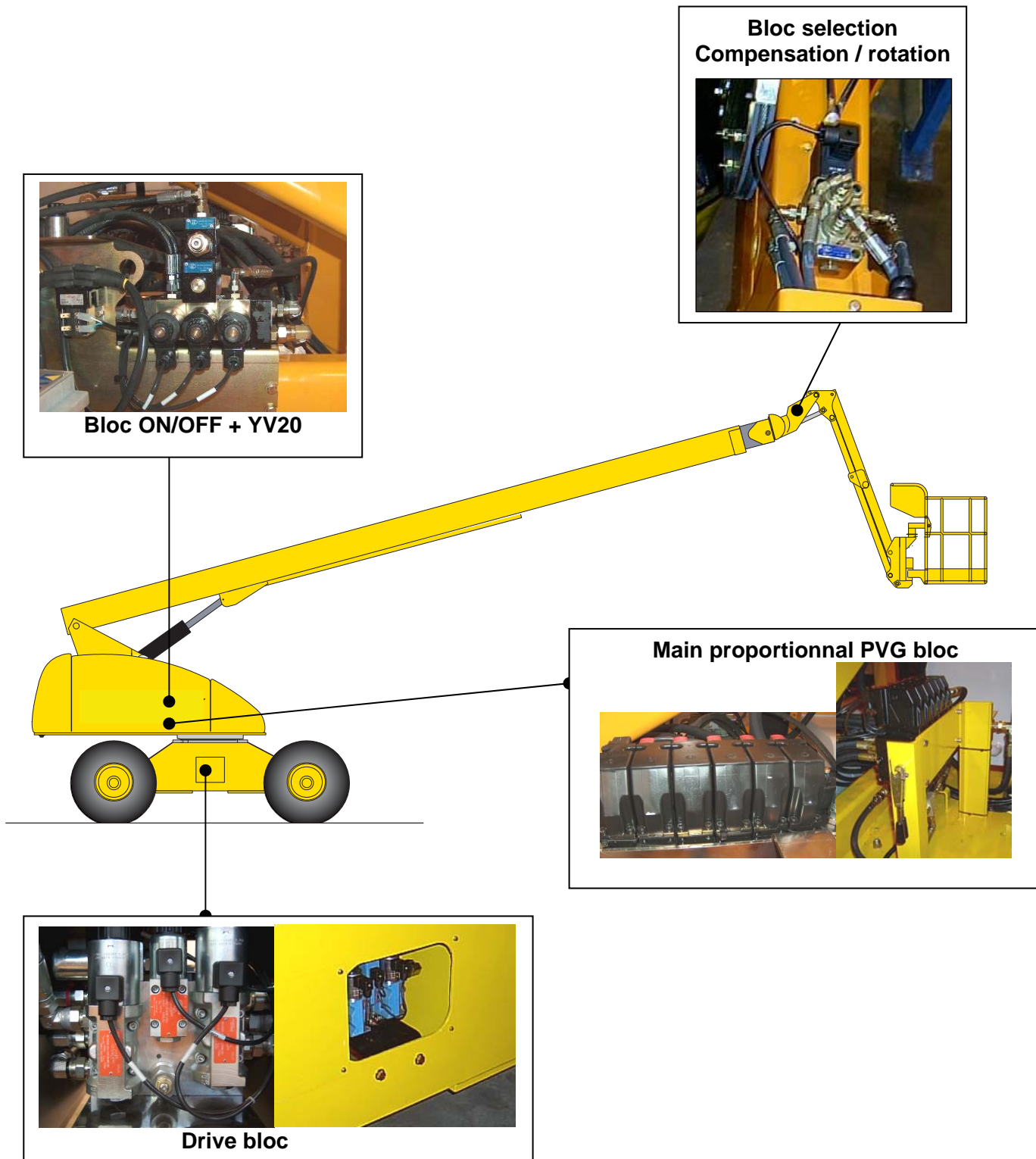
	<p>Pressure sensor (used for weighing)</p>
	<p>Adjustable pressure switch (here set at 170 bars)</p>
	<p>Flow divider</p>
	<p>Position valve 4 ways, 3 positions in closed center</p>
	<p>Distributor/ safety valve</p>
	<p>Counter balance valve with piloting line of the opposite line (here set at 210bars)</p>
	<p>Position valve proportional 5/3 with piloting manual by lever</p>
	<p>Rotary cylinder /jack (here range at 180°)</p>
	<p>Piloted valve</p>

	<p>Manual valve with automatic return (used to readjust the part of compensation on HA32/41PX)</p>
	<p>Position valve proportional 4 ways/3 positions</p>
	<p>Pressure balance/flow control valve</p>
	<p>Flow regulator</p>

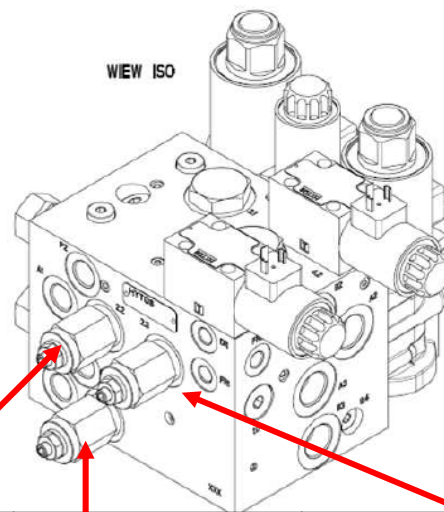
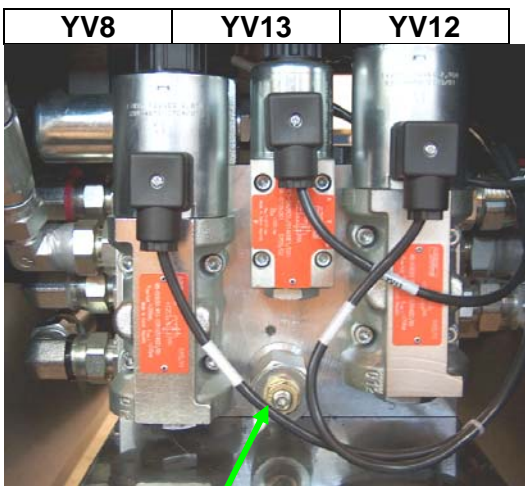
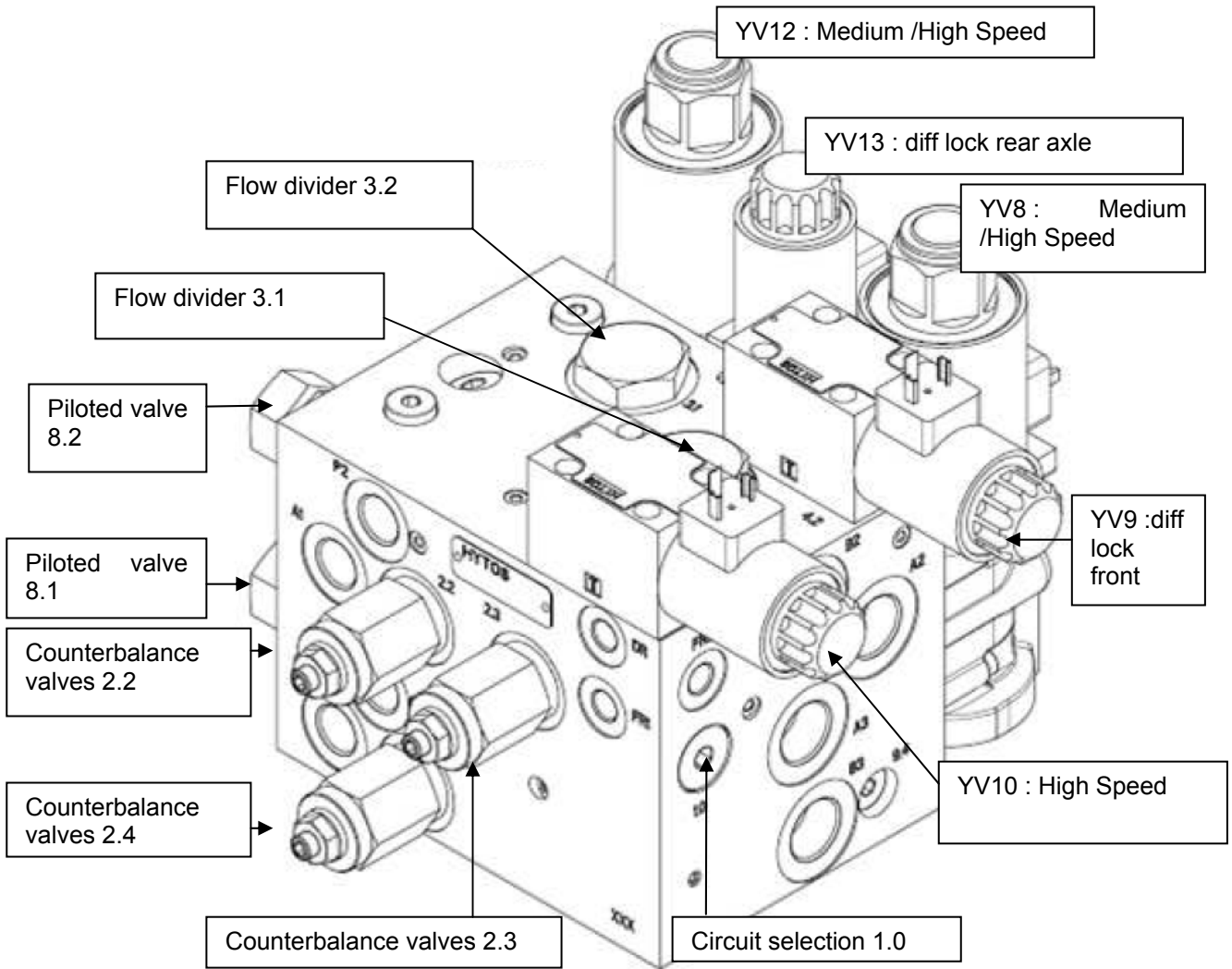
### 3.2. THE HYDRAULIC SCHEMA 149P234040

See end of this manual

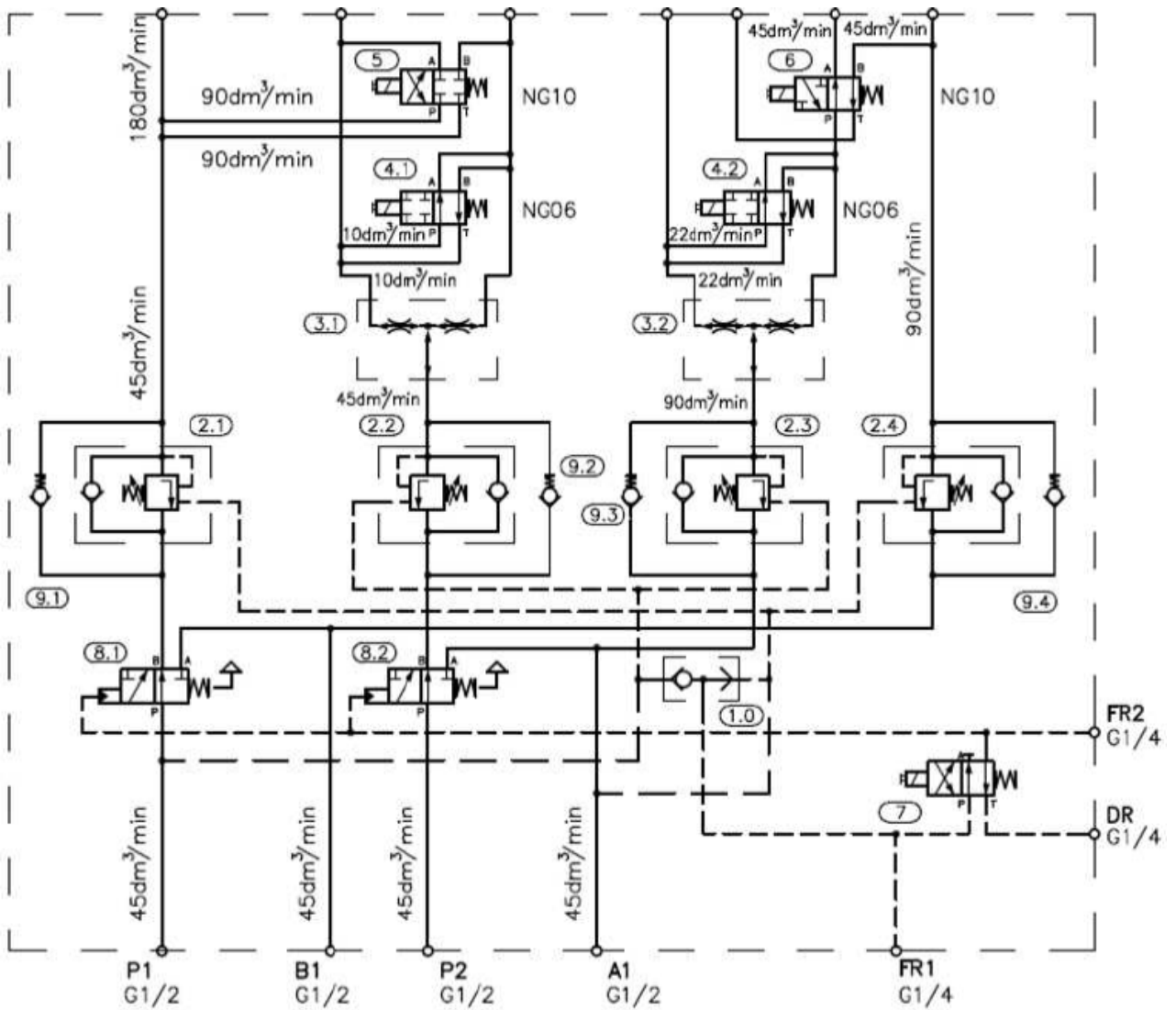
### 3.3. MAIN MANIFOLD



**3.3.1. DETAIL OF THE DRIVE BLOCK**



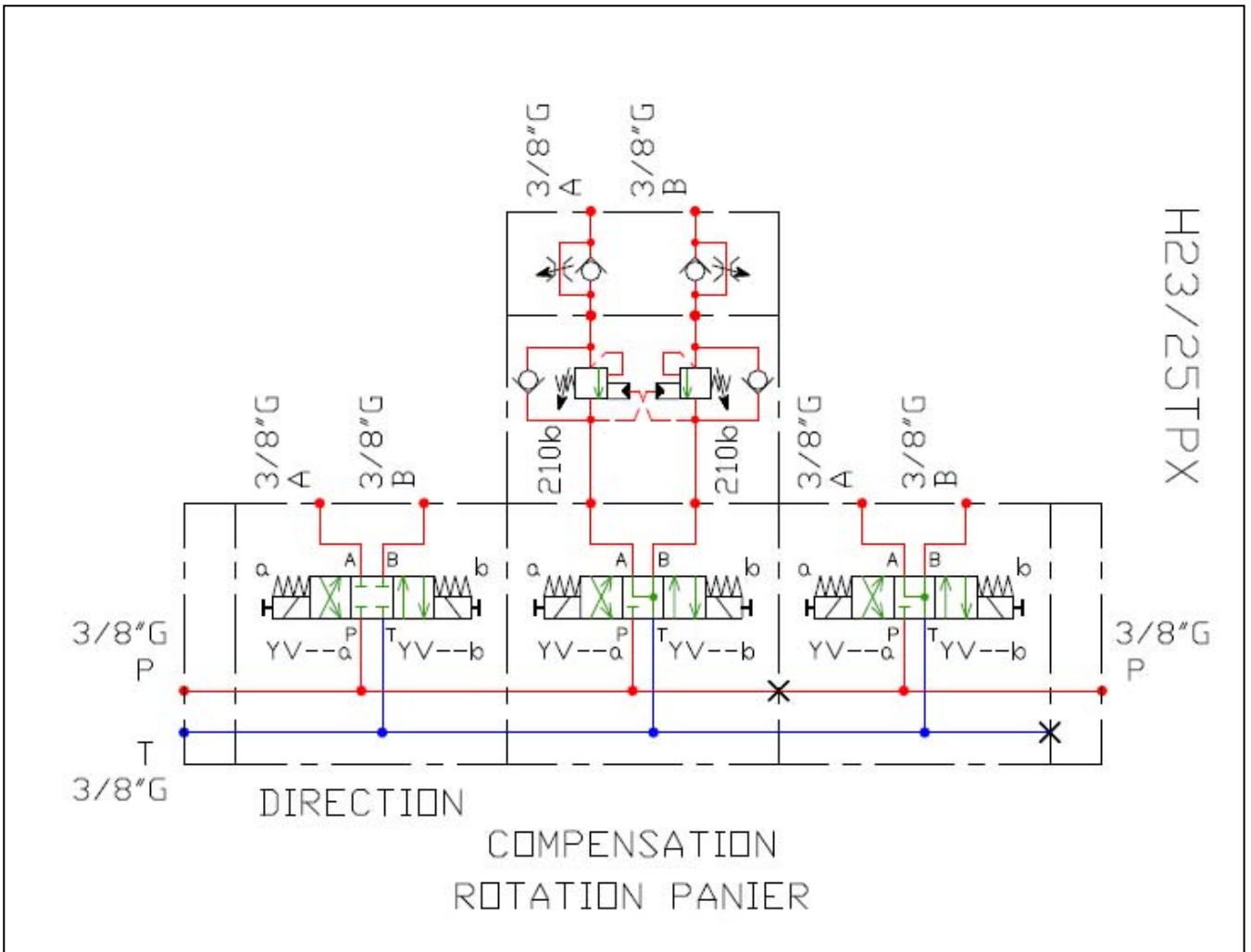
Counterbalance valves 2.4	Counterbalance valves 2.2	Counterbalance valves 2.1	Counterbalance valves 2.3
---------------------------	---------------------------	---------------------------	---------------------------



**3.3.2. DETAIL OF ON/OFF BLOCK**



YV16	YV19	YV18
------	------	------

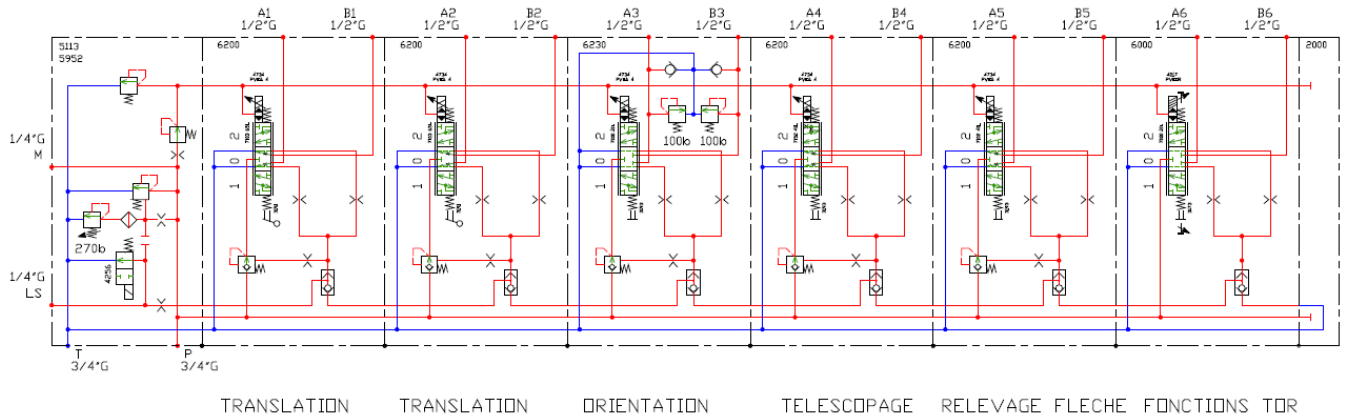




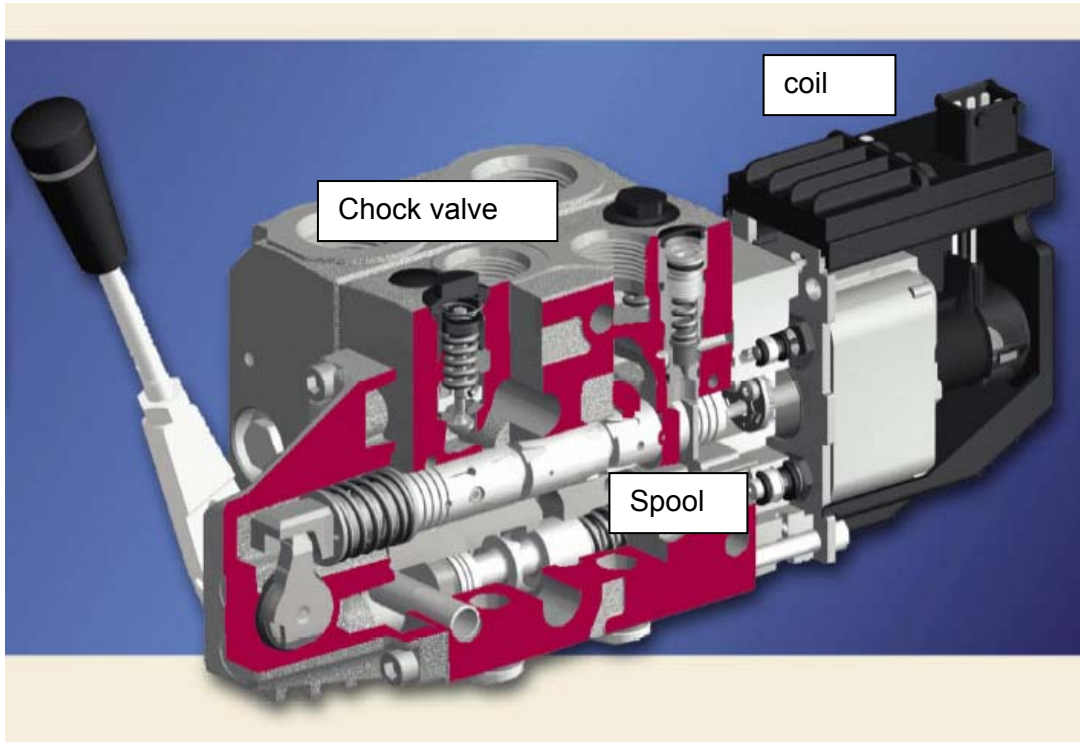
**3.3.3. DETAIL OF PVG BLOCK**



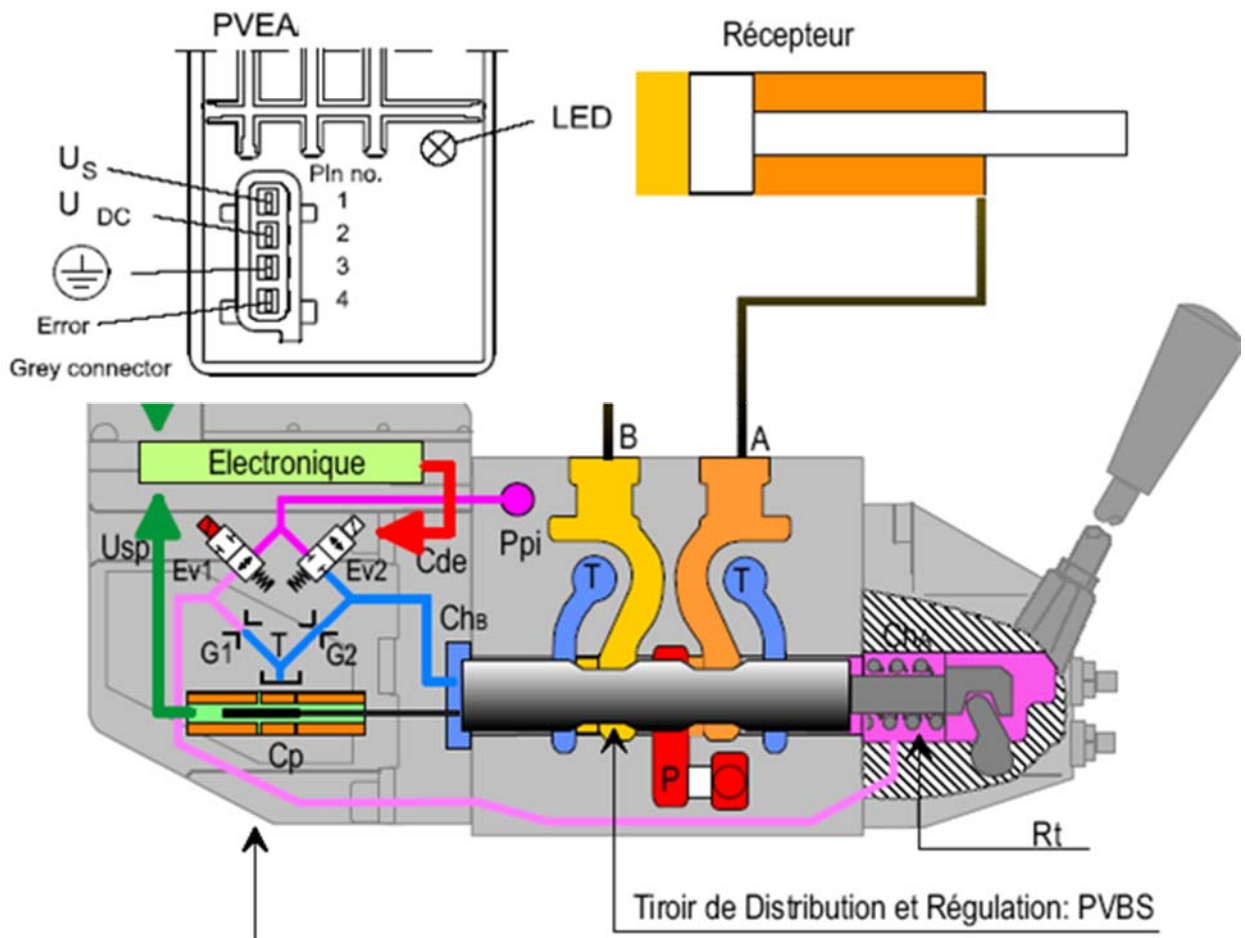
<b>YV2</b>	<b>YV3</b>	<b>YV4</b>	<b>YV5</b>	<b>YV6</b>	<b>YV7</b>	<b>YV1</b>
------------	------------	------------	------------	------------	------------	------------



- Internal view of PVG element



- How it works



## 4. ADJUSTMENTS

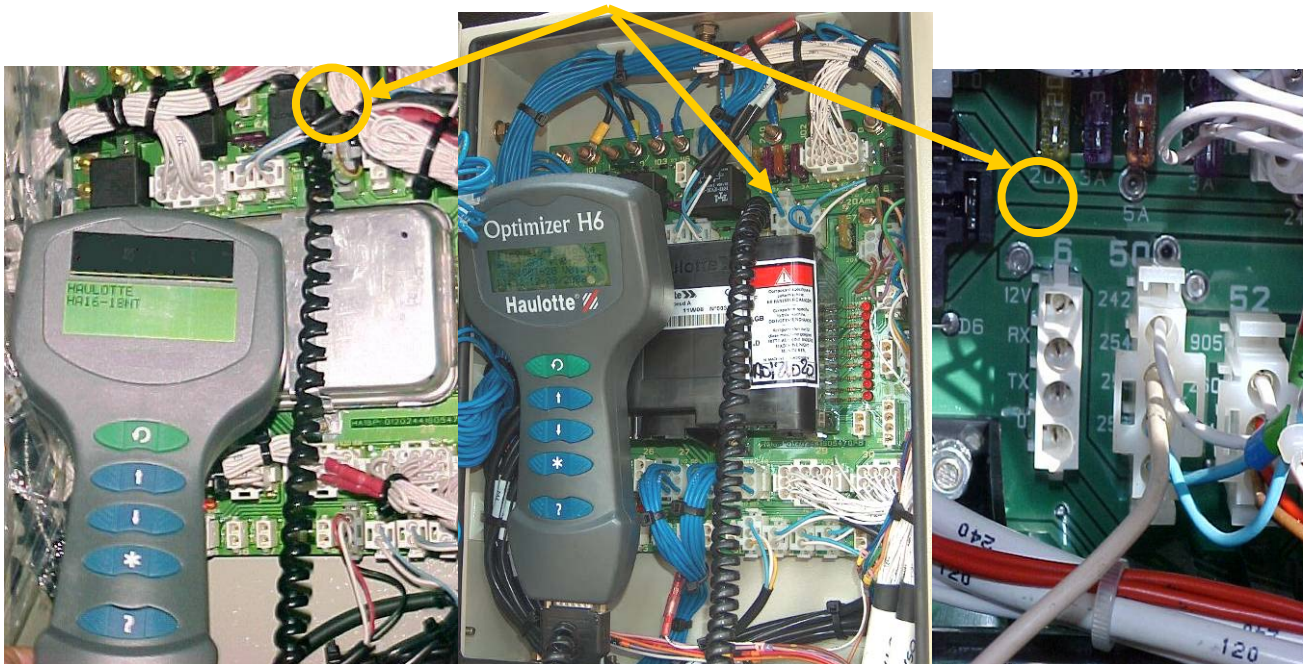
### 4.1. ADJUSTMENTS WITH OPTIMIZER CONSOLE

The adjustments, parameter settings and lists of alarms of the machine are accessible only through this console.

#### Connection bottom panel (turret)

connect the plug socket on the connector number 6:

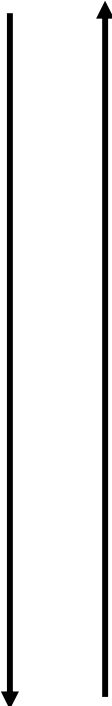
Connector n°6 on main printed circuit





**NOTE :** on any blue key pads , pressing on left , right or in the center have the same result

List of menus  
Access to the menu



```
Pinguely-Haulotte
HA20-260PX EUR
2901001340 V01.08
20:38 23/10/2006
```

```
-----MAIN MENU-----
PARAMETERS
1
```

Parameters setting access

```
-----MAIN MENU-----
INPUTS - OUTPUTS
2
```

Input/output state access

```
-----MAIN MENU-----
DIAGNOSTIC
3
```

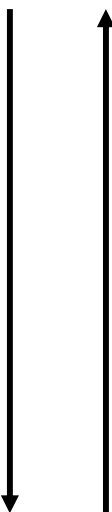
Trouble shooting guide per function

```
-----MAIN MENU-----
INFORMATIONS
4
```

Machines status

```
FAILURES
```

Failures list



```
Pinguely-Haulotte
HA20-260PX EUR
2901001340 V01.08
20:38 23/10/2006
```

```
-----MAIN MENU-----
PARAMETERS
1
```

Speed parameters adjust

```
--PARAMETERS MENU--
SPEEDS
1
```

Speed parameters adjust

```
--PARAMETERS MENU--
RAMPS
2
```

Options setting

```
--PARAMETERS MENU--
OPTIONS
3
```

#### 4.1.1. PARAMETER SETTINGS

Element	Time
boom lift	60 sec (+ 2sec)
boom descent	60 sec (+ 2 sec)
Telescoping extension	30 sec + 2 sec
Telescoping retraction	25 sec + 2 sec
Turret rotation Left- right	30 sec + 1 sec 1/4 of turn
Jib rise	30 sec + 2 sec
Jib descent	23 sec + 1 sec
Basket rotation to the right	15 sec + 2 sec
Basket rotation to the left	15 sec +-2 dry
compensation UP	27 sec + 5 sec
compensation DOWN	35 sec + 5 sec
Steering	12 sec from right to left (full lock)
Deceleration distance in high speed drive	1,20m (+20 cm)
Drive High speed drive FWD/REV	12 sec on 20 m(+ 2 sec)
Drive microspeed	45 sec on 10 m(+ 2 sec)

#### 4.1.2. ALARMS ON UPPER CONTROL BOX

these alarms appears on the upper control box ( fault light HL13)

TYPE	FLASH	Detail	Nbr	level	Condition
CO & CC open or Short Circuit	1	CC TOR (YV) Valves	1	2	Short circuit on YV18A, YV18B, YV15A, YV15B, YV19A, YV19B, YV24, YV22A, YV22B, YV9, YV8, YV13, YV2A, YV2B, YV14A, YV14B, YV17, YV23, YV10, YV12, YV11, YV1
		CC ANA (PVG)	2	1	Short circuit on YV3, YV4, YV5, YV6, YV7
Alarm Fuses	2	FU5 or FU6	1	1	211 = 0V and 212 = 0V or 211 = 12V and 212 = 12V
		FU7	2	1	201 = 0V
		FU8	3	1	242 = 0V
Emergency Circuit	3	KMG	1	3	241 = 0V
Relay	4				
PVG Outputs	5	PVG 1 Alarm (B)	1	1	PVG > limit of power
		PVG 3 Alarm (Tu)	3	1	PVG > limit of power
		PVG 4 Alarm (Te)	4	1	PVG > limit of power
		PVG 5 Alarm (Tr)	5	1	PVG > limit of power
Alarm Joystick SM31	6	SM31 incompatible	1	1	[(2,4V < 403 < 2,6V) and 420A = 12V] oru [(2,4V < 512 < 2,6V) and 420A = 12V]
		SM31 out of neutral	2	1	{[(2,8V < 403 < 4,5V) or (0,5V < 403 < 2,2V)] and 420A = 0} or {[(2,8V < 512 < 4,5V) or (0,5V < 512 < 2,2V)] and 420A = 0}
		SM31 out of range	3	1	(403 > 4,8V) or (403 < 0,2V) or (512 > 4,8V) or (512 < 0,2V)
Alarm Joystick SM2	7	SM2 incompatible	1	1	(2,4V < 506 < 2,6V) et 420B = 12V
		SM2 out of neutral	2	1	[(2,8V < 506 < 4,5V) or (0,5V < 506 < 2,2V)] and 420B = 0
		SM2 out of range	3	1	(506 > 4,8V) or (506 < 0,2V)
Machine faults	8	Slope	1	1	slope + 242 = 12V

		Overload	2	1	Static overload + 242 = 12V
		Pedal	3	2	211 = 12V + pedal = 0
		Reach Limitation	4	2	115A = 0V + 115B = 0V
		Battery discharged	5	3	Year equal to 2000 when power in ON
drive	9				
Chain	10				
Position	11	Boom sensors	1	2	115B=0 and 218B=1
		Telescope sensors	2	2	(115A=1 + 204=1 + 218A=1) or (115A=1 et 204=0 + 218A=1) or (115A=1 + 204=0 et 218A=0) or (115A=0 et 204=0 + 218A=0)
Alarm Joystick SM4	12	SM4 incompatible	1	1	(2,4V < 612 < 2,6V) + 606 = 12V
		SM4 out of neutral	2	1	[(2,8V < 612 < 4,5V) or (0,5V < 612 < 2,2V)] + 606 = 0
		SM4 out of range	3	1	(612 > 4,8V) or (612 < 0,2V)

Note : for newest models (from software 1.38 for US/AUS and 1.39 Std) , it's necessary to reset the KMG failures using the console OPTIMIZER

• **Procedure :**

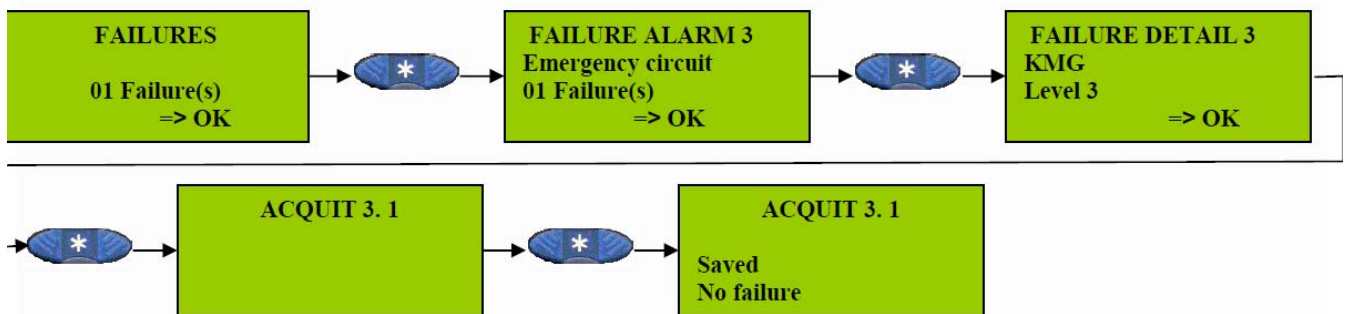
The alarm n°3 (Emergency circuit) is activated when relay KMG is not energised (Wire 241 at 0) and when there is 12V on the wire 240. (Relay KMG stuck)

When the alarm n°3 is activated, the software cuts the engine 2s after each start.

This alarm does not disappear automatically after the problem was repaired. It has to be cleared using the Optimizer and the procedure below:

Menu OPTIMIZER , enter level 2 code ( 2031)

Then go in FAILURES menu and erase the failures as shown below :

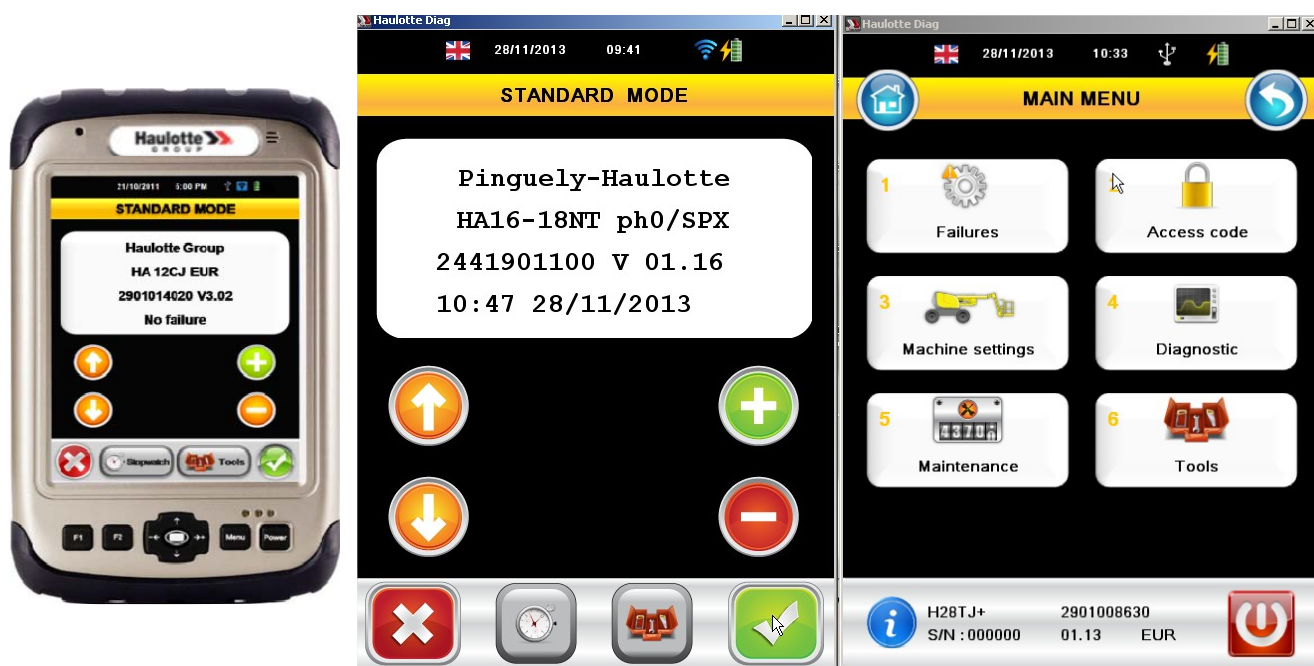


Switch OFF then ON the machine and check if the alarm has been cancelled



## 4.2. CONSOLE DIAG PAD

It's possible to use the 2<sup>nd</sup> generation of diagnostic console (also available through laptop)  
The presentation of the main menu will depend of the software's version of the machine



This diagnostic console could be used in WIFI using a VCI adapter (Vehicle Computer Interface)



The full description of how to use that console and their menus is explained in an other technical note (refer to your nearest HAULOTTE SERVICES of your area)

Note : With that 2<sup>nd</sup> generation of console , the name of alarm's code has been changed ( not the description and function)

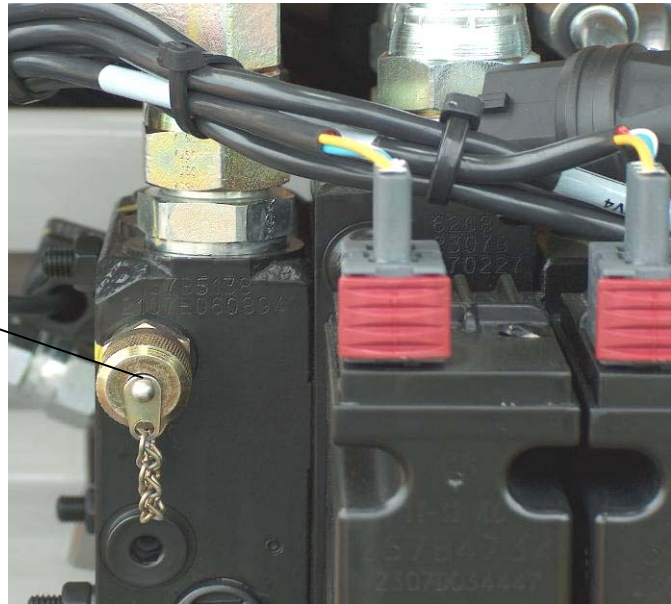
New failure code	Original failure code
F02.03	3.1 KMG
F04.03	5.3 PVG turret
F04.04	5.2 PVG arm lift
F04.05	5.1 PVG boom lift
F04.10	5.5 PVG drive
F04.13	1.1 short circuit on ON/OFF valves
F04.15	1.2 short circuit on PVG valves
F05.01	12.1 joystick SM4
F05.02	7.1 joystick SM2
F05.06	6.1 joystick SM31
F08.01	2.1 fuse FU5 or FU6
F08.02	2.2 fuse FU7
F08.03	2.3 fuse FU8
F11.01	8.1 Tilt
F11.02	8.2 Overload
F11.03	8.3 Foot switch (foot pedal)
F12.03	8.5 ECU battery

### 4.3. PRESSURES ADJUSTMENT

#### 4.3.1. TABLE OF PRESSURES

designation	in Bars
Main	240 +-5
Load Sensing	30 +0/5
Emergency unit	130 +-5
boom raising full stroke	240 +-5
boom raising stowed	140 +-5
Telescoping boom extension	100 +-5
Telescoping boom IN	240 +-5
Turret slewing	100 +-5
Movements ON/OFF	240 +-5

M



### 4.3.3. ADJUSTMENT

- Load sensing (LS)
- Maxi Flow
- Cubic capacity pump

#### Pump version 1

- The pump is preset with a pressure LS of 30b (+-2b)
- The pump is preset with a general pressure of 240b (+-5b)
- The cubic capacity of the pump is set to reach the high speed at 20 seconds during 25 meters



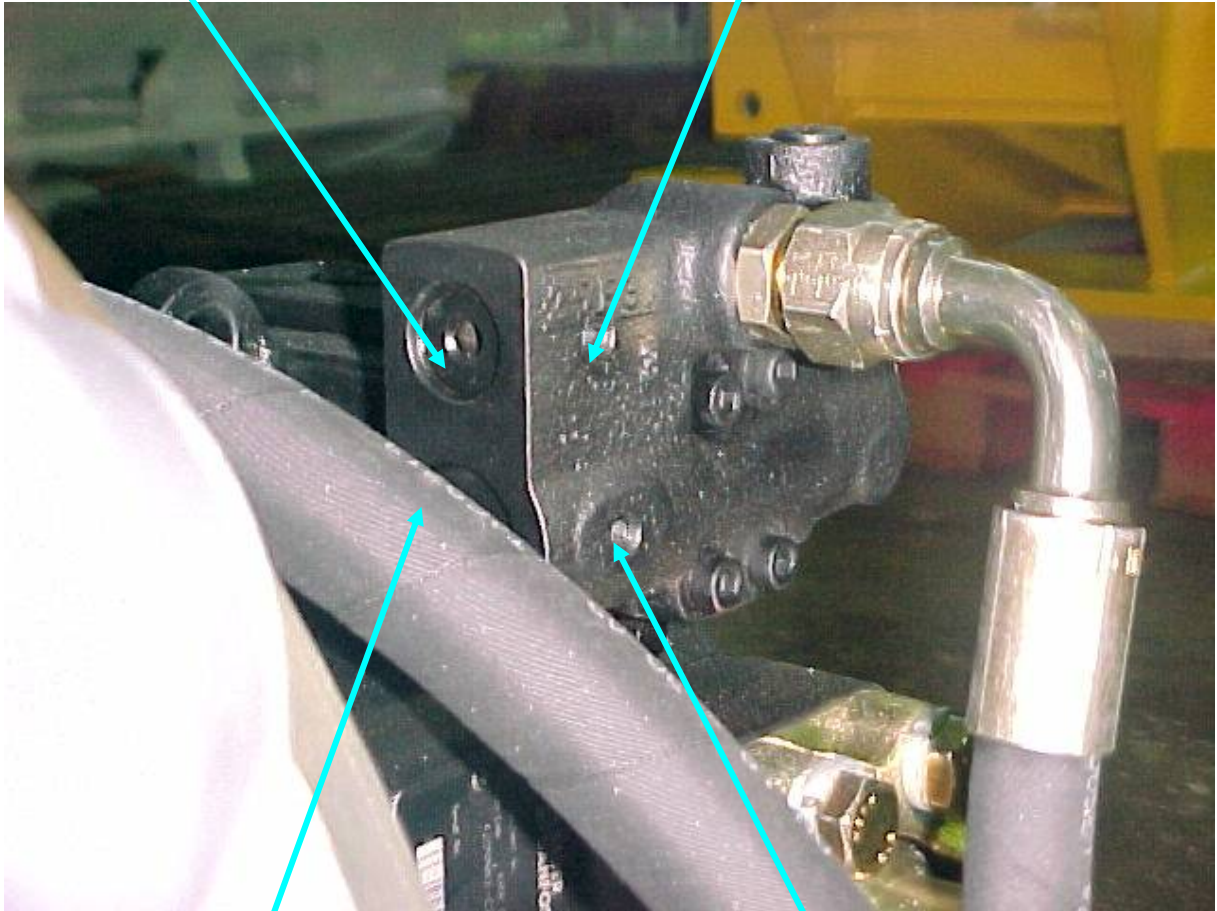
LS adjust

P maxi adjust

CC adjust for High Speed

Turn CW for Load sensing pressure increase

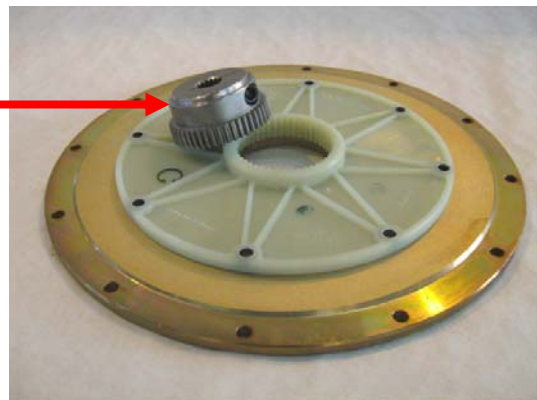
Stop screw for Load sensing



Turn CW for Pmaxi pressure increase

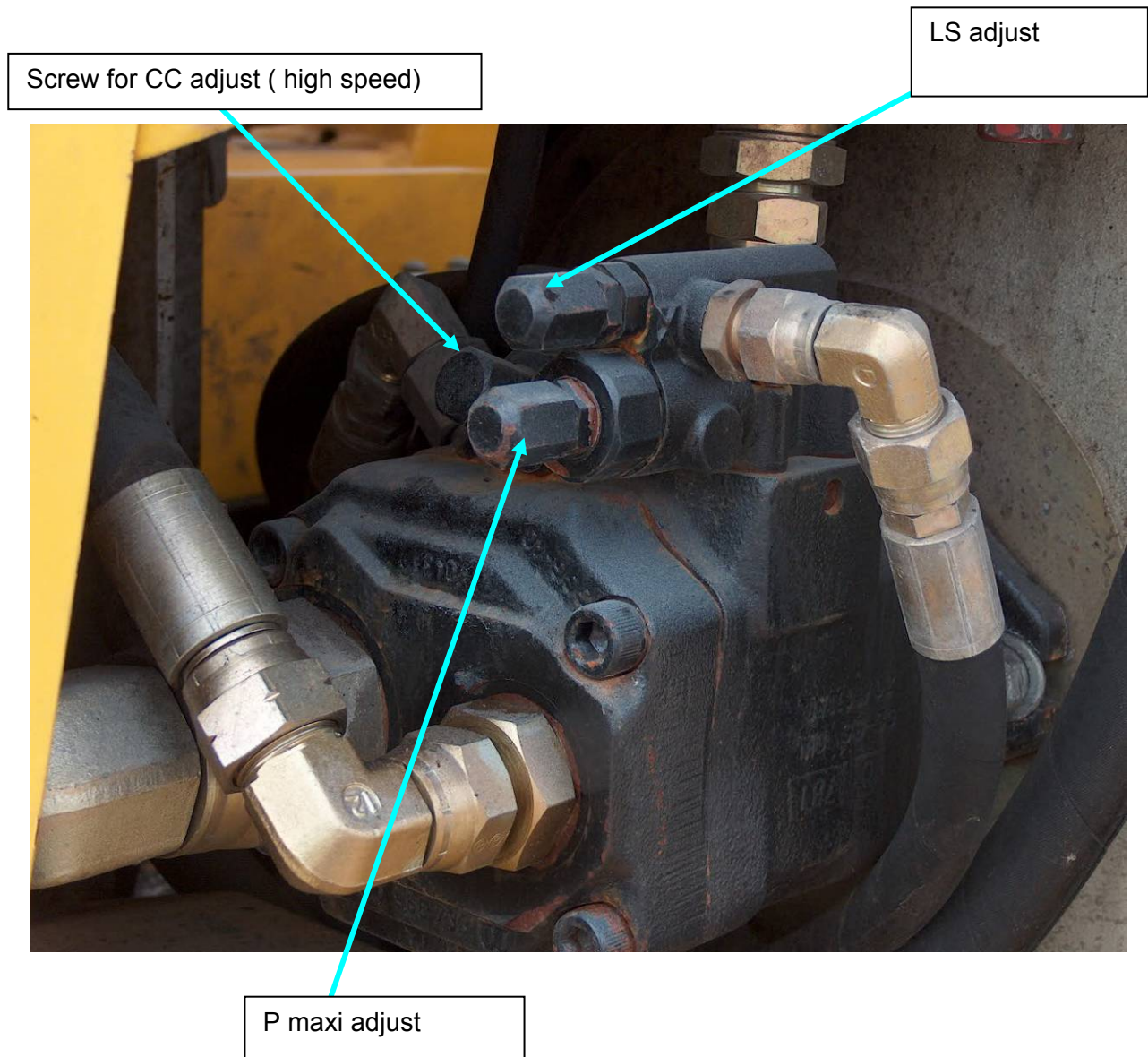
Stop screw for Pmaxi adjust

Note : if no pressure , check coupling between pump and engine

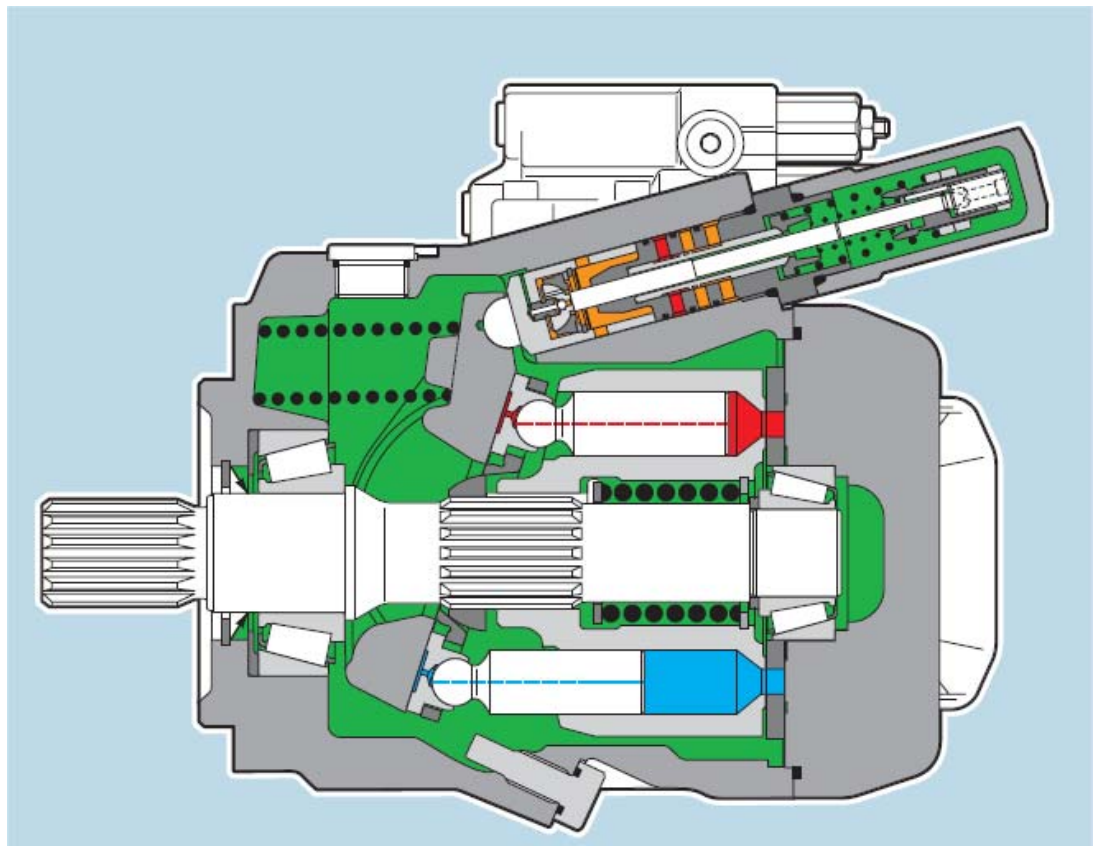
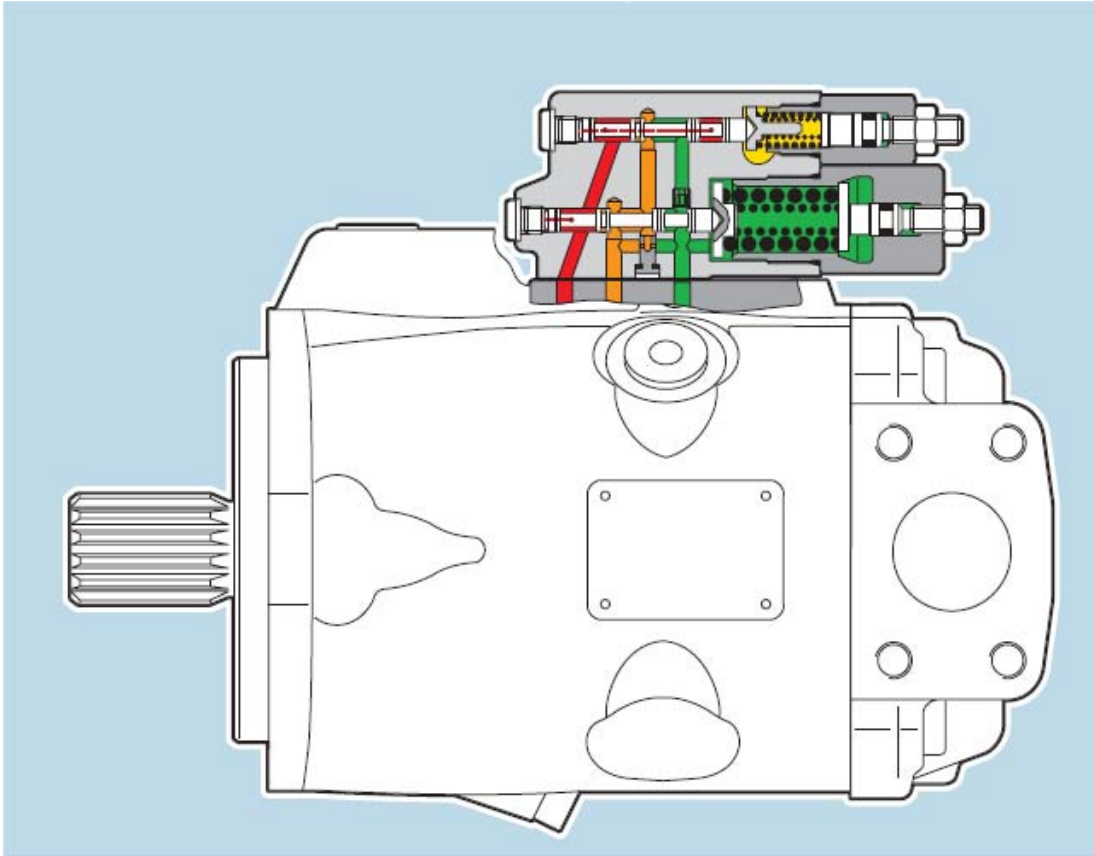


## Pump version 2

- The pump is preset with a pressure LS of 30b (+-2b)
- The pump is preset with a general pressure of 240b (+-5b)
- The cubic capacity of the pump is set to reach the high speed at 20 seconds for 25 meters
  - unscrew the cap (wrench)
  - turn the CHC screw until obtaining the desired value



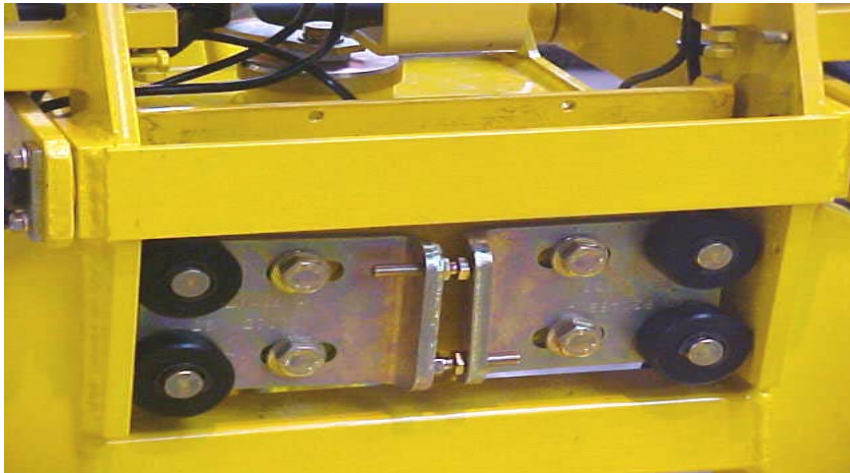
- Internal view of a variable flow pump



#### 4.4. OVERLOAD ADJUSTMENT

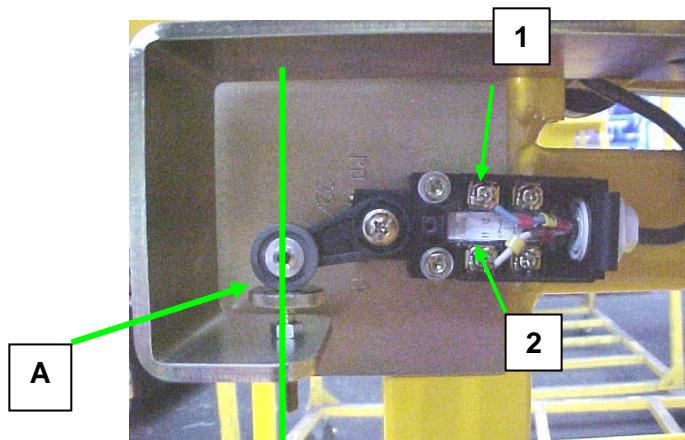
How to adjust the plastic rollers system:

- Centre the basket with the link part
- Push on the left the 2 plastics rollers
- Tighten 2 screws HM12 on left side
- Put a steel wedge (thickness = 0.1 mm) on the right (between plastics rollers and steel parts - see photo)
- Push the right part with the 2 screws HM8, and tighten them
- Tighten 2 screws HM12 on the right
- Take out the steel wedge
- the plastics rollers must turn freely by hand



Adjust the excess load:

- Put the a weight in the centre of the basket (weight = 120% x nominal weigh).
- You stop unscrew the part "A" when you hear the buzzer
- The plastic wheel and the screw must be in the same axis
- Check the opening of the contact between 1 & 2
- Lift and lower the weight to check the adjust



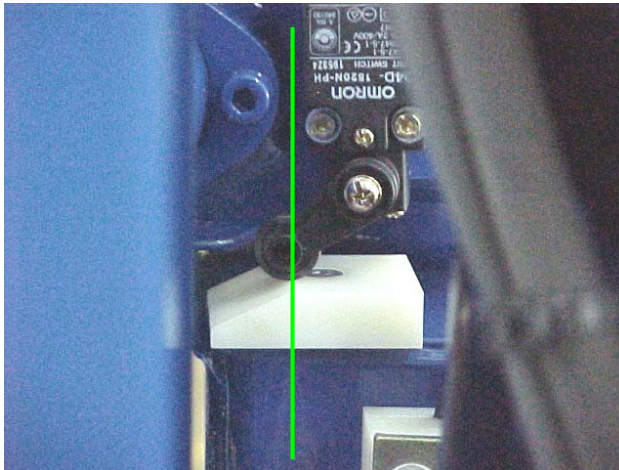


- Check the opening of the contact between 1 & 2
- Lift and lower the weight to check the adjust
- Check the light on the console, the buzzer on, and you can't have movements.
- Block the part "A" with the nut
- Repeat operation the same operation with the other limit switch



#### Adjust the limit switch for the basket rotation

- Put a wedge (thickness = 5 mm) on the mechanic stop of basket rotation
- Turn the basket to put it on this wedge
- Adjust the limit switch , it should activate in this position.



- Make the same operations to adjust the limit switch on the other side

## 5. BREAKDOWN SERVICE GUIDE

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This guide does not replace the logical equations described previously in this manual, it makes it possible to the technician to have a logical step of breakdown service, detailing the successive stages, while going from main one until the details.

The checking of the electric part is carried out in priority because less sensitive to the external parameters than the hydraulics part (temperature, pollution, viscosity...).

The denomination of the movements describes below implies the 2 phases (ie BOOM UP/DOWN)

Note: Some options like ASB (Activ Shied Bar) if installed and activated will stop all movements from upper controls only (except turntable rotation) , all movements from lower controls remain active , refer to Haulotte services for more details

### 5.1. NO START

- Battery (14V)
- Emergency push buttons SB1-SB2
- Start switches SB3-SB4
- Key switch SA1
- Fuse FU8
- Pressure Oil engine B3
- Clogged air filter B1
- Alternator light HL1
- Relays KA2 –KP1-KMG
- Alternator charge D+ =0
- Drive joystick SM4 ( signal and/or neutral position)
- Head module

### 5.2. NO MOVEMENT

- Machine in overload and/or in slope
- Fuses FU7 –FU10
- LS Valve YV1
- Foot dead man pedal SB6 / lower dead man switch SA19
- Head module

### 5.3. NO MOVEMENT > 3 M

- Machine in slope (SQ1)
- Machine in overload (SQ5/SQ6)

### 5.4. NO BOOM LIFT

- Signal on YV3 (25-50-75% Vbat)
- Signal on SM31 joystick ( 0.5/2.5/4.5VDC)
- Toggle switch SA13
- Valve YV3
- Head module
- No pressure lift

## **5.5. NO TELESCOPIC BOOM EXTENSION**

- Signal on YV4 (25-50-75% Vbat)
- Signal on SM2 joystick ( 0.5/2.5/4.5VDC)
- Toggle switch SA8
- Valve YV4
- Head module
- No pressure

## **5.6. NO TURRET ROTATION**

- valves YV5 –YV14
- Signal on SM31 (0.5/2.5/4.5VDC)
- Toggle switch SA15
- Valve YV5 or ON/OFF block
- Head module
- No pressure

## **5.7. NO ON/OFF MOVEMENTS**

- valves YV2/YV16/YV18/YV19
- toggles switch (SA4/SA5/SA6/SA7/SA10)
- valve YV5 or ON/OFF block
- Head module

## **5.8. NO DRIVE**

- Signal on joystick SM4 (0.5/2.5/4.5VDC)
- Signal on YV6 +YV7, ( 25-50-75%Vbat)
- Valve YV11(brakes)
- Brake circuit
- Valves YV6 (YV7)
- Head module

## **5.9. ONLY LOW SPEED**

- Valves YV8/YV10/YV12
- Limit switch SQ2/SQ3/SQ4
- Toggle switch SA11
- Head module

## **5.10. NO STEERING**

- Valves YV2/YV16/YV21 and/or YV22
- Head module

## 6. SUMMARY OF THE VERSIONS H21 H23 H25

<b>ELECTRICAL SCHEMATICS</b>		<b>diagram</b>
Without dead man's pedals + version pre EN280 (until October 2003)	EC + AUS	E455
With dead man's pedals + version pre EN280 (until October 2003)	EC + AUS	E455C
With dead man's pedals + version EN280	EC + AUS	E455H
Dead man switch on lower control box	EC + AUS	E455I
Version Deutz engine (starting from September 2002)	EC + AUS	E580C
Version Deutz engine without dead man's pedals (until September 2002)	USA	E578
Version Deutz engine with dead man's pedals	USA	E580E
Version Hatz engine with dead man's pedals	USA	E579

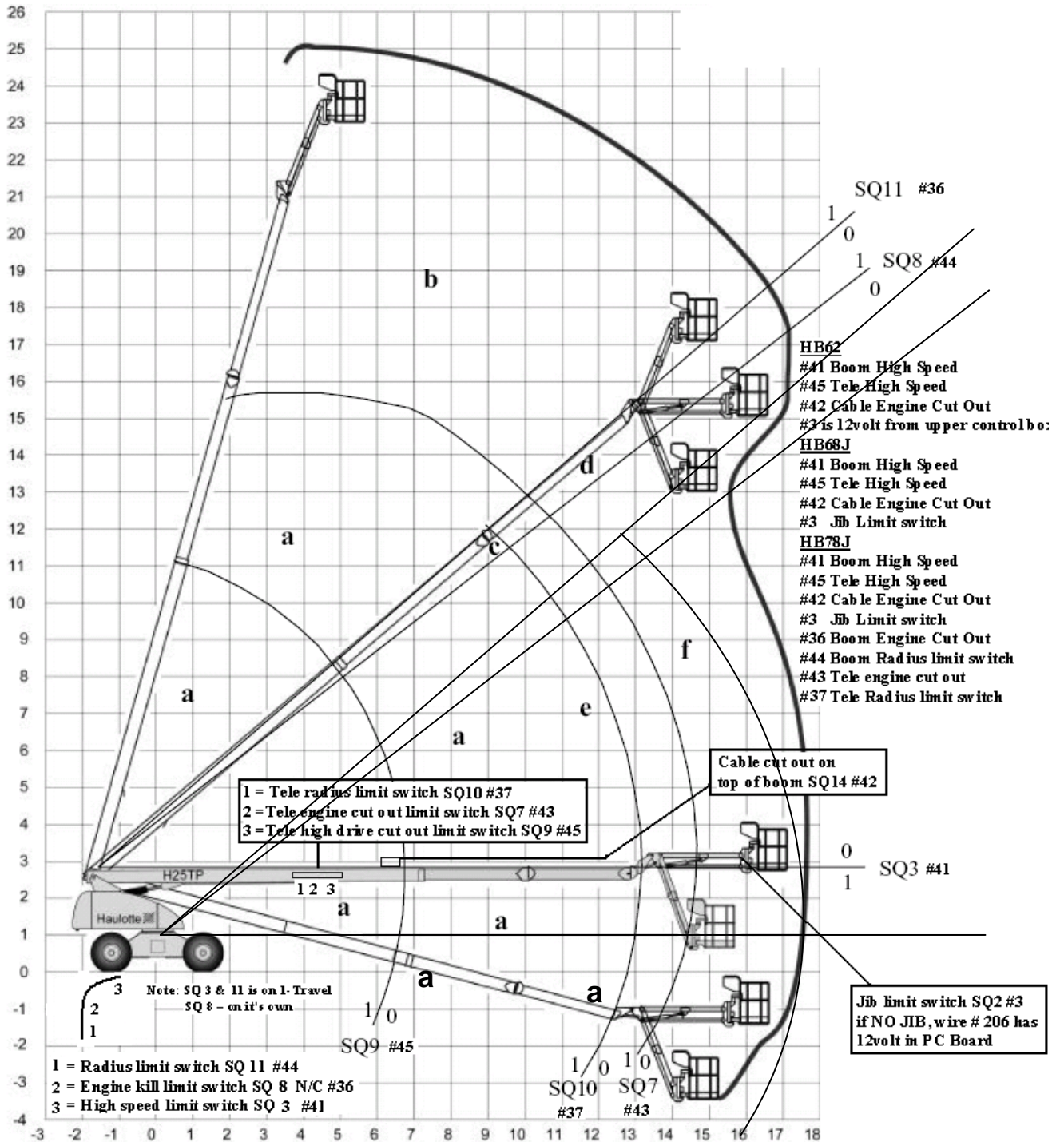
<b>HYDRAULIC SCHEMATICS</b>		<b>diagram</b>
H21 TX - H23 TX (until September 2004)	CE+AUS +USA	B15330
H23 TPX - H25 TPX (until September 2004)	CE+AUS +USA	B15331
H21 TX - H23 TX (until January 2005)	CE+AUS +USA	B15713
H21 T - H23 T (until January 2005)	CE+AUS +USA	B15714
H21 TX - H23 TX	CE+AUS +USA	149P234480
H23 TPX - H25 TPX	CE+AUS +USA	149P234040

Pre version 280 = Detection overload (1<sup>st</sup> step of alarm then cut-off movements)

Version IN 280 = detection overload with cut-off movements + light

## 7. SPECIAL FUNCTIONS

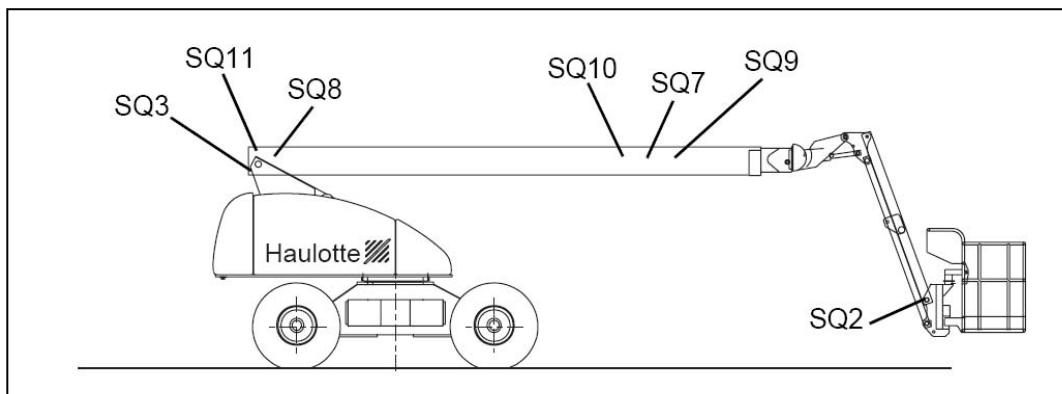
### 7.1. REACH LIMITATION (H25TPX)



- Zone a: no cut-off
- Zone b: movements slowed down
- Zone c: telescope extension cut-off
- Zone d: cut-off boom descent
- Zone e: telescope extension cut-off
- Zone f: engine cut-off

## 7.2. ADJUSTMENT OF REACH LIMITATION SWITCHS

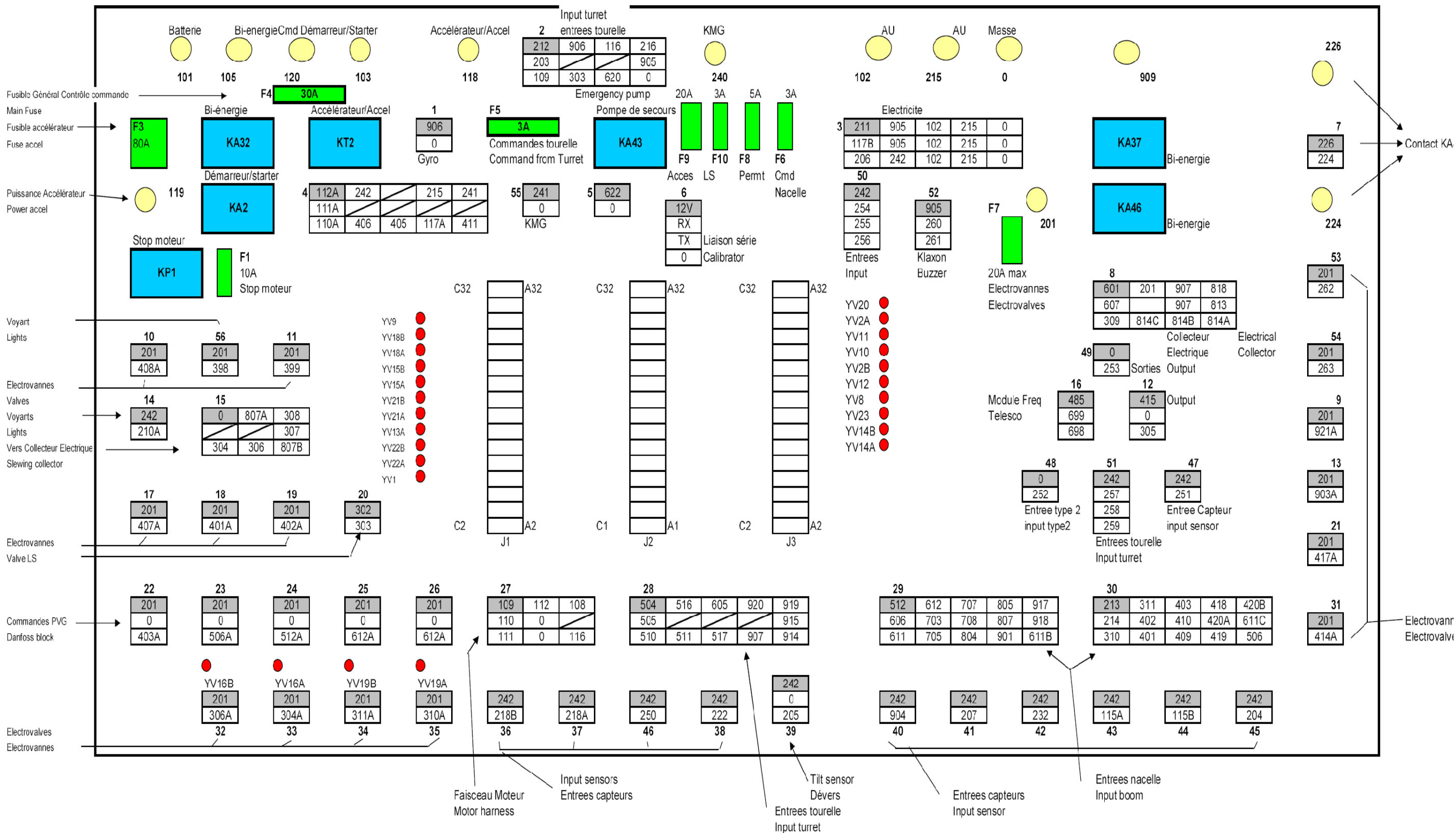
- **SQ7**
  - telescope in retracted position
  - Check that there is 2 mm gap between the mechanical roller of the limit switch and the telescopic section
  - deposit or disconnect limit switch SQ10
  - raise the boom between 0° and 40°
  - Extend the telescope until SQ7
  - check that engine stops
  - put back SQ10 in initial configuration
- **SQ10**
  - telescope in retracted position
  - check that there is 2 mm gap between the mechanical roller of the limit switch and the telescopic section
  - raise the boom at an angle between 0° and 40°
  - Extend the telescope until SQ10
  - check that the telescopic extension is blocked (only retraction is authorized)
- **SQ8**
  - deposit or disconnect SQ11
  - raise the boom above 40°
  - Extend the telescopic boom extension at full lock
  - descend the boom
  - check that SQ8 stops the engine at the angle at 40°
  - give SQ 11 in initial configuration
- **SQ11**
  - raise the boom above an angle of 43°
  - Extend the telescopic boom extension at full lock
  - descend the boom
  - check that SQ11 stops the descent of the boom at 43° (only telescopic retraction is possible)

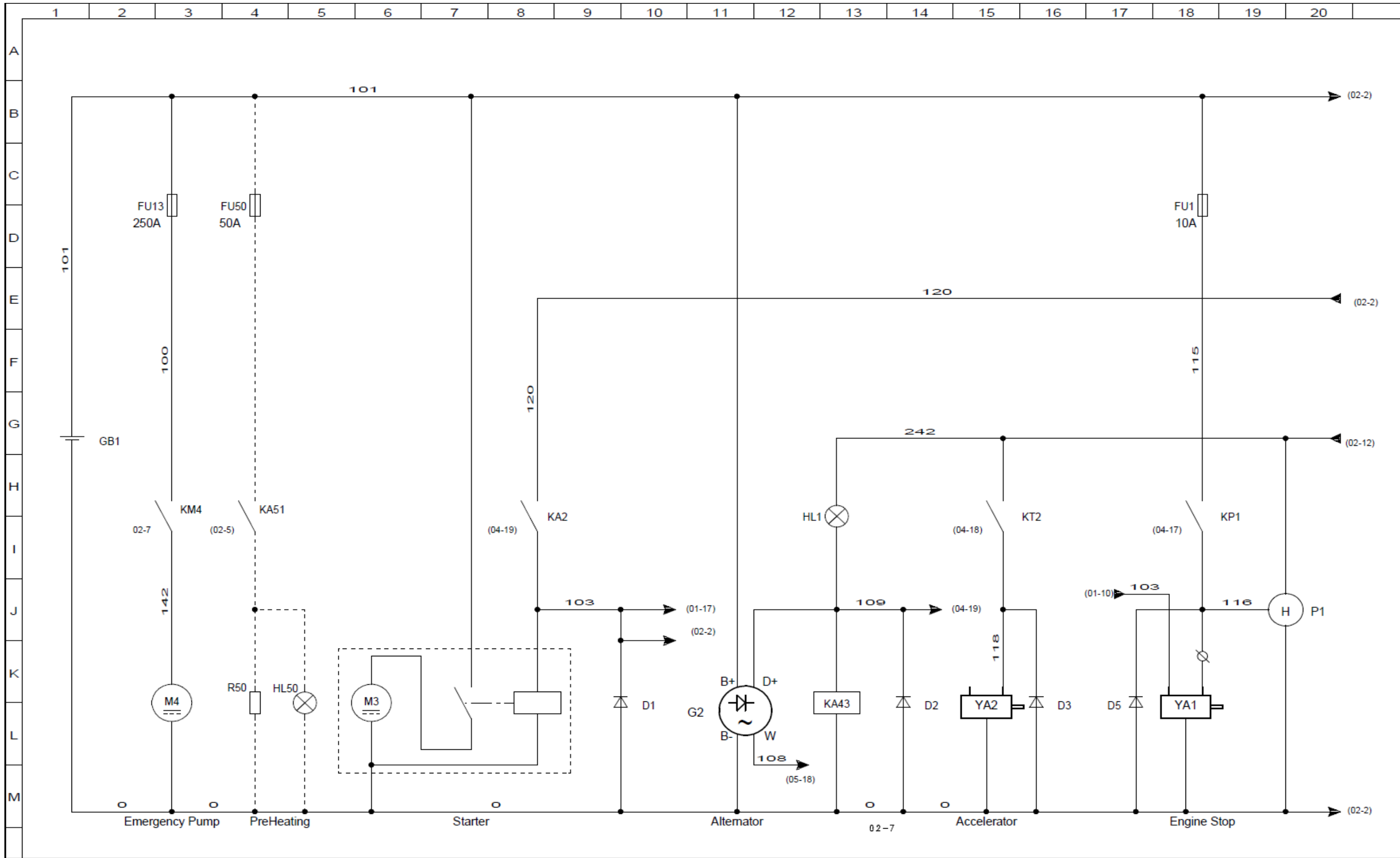


## 8. LIST OF SCHEMATICS

See below all schematics (electric/hydraulic) of the studied model

# LOCATION OF COMPONENTS ON MAIN PRINTED CIRCUIT

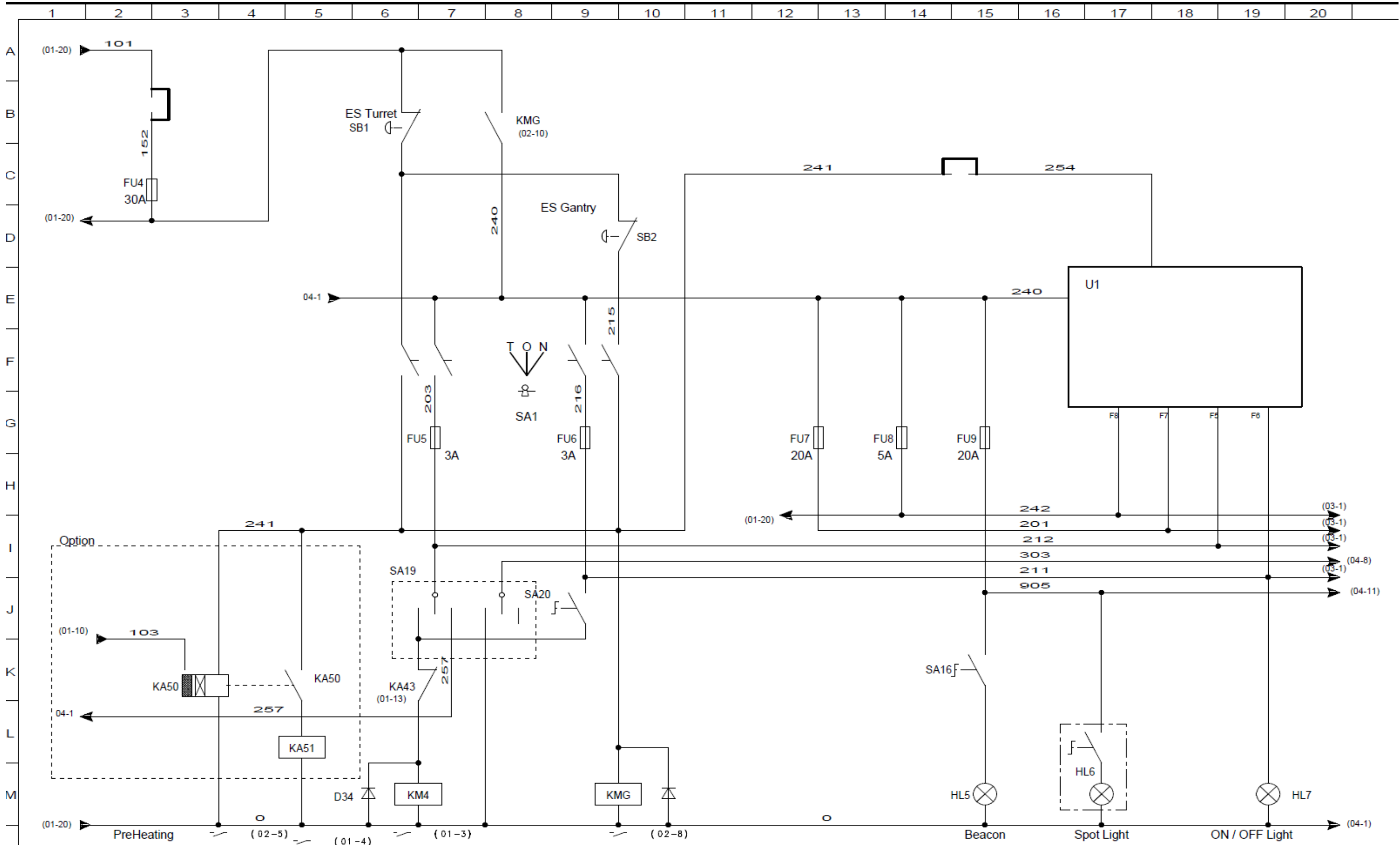


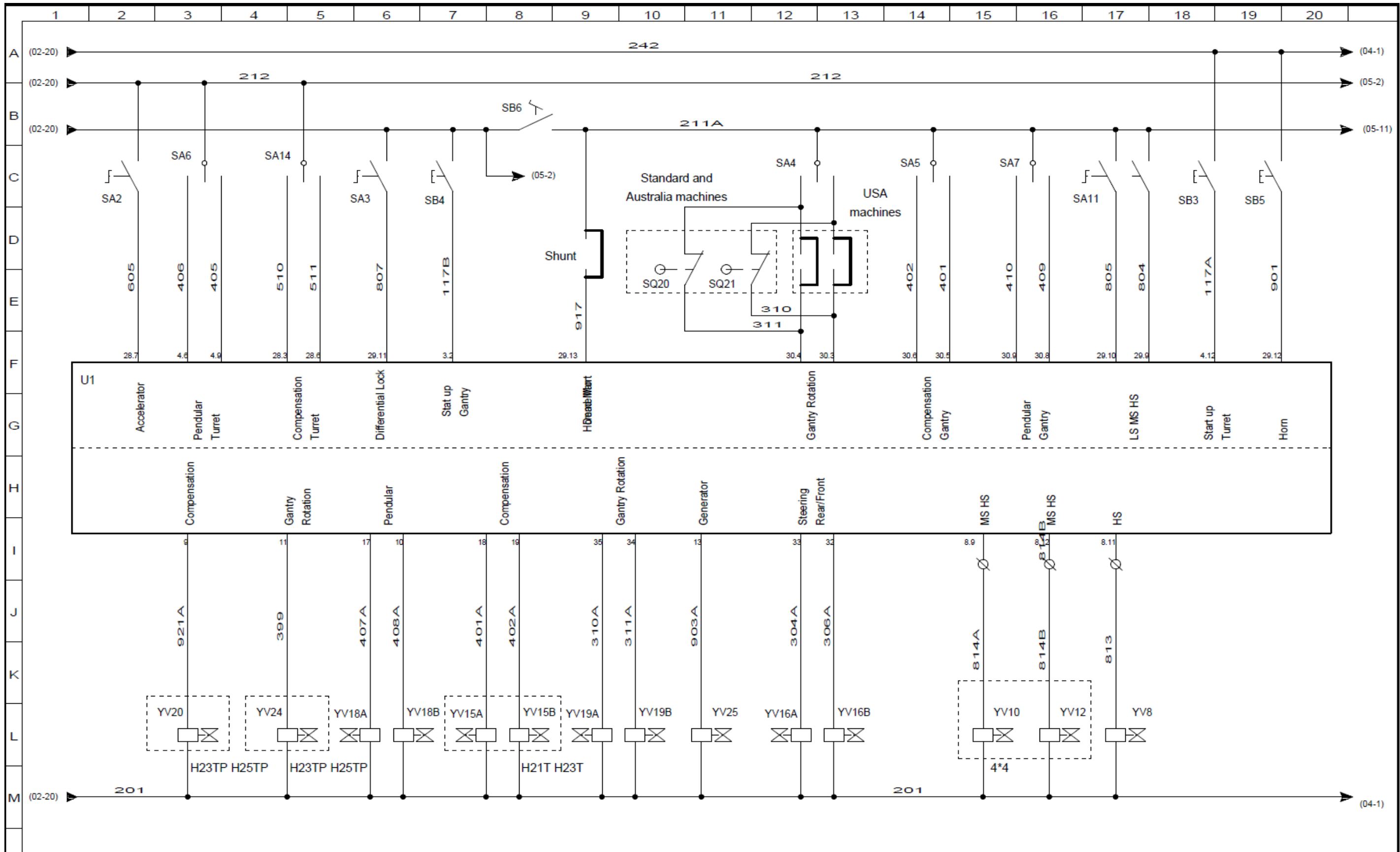


<b>Haulotte</b> <b>GROUP</b> La Peronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Laurent DI FLORIO	DATE DE CREATION 08/04/1999	<b>H21T-H23/H25TP (Hatz)</b>	MODIF CJY	IND H	DATE 05/06/2006	MODIFICATION Opt Préchauf - BEFLC06126	VISA BPT	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR Frédéric DENEZE	DATE DE VERIFICATION	E455i	MODIF B	IND B	DATE 16/04/2002	MODIFICATION Ajout HL13/SB33/YV25	VISA C JEY	

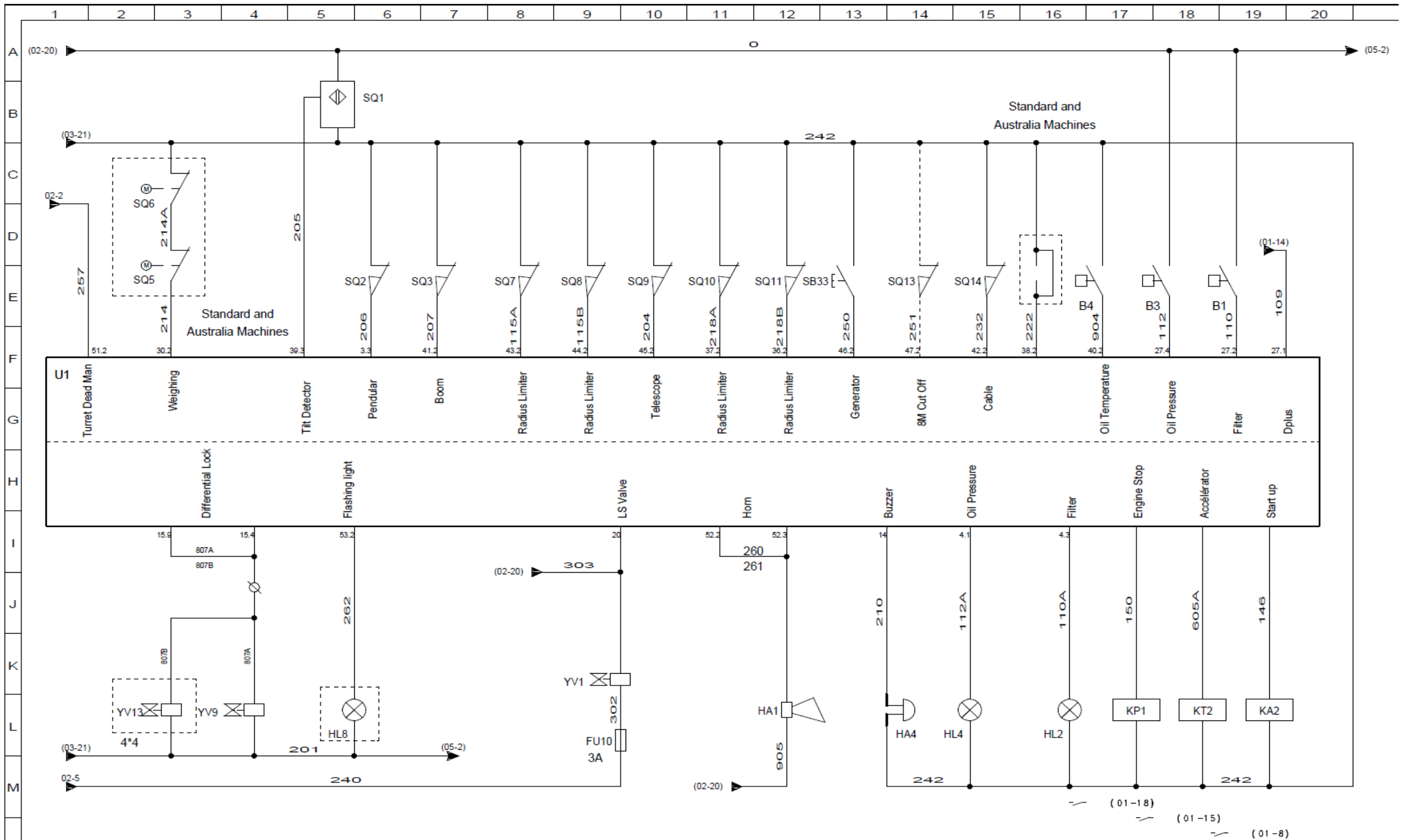
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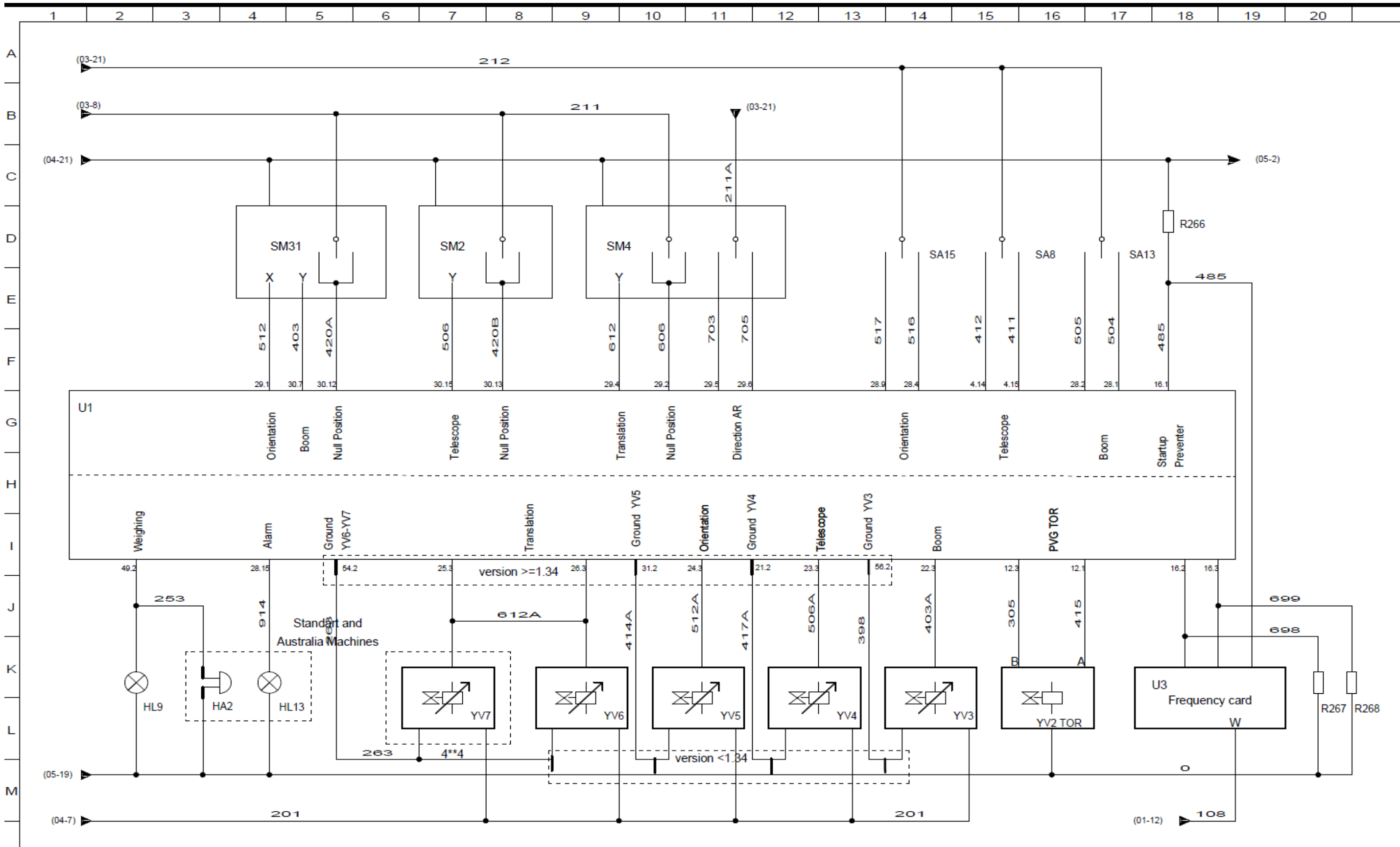




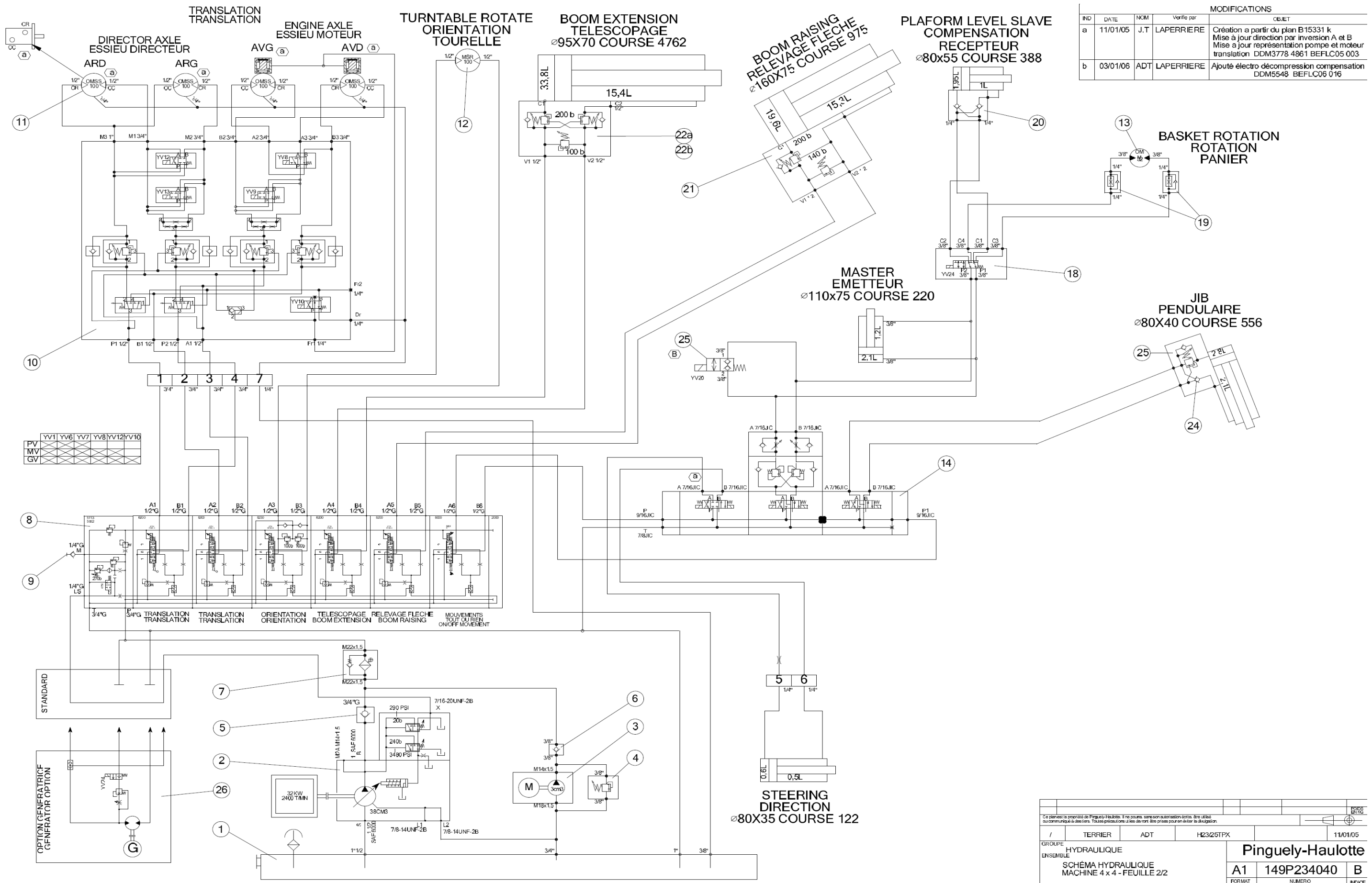
<p>La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24</p>	DESSINE PAR Laurent DI FLORIO	DATE DE CREATION 08/04/1999	H21T-H23/H25TP (Hatz)	MODIF BPT i 22/09/2008 Homme Mort BEFLC08 203a	VISA HBA	NBRE TOTAL DE FOLIOS 05  SCHEMAS <b>03</b>
	VERIFIE PAR Frédéric DENEZE	DATE DE VERIFICATION	E455i	MODIF MLE G 17/01/2006 DDM5548-BEFLC06 021	VISA CJY	
				MODIF F 11/03/2004 Ajout SA14	VISA FLE	
				MODIF D 15/10/2003 Modification pesage	VISA FLE	



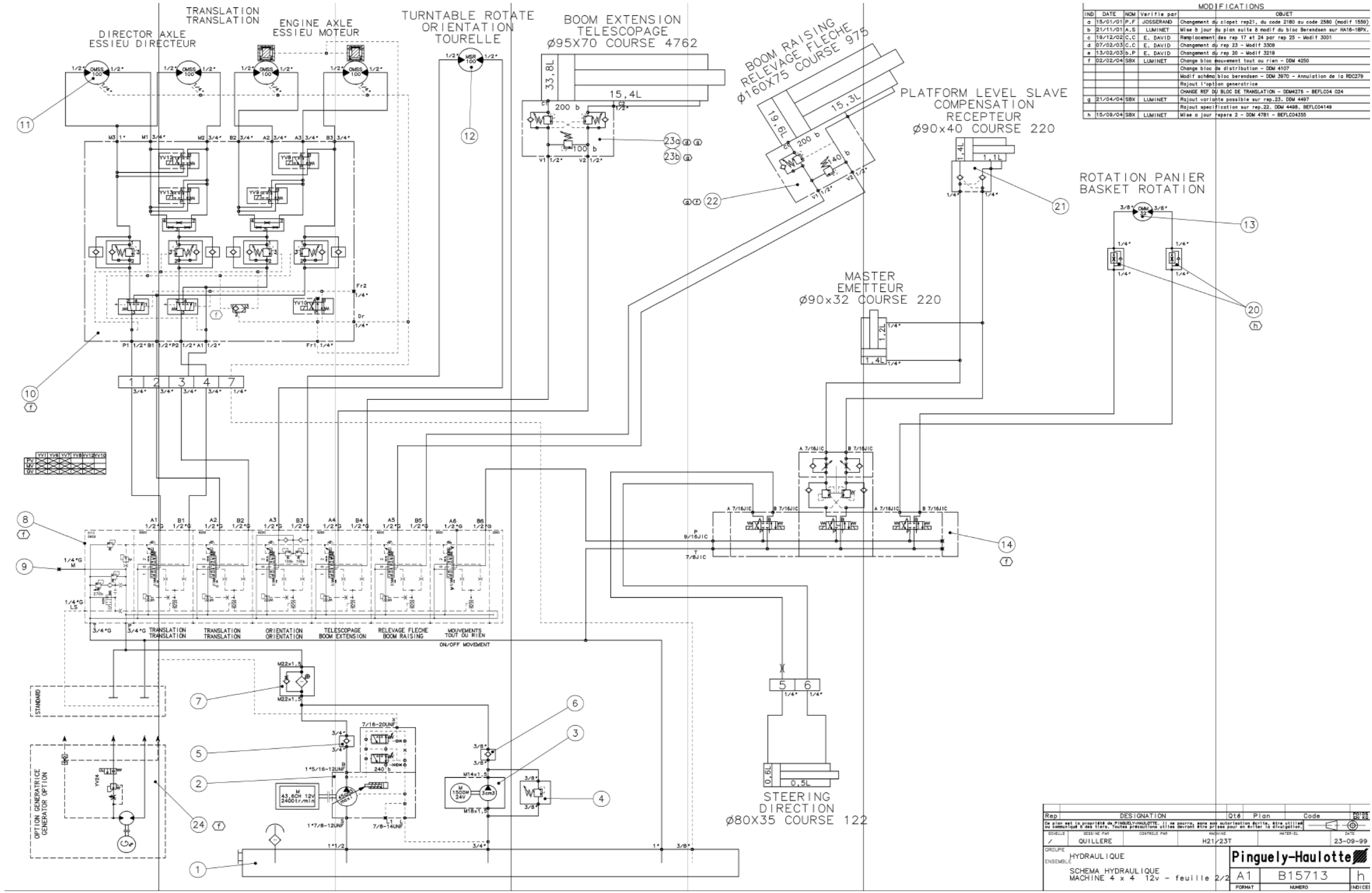
MODIF	IND	DATE	MODIFICATION	VISA
G		19/01/2006	Ajout HL8/NEBEFLC06 021	FLE
D		15/10/2003	Modification pesage	FLE
CJY	B	16/09/2003	Ajout HL13/SB33/YV25	FLE



<p>La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24</p>	DESSINE PAR Laurent DI FLORIO	DATE DE CREATION 20/04/1999	H21T-H23/H25TP (Hatz)	MODIF BPT	IND i	DATE 22/09/2008	MODIFICATION gestion alim PVG BEFLC08 203a	VISA HBA	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR Frédéric DENEZE	DATE DE VERIFICATION	E455h	CJO	IND B	DATE 16/09/2003	MODIFICATION Ajout HL13/SB33/YV25	VISA FLE	
	SCHEMAS								



Ce plan est la propriété de Pinguely-Haulotte. Il ne pourra, sans autorisation écrite, être utilisé ou communiqué à des tiers. Toutes précautions utiles doivent être prises pour en éviter la divulgation.				11/01/05
GROUPES ENSEMBLE	TERRIER	ADT	H2325TPX	
SCHEMA HYDRAULIQUE MACHINE 4 x 4 - FEUILLE 2/2			<b>Pinguely-Haulotte</b>	
FORMAT	A1	149P234040	B	INDICE



MODIFICATIONS				
IND	DATE	NOM	Verifie par	OBJET
a	15/01/01	P.F.	JOSSERAND	Changement du clapet rep21, du code 2180 au code 2580 (modif 1559)
b	21/11/01	A.S	LUMINET	Mise a jour de plan suite a modif du bloc Berendsen sur HAT6-18PX.
c	19/12/02	C.C	E. DAVID	Remplacement des rep 17 et 24 par rep 25 - Modif 3001
d	07/02/03	C.C	E. DAVID	Changement du rep 23 - Modif 3309
e	13/02/03	P.E.	DAVID	Changement du rep 20 - Modif 3219
f	02/02/04	SBX	LUMINET	Change bloc de mouvement tout ou rien - DDM 4250
				Change bloc de distribution - DDM 4107
				Modif schéma bloc berendsen - DDM 3970 - Annulation de la RDC279
				Rajout l'option generateur
				CHANGE REF DU BLOC DE TRANSLATION - DDM4276 - BEFL04 024
g	21/04/04	SBX	LUMINET	Rajout variante possible sur rep.23, DDM 4487
				Rajout specification sur rep.22, DDM 4498, BEFL04049
h	15/09/04	SBX	LUMINET	Mise a jour repare 2 - DDM 4781 - BEFL04355

Rep	DESIGNATION	Qté	Plan	Code	REVISION
/	QUILLERE		H21/23T		23-09-99
GROUPE HYDRAULIQUE SCHEMA HYDRAULIQUE MACHINE 4 x 4 12v - feuille 2/2					
<b>Pinguly-Haulotte</b>				A1	B15713
ENSEMBLE				FORMAT	NUMERO
				INDICE	