TECHNICAL TRAINING

DIAGNOSTIC LEVEL II

All types HA16PX-HA18PX (HA46JRT – HA51JRT)

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 manual user delivered with the machine: components, overall dimensions, working zones , commands, etc…

Chapter 2: Study of the wiring diagram
You will find there the elements 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 diagram
You will find there the elements 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.

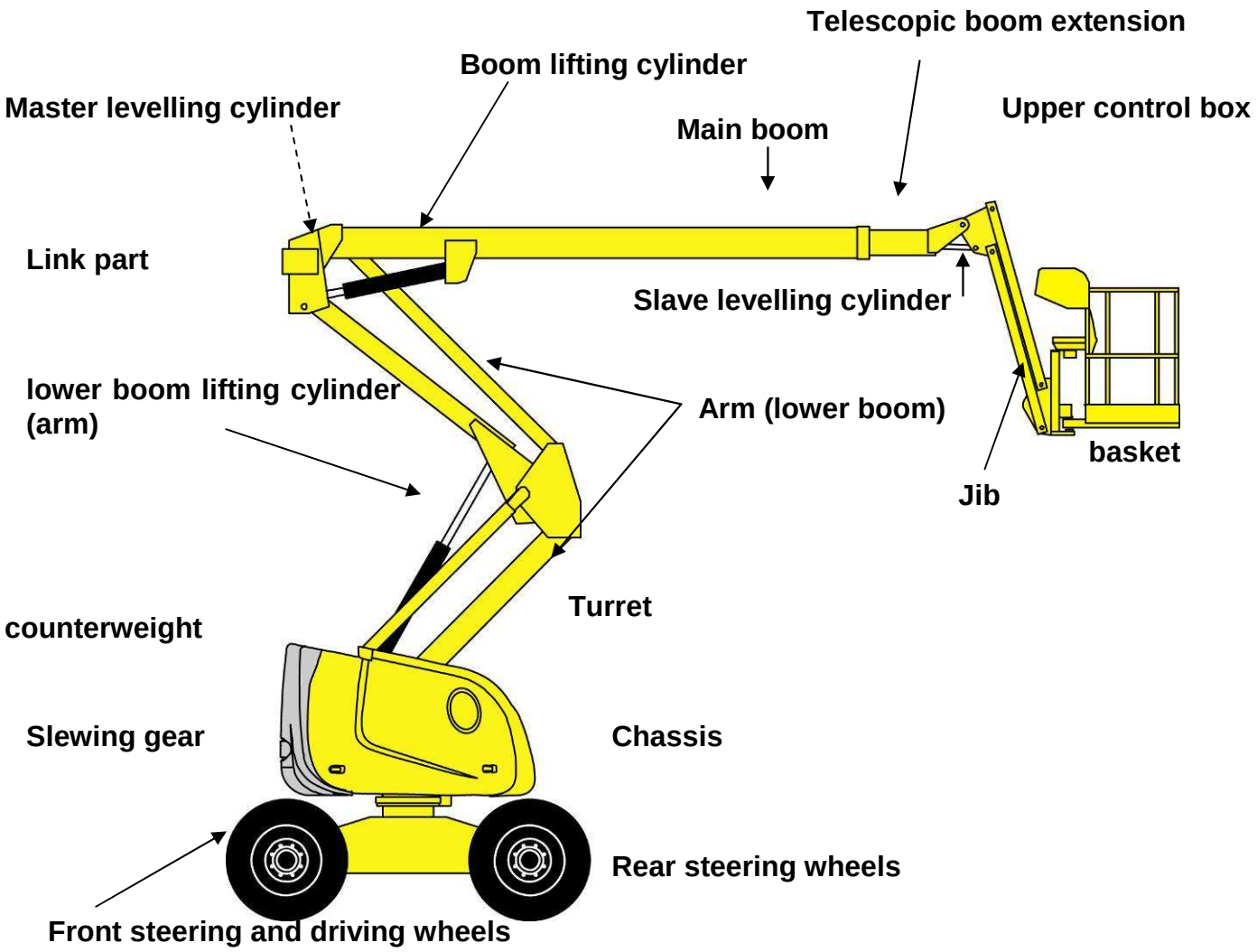
Chapter 6: Summary of the versions
This manual treats of the latest version, however this summary table enables you to find the former versions of the material (electric and hydraulics).

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 as 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)

SUMMARY

1. MAIN FEATURES AND FUNCTIONS

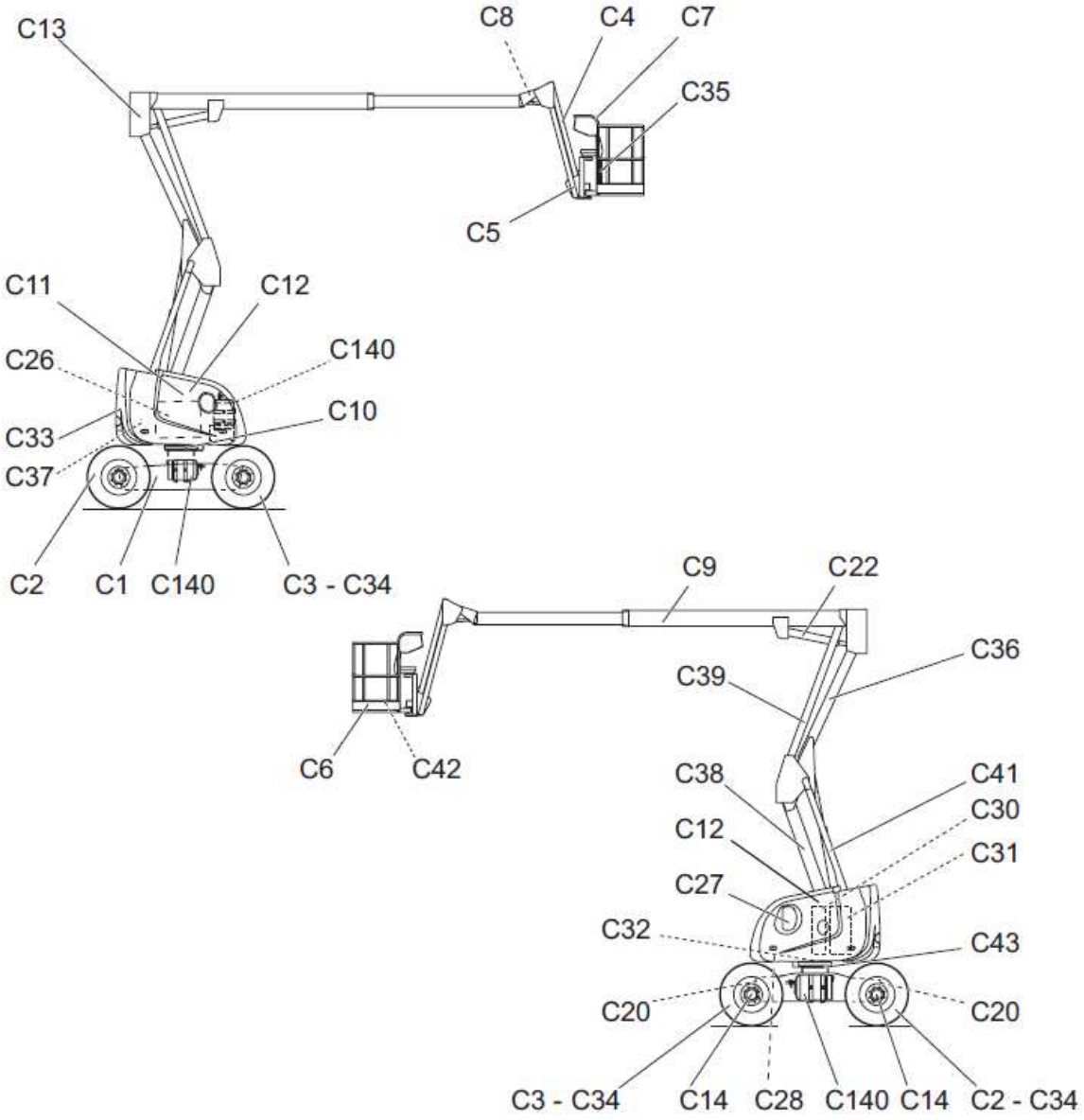
1.1. THE DESIGN



1.2. CHARACTERISTICS

1.2.1. MAIN COMPONENTS

HA16X - HA16SPX (HA46SJRT) - HA16PX (HA46JRT) - HA18SPX (HA51SJRT) - HA18PX (HA51JRT) - View of components for articulated arms under 20 m(65 ft7 in)



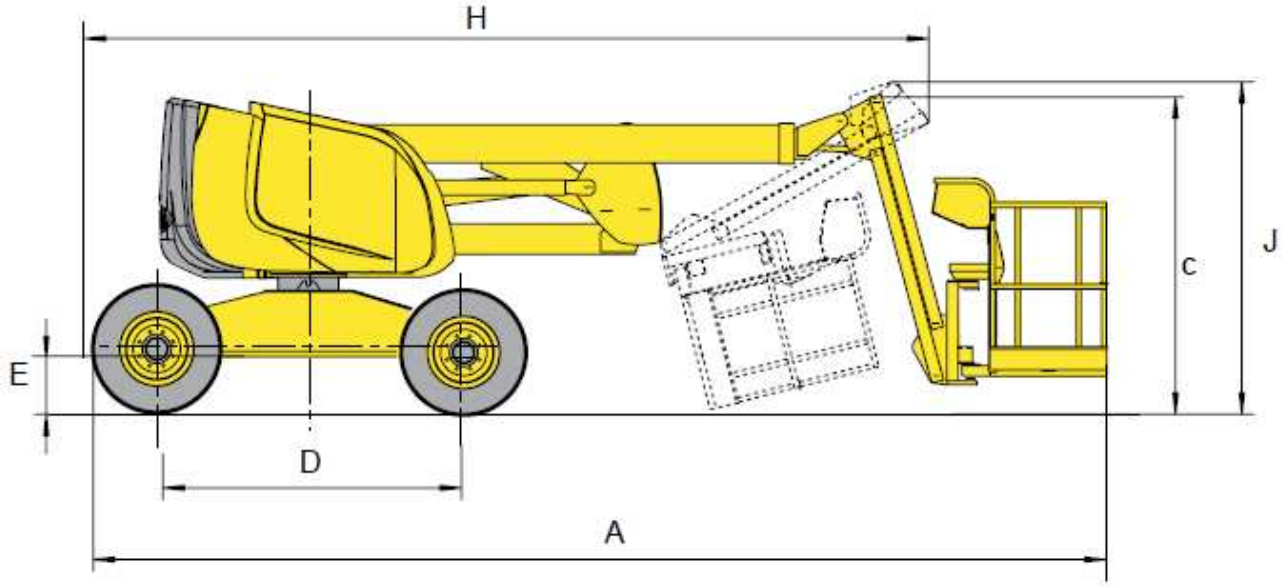
HA16X - HA16SPX (HA46SJRT) - HA16PX (HA46JRT) - HA18SPX (HA51SJRT) - HA18PX (HA51JRT) - Description of the components

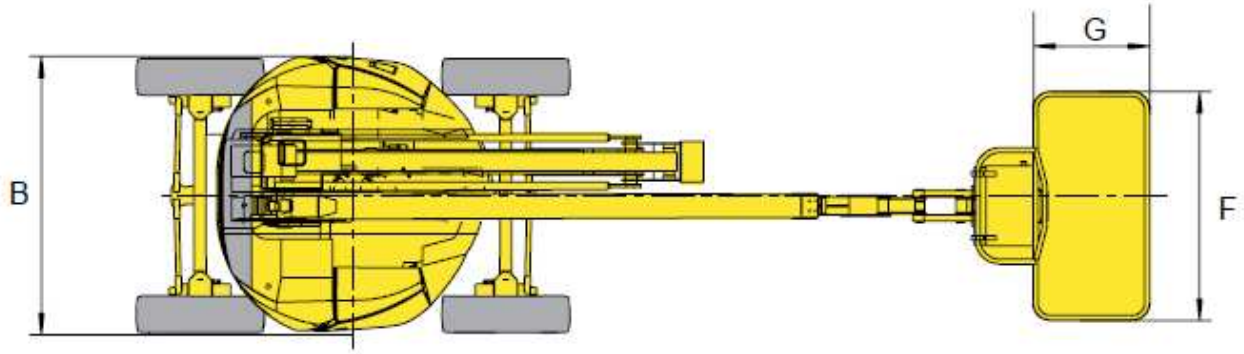
Marking	Description
C1	Rolling chassis
C2	Front driven steering axle
C3	Rear drive and/or steer wheel
C4	Jib
C5	Platform support incorporating load limiter
C6	Platform
C7	Platform control box
C8	Compensation receiver cylinder
C9	Boom (or boom tube)
C10	Slew ring
C11	Turntable assembly
C12	Hood
C13	Arm/Boom link piece
C14	Hydraulic drive motor and reducer
C20	Tie-down (and/or lifting) points
C22	Boom lift cylinder
C26	Engine and hydraulic pump
C27	Ground control box
C28	Tilt detector
C30	Hydraulic tank
C31	Fuel tank
C32	Turntable rotation gearbox
C33	Counterweight
C34	Drive wheels
C35	Document holder
C36	Top arm
C37	Starter battery
C38	Bottom arm
C39	Top tie rod
C41	Bottom tie rod
C42	'Enable Switch' pedal
C43	Turntable rotation lock pin
C140	Gas bottles[1]

1. For US only

1.2.2. OVERALL DIMENSIONS

General diagram HA16PX (HA46JRT) - HA18PX (HA51JRT) - HA16SPX (HA46SJRT) - HA18SPX (HA51SJRT)

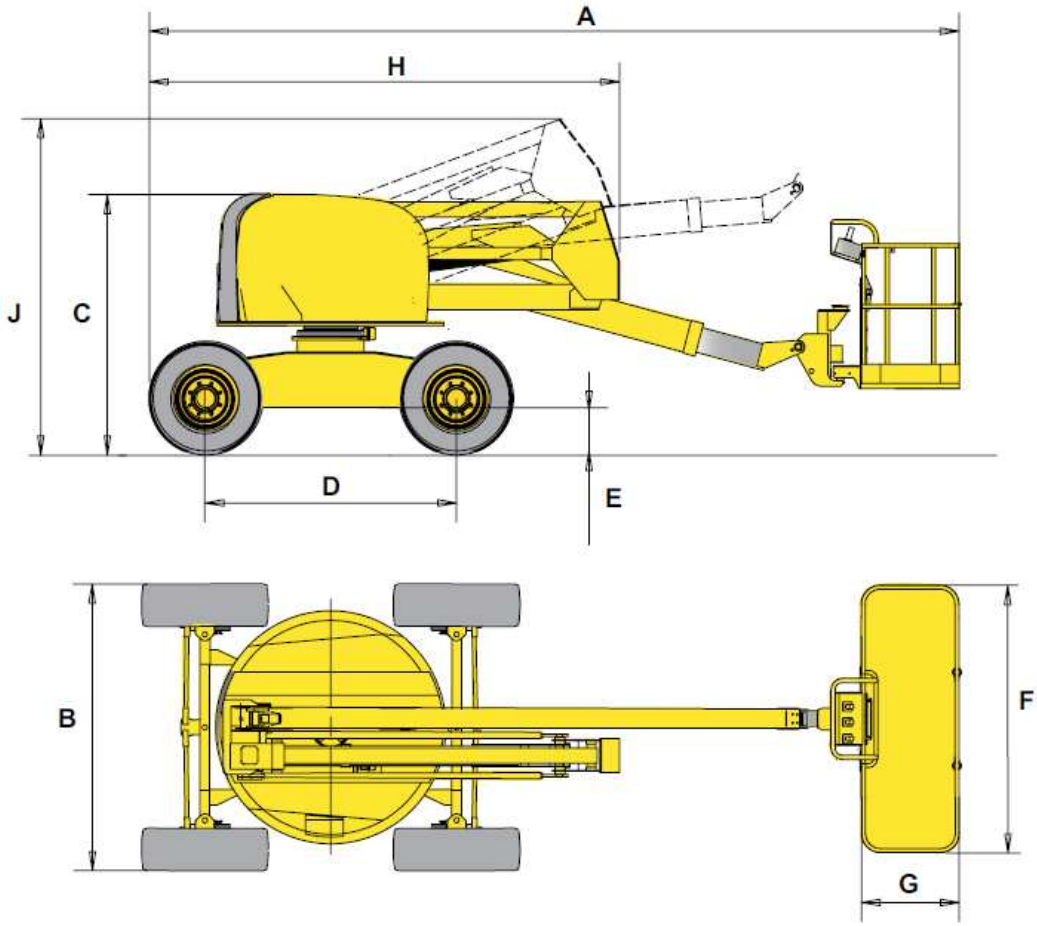




Marking	HA16PX (HA46JRT)		HA18PX (HA51JRT)	
	Mètre	Feet Inch	Mètre	Feet Inch
A	6,95	22 ft 9 in	7,60	24 ft 11 in
B	2,30	7 ft 6 in	2,30	7 ft 6 in
C	2,30	7 ft 7 in	2,30	7 ft 7 in
D	2,00	6 ft 7 in	2,00	6 ft 6 in
E	0,40	1 ft 3 in	0,40	1 ft 3 in
F x G	1,80/2,30 x 0,80	5 ft 10 in / 7 ft 6 in x 2 ft 7 in	1,80/2,30 x 0,80	5 ft 10 in / 7 ft 6 in x 2 ft 7 in
H	5,25	17 ft 2 in	5,90	19 ft 4 in
J	2,30	7 ft 7 in	2,30	7 ft 7 in

Marking	HA16SPX (HA46SJRT)		HA18SPX (HA51SJRT)	
	Mètre	Feet Inch	Mètre	Feet Inch
A	6,80	22 ft 3 in	7,50	24 ft 7 in
B	2,30	7 ft 6 in	2,30	7 ft 6 in
C	2,20	7 ft 2 in	2,20	7 ft 2 in
D	2,00	6 ft 7 in	2,00	6 ft 7 in
E	0,35	1 ft 1 in	0,35	1 ft 1 in
F x G	1,80 x 0,80	5 ft 10 in x 2 ft 7 in	1,80 x 0,80	5 ft 10 in x 2 ft 7 in
H	5,30	17 ft 4 in	5,80	19 ft 0 in
J	2,30	7 ft 6 in	2,30	7 ft 6 in

General diagram HA16X

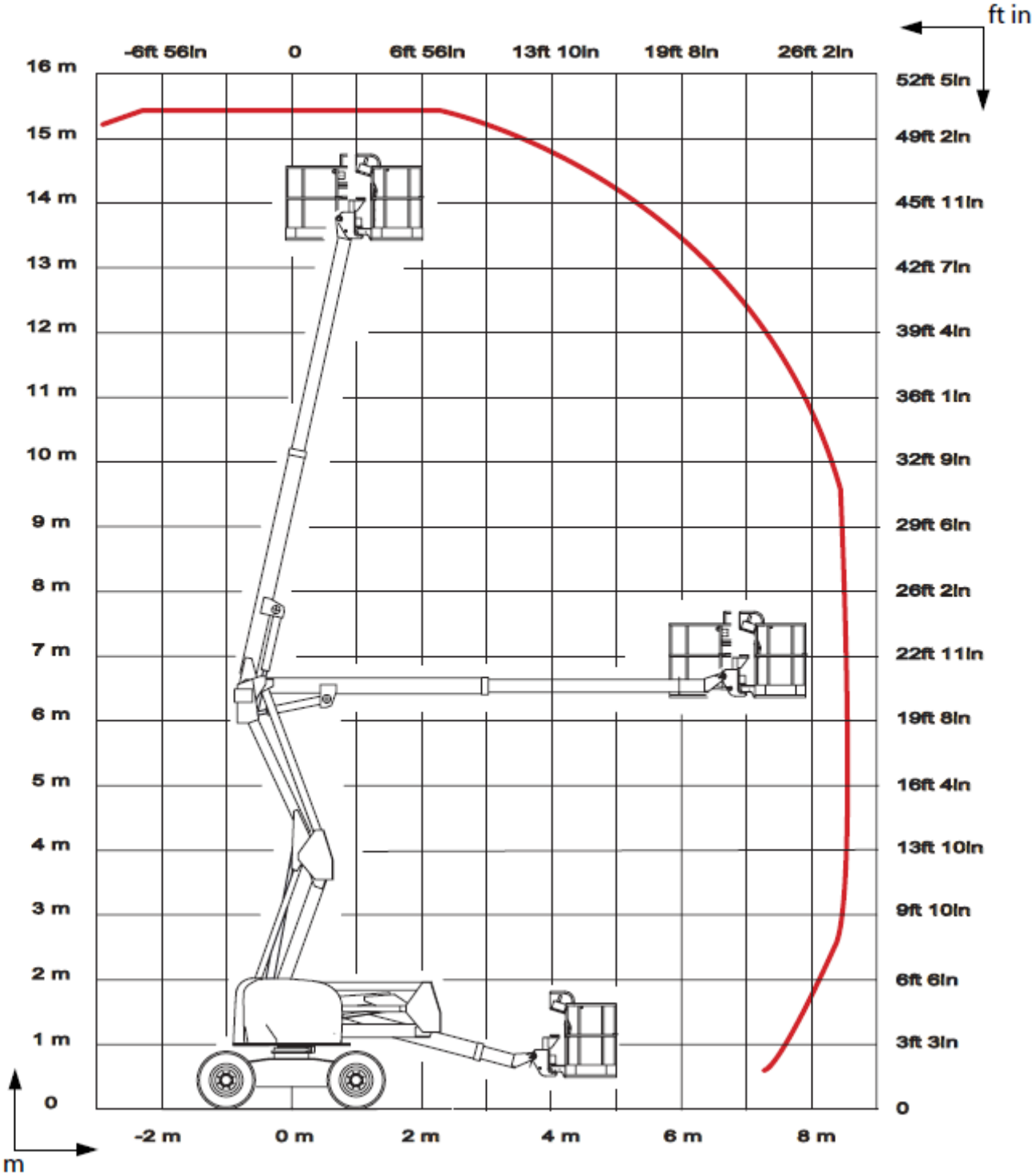


Marking	HA16X	
	Mètre	Feet Inch
A	6,70	22 ft 0 in
B	2,25	7 ft 5 in
C	2,08	6 ft 9 in
D	2,00	6 ft 7 in
E	0,37	1 ft 3 in
F x G	1,80/2,30 x 0,80	5 ft 10 in / 7 ft 6 in x 2 ft 7 in
H	6,70	21 ft 11 in
J	2,25	7 ft 5 in

1.2.3. WORKING ZONE

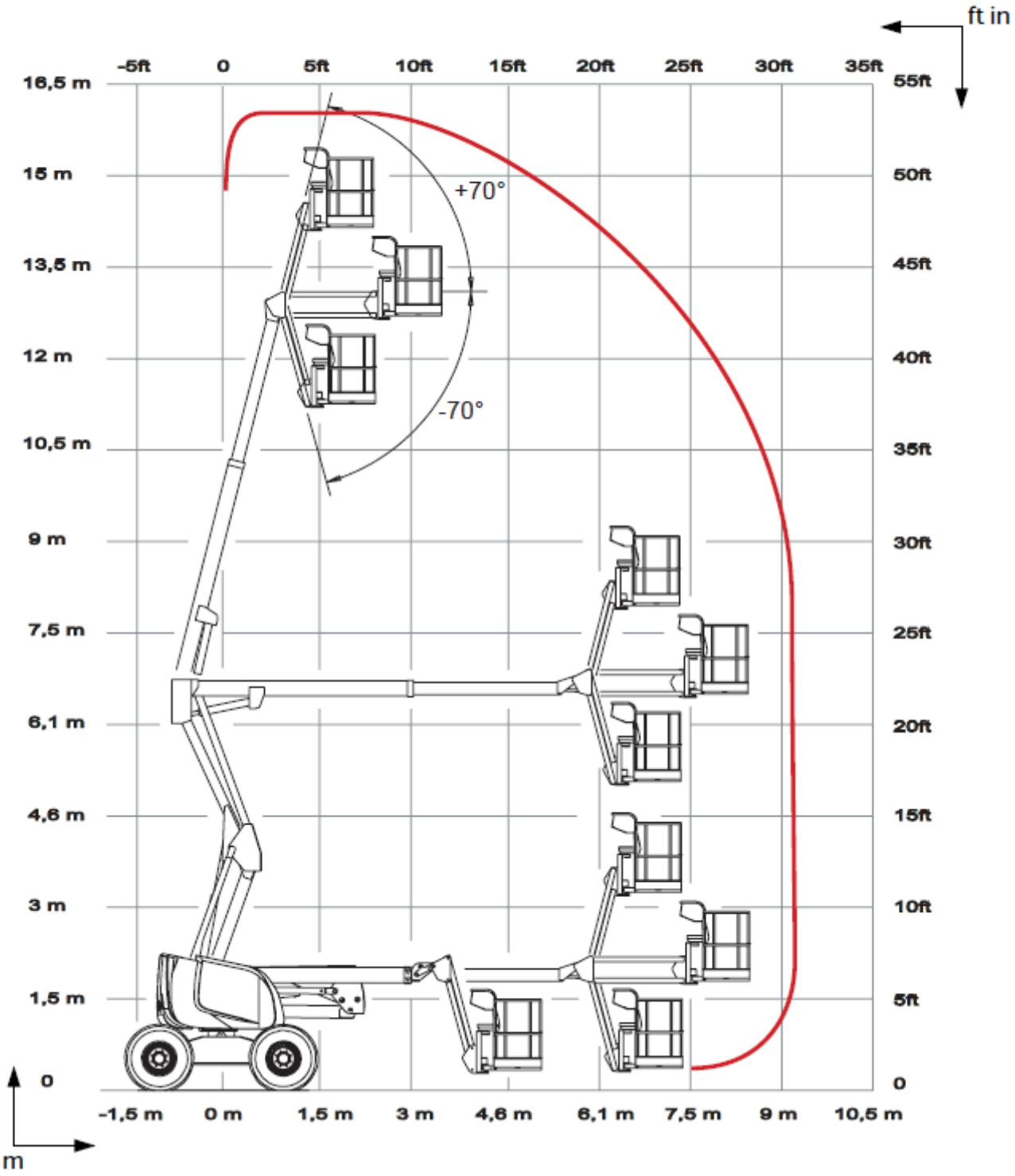
HA16X

Working area

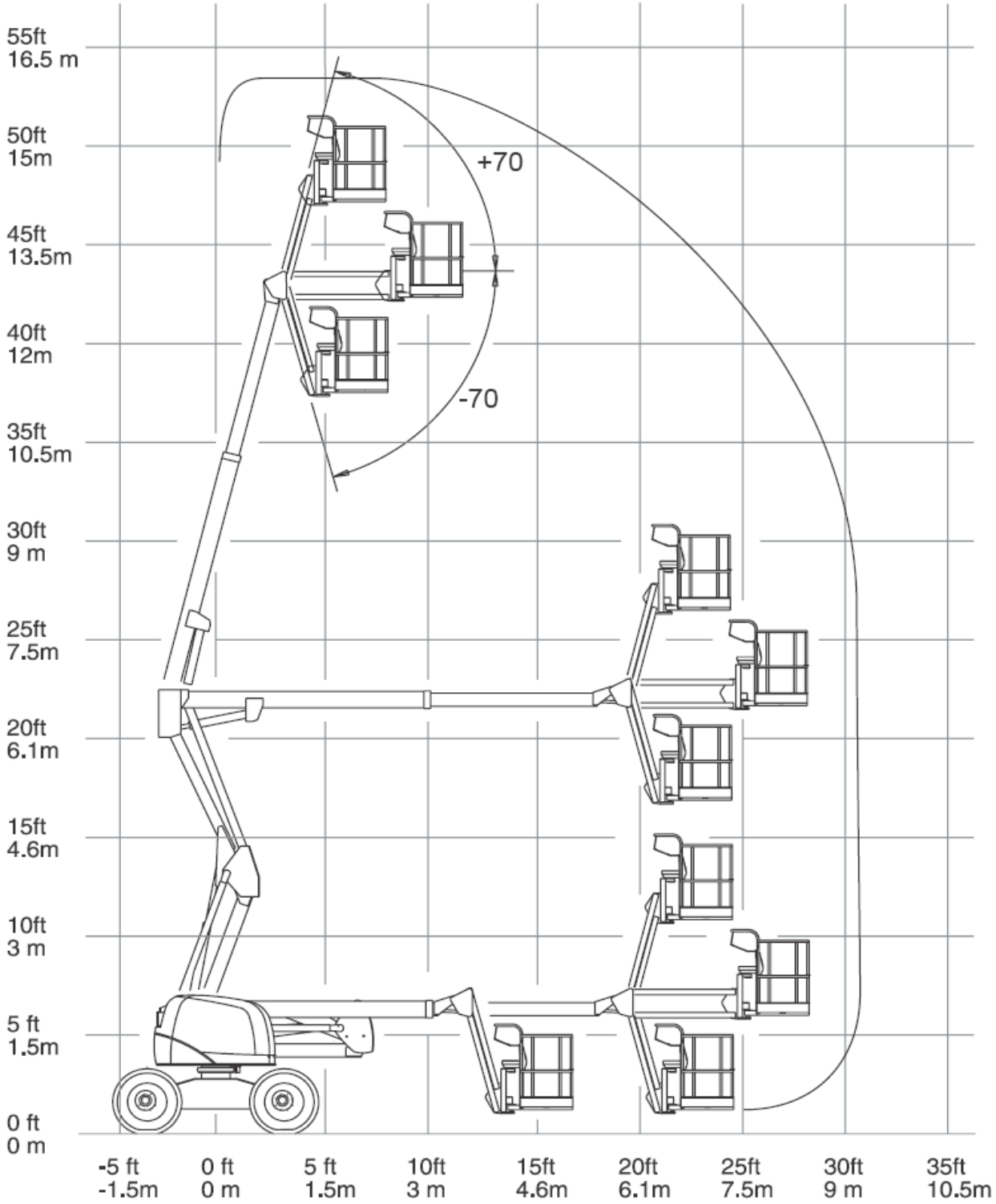


MACHINE HA16PX (HA46JRT)

Working area

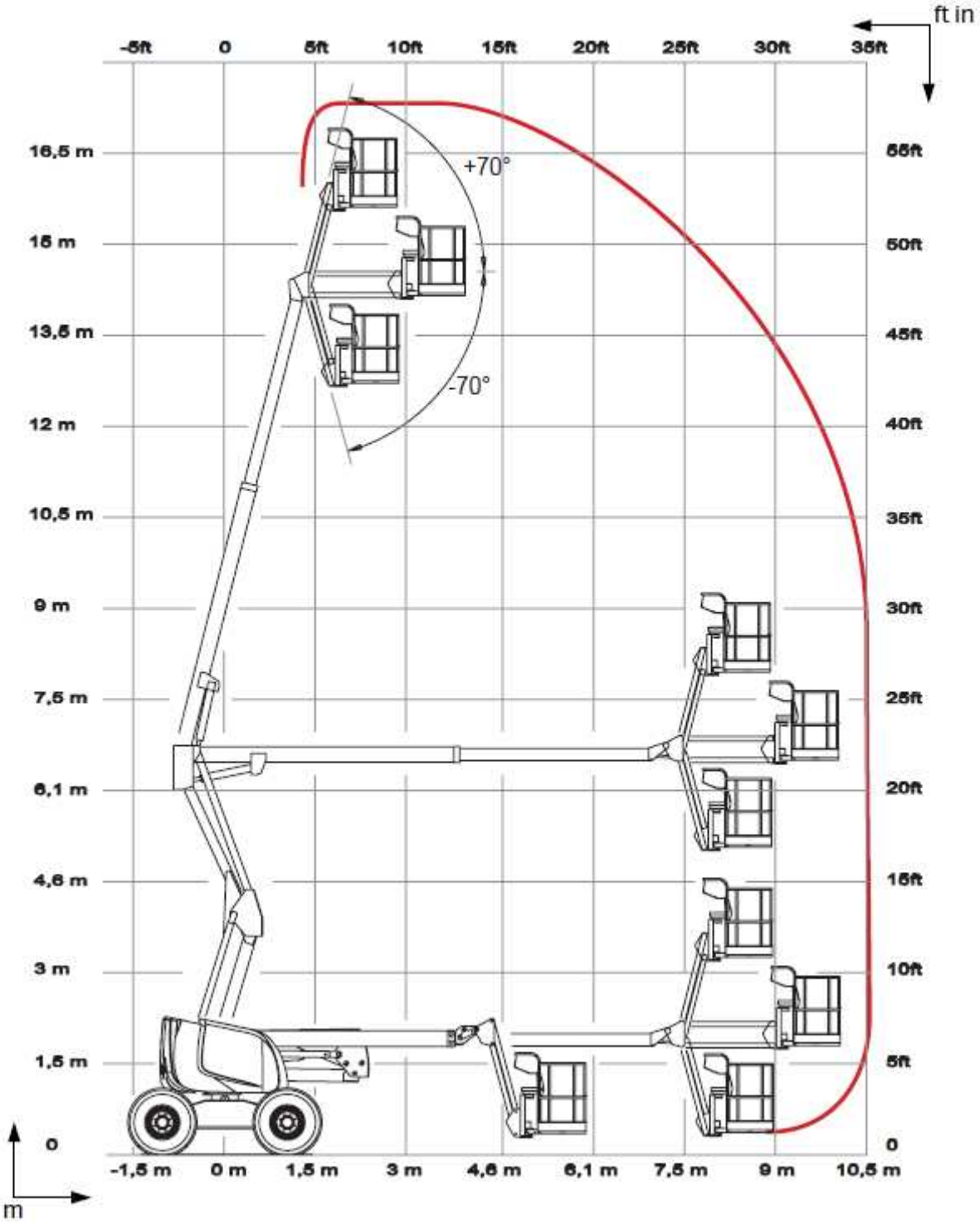


HA 16PE


55ft
16.5 m
50ft
15m
45ft
13.5m
40ft
12m
35ft
10.5m
30ft
9 m
25ft
7.5m
20ft
6.1m
15ft
4.6m
10ft
3 m
5 ft
1.5m
0 ft
0 m
+70
-70
-5 ft
-1.5m
0 ft
0 m
5 ft
1.5m
10ft
3 m
15ft
4.6m
20ft
6.1m
25ft
7.5m
30ft
9 m
35ft
10.5m

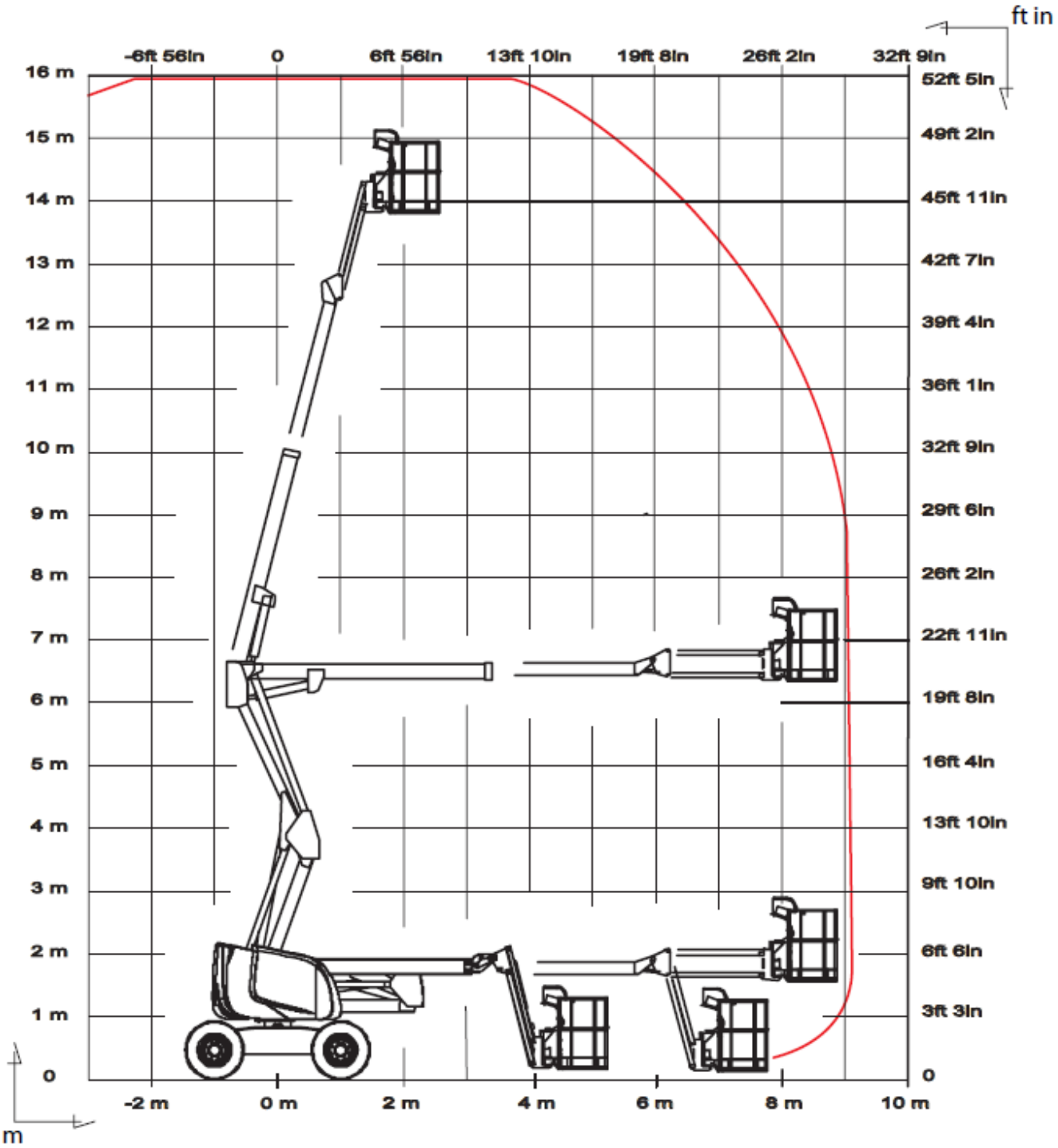
MACHINE HA18PX (HA51JRT)

Working area



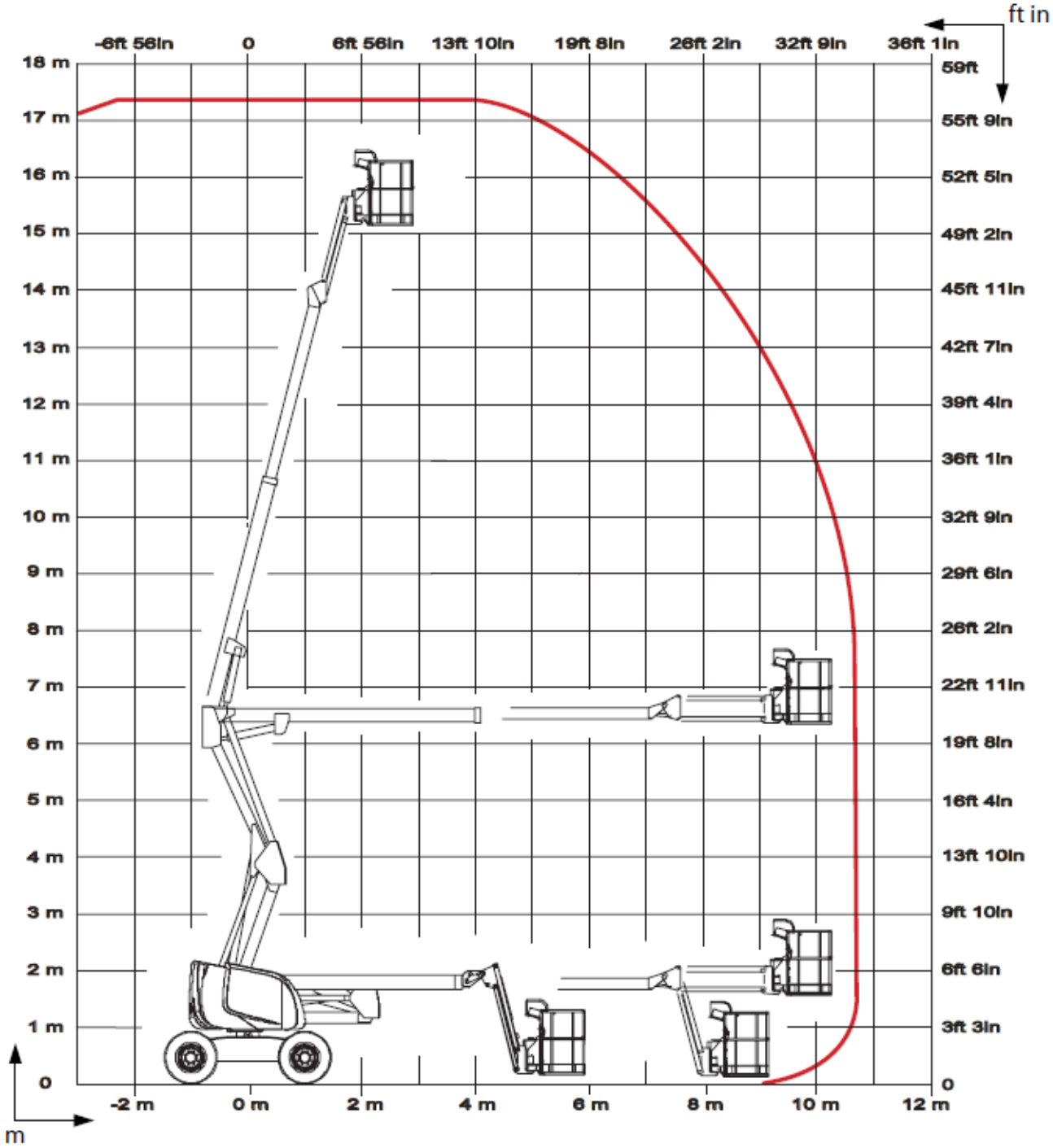
MACHINE HA16SPX (HA46SJRT)

Working area



3.6 - MACHINE HA18SPX (HA51SJRT)

Working area



1.2.4. FEATURES

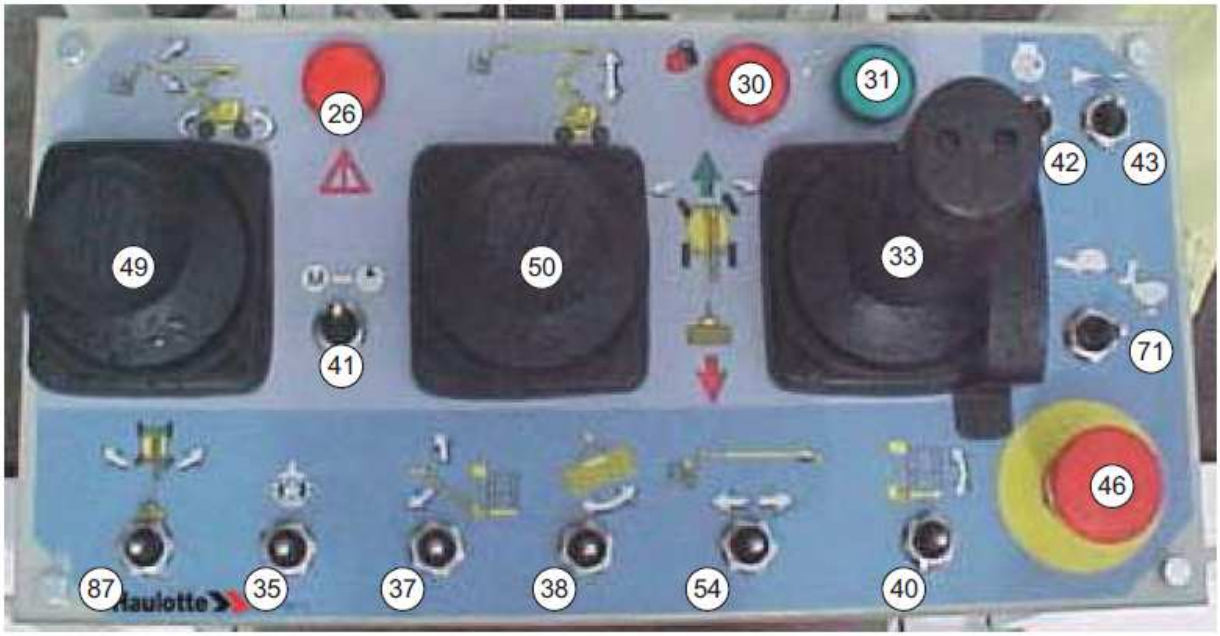
Machine Characteristics	HA16X Metric	HA16X Imperial
Length of machine in stowed position	7,60 m	(24 ft 11 in)
Width of the machine in stowed position	2,26 m	(7 ft 5 in)
Machine height	2,08 m	(6 ft 9 in)
Maximum ground clearance	0,35 m	(1 ft 1 in)
Transport height	2,26 m	(7 ft 5 in)
Transport length	6,70 m	(21 ft 11 in)
Maximum work height	15,45 m	(50 ft 8 in)
Maximum platform height	13,45 m	(44 ft 1 in)
Maximum drift	8,45 m	(27 ft 8 in)
Maximum radius	7,35 m	(24 ft 1 in)
Turntable rotation	350 °	
Boom rotation angle	+76° / -18° s	
Jib working range	+70° / -70° s	
Platform length	0,80 m	(2 ft 7 in)
Platform width	1,80 m -2,30 m	(5 ft 10 in) - (7 ft 6 in)
Platform rotation angle	+90° / -90° s	
Outer turning radius (without axle outriggers retracted)	9,30 m	(30 ft 6 in)
Inner turning radius (with axles retracted)	3,55 m	(11 ft 7 in)
Lateral distance between the wheels	2,00 m	(6 ft 6 in)
Tilt	5 °	
Maximum authorized wind speed	45 km/h	(28 mph)
Total weight	6500 kg	(14330 lb)
Maximum platform load	230 kg	(507 lb)
Engine type	Diesel - Deutz F3L1011F	
Engine power	28 kW	(38 Hp)
Engine power when idle	15 kW	(20,3 Hp)
Fuel consumption when idle	2309 g/kWh	
Sound level at 10 m (32 ft 9 in)	75 dB (A)	
Vibration in the hands	<2,5 m/s²	(98,4 in/s²)
Vibration in the feet	<0,5 m/s²	(19,6 in/s²)
Fuel tank capacity	55 l	(14 gal US)
Hydraulic tank capacity	100 l	(26 gal US)
Starter battery	12 V-95 Ah	
Differential blocking	Yes	
Maximum climbable slope	50 %	
Type of tyres	Foam-filled-14 x 17,5	
Maximum pressure on hard ground	10,1 bar	(146,4 psi)
Maximum pressure on soft ground	3 bar	(43,5 psi)
Low drive speed	0,4 km/h	(0,2 mph)
Medium-speed driving	1,5 km/h	(0,9 mph)
High drive speed	6,0 km/h	(3,7 mph)

Machine Characteristics	HA16PX (HA46JRT) Metric	HA16PX (HA46JRT) Imperial	HA18PX (HA51JRT) Metric	HA18PX (HA51JRT) Imperial
Length of machine in stowed position	6,95 m	(22 ft 9 in)	7,60 m	(24 ft 11 in)
Width of the machine in stowed position	2,30 m	(7 ft 6 in)	2,30 m	(7 ft 6 in)
Machine height	2,20 m	(7 ft 2 in)	2,20 m	(7 ft 2 in)
Maximum ground clearance	0,40 m	(1 ft 3 in)	0,40 m	(1 ft 3 in)
Transport height	2,15 m	(7 ft 0 in)	2,15 m	(7 ft 0 in)
Transport length	5,25 m	(17 ft 2 in)	5,90 m	(19 ft 4 in)
Maximum work height	16,00 m	(52 ft 5 in)	17,30 m	(56 ft 9 in)
Maximum platform height	14,00 m	(45 ft 11 in)	15,30 m	(50 ft 2 in)
Maximum drift	9,10 m	(29 ft 10 in)	10,60 m	(34 ft 9 in)
Maximum radius	8,70 m	(28 ft 6 in)	10,07 m	(33 ft 0 in)
Turntable rotation	360 °			
Boom rotation angle	+74° / -3° s			
Jib working range	+70° / -70° s			
Platform length	0,80 m	(2 ft 7 in)	0,80 m	(2 ft 7 in)
Platform width	1,80 m -2,30 m	(5 ft 10 in) - (7 ft 6 in)	1,80 m -2,30 m	(5 ft 10 in) - (7 ft 6 in)
Platform rotation angle	+90° / -90° s			
Outer turning radius (without axle outriggers retracted)	4,00 m	(13 ft 1 in)	4,00 m	(13 ft 1 in)
Inner turning radius (with axles retracted)	1,90 m	(6 ft 2 in)	1,90 m	(6 ft 2 in)
Lateral distance between the wheels	2,00 m	(6 ft 6 in)	2,00 m	(6 ft 6 in)
Tilt	5 °			
Maximum authorized wind speed	60-45 km/h	(37 - 28 mph)	60-45 km/h	(37 - 28 mph)
Total weight	7240 kg	(15961 lb)	8120 kg	(17901 lb)
Maximum platform load	230 kg	(507 lb)	230 kg	(507 lb)
Engine type	Diesel - Deutz F3L1011F			
Engine power	28 kW	(38 Hp)	28 kW	(38 Hp)
Engine power when idle	15 kW	(20,3 Hp)	15 kW	(20,3 Hp)
Fuel consumption when idle	2309 g/kWh			
Sound level at 10 m (32 ft 9 in)	75 dB (A)			
Vibration in the hands	<2,5 m/s²	(98,4 in/s²)	<2,5 m/s²	(98,4 in/s²)
Vibration in the feet	<0,5 m/s²	(19,6 in/s²)	<0,5 m/s²	(19,6 in/s²)
Fuel tank capacity	72 l	(19 gal US)	72 l	(19 gal US)
Hydraulic tank capacity	100 l	(26 gal US)	100 l	(26 gal US)
Starter battery	12 V-95 Ah		12 V-95 Ah	
Differential blocking	Yes			
Maximum climbable slope	50 %			
Type of tyres	Foam-filled-385/65D22,5			
Wheel nut torque	32,5 daN.m	(236 lbf.ft)	32,5 daN.m	(236 lbf.ft)
Slew ring torque	21,5 daN.m	(158 lbf.ft)	21,5 daN.m	(158 lbf.ft)
Maximum pressure on hard ground	8 bar	(116 psi)	8,2 bar	(118 psi)
Maximum pressure on soft ground	3,2 bar	(46 psi)	3,6 bar	(52 psi)
Micro drive speed	0,22 km/h	(0,1 mph)	0,22 km/h	(0,1 mph)
Low drive speed	0,38 km/h	(0,2 mph)	0,38 km/h	(0,2 mph)
Medium-speed driving	0,77 km/h	(0,4 mph)	0,77 km/h	(0,4 mph)
High drive speed	1,52 km/h	(0,9 mph)	1,52 km/h	(0,9 mph)

Machine	HA16SPX (HA46SJRT)		HA18SPX (HA51SJRT)	
Characteristics	Metric	Imperial	Metric	Imperial
Length of machine in stowed position	6,80 m	(22 ft 3 in)	7,50 m	(24 ft 7 in)
Width of the machine in stowed position	2,30 m	(7 ft 6 in)	2,30 m	(7 ft 6 in)
Machine height	2,20 m	(7 ft 2 in)	2,20 m	(7 ft 2 in)
Maximum ground clearance	0,35 m	(1 ft 1 in)	0,35 m	(1 ft 1 in)
Transport height	2,25 m	(7 ft 4 in)	2,25 m	(7 ft 4 in)
Transport length	5,30 m	(17 ft 4 in)	5,80 m	(19 ft 0 in)
Maximum work height	16,00 m	(52 ft 5 in)	17,30 m	(56 ft 9 in)
Maximum platform height	14,00 m	(45 ft 11 in)	15,30 m	(50 ft 2 in)
Maximum drift	9,10 m	(29 ft 10 in)	10,60 m	(34 ft 9 in)
Maximum radius	8,60 m	(28 ft 2 in)	10,00 m	(32 ft 9 in)
Turntable rotation	350 °			
Boom rotation angle	+75° / -0° s			
Jib working range	+70° / -70° s			
Platform length	0,80 m	(2 ft 7 in)	0,80 m	(2 ft 7 in)
Platform width	1,80 m	(5 ft 10 in)	1,80 m	(5 ft 10 in)
Platform rotation angle	+90° / -90° s			
Outer turning radius (without axle outriggers retracted)	9,30 m	(30 ft 6 in)	9,30 m	(30 ft 6 in)
Inner turning radius (with axles retracted)	3,55 m	(11 ft 7 in)	3,55 m	(11 ft 7 in)
Lateral distance between the wheels	2,00 m	(6 ft 6 in)	2,00 m	(6 ft 6 in)
Tilt	5 °			
Maximum authorized wind speed	45 km/h	(28 mph)	45 km/h	(28 mph)
Front-axle load	2700 kg	(5952 lb)	. kg	(. lb)
Rear-axle load	3900 kg	(8598 lb)	. kg	(. lb)
Total weight	6600 kg	(14550 lb)	7500 kg	(16534 lb)
Maximum platform load	230 kg	(507 lb)	230 kg	(507 lb)
Engine type	Diesel - Deutz F3L2011F			
Engine power	30,9 kW	(42 Hp)	30,9 kW	(42 Hp)
Engine power when idle	15 kW	(20,3 Hp)	15 kW	(20,3 Hp)
Fuel consumption when idle	2309 g/kWh			
Sound level at 10 m (32 ft 9 in)	75 dB (A)			
Vibration in the hands	<2,5 m/s²	(98,4 in/s²)	<2,5 m/s²	(98,4 in/s²)
Vibration in the feet	<0,5 m/s²	(19,6 in/s²)	<0,5 m/s²	(19,6 in/s²)
Fuel tank capacity	55 l	(14 gal US)	55 l	(14 gal US)
Hydraulic tank capacity	100 l	(26 gal US)	100 l	(26 gal US)
Starter battery	12 V-95 Ah			
Differential blocking	Yes			
Maximum climbable slope	40 %			
Type of tyres	Foam-filled-14 x 17,5			
Wheel nut torque	32,5 daN.m	(236 lbf.ft)	32,5 daN.m	(236 lbf.ft)
Slew ring torque	21,5 daN.m	(158 lbf.ft)	21,5 daN.m	(158 lbf.ft)
Maximum pressure on hard ground	10,1 bar	(146 psi)	13 bar	(188 psi)
Maximum pressure on soft ground	3 bar	(43 psi)	3,5 bar	(50 psi)
Micro drive speed	0,7 km/h	(0,4 mph)	0,7 km/h	(0,4 mph)
Low drive speed	1,5 km/h	(0,9 mph)	1,5 km/h	(0,9 mph)
Medium-speed driving	2,3 km/h	(1,4 mph)	2.3 km/h	(1,4 mph)
High drive speed	5,5 km/h	(3,4 mph)	5,5 km/h	(3,4 mph)

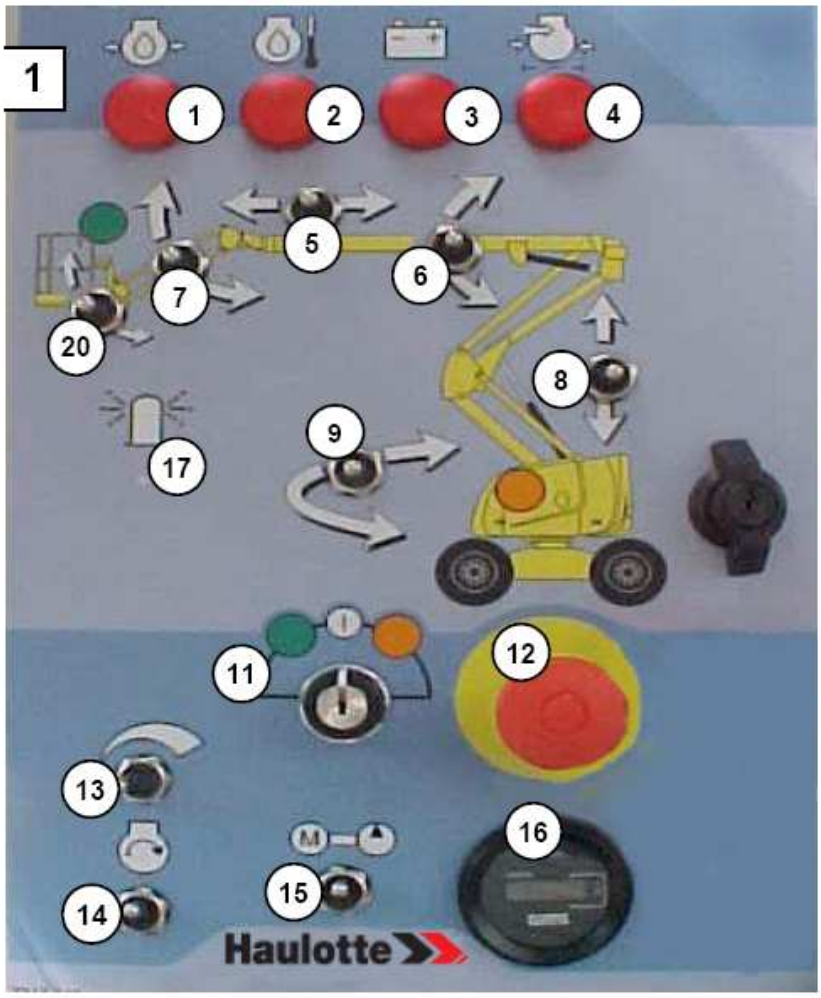
Machine	HA16PX (HA46JRT)		HA18PX (HA51JRT)	
Characteristics	Metric	Imperial	Metric	Imperial
Petrol / gas engine	PSI OPU-9T CPLG-PHSG-ZDFS			
Engine power	23 kW 2400 tr/mn	(31 Hp) 2400 rpm	23 kW 2400 tr/mn	(31 Hp) 2400 rpm
Engine power when idle	From 1200 tr/mn to 2400 tr/mn			
Sound level at 10 m (32 ft 9 in) Petrol supply	<104 dB (A)			
Fuel tank capacity	72 l	(19 gal US)	72 l	(19 gal US)

1.3. THE COMMANDS (UP/DOWN)



Controls and indicators

Marking	Description	Function
26	Fault indicator	Operation malfunction[1]
		Machine on excessive slope
30	Platform overload indicator	Platform overload
31	Power ON indicator	On : Machine switched on
		Off : Machine switched off
32	Radius limitation indicator	The indicator flashes : Close to radius limitation
		The indicator flashes continuously : Radius limitation reached
33	Drive joystick	Move forward : Forward drive
		Move backward : Reverse drive
	Front axle steering selector	Press right side of button : Right-hand steering
		Press left side of button : Left-hand steering
34	Rear axle steering selector	Move to the right : Right-hand steering
		Move to the left : Left-hand steering
35	Differential lock selector	Press in and hold (activated) : Maximum drive torque (on difficult or sloping ground)
		Release (deactivated) : Standard torque
37	Jib lifting / lowering selector	Move upwards : Jib lifting
		Move downwards : Jib lowering
38	Platform rotation selector	Move to the right : Counter clockwise (CCW) rotation
		Move to the left : Clockwise rotation
40	Platform leveling selector	Move upwards : Lifting of platform
		Move downwards : Lowering of platform
41	Back-up unit selector	Press in and hold : Back-up unit activated
		Release : Back-up unit deactivated
42	Engine start-up selector	Starting the engine
43	Horn selector	Horn
44	Petrol/Gas selector[2]	LPG : Gas supply
		G : Petrol or Optional diesel power supply
46	Emergency stop button	Pulled out (activated) : Ground control box energized
		Pushed down (deactivated) : De-energizes control system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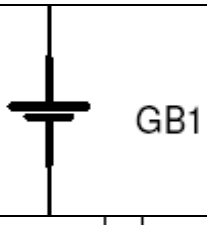
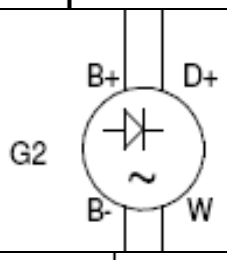
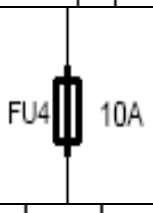
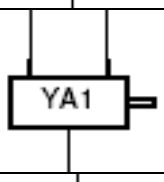
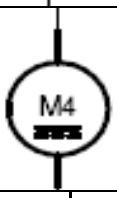
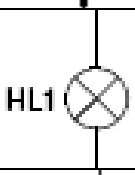
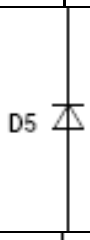
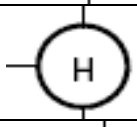
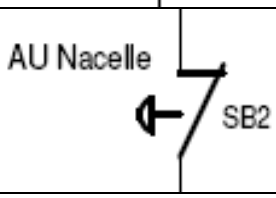
Controls and indicators

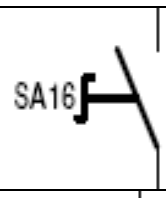
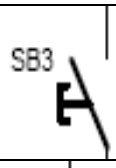
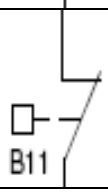
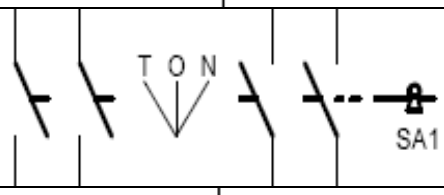
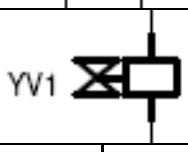
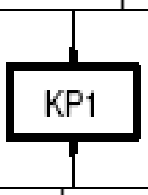
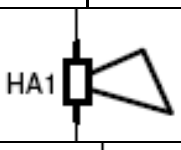
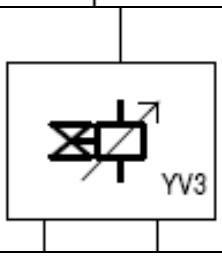
Marking	Description	Function
1	Electric pre-heating indicator	On : Engine in pre-heating mode
		Off : Engine pre-heated, starting possible
2	Engine oil pressure light	Low engine oil pressure[1]
3	Engine temperature indicator	High engine oil temperature(1.)
4	Battery charge indicator	Low battery charge(1.)
5	Air filter clogging indicator	Clogged air filter(1.)
6	Platform overload indicator	Platform overload
7	Radius limitation indicator	Close to radius limitation : • The indicator flashes • Movement is slowed down
		Radius limitation reached : • The indicator flashes continuously • An automatic movement is performed to return to the authorized radius limitation
8	Jib lifting / lowering selector	Move upwards : Jib lifting
		Move downwards : Jib lowering
9	Boom telescoping selector	Move to the left : To telescope out
		Move to the right : To telescope in
10	Boom raising selector	Move upwards : Boom raising
		Move downwards : Boom lowering
12	Arm lifting selector	Move upwards : Arm lifting
		Move downwards : Boom lowering
13	Platform levelling or transport position selector	Move to the right : Platform leveling lowered or placed in transport position
		Move to the left : Platform compensation lifted or placed in operating position
14	Turntable rotation selector	Move to the left : Counter clockwise (CCW) rotation
		Move to the right : Clockwise rotation
15	Emergency stop button	Pulled out (activated) : Ground control box energized
		Pushed down (deactivated) : De-energizes control system
19	Back-up unit selector[2]	Press in and hold : Back-up unit activated
		Release : Back-up unit deactivated
20	Hour meter	Total machine running hours
21	Engine acceleration selector	Move to the right : Engine speed increases
		Move to the left : Engine idle speed
22	Engine start-up selector	Starting the engine
23	Petrol/Gas selector[3]	LPG : Gas supply
		G : Petrol or Optional diesel power supply
24	Beacon light on/off	Move upwards : Beacon light on
		Move downwards : Beacon light off
72	Control box energizing key selector	Left : Platform control box energized
		Center : De-energizes control system
		Right : Ground control box energized
167	Engine temperature indicator[4]	Coolant temperature
228	'Enable Switch' selector / Back-up unit selector[5]	Move upwards : Movement validation
		Move downwards : Back-up unit activatedMovement validation

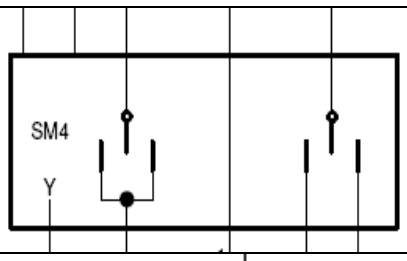
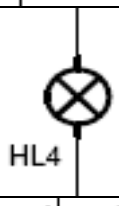
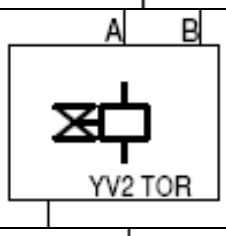
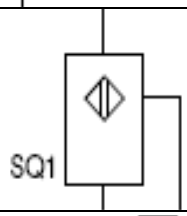
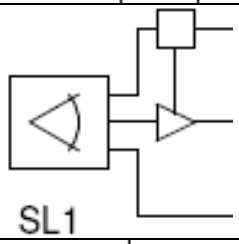
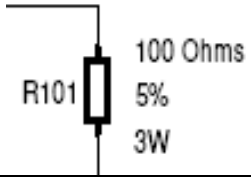
1. *Perform the required maintenance (see the machine maintenance book)*
2. *For machines fitted with*
3. *For machines fitted with*
4. *For machines fitted with*
5. *For machines fitted with*

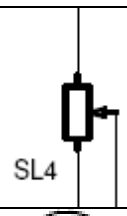
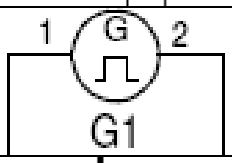
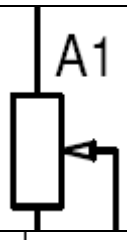
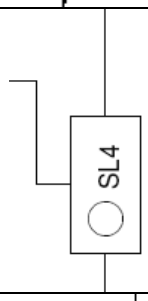
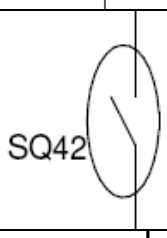
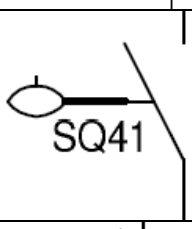
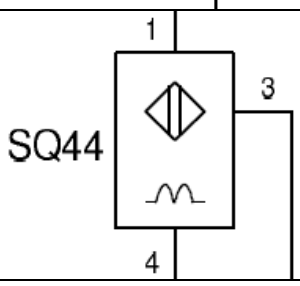
2. THE ELECTRICAL PART

2.1. SYMBOLS USED

	Battery with one element
	Alternator
	Fuse (Here 10 amps)
	Coil doble roll
	Electric motor
	light
	Diode
	Hourmeter
	Standard push-button of safety “mushroom-headed button”

	Rotary knob
	Push-button
	Limit switch
	Pressure switch
	Key selector with 3 positions (T turret, O neutral, N platform)
	Toggle switch with 2 positions
	Electrovalve
	relay
	horn
	Proportional electrovalve

	Controller/joysticks
	Pedals “dead man” or “foot dead man” switch
	buzzer
	“light”
	Electrovalve “ON/OFF » (bang-bang)
	Tilt sensor (ramp detection)
	Angle sensor (reach limitation)
	Contact « mercury » (angle detection)
	Resistor (here value 100 ohms, 3 Watts, tolerance of 5%)

	Sensor length (reach limitation)
	Pressure sensor (weighing)
	Angle sensor (weighing)
	Standard light “Led”
	Strain gauge
	Flexible Blade Switch (ILS) detection of the magnets on the telescopic boom/arm extension
	Level detector (diesel tank)
	Proximity detector with impulses (detection teeth slew ring)

2.2. METHODOLOGY OF CONTROL

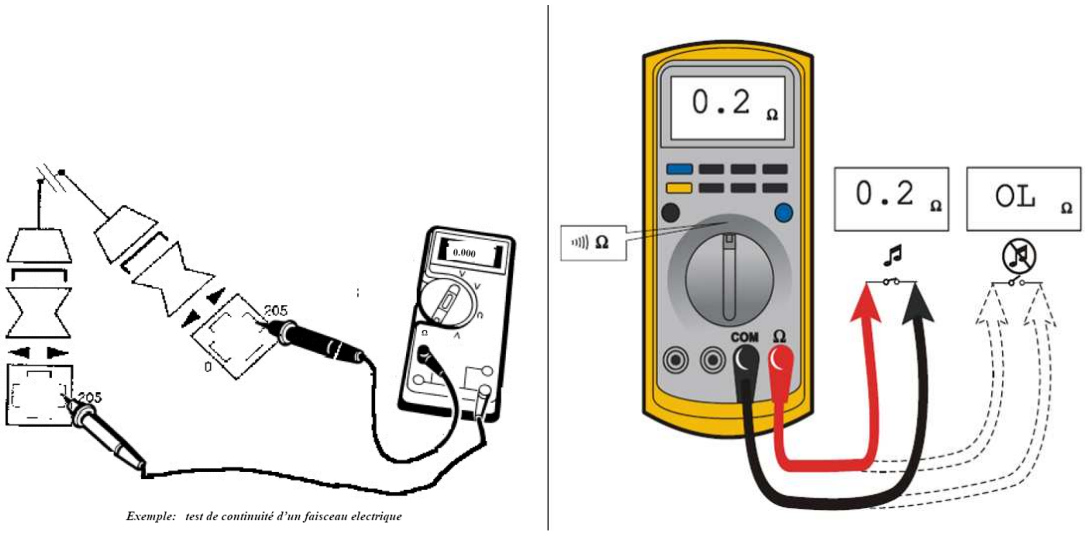
Note: during an intervention on a component or a loom, it is important to remember to switch OFF the power supply of the machine in order to avoid any risk.

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 (Ω).
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 Ω if continuity is good.
In the contrary case (resistor which tends towards the infinite one : ∞), continuity presents a defect.

Control of insulation

At the contrary of continuity, insulation represents a non electric connectiion 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 : ∞



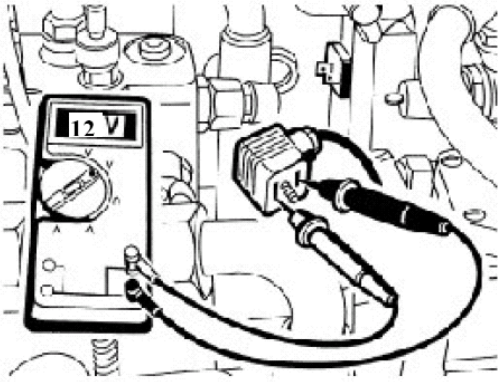
Exemple: test de continuité d'un faisceau electrique

2.2.2. CONTROL OF AN ON/OFF VALVE

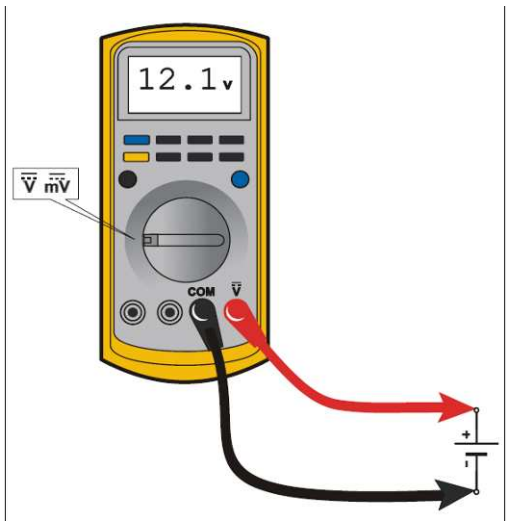
Note: These tests are to be carried out when power is ON .
Also control the state of the terminals or any other connectors (oxydation…)

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

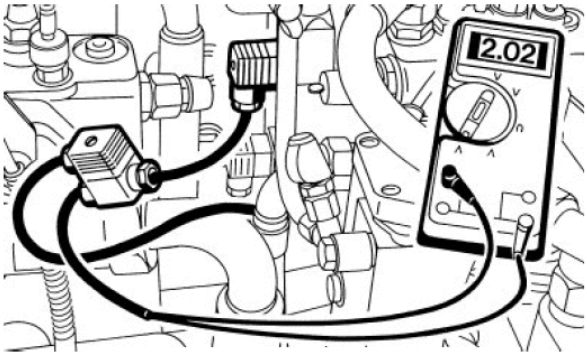


Contrôle de la tension d'alimentation du solénoïde

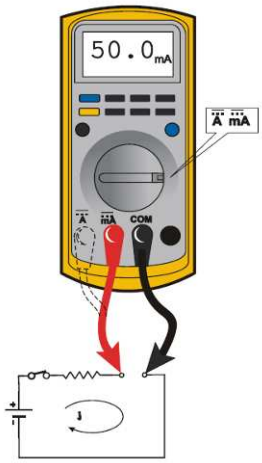


Control intensity of the coil

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 (Ω), then compare the value measured with that of the data manufacturer.
In the event of nonconformity of the coil, replace it.

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 Ohmmeter 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.

- **<u>supply control of the relay</u>**

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

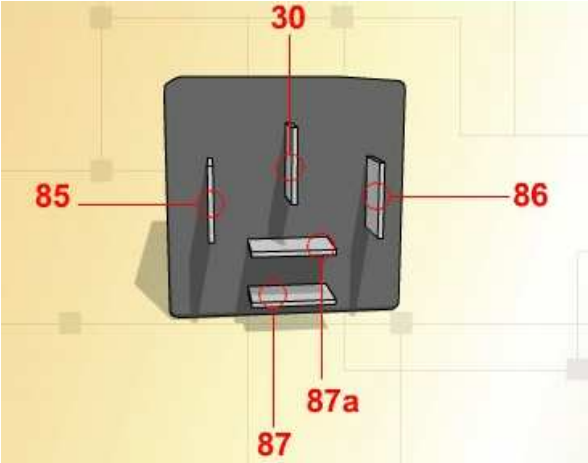
  Control the continuity of terminal 86 with the ground

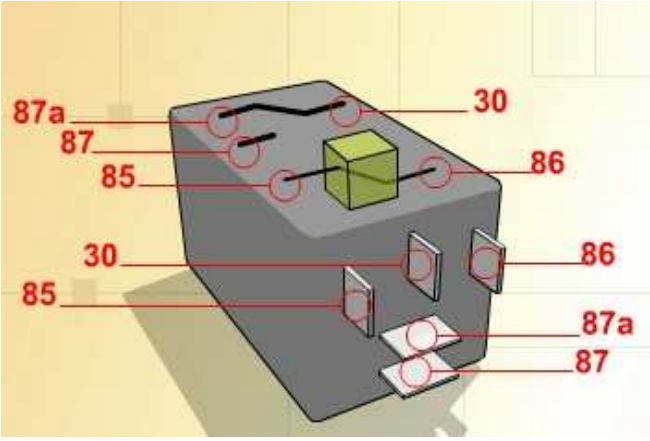
.(In the event of defect of continuity, check the concerned loom)

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



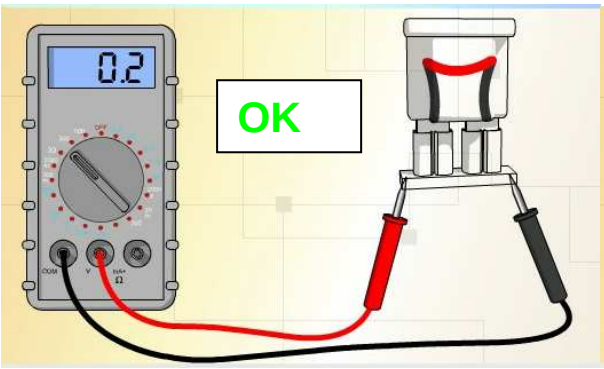


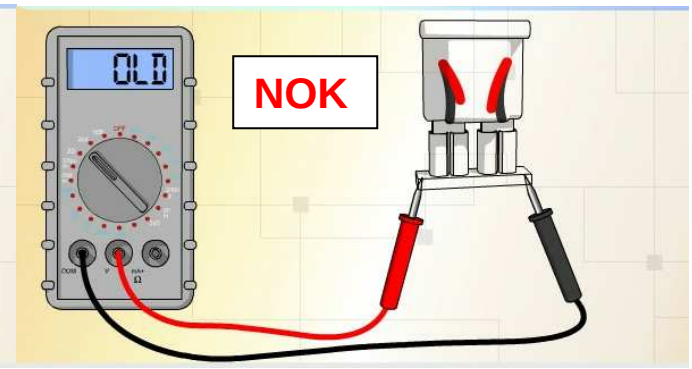
- **Control of a fuse**

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

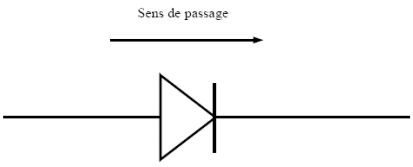
Fuse check
Multimeter in Ω position, it must indicate a value near 0





- **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.



Représentation normalisée d’une diode

2.3. THE WIRING DIAGRAM

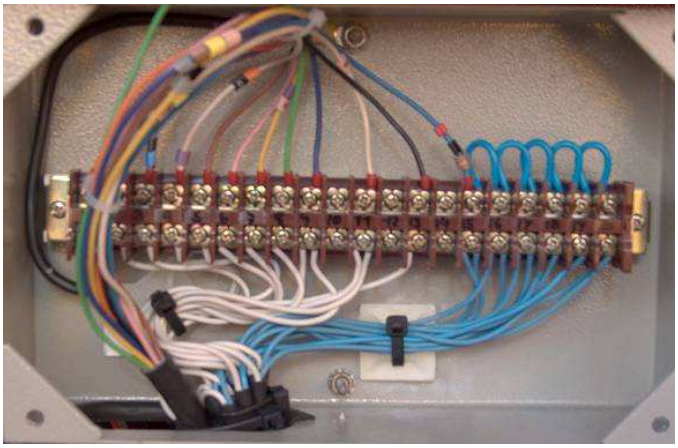
See all versions at the end of this manual

2.4. THE MAIN PRINTED CIRCUIT (LOW CONTROL BOX)

See at the end of this manual

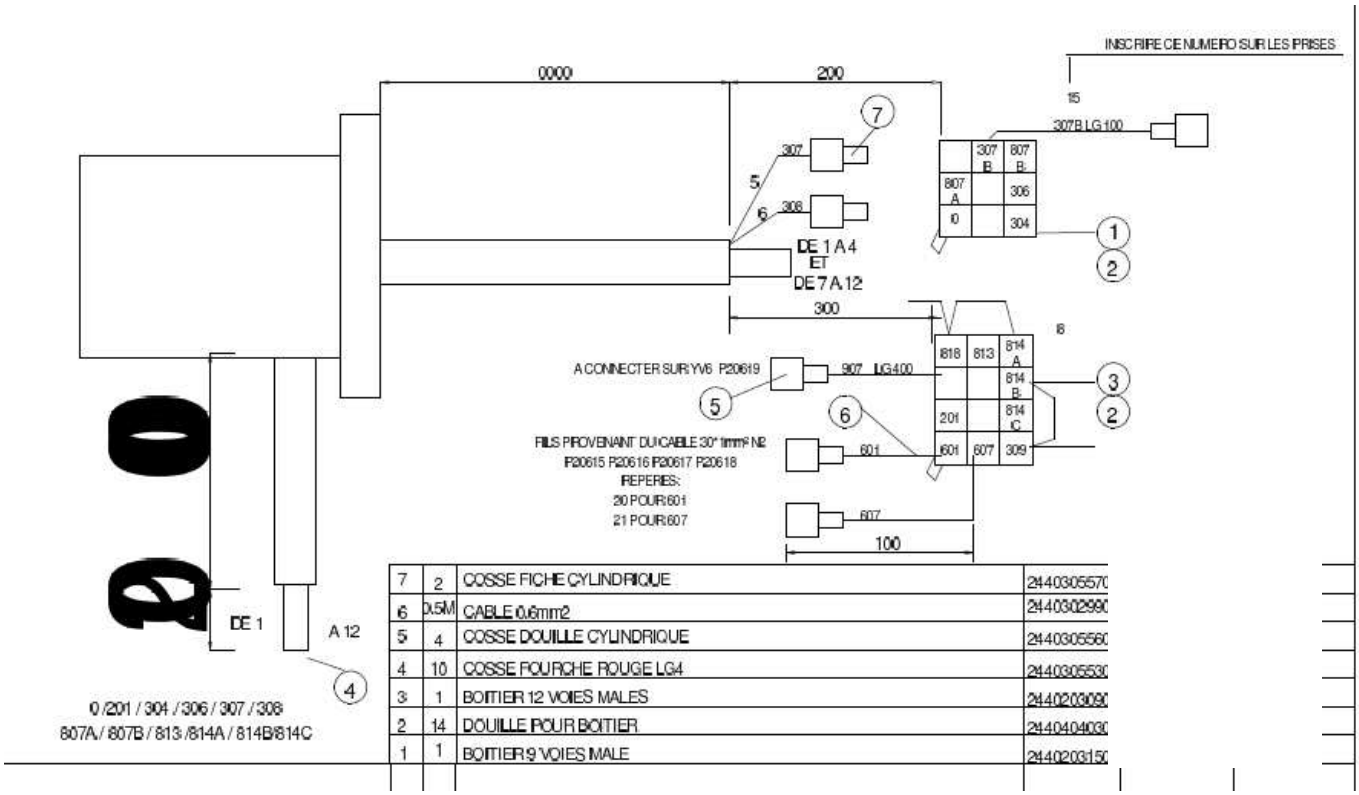
2.5. LOOMS

2.5.1. JUNCTION BOX (CHASIS)



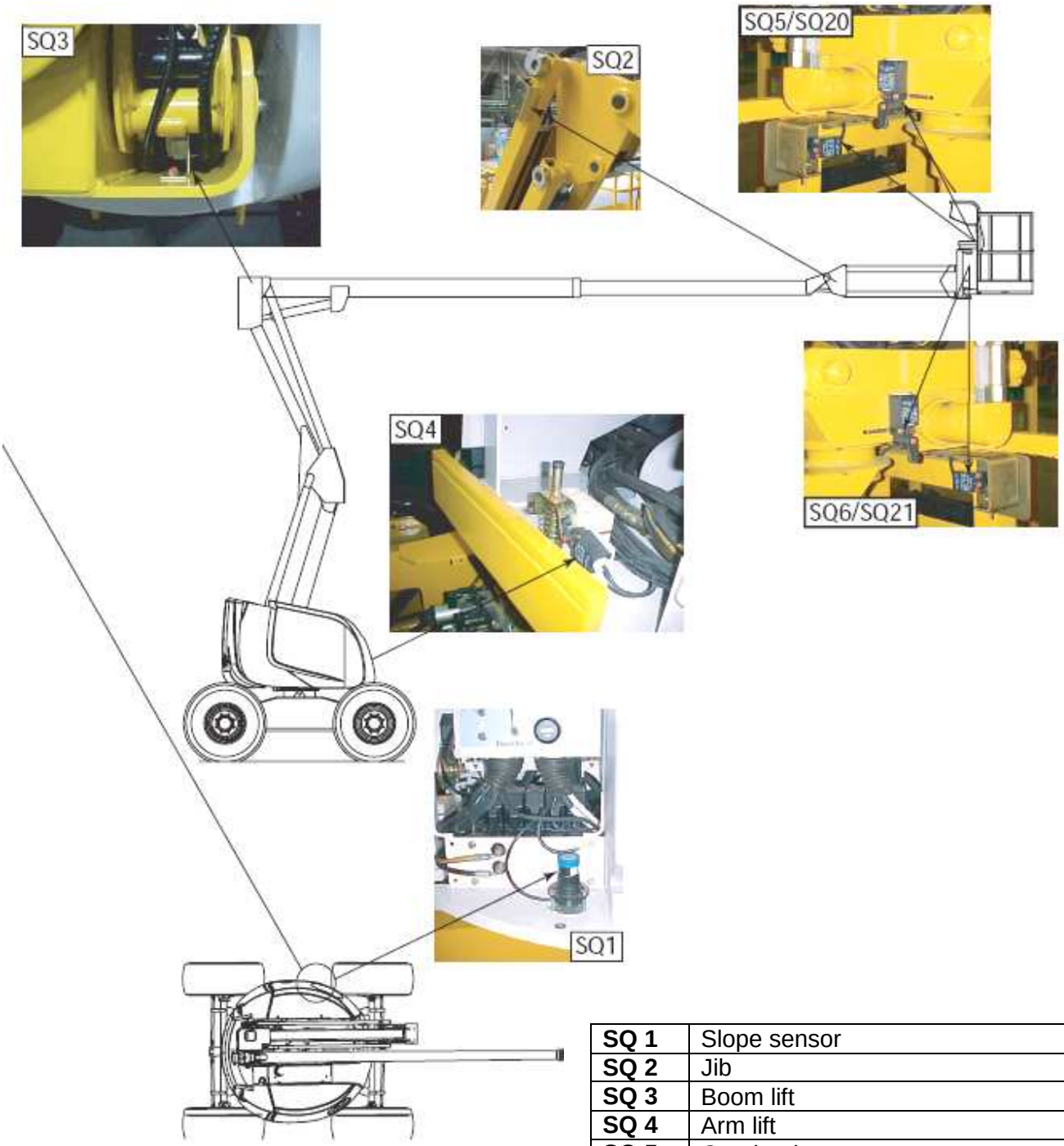
Locate cables terminal block	Electrovalve	Cables color
1		0 - orange
2	YV22A	red
3	YV22B	306 - purple
4	YV21A	307 - white
5	YV21B	308 - brown
6	YV9	807A - pink
7	YV13	807 B - yellow
8	YV8	813 green
9	YV10-YV23	814A dark blue
11	YV12-YV17	814 B light brown
13	YV11	814C black
15-20	+ EV	201 blue

2.5.2. SLIP RING (P20620)



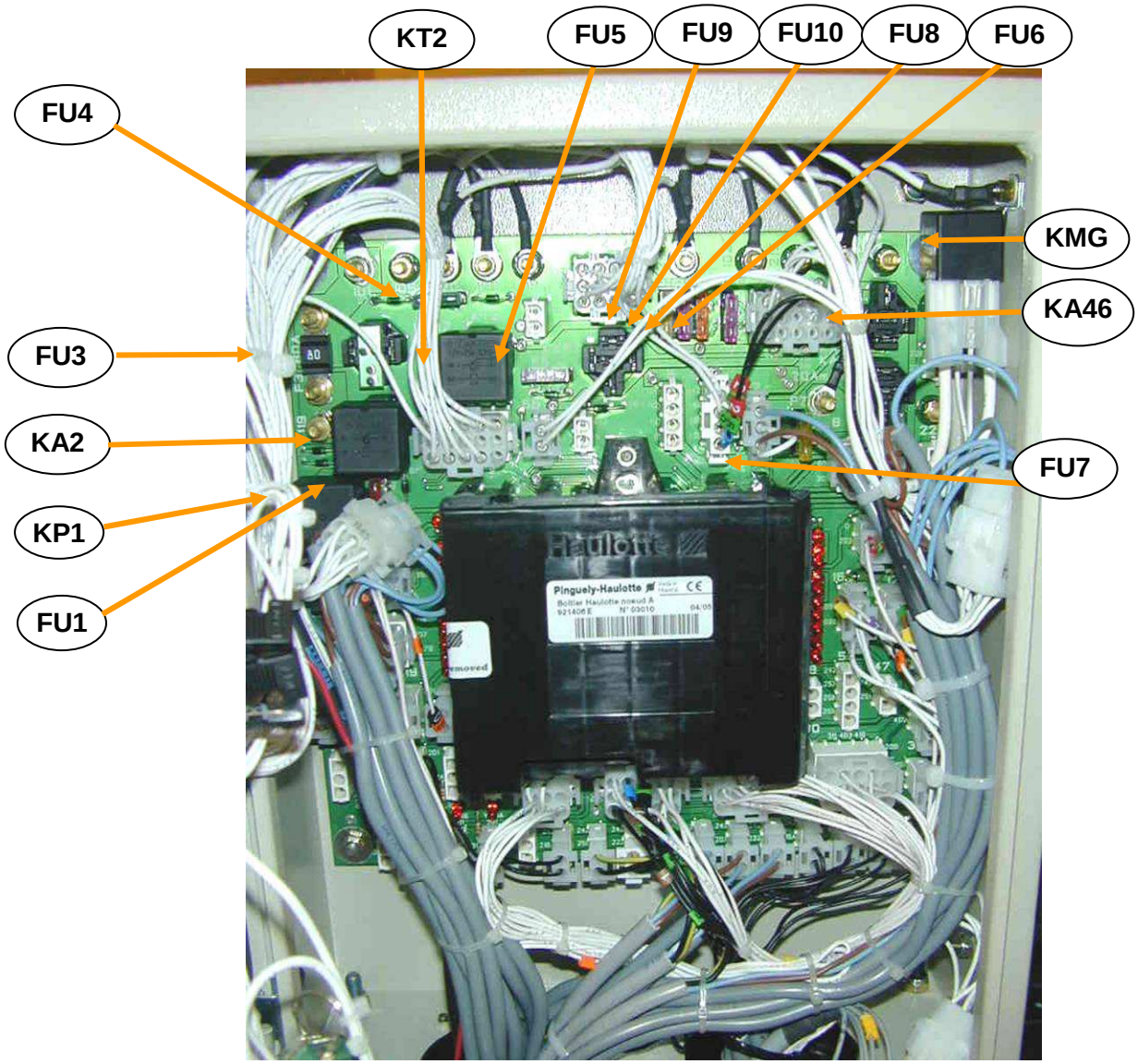
7	2	COSSE FICHE CYLINDRIQUE	2440305570
6	0.5M	CABLE 0.6mm2	2440302990
5	4	COSSE DOUILLE CYLINDRIQUE	2440305560
4	10	COSSE FOURCHE ROUGE LG4	2440305530
3	1	BOITIER 12 VOIES MALES	2440203090
2	14	DOUILLE POUR BOITIER	2440404030
1	1	BOITIER 9 VOIES MALE	2440203150

2.6. THE MAIN SAFETY COMPONENTS



SQ 1	Slope sensor
SQ 2	Jib
SQ 3	Boom lift
SQ 4	Arm lift
SQ 5	Overload
SQ 6	Overload
SQ 20	Basket rotation left side
SQ 21	Basket rotation right side

2.7. LIST OF COMPONENTS



In the following tables
the column n°2 gives the coordinates of the compone nts on different the sheets from the wiring schematics in order to find their position easily.
The first figure corresponds to 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 connec tor of the printed circuit board 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.

2.7.1. ENGINE

ENGINE ELEMENTS		
M3	01 – 4	Starter
G2	01 – 10	Alternator
YA2	01 – 15	Accelerator valve coil
YA1	01.-18	Start/stop engine valve coil
U1		Head module

2.7.2. FUSES

FUSES			
FU1	01 – 18		Engine stop 10A (115)
FU3	01 – 15		Accelerator 80A (119)
FU4	02 – 3		+ main 30A (120)
FU5	02 – 8		+ turret 30 A(212)
FU6	02.-11		+ platform 3A (211)
FU7	02.-12		+ valves 20A (201) if valve permanently: FU7 blows up
FU8	02 – 13		+ permanent 5A (242)
FU9	02 – 15		+ accessories 20A (905)
FU10	04 – 12		+ YV1 Load Sensing 3A (302)
FU11	01 – 3		+ emergency pump 250A (100)
FU13	01 – 2		cooler option
FU	01 - 15		Fuse 30A inside harness YA2 coil – no label

2.7.3. INPUTS

COMMANDS			
SA 1	02 - 9		Selection (upper/lower control box)
SA 2	03 - 2	28.7	Accelerator (605)
SA 3	03 - 3	29.11	Differential lock (807)
SA 4	03 - 5		Basket rotation
		30.3	SA4a left (3100)
		30.4	SA4b right (3110)
SA 5	03 - 6		Basket compensation (upper control box)
		30.5	SA5a lift (401)
		30.6	SA5b descent (402)
SA 6	03 - 9		Jib (lower control box)
		4.6	SA6b lift (406)
		4.9	SA6a descent (405)
SA 7	03 - 10		jib (upper control box)
		30.9	SA7a lift (410)
		30.8	SA7b descent (409)
SA 8	03 - 12		Telescopic boom extension (lower control box)
		4.15	SA8a retraction (411)
		4.14	SA8b extension (412)
SA9	03 - 13		Telescopic boom extension (upper control box)
		30.10	SA9a retraction (418)
		30.11	SA9b extension (419)
SA 11	03 - 15		Selection of drive speed
		29.10	Low speed: 805=1 and 804=0
		29.9	Medium speed: 805=0 and 804=0
			High speed: 805=0 and 804=1
SA12	03 - 16		Steering rear axle
		29.7	SA12a right (707)
		29.8	SA12b left (708)
SA 13	05 - 17		Boom (lower control box)
		28.1	SA13a lift (504)
		28.2	SA13b descent (505)

SA14	05 - 15		Arm (lower control box)
		28.3	SA14a lift (510)
		28.6	SA14b Descent (511)
SA 15	05 - 14		Orientation (lower control box)
		28.9	SA15a right (517)
		28.4	SA15b left (516)
SA17	03 - 7		Basket compensation (lower control box)
		30.5	SA17a lift (401)
		30.6	SA17b descent (402)
SA19	02 - 8		Emergency pump upper control box (620)
SA20	02 - 11		Emeregency pump lower control box (620)
SB 1	02 - 11		Emergency stop turret (120)
SB 2	02 - 11		Emergency stop basket (102)
SB 3	03 - 18	4.12	Engine start lower control box (117a)
SB 4	03 - 19	3.2	Engine start upper control box (117b)
SB 5	03 - 19	29.12	Buzzer (115a)
SB 6	02 - 19		Dead man's pedals (917)
SM 4	05 - 9		Drive joystick
		29.6	SM4d right steering (705)
		29.5	Left SM4g steering (703)
		29.2	Off neutral SM4ab (606)
		29.4	Y signal (612)
			FWD from 2.5 to 4.5 V
			REV from 2.5 to 0.5 V
SM 31	05 - 3		turret rotation and boom raising joystick
		30.12	SM off neutral 31ab (420a)
		29.1	X signal orientation (512)
			Signal from 0.5 to 2.5 and 2.5 with 4,5V
		30.7	Y signal boom lift (403)
			Lift from 2.5 to 4,5V
			Descent from 2.5 to 0,5V

SM 2	05 - 6	30.13 30.15	Arm lifting joystick SM off neutral 2ab (420b) Y signal (506) Extension from 2.5 to 4,5V Retraction from 2.5 to 0,5V

MODULES		
U1		module Head node A

SAFETY INPUTs			
SQ1	04 - 4	39.3	Tilt sensor (205 = 0 if in slope)
SQ2	04 - 5	3.3	Jib (206 = 0 if jib above horizontal)
SQ3	04 - 6	41.2	Boom (207 = 0 if boom unfolded)
SQ4	04 - 7	42.2	Arm (232=0 if arm unfolded)
SQ5	04 - 2	30.2	Overload (214a)
SQ6	04 - 2	30.2	Overload (214)
SQ20	03 - 4	30.4	Basket rotation right (311)
SQ21	03 - 5	30.3	Basket rotation left (310)
B1	04 - 19	27.2	Air filter clogging (110 = GND if filter clogged)
B2	04 - 18	27.3	Pressure switch for oil engine Temp (111= GND if T > 85℃)
B3	04 - 18	27.4	Pressure switch oil engine (112 = 0 if P > 0.5 bars)
B4	04 - 17	40 .2	Pressure switch for hydraulic oil temperature (904 = 0 if T >85℃)
D+	04 - 20	27.1	Alternator (109 = 12V mini if alternator runs)
W	04 - 20	27.7	Frequency (108)

2.7.4. OUTPUTS

RELAYS			
KP1	04 - 18		Engine start/stop (150)
KT2	04 - 19		Accelerator (605a)
KA2	04 - 20		Starter (146)
KA43	01 - 11		Relay alternator (109)
KMG	02 - 9		General relay (241)
KM4	02 - 8		Relay emergency pump (622)

VALVES			
YV 1	04 - 12	20	Load Sensing (303)
YV2	05 - 16	 12.3 12.1	Telescope YV2a extension (305) YV2b retraction (415)
YV3	05 - 14	22.3	Boom (403a) Lift: from 50 to 75% of the tension of battery Descent: from 50 to 25% of the tension of battery
YV4	05 - 11	23.3	Arm (506a) Lift: from 50 to 75% of the tension of battery descent: from 50 to 25% of the tension of battery
YV5	05 - 9	24.3	Block ON/OFF turret slewing (512a) from 50 to 75% of the battery voltage
YV6	05 - 6	26.3	Drive (612a) FWD from 50 to 75% of the battery voltage REV from 50 to 25% of the battery voltage
YV8	03 - 19	8.11	High speed drive (813)
YV9	04 - 5	15.4	Differential lock front axle (807a)
YV10	03 - 17	8.10/8.12	Medium and high speed drive (814a)
YV11	03 - 16	8.6	Brake release (814c)
YV12	03 - 15	8.3/8.9	Medium and high speed drive (814b)
YV13	04 - 4	15.9	High speed (807b)
YV14	04 - 2	 31 21	Turret slewing YV14a Right (417a) YV14b Left (414a)
YV15a	03 - 5	18	compensation raise (401a)
YV15b	03 - 6	19	compensation descent (402a)
YV17	03 - 14	8.3/8.9	Medium and high speed drive (814b)
YV18a	03 - 4	17	jib descent (407a)
YV18b	03 - 4	10	jib raise (408a)
YV19a	03 - 7	35	Basket rotation left side (310a)
YV19b	03 - 8	34	Basket rotation right side (311a)
YV21a	03 - 9	15.8	Left steering rear axle (307)
YV21b	03 - 10	15.7	Right Steering rear axle (308)

YV22a	03 - 11	15.3	Left steering front axle (304)
YV22b	03 - 12	15.6	Right steering front axle (306)
YV23	03 - 18	8.10/8.12	Medium and high speed drive (814a)

BUZZER AND LIGHTS			
HA1	04 - 13	52.2/52.3	Buzzer (260 and 261)
HA2	05 - 4	28.15	overload upper control box (921a)
HA4	04 - 14	14	Buzzer lower control box (210)
HL1	01 - 11		Light alternator powered (109)
HL2	04 - 17	4.3	Light air filter clogging (110a)
HL3	04 - 17	4.2	Temperature oil engine (111a)
HL4	04 - 16	4.1	Oil pressure engine (112a)
HL5	02 - 15		Beacon (906) Option
HL6	02 - 16		Work headlight (905) Option
HL9	05 - 3	49.2	Light defect upper control box (253)
HL13	05 - 4	28.15	Light overload upper control box (914)

2.8. LOGICAL EQUATIONS OF OPERATION

2.8.1. ENGINE

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

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Engine supply	KP1=1 + YA1=1	KA2=1 then 0 W=1	Defect engine + 6 seconds: D+=0 and B3=GND Clogged filter: B1=GND T°engine oil B2=GND	

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 is time-lag during 0.5 second when released.

2.8.2. DRIVE

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Low speed forward	YV1=1 + YV6=1 +YV11 =1	SA1 (side N) + SA11a = 1 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 4,5V	SQ5=0 or SQ6=0 (overload if machine elevated)	Speed reduced if SQ2/SQ3/or SQ4 =0
Low speed reverse	YV1=1 + YV6=1 + YV11=1	SA1 (side N) + SA11a = 1 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 0,5V	SQ5=0 or SQ6=0 (overload if machine elevated)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Medium speed forward	YV1=1 + YV6=1 + YV10=1 + YV11=1 + YV12=1 + YV17=1 + YV23=1	SA1 (side N) + SA11a = 0 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 4,5V	SQ2=0 or SQ3=0 or SQ4=0 (unfolded machine)	
Medium speed reverse	YV1=1 + YV6=1 + YV10=1 + YV11=1 + YV12=1 + YV17=1 + YV23=1	SA1 (side N) + SA11a = 0 and SA11b = 0 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 0,5V	SQ2=0 or SQ3=0 or SQ4=0 (unfolded machine)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
High speed forward	YV1=1 + YV6=1 + YV8=1 + YV10=1 + YV11=1 + YV12=1 + YV13=1 + YV17=1 + YV23=1	SA1 (side N) + SA11a = 0 and SA11b = 1 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 4,5V	SQ2=0 or SQ3=0 or SQ4=0 (unfolded machine)	
High speed reverse	YV1=1 + YV6=1 + YV8=1 + YV10=1 + YV11=1 + YV12=1 + YV13=1 + YV17=1 + YV23=1	SA1 (side N) + SA11a = 0 and SA11b = 1 and SM4ab=1 and SB6 = 1 and SM4 between 2,5V and 0,5V	SQ2=0 or SQ3=0 or SQ4=0 (unfolded machine) SQ5=0 and SQ6=0 (Overload)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Differential lock	YV9=1	SA1 (side N) + SA3=1 and SA11a = 1	Selection medium speed Selection high speed YV11= 0 (brake release)	

2.8.3. STEERING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Steering front axle	YV1 + YV5a + YV22a=1 or YV22b=1	SA1 (side N) + SB6=1 + SM4 g=1 or SM4 d=1	SQ5=0 or SQ6=0 (Overload)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Steering rear axle	YV1 + YV5b + YV21a=1 or YV21b=1	SA1 (side N) + SB6=1 + SA12a=1 or SA12b=1	SQ5=0 or SQ6=0 (Overload)	

2.8.4. BOOM

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise upper control box	YV1=1 + YV3=1	SA1 (side N) + SB6=1 + SM1ab=1 and SM31y between 2,5V and 4,5V	SQ1=0 SQ5=0 or SQ6=0 (overload if machine elevated)	
Descent upper control box	YV1=1 + YV3=1	SA1 (side NR) + SB6=1 + SM1ab=1 and SM31y between 2,5V and 0,5V	SQ5=0 or SQ6=0 (overload if machine elevated)	

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise lower control box	YV1=1 + YV3=1	SA1 (side T) + SA13a=1	SQ1=0 SQ5=0 or SQ6=0 (Overload)	SQ5=0 or SQ6=0 (Overload)
Descent lower control box	YV1=1 + YV3=1	SA1 (side T) + SA13b=1		

2.8.5. TELESCOPING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Extension upper control box	YV1=1 + YV2=1	SA1 (side N) + SB6=1 and SA9b=1	SQ1=0	
			SQ5=0 or SQ6=0 (Overload)	
Retraction upper control box	YV1=1 + YV2=1	SA1 (side N) + SB6=1 and SA9a=1	SQ5=0 or SQ6=0 (Overload)	
extension lower control box	YV1=1 + YV2=1	SA1 (side T) + SA8b=1	SQ1=0	
			SQ5=0 or SQ6=0 (Overload)	
Retraction lower control box	YV1=1 + YV2=1	SA1 (side T) + SA8a=1		

2.8.6. ARM

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise upper control box	YV1=1 + YV4=1	SA1 (side N) + SB6=1 + SM2ab=1 and SM2y between 2,5V and 4,5V	SQ1=0	
			SQ5=0 or SQ6=0 (Overload)	
Descent upper control box	YV1=1 + YV4=1	SA1 (side N) + SB6=1 + SM2ab=1 and SM2y between 2,5V and 0,5V	SQ5=0 or SQ6=0 (Overload)	Slowed movements SQ4 =0

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise lower control box	YV1=1 + YV4=1	SA1 (side T) + SA14a=1	SQ1=0	Slow down movement if SQ5=0 or SQ6=0 (Static Overload)
Descent lower control box	YV1=1 + YV4=1	SA1 (side T) + SA14b=1		Slow down movements SQ4 =0

2.8.7. TURRET SLEWING

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Orientation upper control box	YV1=1 + YV5a=1 +YV14a=1 or YV14b=1	SA1 (side N) + SB6=1 and SM31ab=1 and SM31y between 2,5V and 4,5V or 2,5V and 0,5V	SQ5=0 or SQ6=0 (Overload)	
Orientation lower control box	YV1=1 + YV5a=1 +YV14a=1 or YV14b=1	SA1 (side T) + SA15a=1 or SA15b=1		Slow down movement if SQ5=0 or SQ6=0 (Static Overload)

2.8.8. JIB

Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise upper control box	YV1=1 + YV5b=1 + YV18b=1	SA1 (side N) + SB6=1 and SA7b=1	SQ1=0	
			SQ5=0 or SQ6=0 (Overload)	
Descent upper control box	YV1=1 + YV5b=1 + YV18a=1	SA1 (side N) + SB6=1 and SA7a=1	SQ5=0 or SQ6=0 (Overload)	
Raise lower control box	YV1=1 + YV5b=1 + YV18b=1	SA1 (side T) + SA6b=1	SQ1=0	
			SQ5=0 or SQ6=0 (Overload)	
Descent lower control box	YV1=1 + YV5b=1 + YV18a=1	SA1 (side T) + SA6a=1		

2.8.9. COMPENSATION

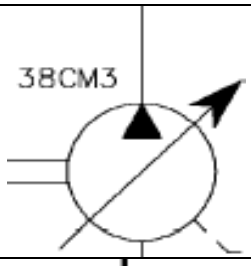
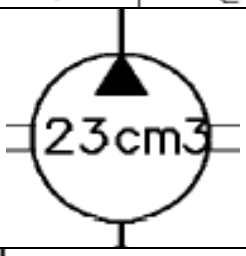
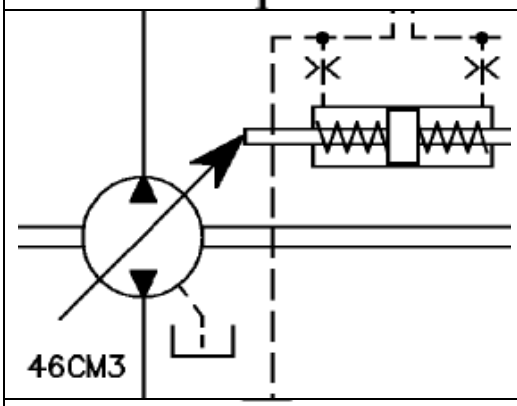
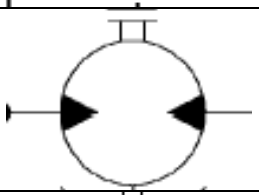
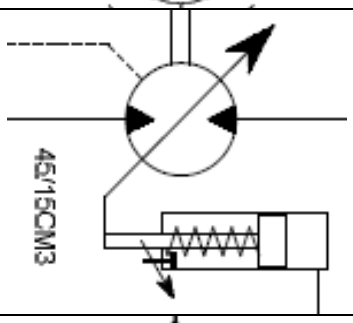
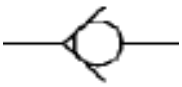
Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Raise upper control box	YV1=1 + YV5b=1 + YV15b=1	SA1 (side N) + SB6=1 + SA5b=1	SQ5=0 or SQ6=0 (Overload) Telescope in progress Orientation in progress Lift in progress	
Descent upper control box	YV1=1 + YV5b=1 + YV15a=1	SA1 (side N) + SB6=1 + SA5a=1	SQ5=0 or SQ6=0 (Overload) Telescope in progress Orientation in progress Lift in progress	
Raise lower control box	YV1=1 + YV5b=1 + YV15b=1	SA1 (side T) + SA17b=1 + SQ2=1 + SQ3=1 + SQ4=1	Telescope in progress Orientation in progress Lift in progress	
Descent lower control box	YV1=1 + YV5b=1 + YV15a=1	SA1 (side T) + SA17b=1 + SQ2=1 + SQ3=1 + SQ4=1	Telescope in progress Orientation in progress Lift in progress	

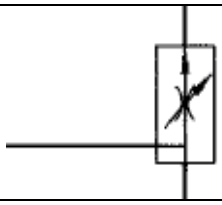
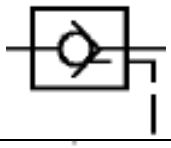
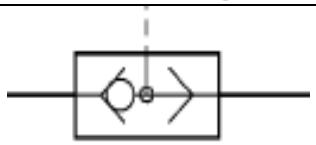
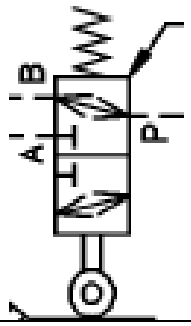
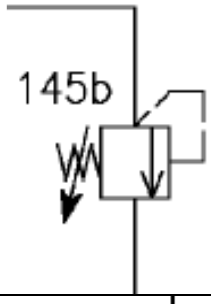
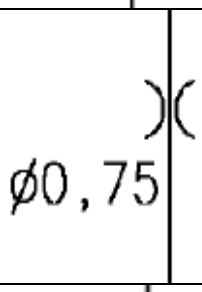
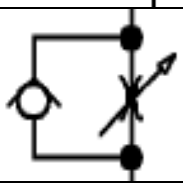
2.8.10. BASKET ROTATION

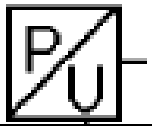
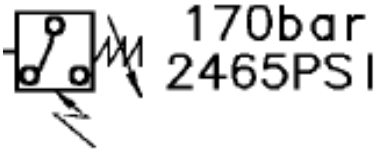
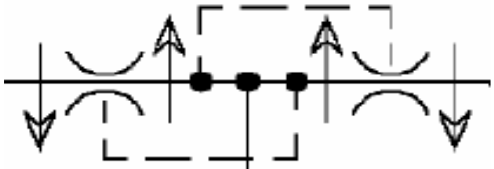
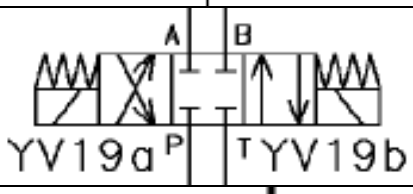
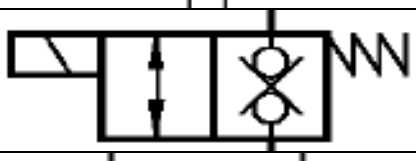
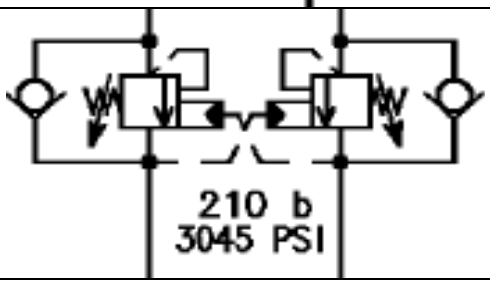
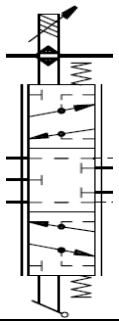
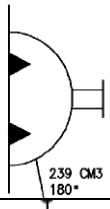
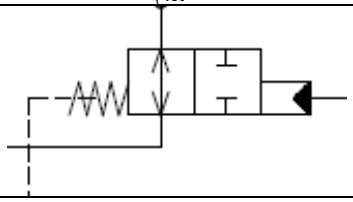
Function	Action	CONDITIONS		
		Necessary	Prohibiting the function	Modifying the function
Right rotation upper control box	YV1=1 + YV5b=1 + YV19b=1	SA1 (side N) + SB6=1 and SA4b=1	SQ5=0 or SQ6=0 (Overload) SQ20=0	
Left rotation upper control box	YV1=1 + YV5b=1 + YV19a=1	SA1 (side N) + SB6=1 and SA4a=1	SQ5=0 or SQ6=0 (Overload) SQ21=0	

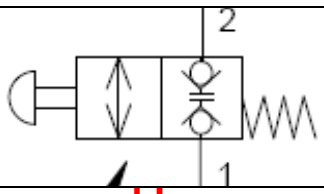
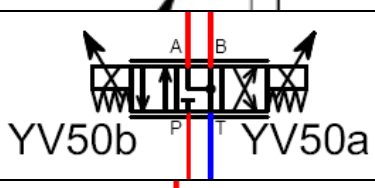
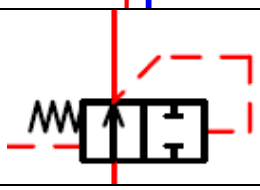
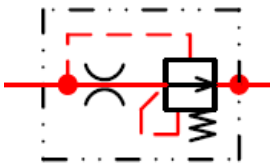
3. THE HYDRAULIC PART

3.1. SYMBOLS USED

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

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

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

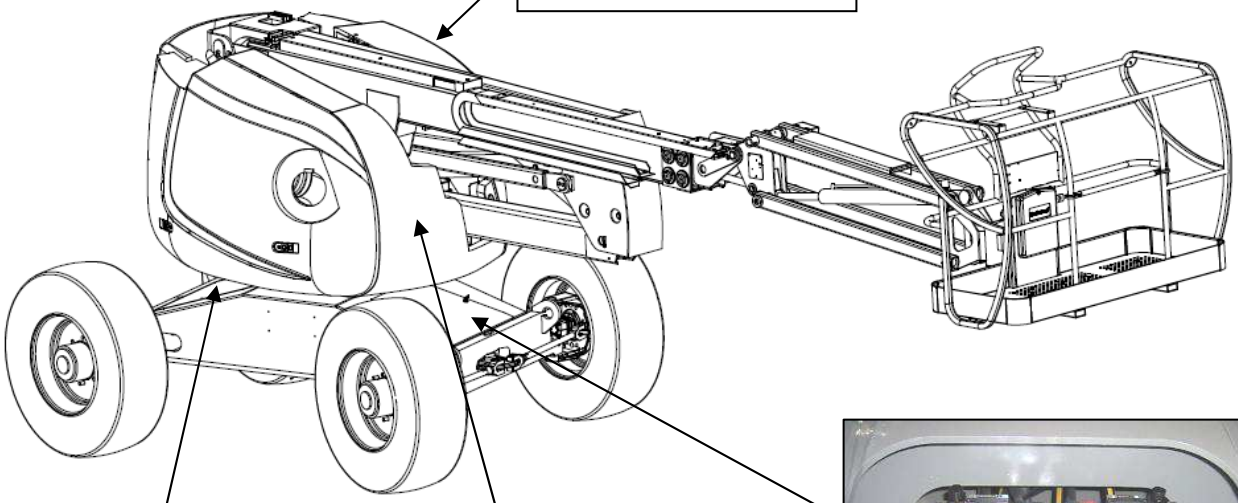
	Manual valve with automatic return (used to readjust the part of compensation on HA32/41PX)
	proportional valve 4 ways/3 positions
	Pressure balance/flow control valve
	Flow regulator

3.2. HYDRAULIC DIAGRAM (P22513G)

See at this end of this manual

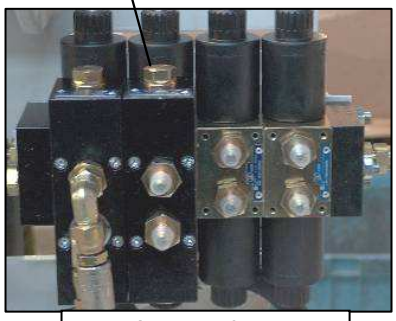
3.3. MANIFOLD

Proportionnal valve block



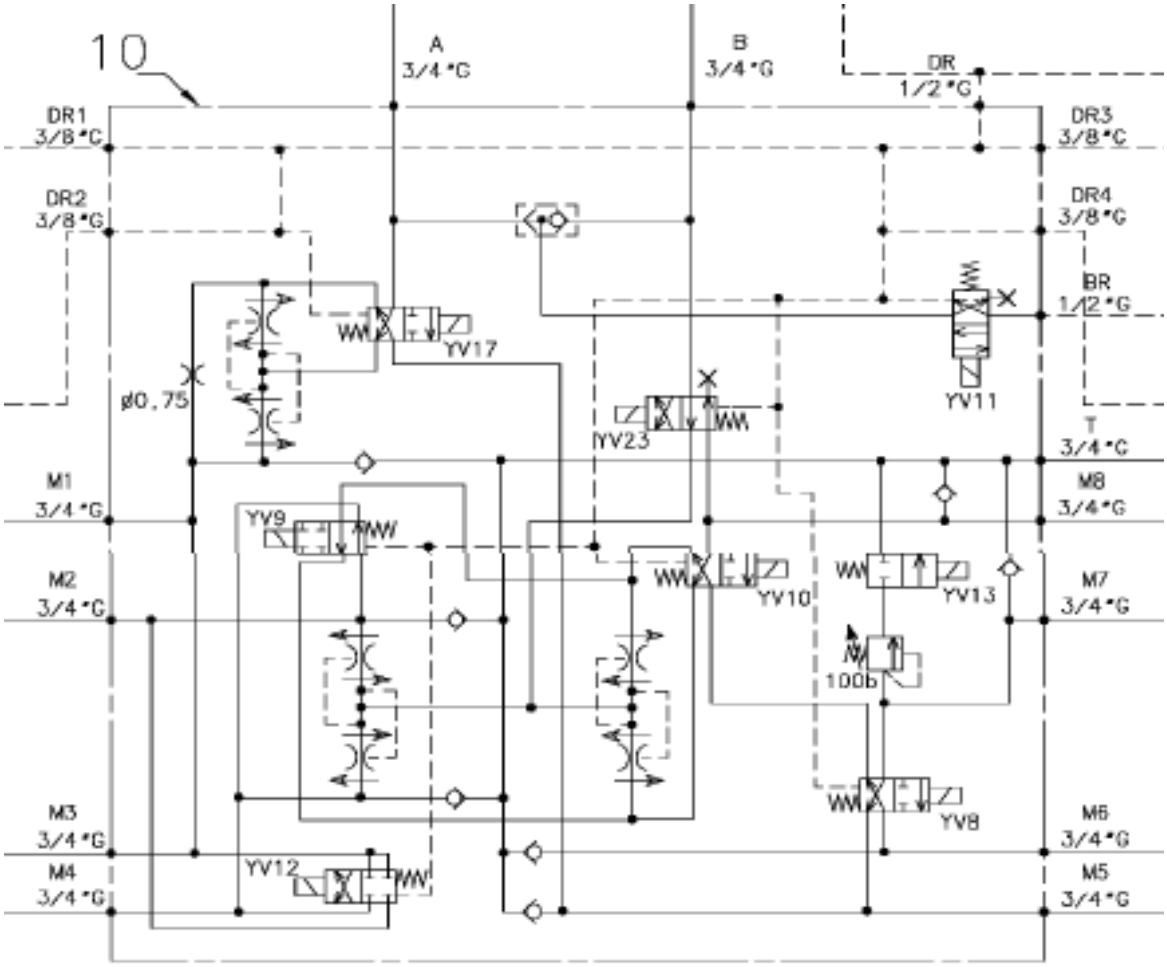
Drive bloc

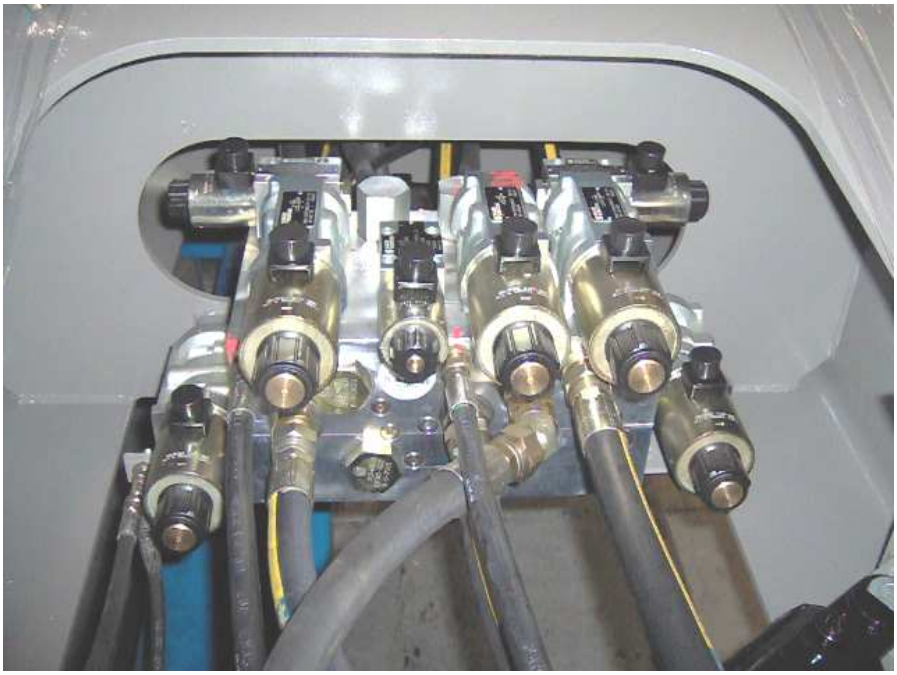
Steering bloc

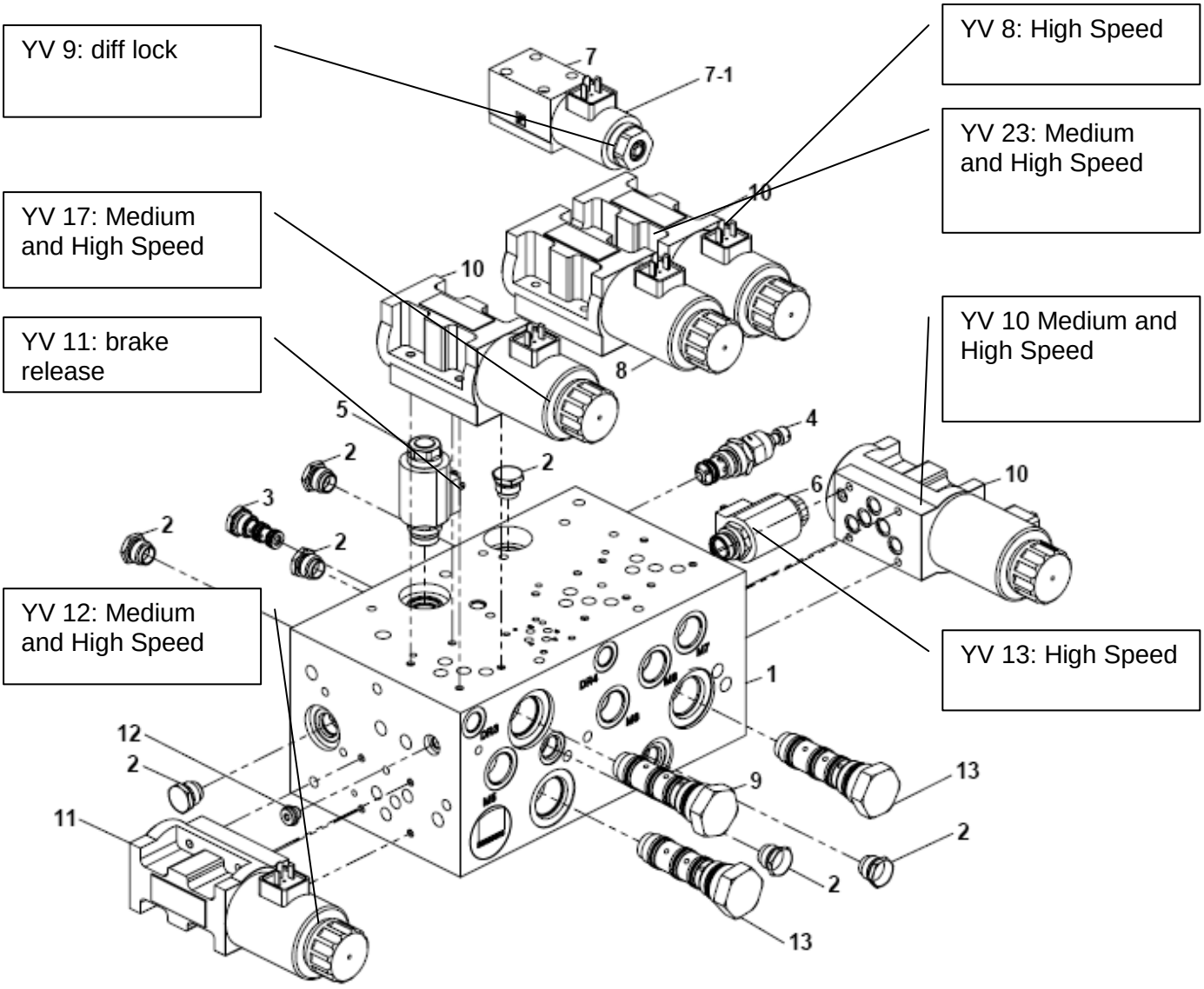


Bloc ON/OFF

3.3.1. DETAIL DRIVE BLOCK

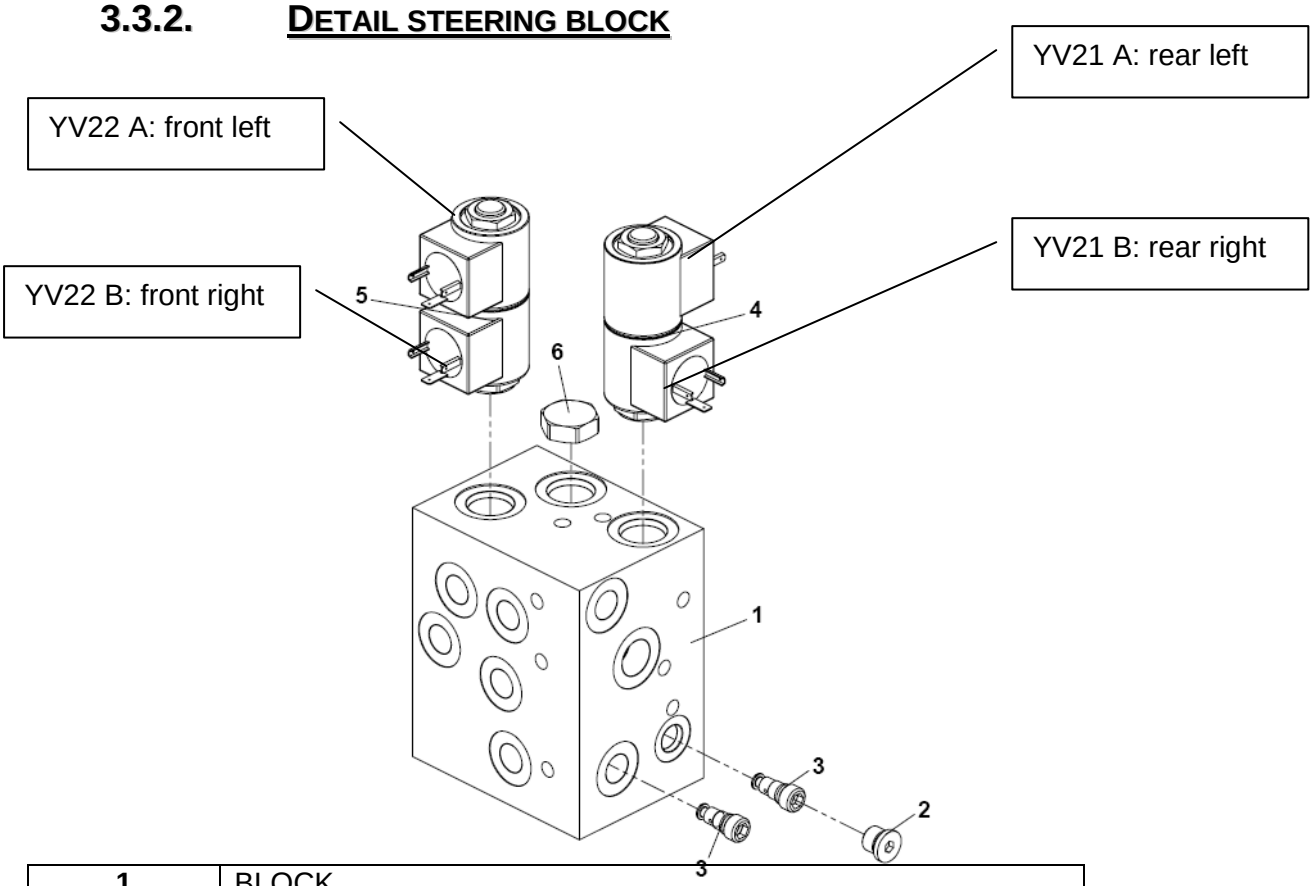




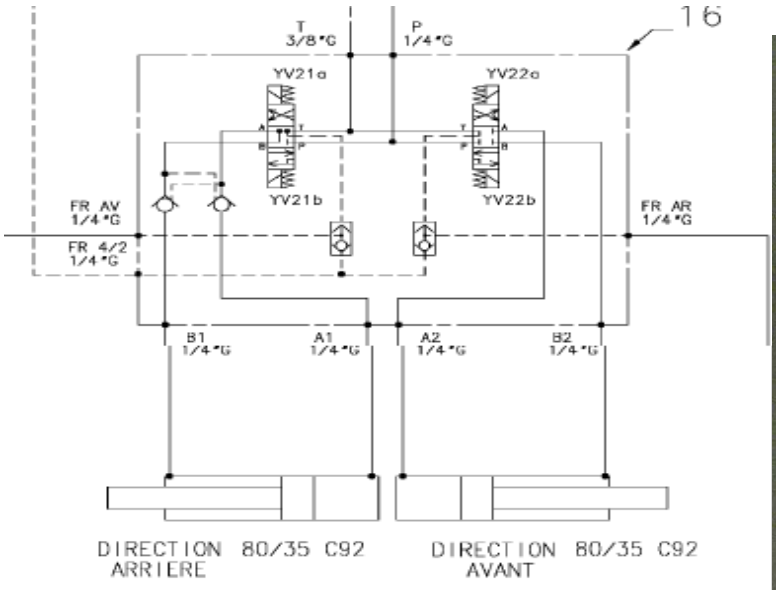


1	BLOCK
2	VALVE
3	CIRCUIT SELECTOR SWITCH
4	PRESSURE RELIEF VALVE
5	COIL
6	COIL
7	SOLENOID VALVE
7-1	COIL
8	SOLENOID VALVE
9	FLOW DIVIDER
10	SOLENOID VALVE
11	SOLENOID VALVE
12	PLUG
13	FLOW DIVIDER

3.3.2. DETAIL STEERING BLOCK

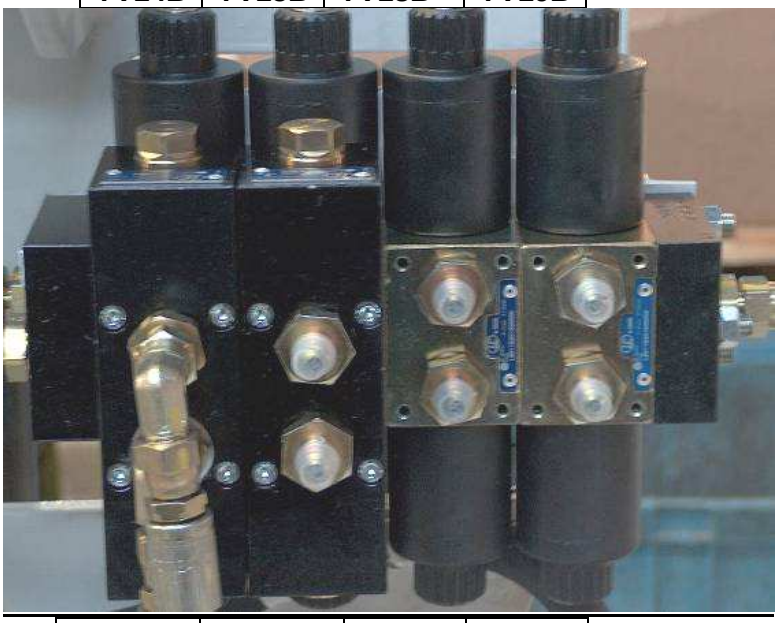


1	BLOCK
2	PLUG
3	CIRCUIT SELECTOR SWITCH
4	SOLENOID VALVE
4-1	COIL
5	SOLENOID VALVE
5-1	COIL
6	VALVE

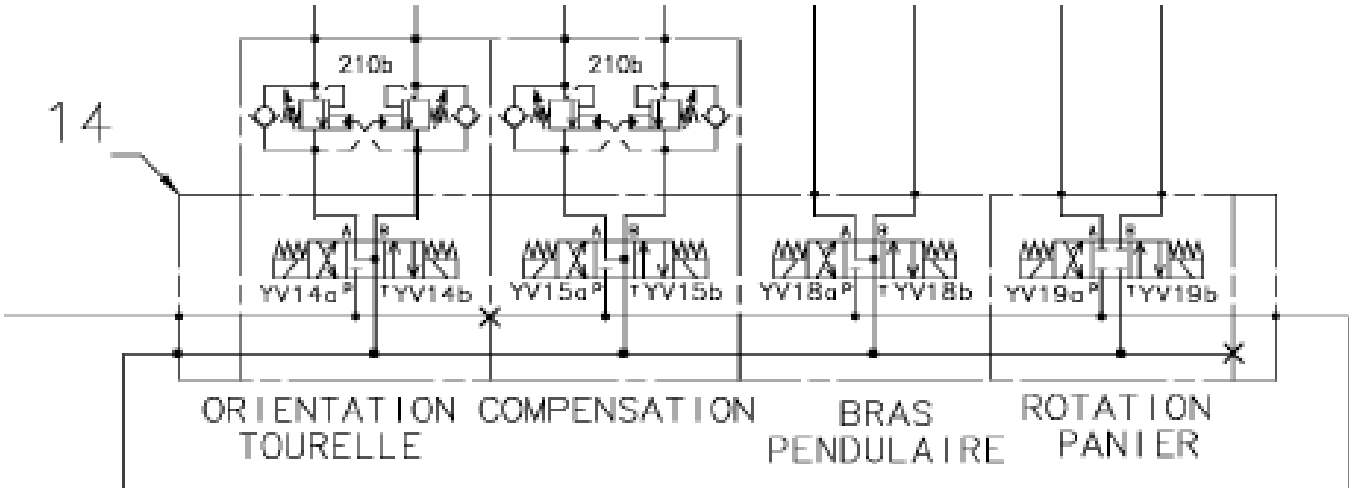


3.3.3. BLOCK ON/OFF

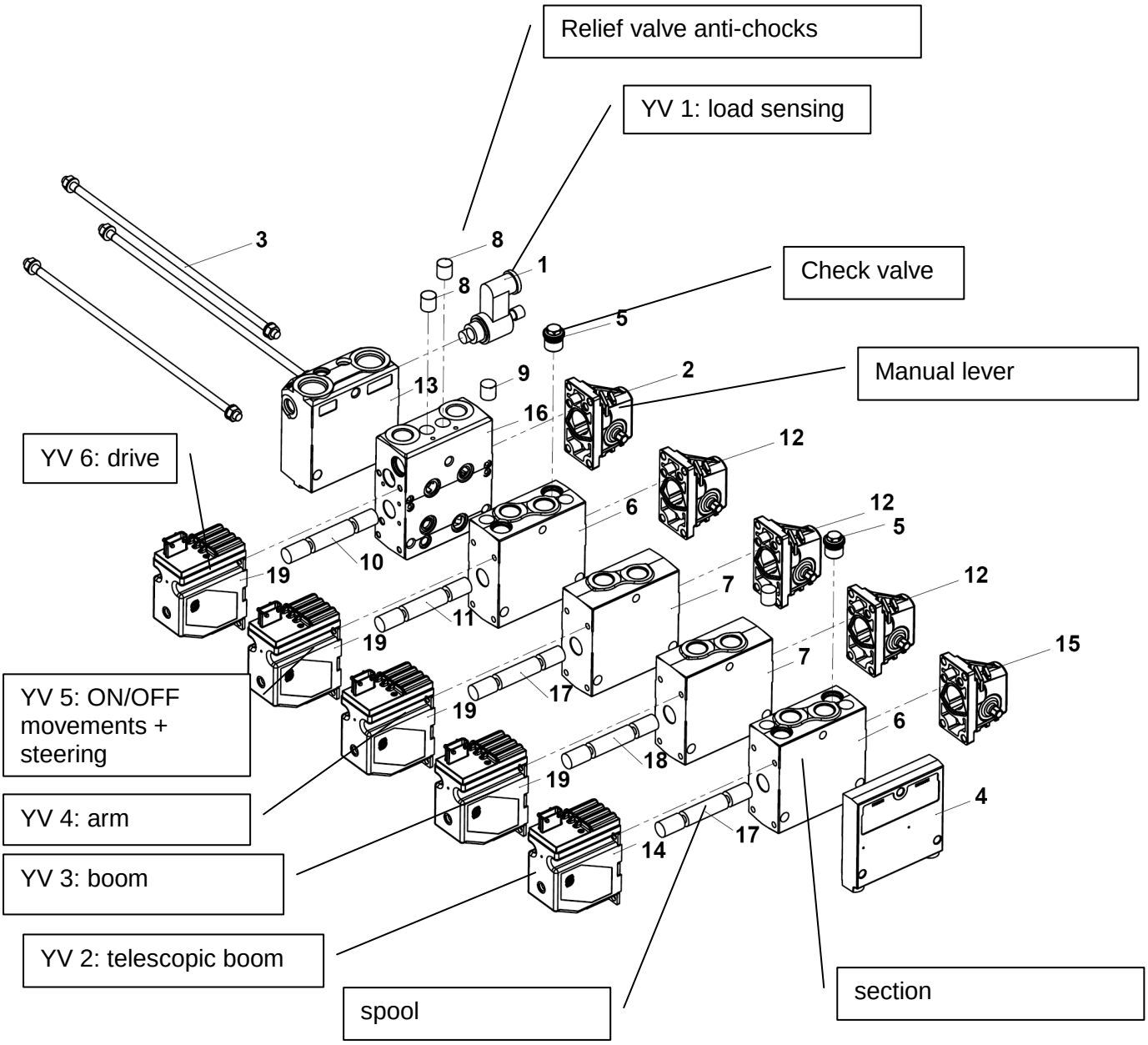
YV14B	YV15B	YV18B	YV19B



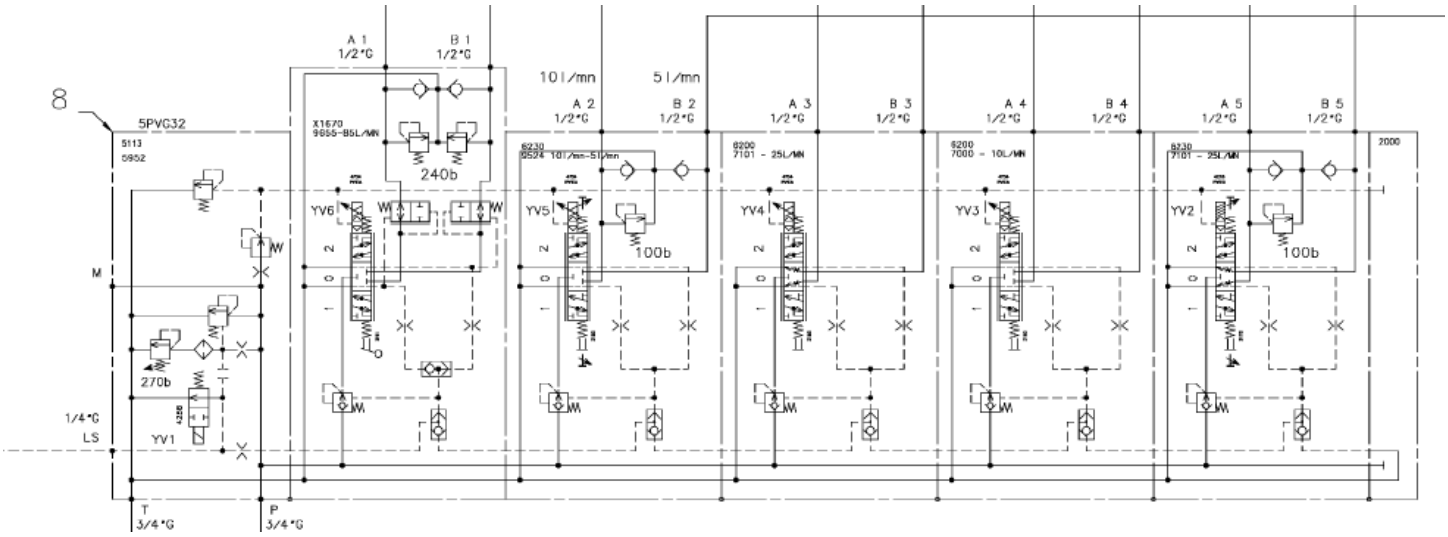
YV14A	YV15A	YV18A	YV19A



3.3.4. BLOCK PROPORTIONAL

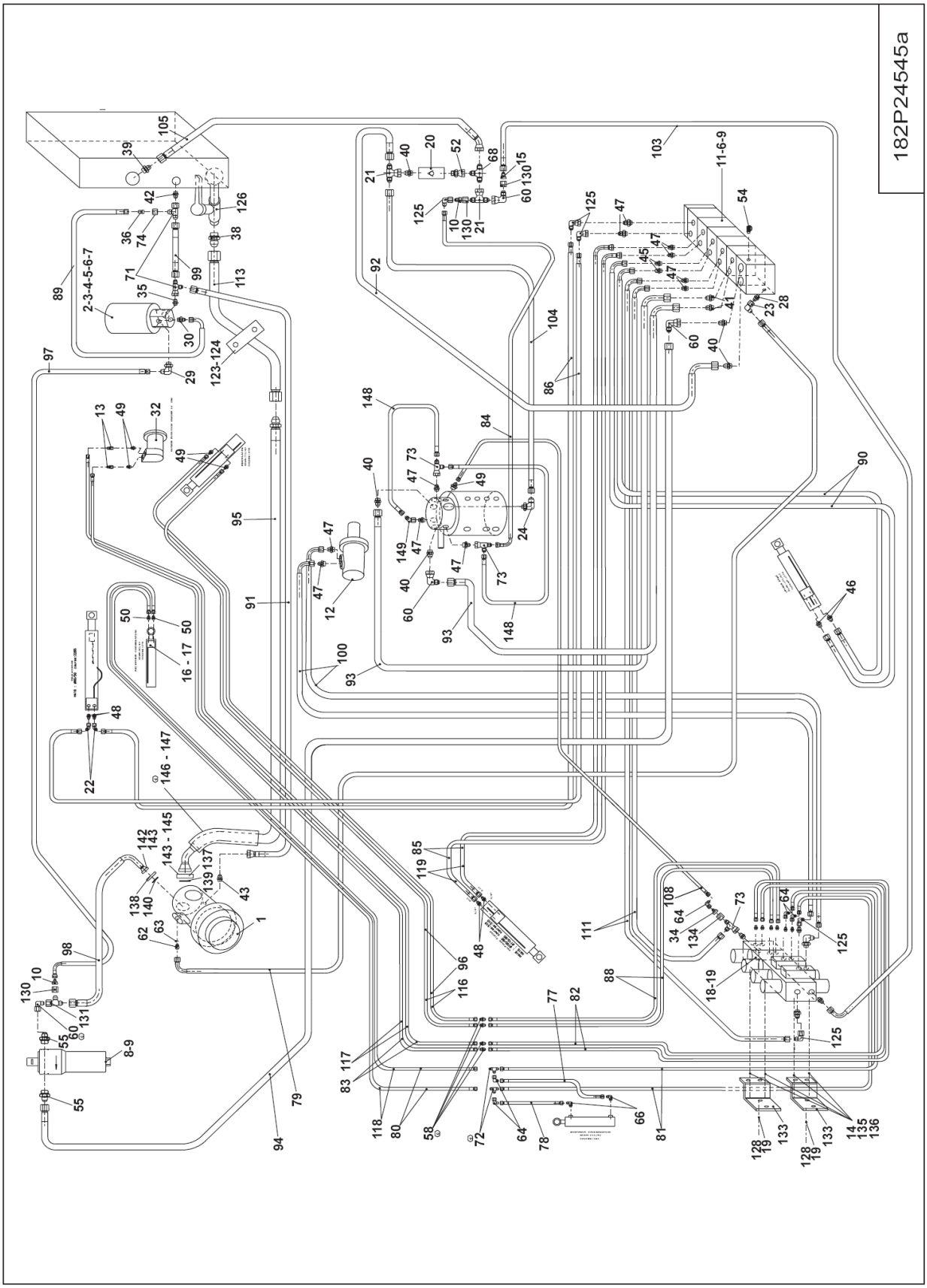


YV1	YV6	YV5	YV4	YV3	YV2

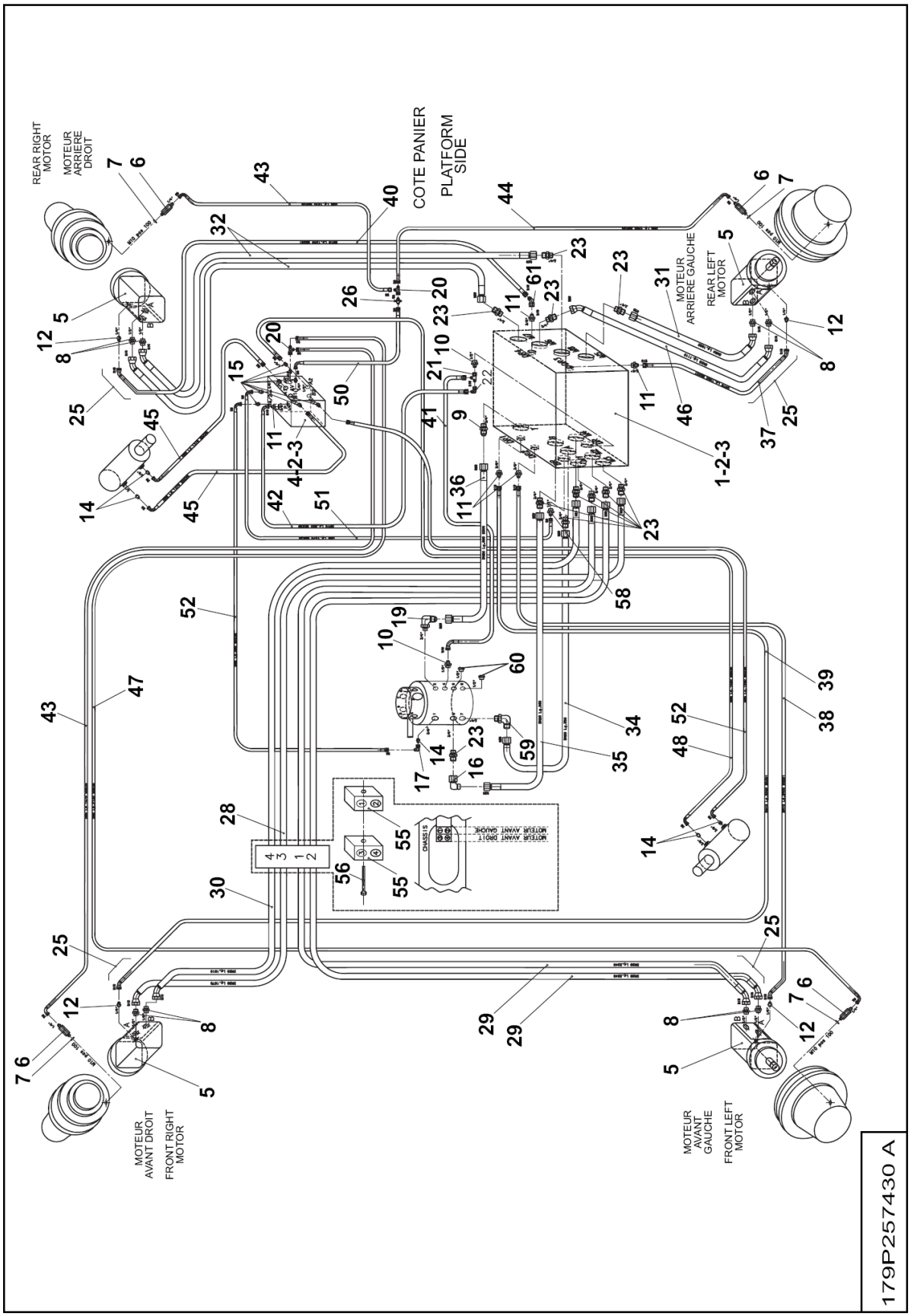


3.4. THE LOOMS

3.4.1. TURRET



3.4.2. CHASSIS


REAR RIGHT MOTOR
MOTEUR ARRIERE DROIT
COTE PANIER
PLATFORM SIDE
MOTEUR ARRIERE GAUCHE
REAR LEFT MOTOR
MOTEUR AVANT DROIT
FRONT RIGHT MOTOR
MOTEUR AVANT GAUCHE
FRONT LEFT MOTOR
CHASSIS
MOTEUR AVANT DROIT
MOTEUR AVANT GAUCHE
179P257430 A

4. ADJUSTMENTS

4.1. ADJUSTMENTS WITH OPTIMIZER CONSOLE

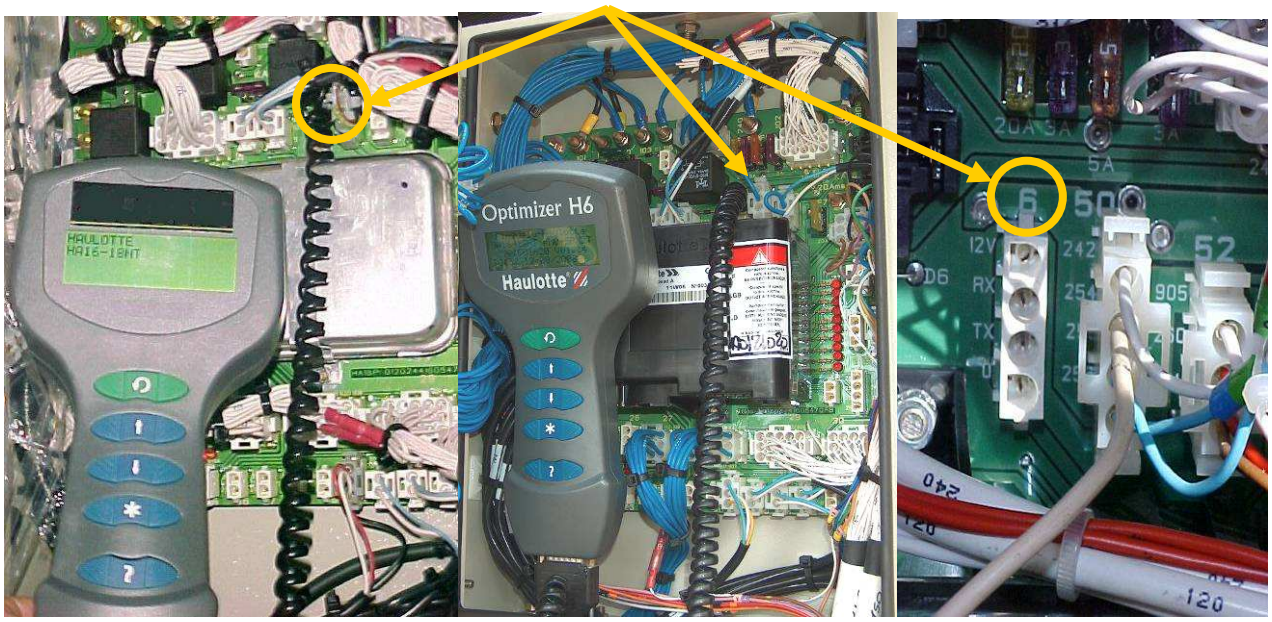
The adjustments, parameter settings and lists of alarms of the machine are accessible through this console.

Use OPTIMIZER console with module HEAD

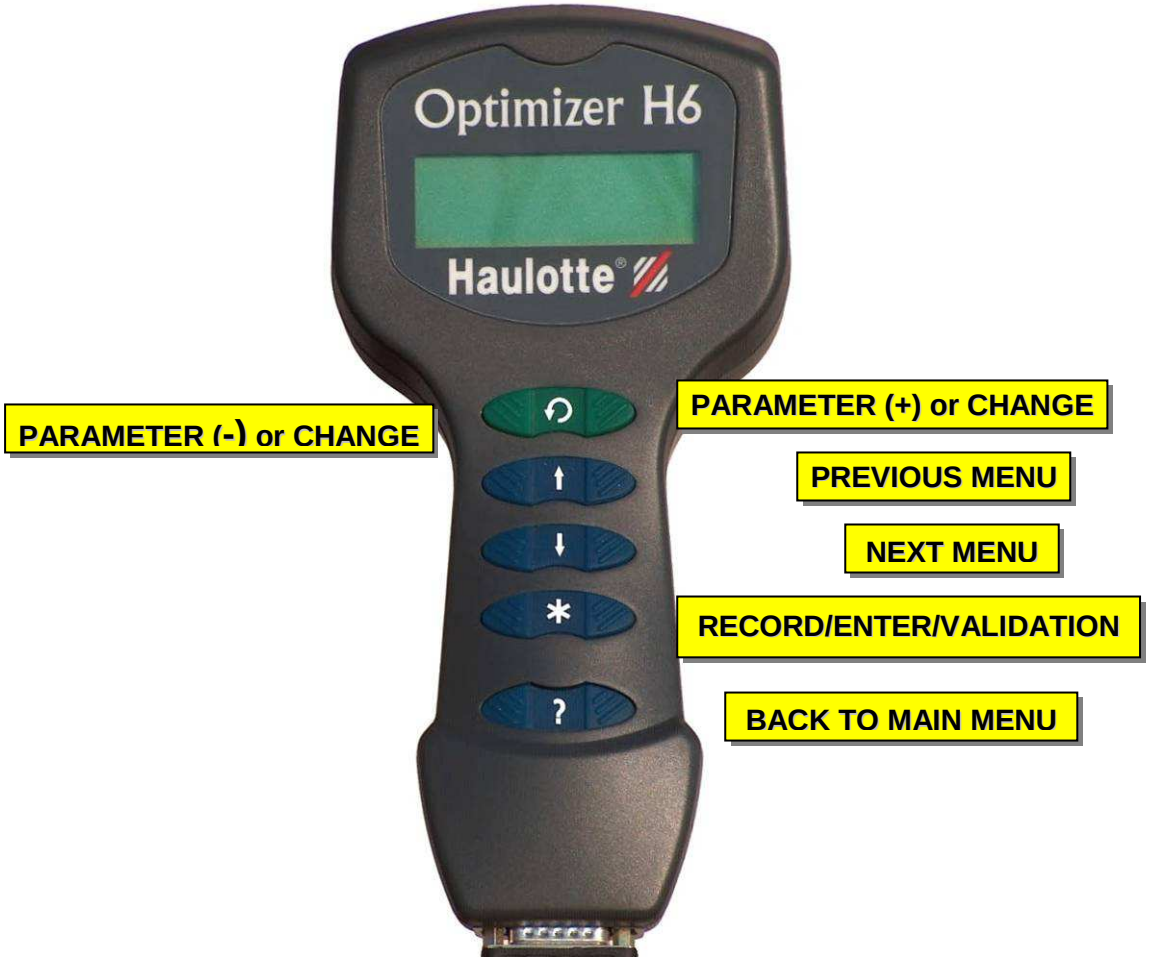
Connection bottom panel (turret)

connect the plug socket on the connector number 6:

Connector n°6 on main printed circuit



Description of the console



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
```

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

Speed parameters adjust

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

ramp parameters adjust

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

Options setting

4.2. FLASH CODE ON UPPER CONTROL BOX

Catégorie	*Code*	*Détail*	*Numéro*	*Commentaires*	*Niveau*
CO & CC	01	CC TOR (YV)	1	CC sur YV concernées	2
		CC ANA (PVG)	2	CC sur tous les PVG	1
		CC ANA (PWM)	3	CC sur tous les PWM	1
		CO TOR (YV)	4	CO sur YV concernées	2
		CO ANA (PVG)	5	CO sur tous les PVG	1
		CO ANA (PWM)	6	CO sur tous les PWM	1
Alarme Fusible	02	FU05 ou FU06	1	Via le commutateur	1
		FU07	2		1
		FU08	3		1
Circuit d'Urgence	03	KMG	1	Surveillance TRT	3
Relais d'aiguillage	04		1		
			2		
			3		
Alarme Sortie PVG	05	S.Ana PVG 1 (R)	1	Au relevage	1
		S.Ana PVG 2 (L)	2	Au levage	1
		S.Ana PVG 3 (O)	3	A l'orientation	1
		S.Ana PVG 2 (TL)	4	Au télescopage	1
		S.Ana PVG 4 (TR)	5	A la Translation	1
Alarme Joystick 1	06	SM31 incompatible	1	Manipulateur 2 axes	1
		SM31 hors neutre	2		1
		SM31 hors plage	3		1
Alarme Joystick 2	07	SM2 incompatible	1	Manipulateur simple	1
		SM2 hors neutre	2		1
		SM2 hors plage	3		1
Défauts Machines	08	Dévers	1	Sécurité dévers	1
		Surcharge	2	Sécurité surcharge	1
		Blocage Pédale	3	Homme mort (>10s)	2
		Lim. Portée	4	Sécurité Limitation de portée	3

4.3. PARAMETER SETTINGS

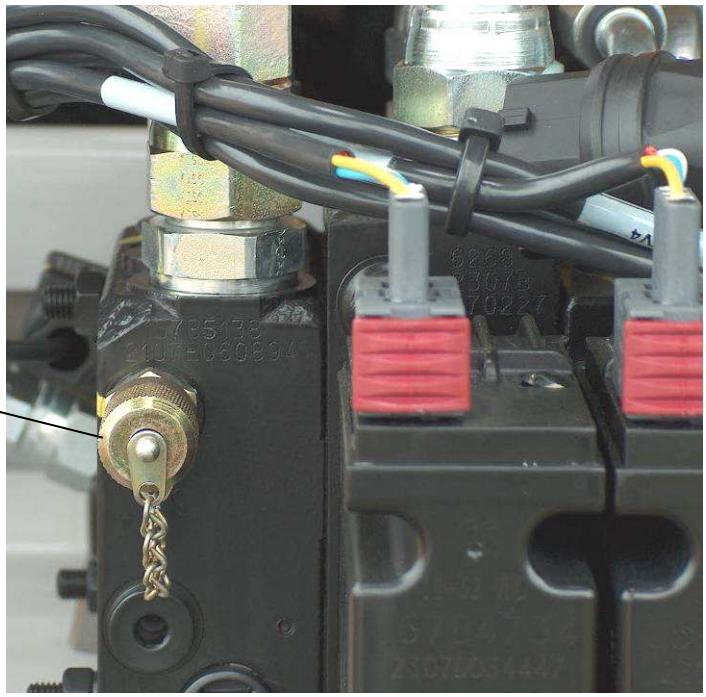
Movement from Turret	
Movements	**Time**
Boom lift	30 + 3s
Boom descent	33 +-3s
Arm lift	35 +-3s
Arm descent	23 +-3s
Left turret rotation	75 +-1,5s 1/2 turn
Right turret rotation	75 +-1,5s 1/2 turn
Movement from Platform	
Movements	**Time**
Boom lift	27 +-3s
Boom descent	30 +-3s
Arm lift	29 +-3s
Arm descent	20 +-3s
Left turret rotation	44 +-1,5 sec 1/2 turn
Right turret rotation	44 +-1.5 sec 1/2 turn
Drive in Micro V FWD	45 sec on 10 m
Drive in Micro V REV	45 sec on 10 m
Drive in Low Speed FWD (for Machine 4*2 only)	29 sec on 10 m
Drive in Low Speed REV (for Machine 4*2 only)	29 sec on 10 m
Checking of the movements	
Movement	**distance**
deceleration ramp in High speed drive	FWD 1,30m (+ 20cm)
	REV 1,30m (+ 20cm)
Movement	**time**
High speed drive output of pump	FWD 13 sec on 20 m
	REV 13 sec on 20 m
Adjustment speeds of ON/OFF movements (oil > 30°C mini)	
Movements	**Times**
telescope extension HA16PXNT-HA18PXNT speed adjustment speed (adj on PVG ON/OFF element)	extension 18 + 3s
	Retraction 12 + 3s
Steering speed adjustment speed (adj on PVG ON/OFF element)	extension 6 sec
	Retraction 5 sec
jib regulation with relief valve on movements block	Raise 26 + 2 s
	Descent 35 + 2s
Basket rotation basket to be regulated with relief valve on hydraulic motor	Right 15 + 2s
	Left 15 + 2s
Compensation regulation with relief valve on movements block	Raise 27 + 5s
	Descent 35 + 5s

4.4. ADJUSTMENT OF PRESSURES

4.4.1. TABLE OF PRESSURES

DESIGNATION	IN BARS
General	240 +-5
Load Sensing	30 +-5
Emergency unit (movement of retraction at full stroke)	130 +-5
Arm lift full height	240 +-5
arm bottom position	140+/-5
Boom full stroke	240 +-5
Boom bottom position	150 +-5
Telescoping extension	70 +-5
Telescoping retraction	240 +-5
Turret slewing	100 +-5
Movements ON/OFF	240 +-5

4.4.2. PORT PLUG FOR THE PRESSURES

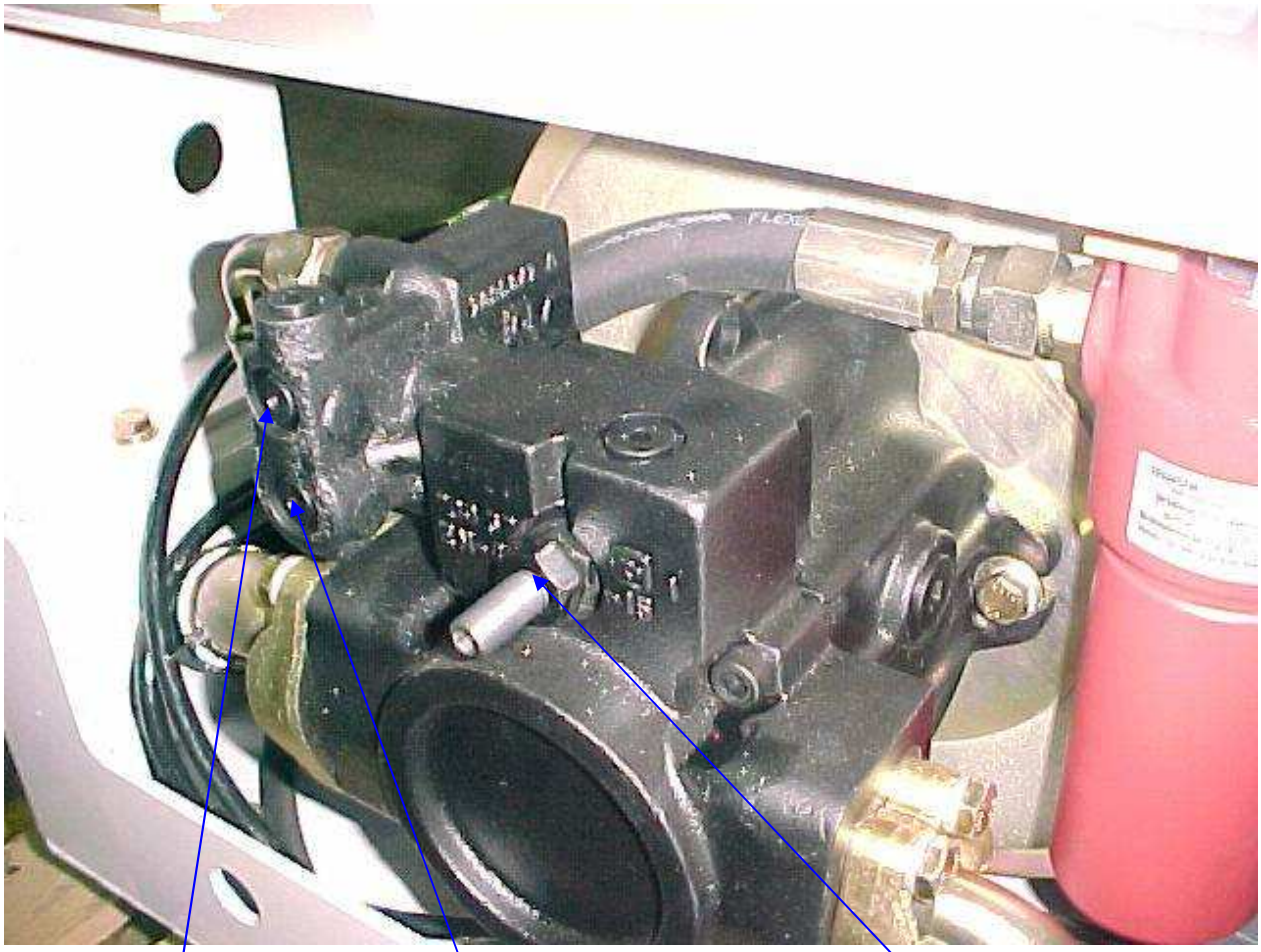


4.4.3. ADJUSTMENTS

- Load sensing (LS)
- main flow
- Cubic capacity pump

Standard pump 1

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

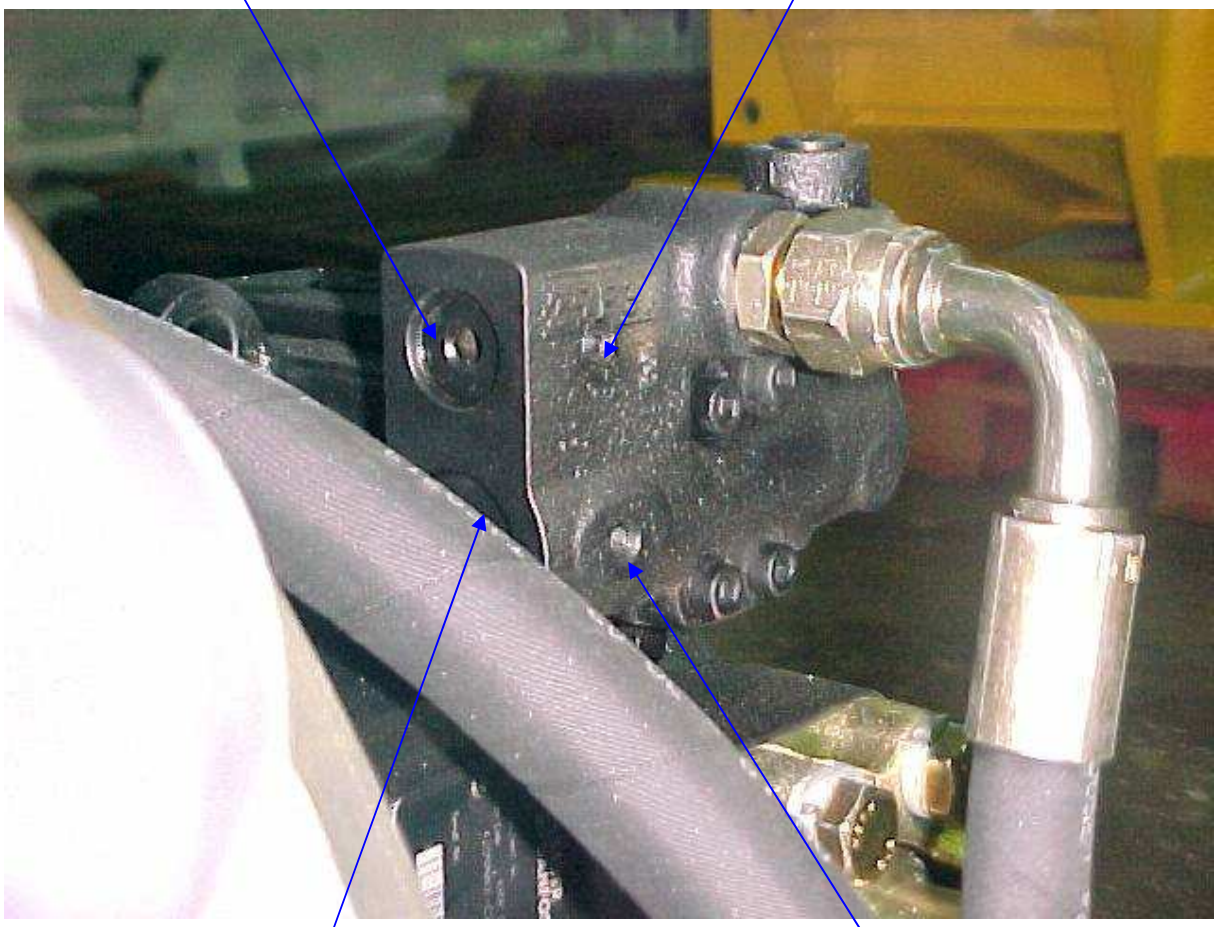


LS adjust	Pmaxi adjust

CC adjust (High Speed)

Turn screw CW for LS pressure increase

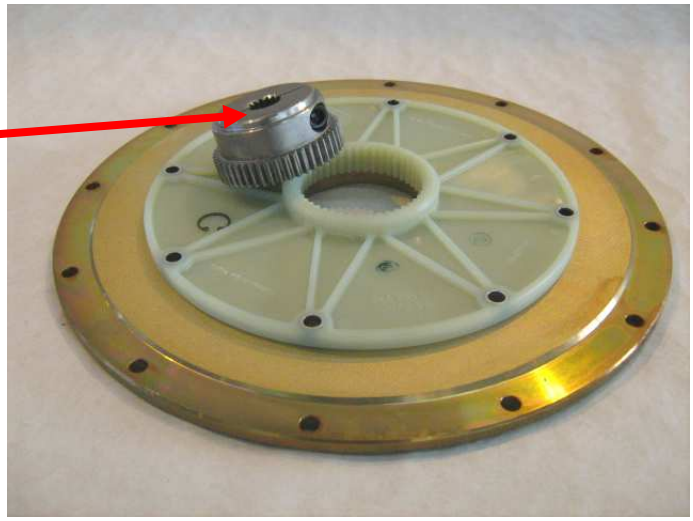
Stop screw



Turn screw CW for Pmaxi pressure increase

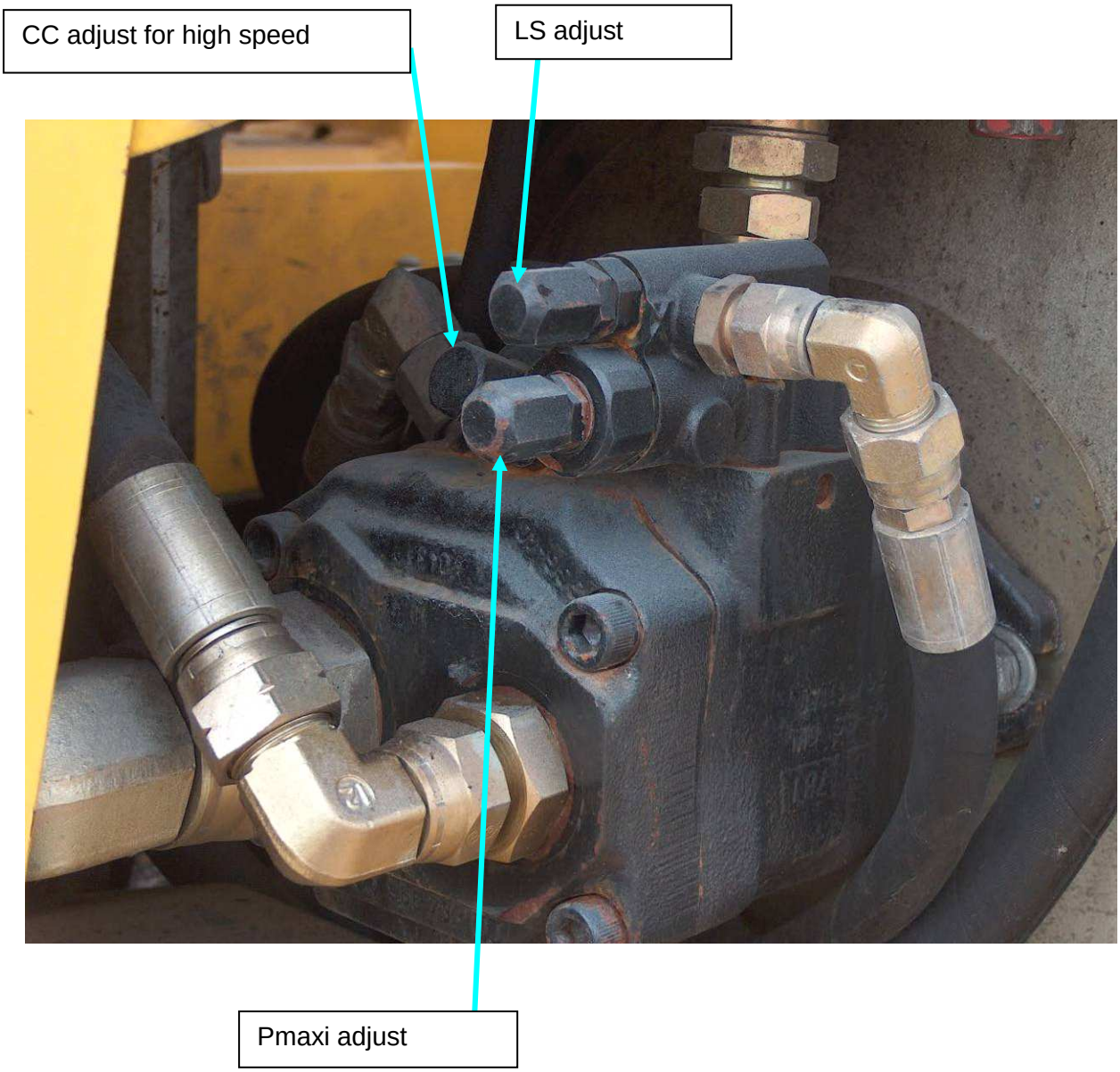
Stop screw

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



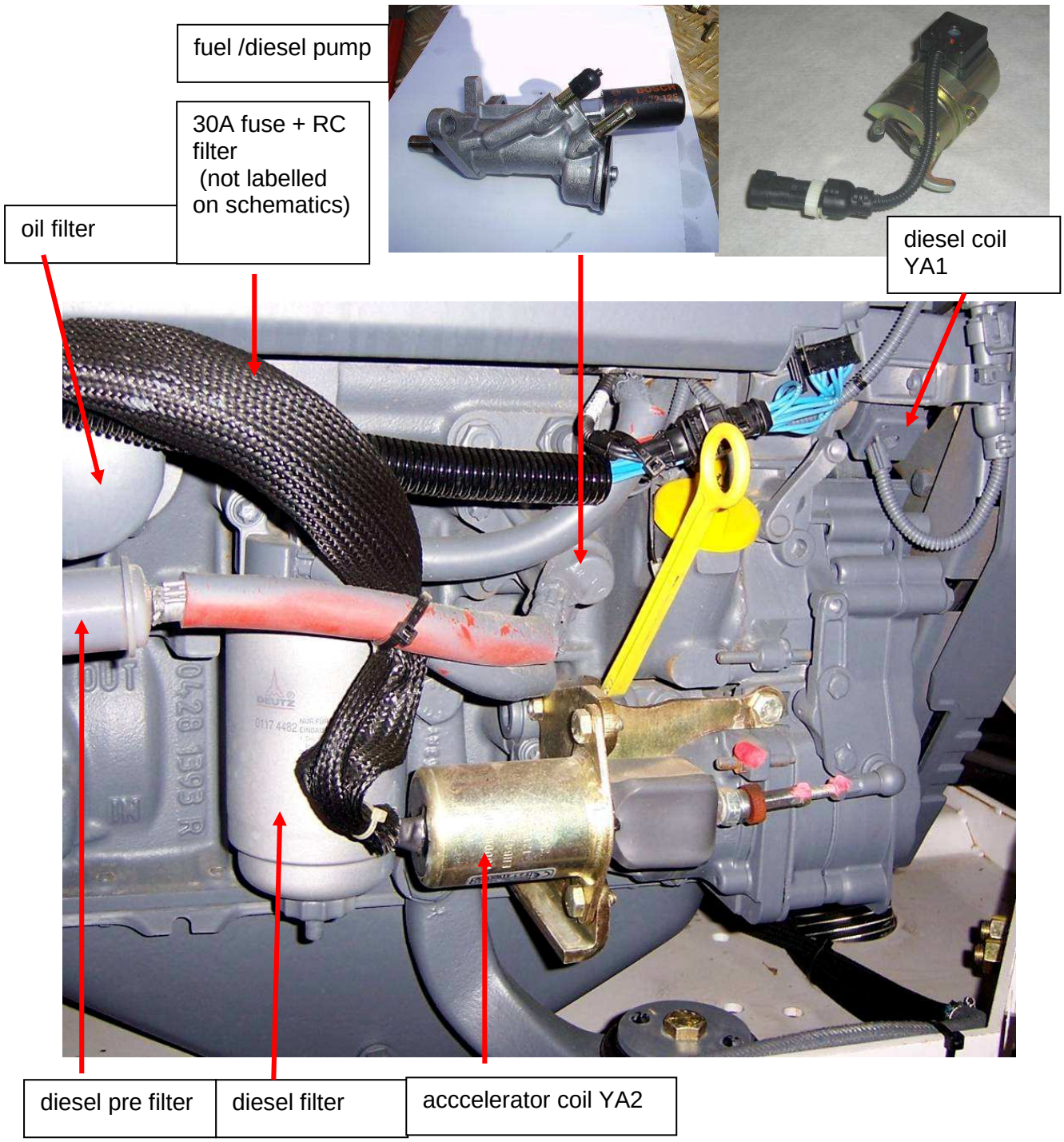
Standard pump 2

- 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 preset to reach the high speed (20 seconds for 25 meters)
- unscrew the cap (wrench)
- turn the HEX screw until obtaining the desired value

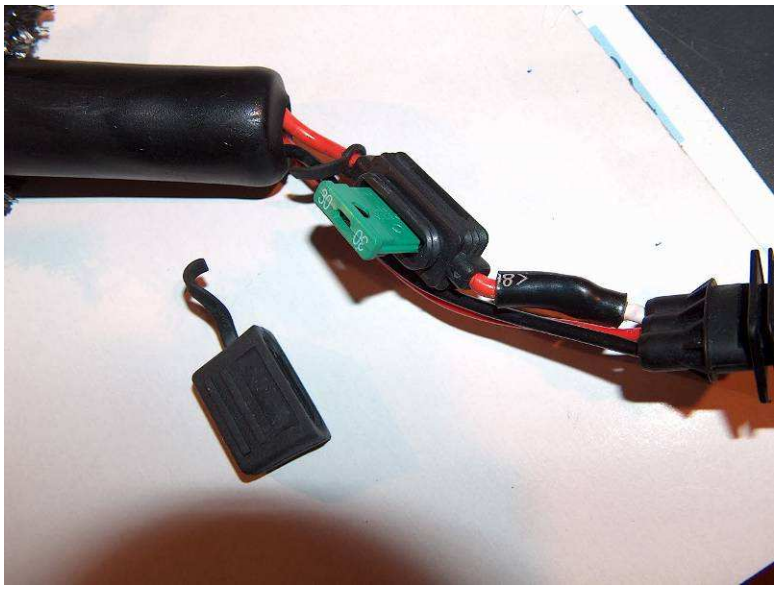


4.5. ACCELERATOR ENGINE COIL

This adjustment must be done when the accelerator coil has been replaced

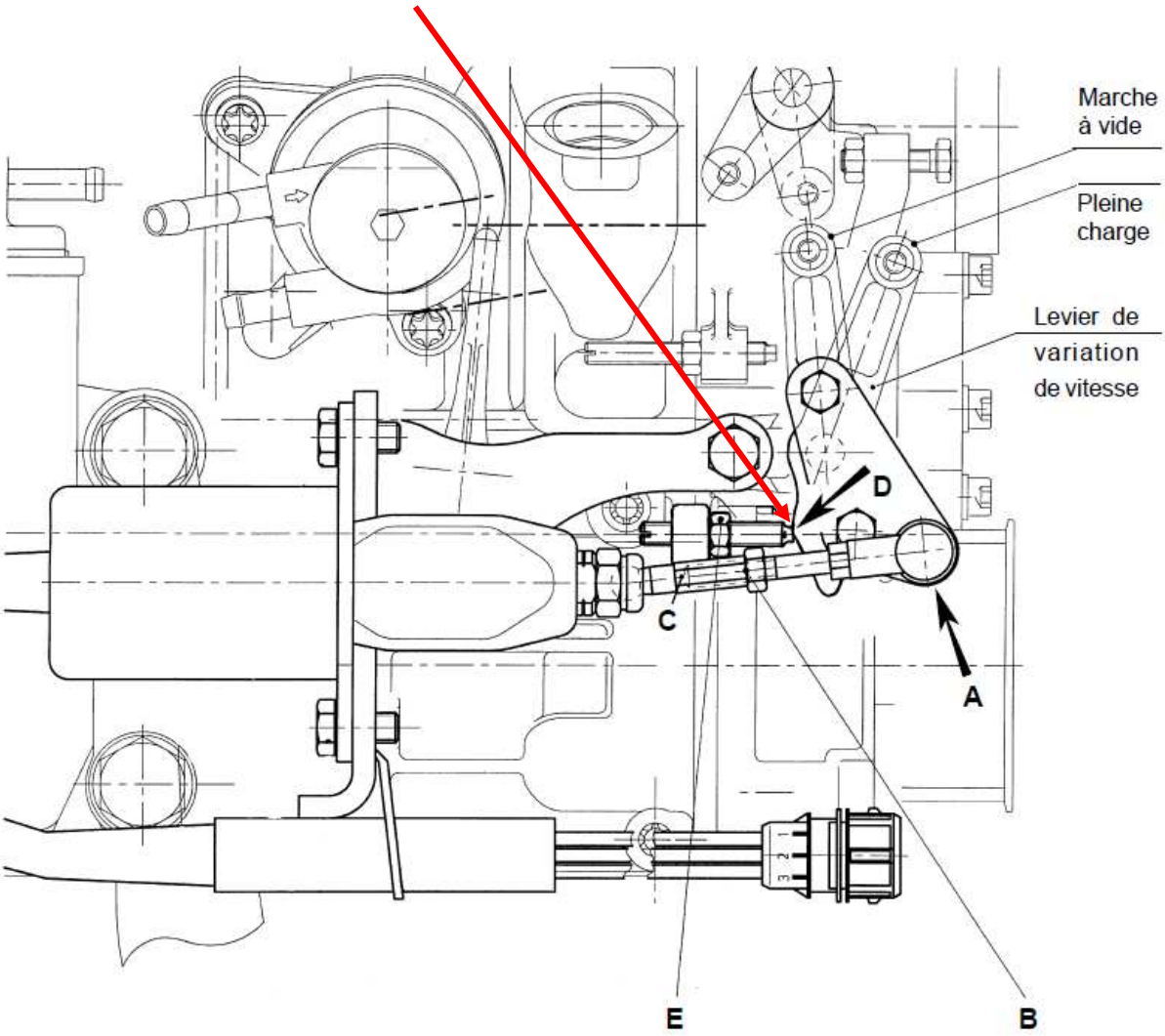


Fuse 30A on accelerator coil :



- **Procedure**

the coil rod A must be aligned straight with coil
the clearance D must be adjusted at +/- 0.5mm when accelerator is at maxi stroke
(it must never touch the stop screw mark D)

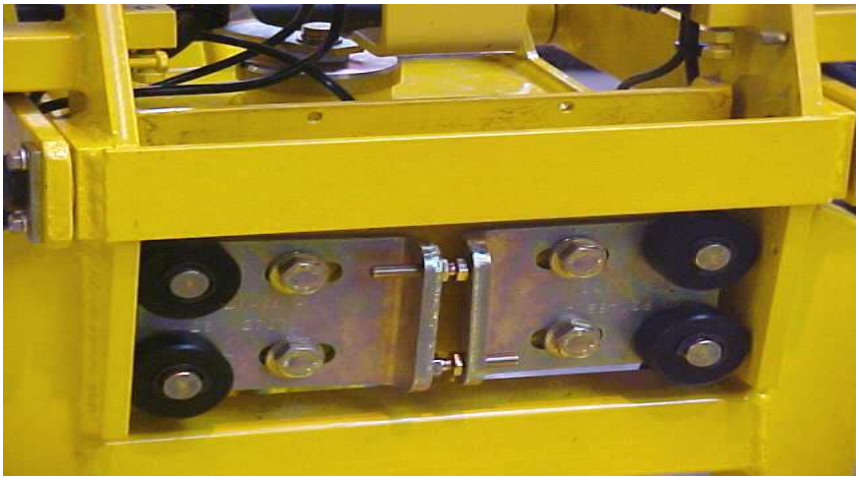


4.6. OVERLOAD

Procedure :

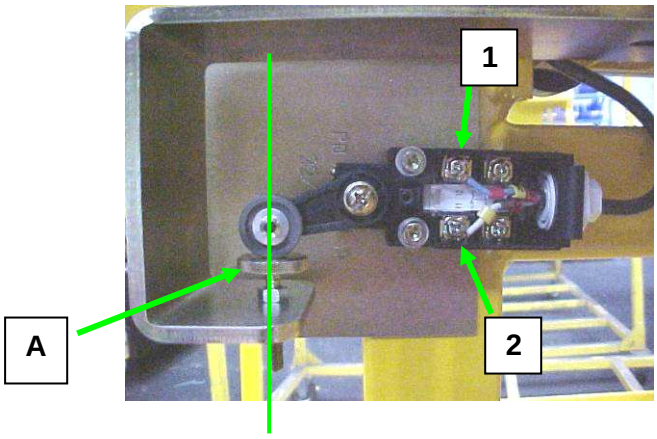
Adjust the wheels

- Centre the basket with the link part
- Push on the left the 2 plastics wheels
- Tighten 2 screws HM12 on left side
- Put a steel wedge (thickness = 0.1 mm) on the right (between plastics wheels 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 wheels shoud turn freely only by hand



Overload

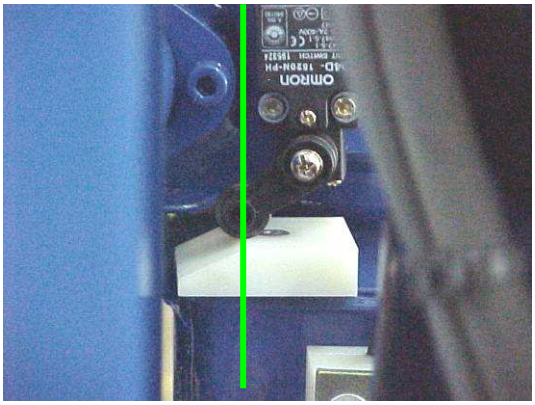
- Put the weight in the centre of the basket (weight = 120% x nominal weigh).
- stop unscrew the part "A" when you hear the buzzer
- The plastic wheel and the screw must be in the same axis
- Check the opening of the contact between 1 & 2
- Lift and lower the weight to check the adjust
- Check the light on the console, the buzzer on, and you can't have movements.
- Block the part "A" with the nut
- Repeat the same operation for the second limit switch



- Adjust electrical contactor 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
- Check the light on the console, the buzzer on, and you can't have movements.
- Block the part "A" with the nut
- Repeat operation for the second limit switch

<u>Adjust electrical contactor for the basket rotation</u>

- 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 must activate in this position.
- Do the same thing for the second limit switch



5. BREAKDOWN SERVICE GUIDE

This guide does not replace the logical equations described previously in this manual,
it allows him to have a logical step of breakdown service, detailing the successive steps to be followed starting from general tips until 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 (ex not arm lift: neither raise, nor descent from both controls)

5.1. NO START

- Battery (14V)
- Emergency push buttons SB1-SB2
- Start switchs SB3-SB4
- Key switch SA1
- Fuse FU8
- Engine oil Temperature B2
- 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
- Load Sensing Valve YV1
- Foot dead man pedal SB6 / lower box dead man switch SA19
- Head module

5.3. NO MOVEMENT > 3 M

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

5.4. NO ARM LIFT

- Signal on YV4 (25-50-75%Vbat)
- Signal on SM2 joystick (0.5/2.5/4.5VDC)
- Toggle switch SA14
- Valve YV4
- Head module

5.5. NO BOOM LIFT

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

5.6. NO TELESCOPIC BOOM EXTENSION

- Valve YV2
- Toggle switch SA8/SA9
- Head module

5.7. NO TURRET ROTATION

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

5.8. NO ON/OFF MOVEMENTS

- valves YV5/YV 15/YV18/YV19
- toggles switch (SA4/SA5/SA6/SA7/SA17)
- valve YV5 or ON/OFF block
- Head module

5.9. 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
- Head module

5.10. ONLY LOW SPEED

- Valves YV8/YV12/YV13/YV17/YV23
- Limit switch SQ2/SQ3/SQ4
- Toggle switch SA11
- Head module

5.11. NO STEERING

- Valves YV5/YV11/YV21/YV22
- Head module

6. SUMMARY OF VERSIONS HA16PX –HA18PX

HA15X/HA16X		Electric	Hydraulic
Pre version 280 with pedals	Standard EC	E572	B16529
Pre-280 version without pedals	Standard EC	E565	B16529
Version IN 280 (until June 2006)	Standard EC	E603	P22873
+ change steering axle- with the joystick	Standard EC	137P270910	180P212140
Aus version		E603	P22873
Usa version		E603	P22873

HA16PE		Electric	Hydraulic
Pre version 280 (without pedals) (until May 2005)	Standard EC	E436 C	B15160
Version IN 280	Standard EC	E567	B15160
Version IN 280 + basket rotation with limit switchs	Standard EC	E586	B15160
Aus version	E586 B E436 C		B15160
Usa version	E436 (P20251) E586 B E436 C		B15160

HA16PE-PX		Electric	Hydraulic
Pre version 280 (without pedals) (until June 2003)	Standard EC	E436 C	B15832
Version IN 280 (until June 2004)	Standard EC	E567	B15832
Version IN 280 + basket rotation with limit switchs	Standard EC	E586	B15832
Aus version	E586 B E436 C		B15832
Usa version	E436 (P20251) E586 B E436 C		B15832

HA16-18NT Phase 1 Machine with relay EHR-EHF		Electric	Hydraulic
Pre version 280 + relay EHR (until September 2003)	Standard EC	E567	P22513
Version IN 280 + relay EHR (until September 2003)	Standard EC	E567	P22513
Version Aus (until September 2003)		E584	P22513
Usa version (until September 2003)		E584	P22513

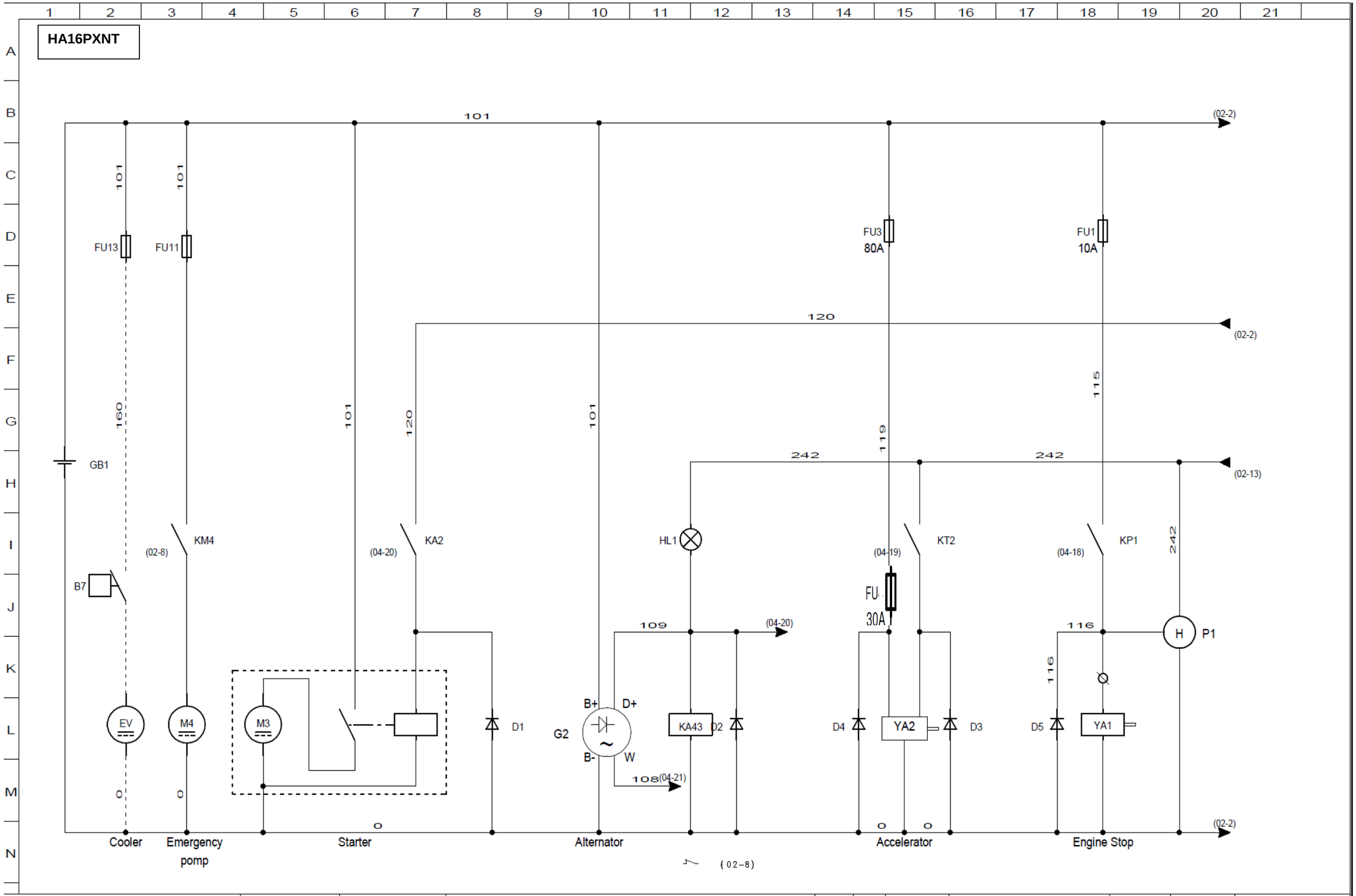
HA16-18NT Phase 2 EN280 Joystick 3v/6v/9v		Electric	Hydraulic
Standard (until January 2006)	Standard EC	E567	P22513
+ addition of steering relays + change steering axle- with the joystick + button compensation bottom panel	Standard EC	E584	P22513
Aus version		E567	P22513
Usa version		E567	P22513

HA16SPX and NT Phase 0 EN280 machine with progressivity		Electric	Hydraulic
Standard (until March 2005)	Standard EC	E595	P21214
+ turret slewing plug socket on block TOR	Standard EC	E595	P21214
Only NT model	Standard EC	E598	179P260650
Aus version		E582 E595	P21214
Usa version		E582 E595	P21214

Pre version 280 = Detection overload (threshold of alarm then cut-off movements)
Version EN 280 = detection overload with cut-off movements

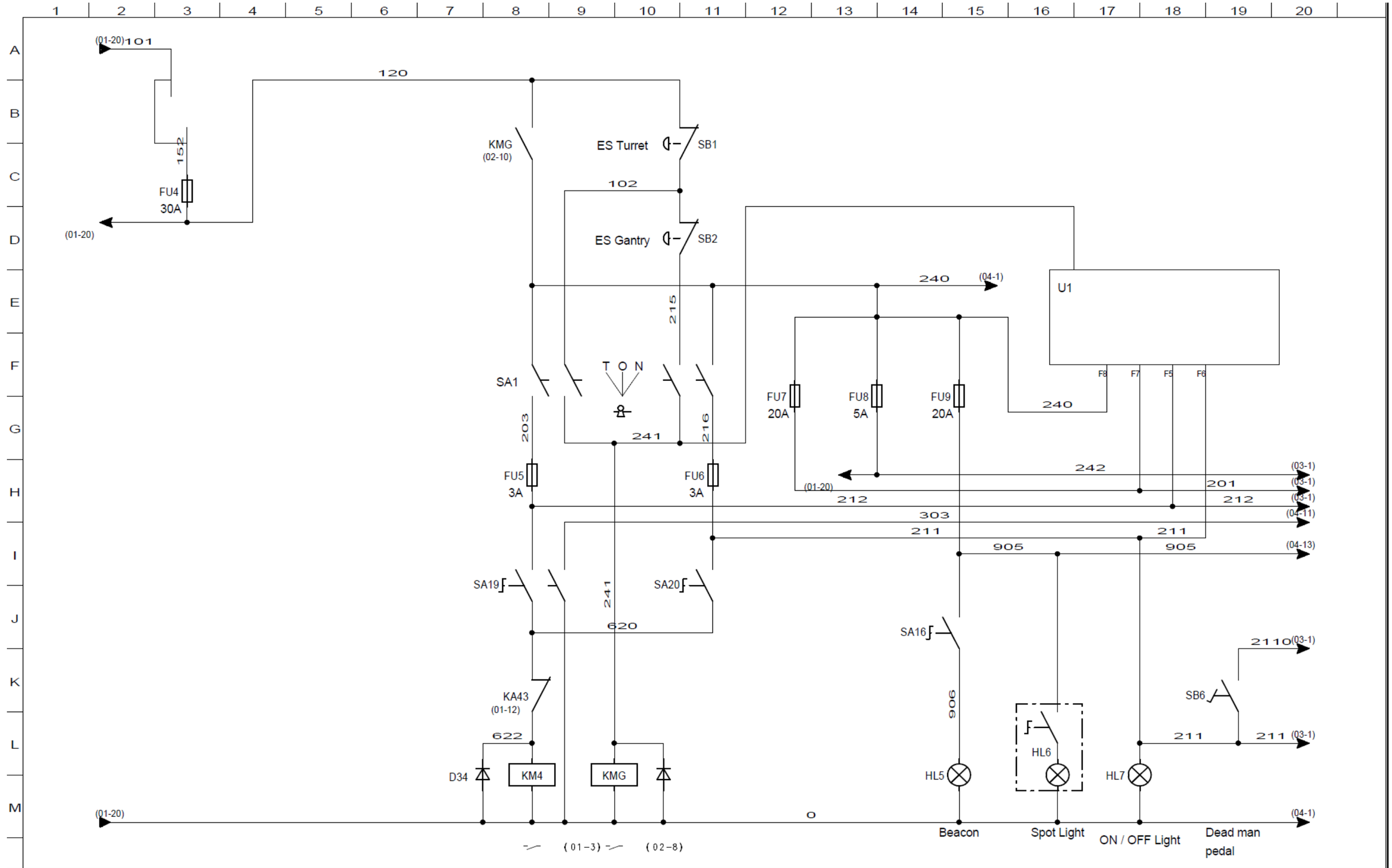
7. SPECIAL FUNCTIONS

there is no special functions for these models

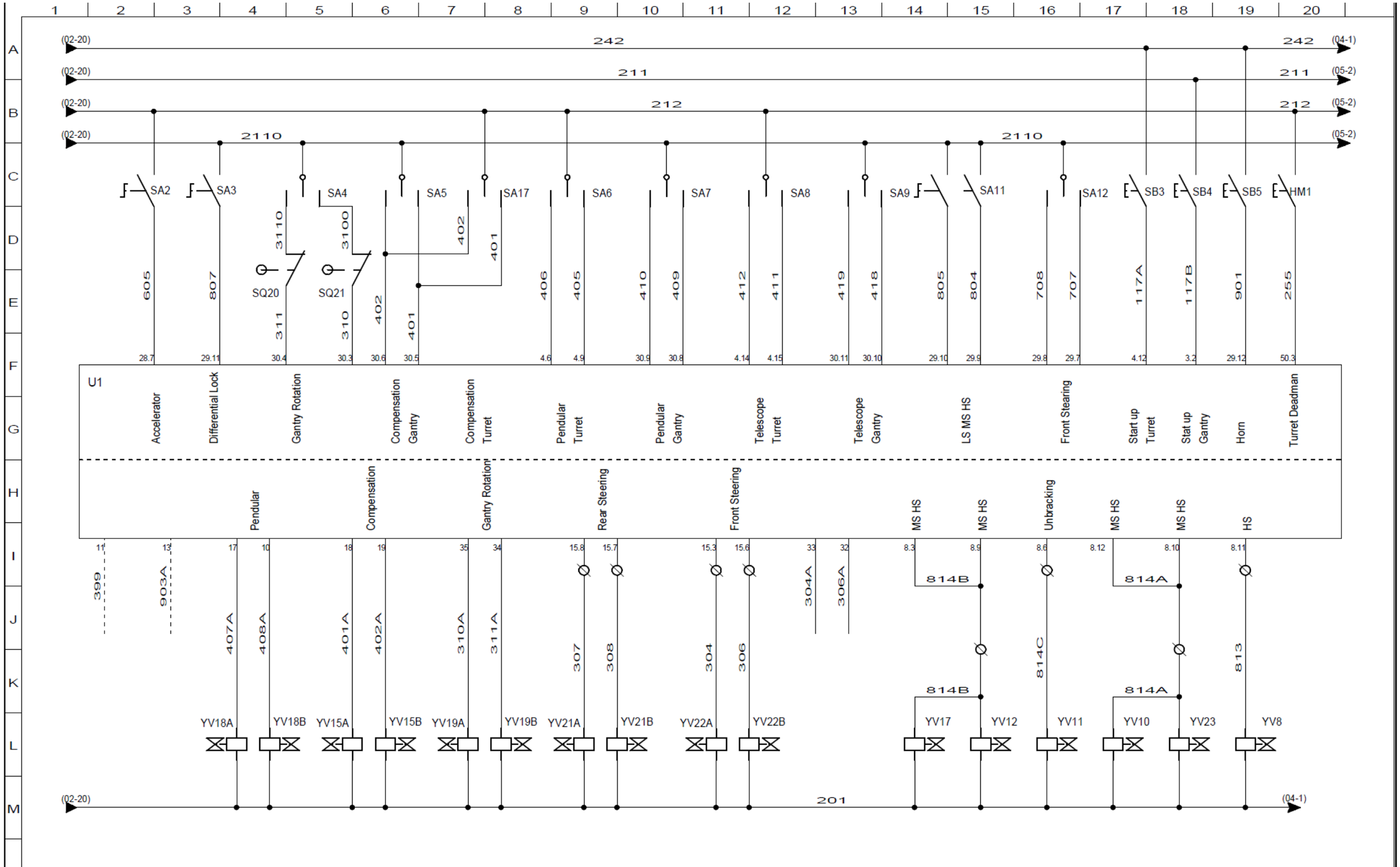


Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

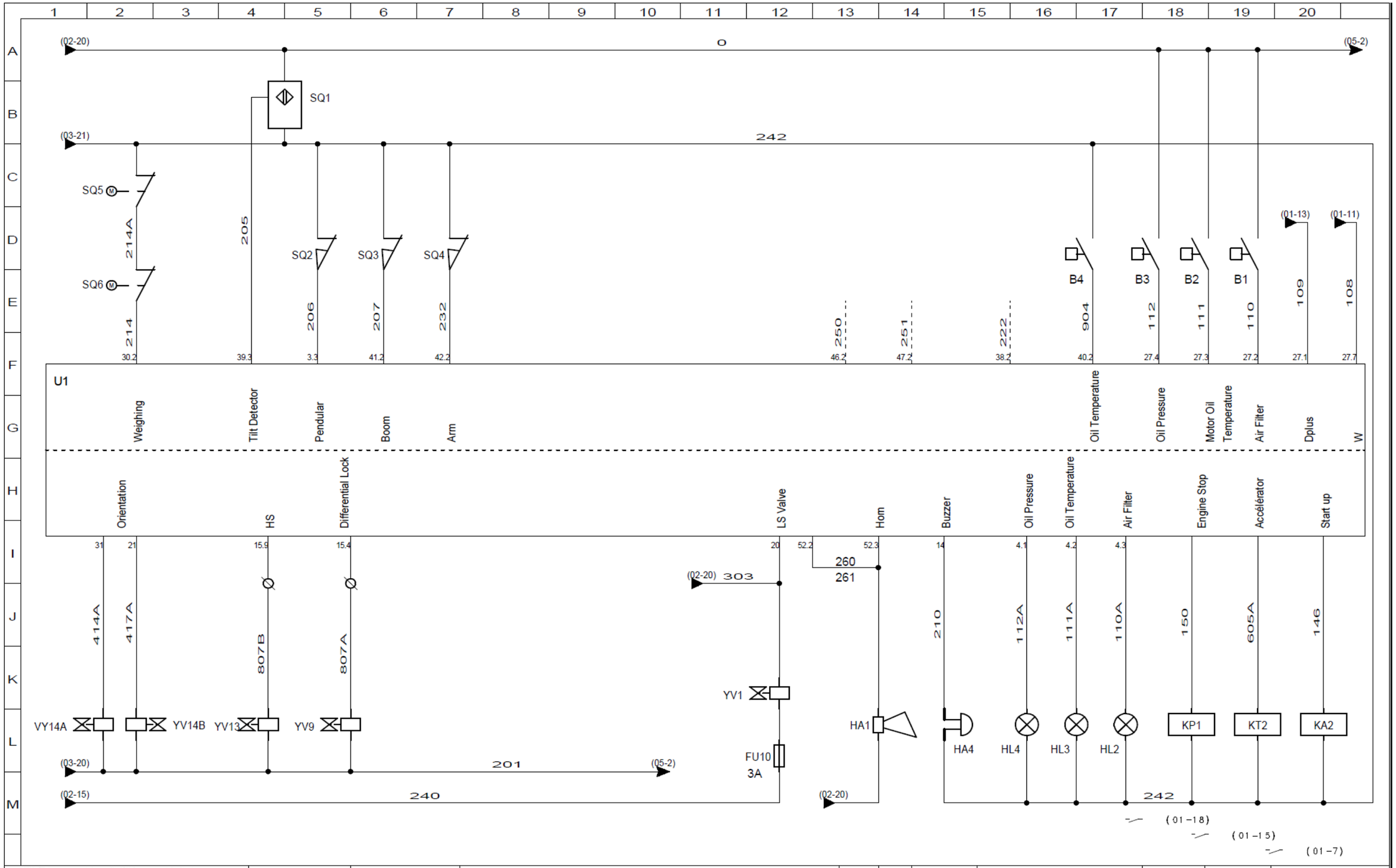
DESSINE PAR	DATE DE CREATION	E598	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS
F DÉNÉZÉ	03/03/2004		N DEAUX	C	01/07/2008	DM7074 & DM7217	A DURO	05
VERIFIE PAR	DATE DE VERIFICATION	HA16NT		B	10/01/2007	TEXTE PASSAGE PHASE 3	A. DURO	SCHEMAS 01
L DI FLORIO								



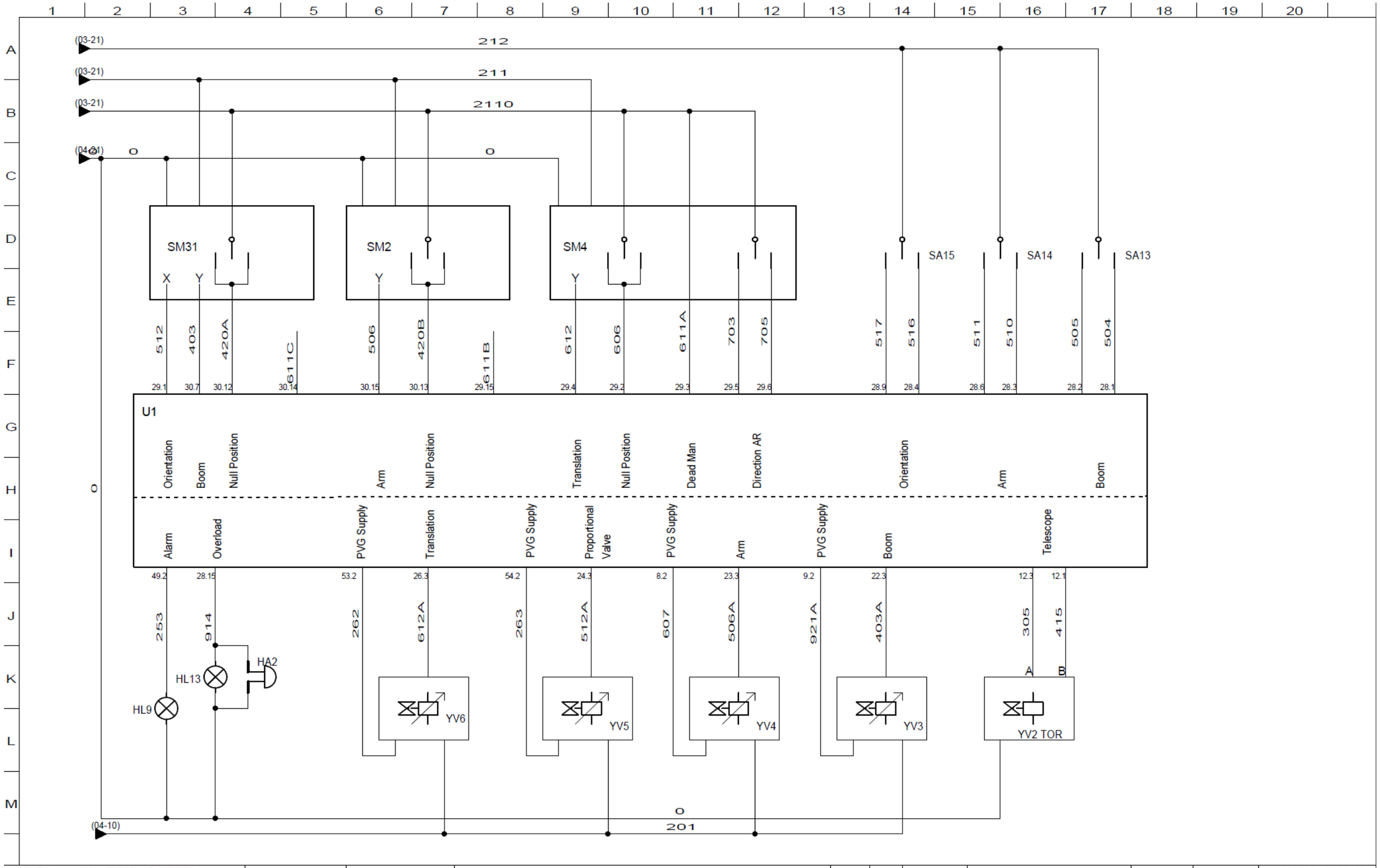
Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 03/03/2004	E598	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16NT	N DEAUX	C	01/07/2008	DM7074 & DM7217	A DURO	SCHEMAS 02



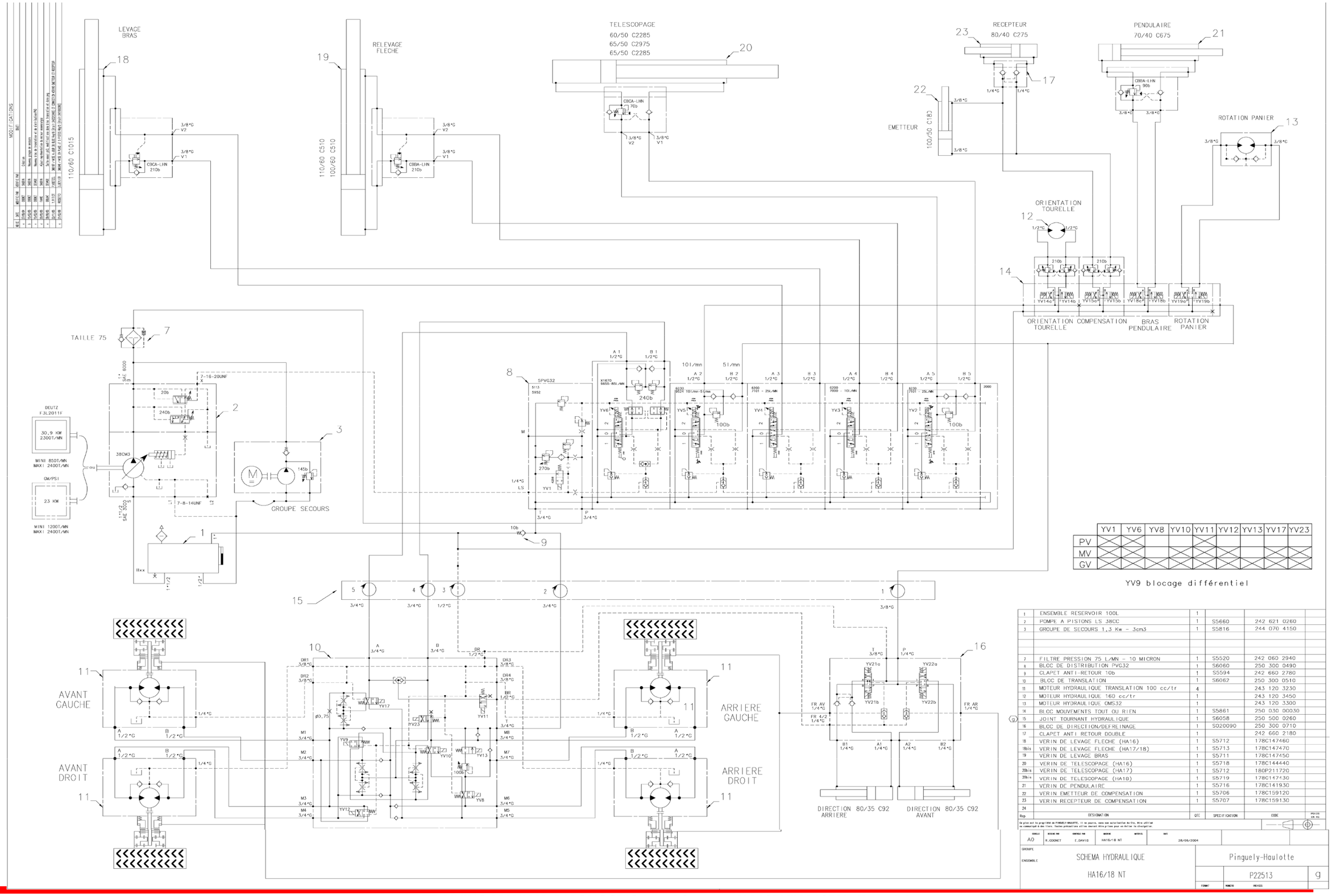
Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 03/03/2004	E598	MODIF N DEAUX	IND C	DATE 01/07/2008	MODIFICATION DM7074 & DM7217	VISA A DURO	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16NT						SCHEMAS 03



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 03/03/2004	E598	MODIF N DEAUX	IND C	DATE 01/07/2008	MODIFICATION DM7074 & DM7217	VISA A DURO		NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16NT						SCHEMAS	04

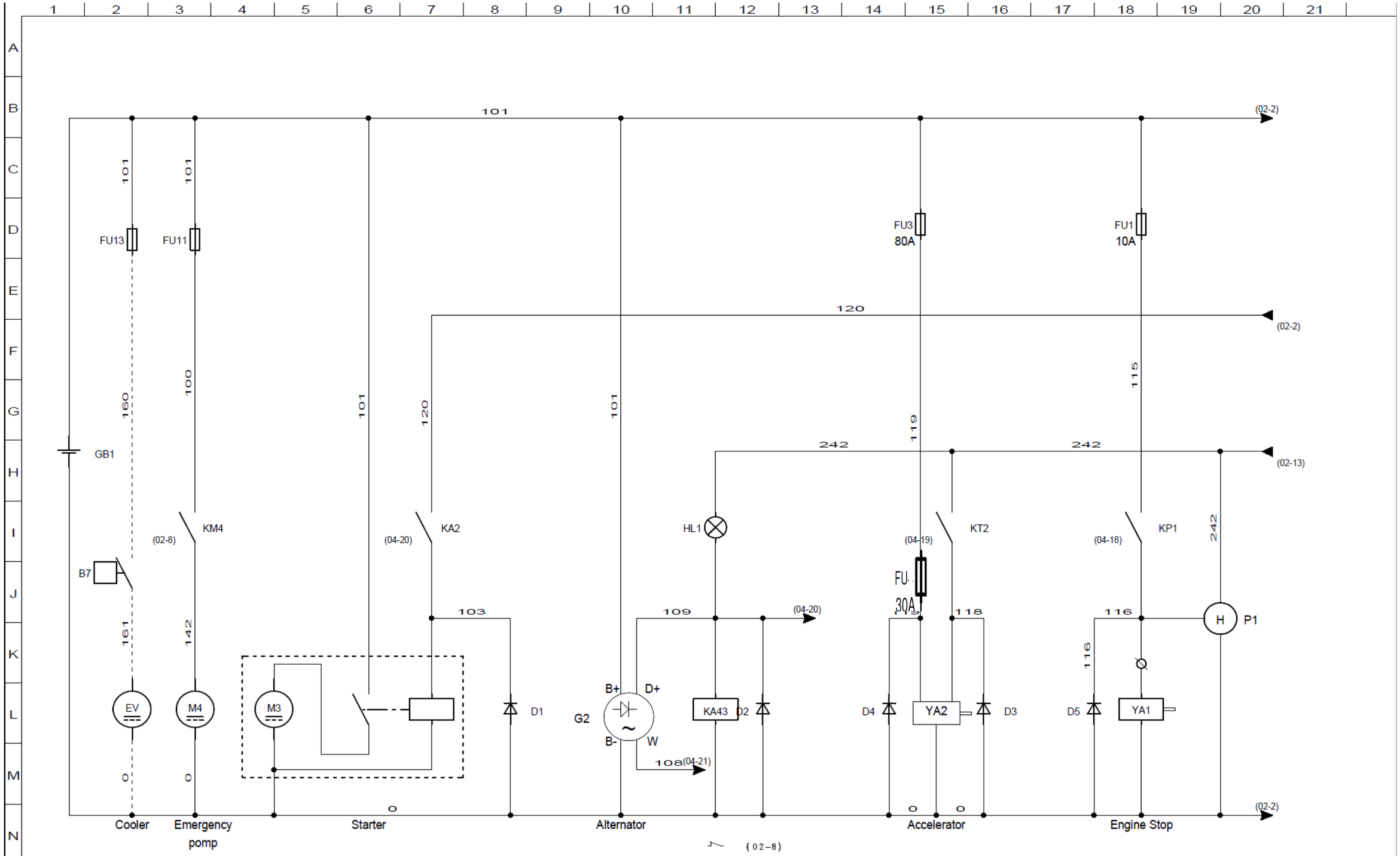


Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 03/03/2004	E598	MODIF	IND	DATE	MODIFICATION	VISA		NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16NT	N DEAUX	C	01/07/2008	DM7074 & DM7217	A DURO	SCHEMAS	05

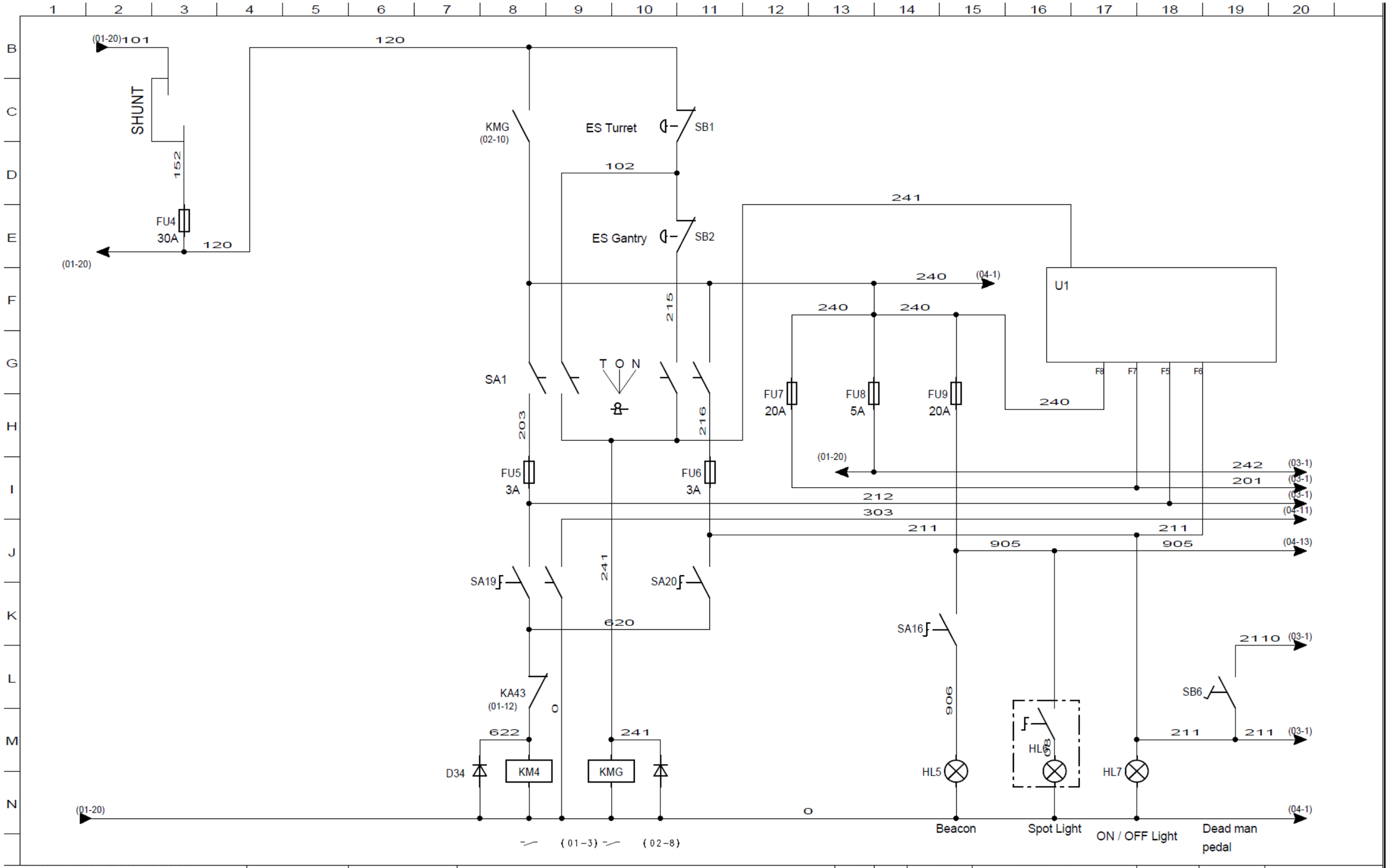


	YV1	YV6	YV8	YV10	YV11	YV12	YV13	YV17	YV23
PV	X	X			X				
MV	X	X	X	X	X	X	X	X	X
GV	X		X	X	X	X	X	X	X

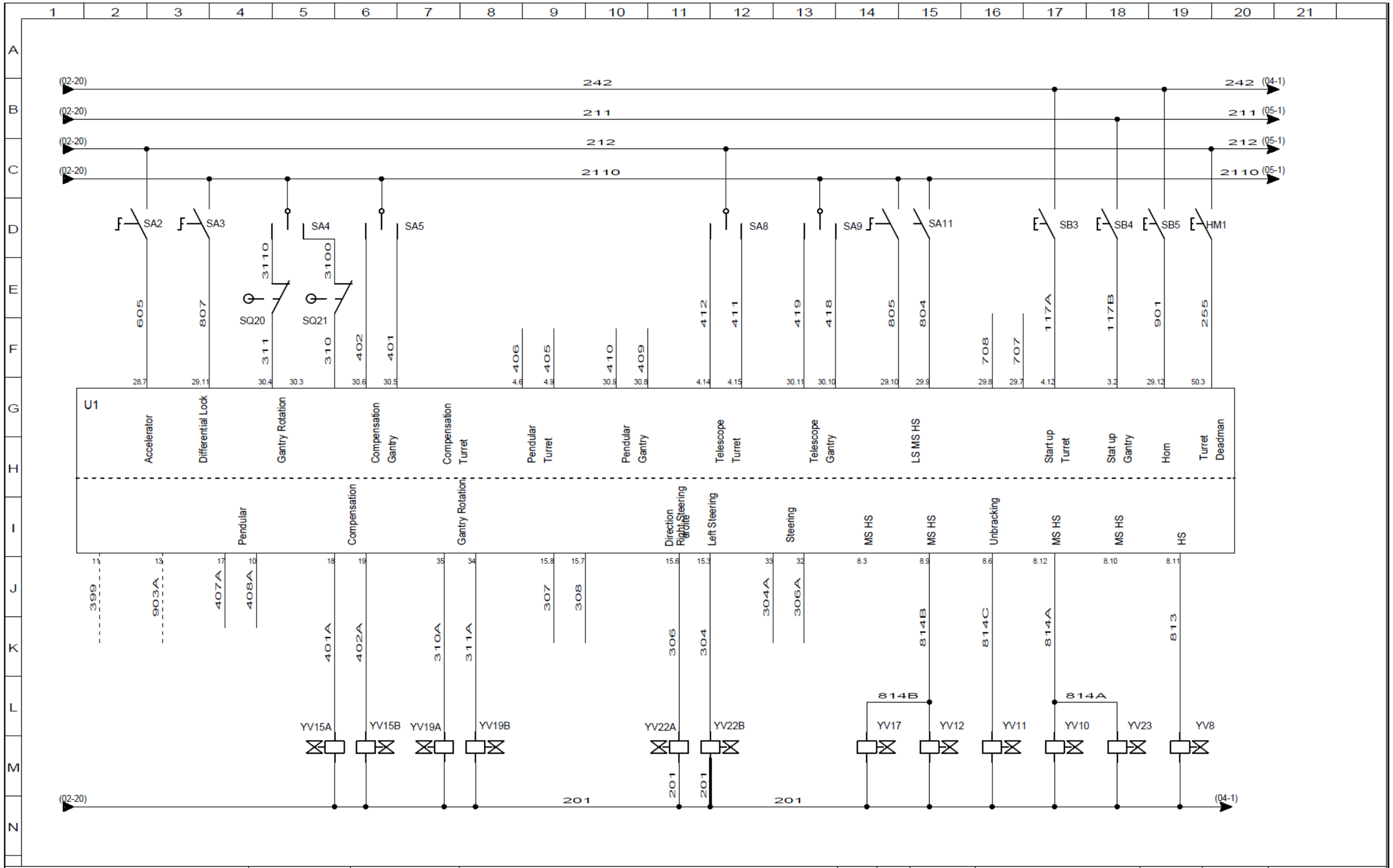
Rep.	DESIGNATION	QTE	SPECIFICATION	CODE
1	ENSEMBLE RESERVOIR 100L	1		
2	POMPE A PISTONS LS 38CC	1	S5660	242 621 0260
3	GROUPE DE SECOURS 1,3 Kw - 3cm3	1	S5816	244 070 4150
7	FILTRE PRESSION 75 L/MN - 10 MICRON	1	S5520	242 060 2940
8	BLOC DE DISTRIBUTION PVG32	1	S6060	250 300 0490
9	CLAPET ANTI-RETOUR 10b	1	S5594	242 660 2780
10	BLOC DE TRANSLATION	1	S6062	250 300 0510
11	MOTEUR HYDRAULIQUE TRANSLATION 100 cc/tr	4		243 120 3230
12	MOTEUR HYDRAULIQUE 160 cc/tr	1		243 120 3450
13	MOTEUR HYDRAULIQUE OMS32	1		243 120 3300
14	BLOC MOUVEMENTS TOUT OU RIEN	1	S5861	250 030 00030
15	JOINT TOURNANT HYDRAULIQUE	1	S6058	250 500 0260
16	BLOC DE DIRECTION/DEFRENAGE	1	S020090	250 300 0710
17	CLAPET ANTI RETOUR DOUBLE	1		242 660 2180
18	VERIN DE LEVAGE FLECHE (HA16)	1	S5712	178C147460
18bis	VERIN DE LEVAGE FLECHE (HA17/18)	1	S5713	178C147470
19	VERIN DE LEVAGE BRAS	1	S5711	178C147450
20	VERIN DE TELESCOPAGE (HA16)	1	S5718	178C144440
20bis	VERIN DE TELESCOPAGE (HA17)	1	S5712	180P211720
20bis	VERIN DE TELESCOPAGE (HA18)	1	S5719	178C147430
21	VERIN DE PENDULAIRE	1	S5716	178C141930
22	VERIN EMETTEUR DE COMPENSATION	1	S5706	178C159120
23	VERIN RECEPTEUR DE COMPENSATION	1	S5707	178C159130
24				



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR A DURO	DATE DE CREATION 05/07/2006	137P270910	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR	DATE DE VERIFICATION	HA16X	N DEAUX	C	10/07/2008	DM7074 et DM7217	A DURO	
					B	14/06/2007	modif câblage YV22 DM6225	D FERRATON	SCHEMAS 01
					A	14/06/2007	création (phase 3)	A DURO	



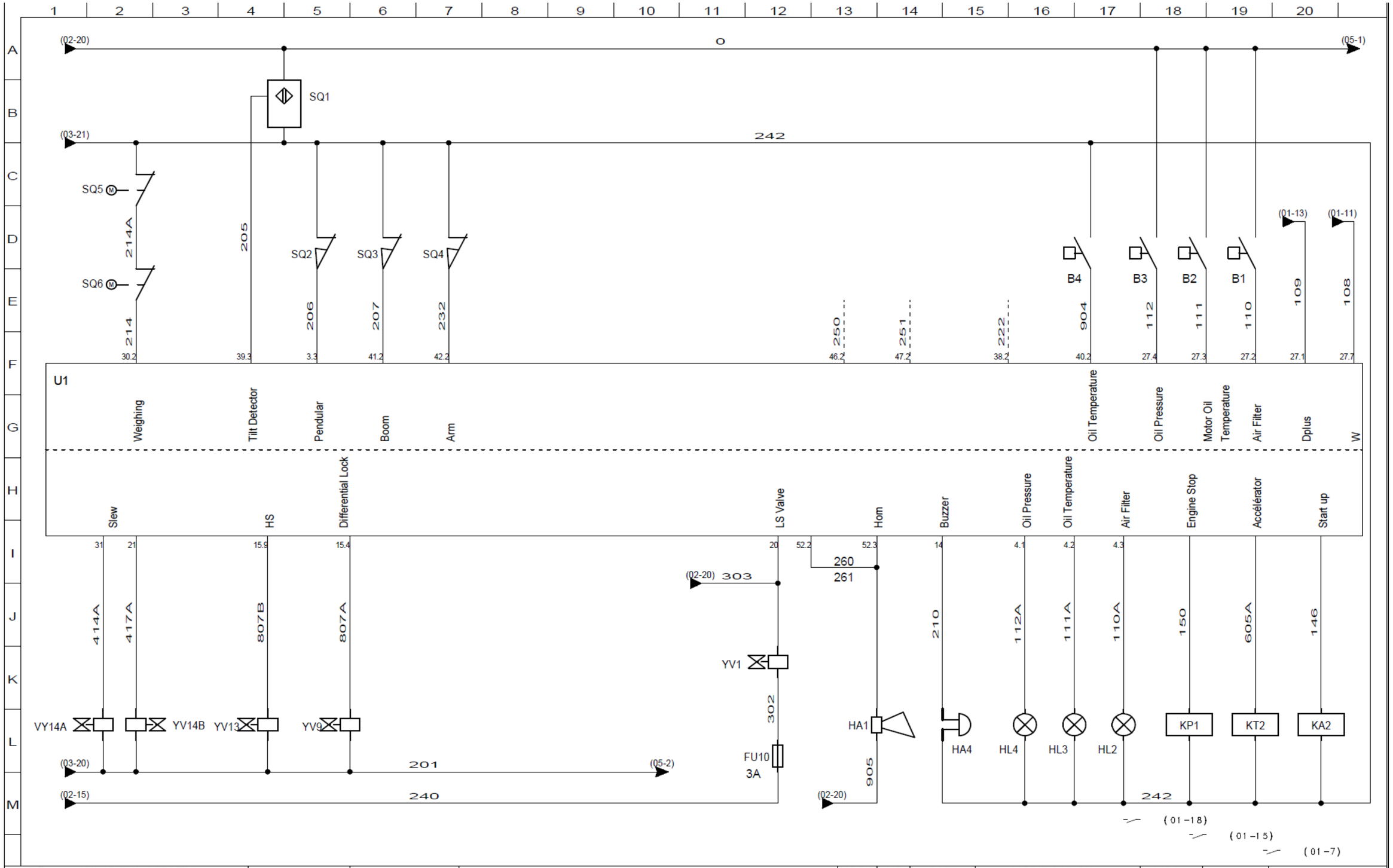
Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR A DURO	DATE DE CREATION 05/07/2006	137P270910	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR	DATE DE VERIFICATION	HA16X	N DEAUX	C	10/07/2008	DM7074 et DM7217	A DURO	SCHEMAS 02



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR A DURO	DATE DE CREATION 05/07/2006	137P270910	MODIF N DEAUX	IND C	DATE 10/07/2008	MODIFICATION DM7074 et DM7217	VISA A DURO
	VERIFIE PAR	DATE DE VERIFICATION	HA16X					

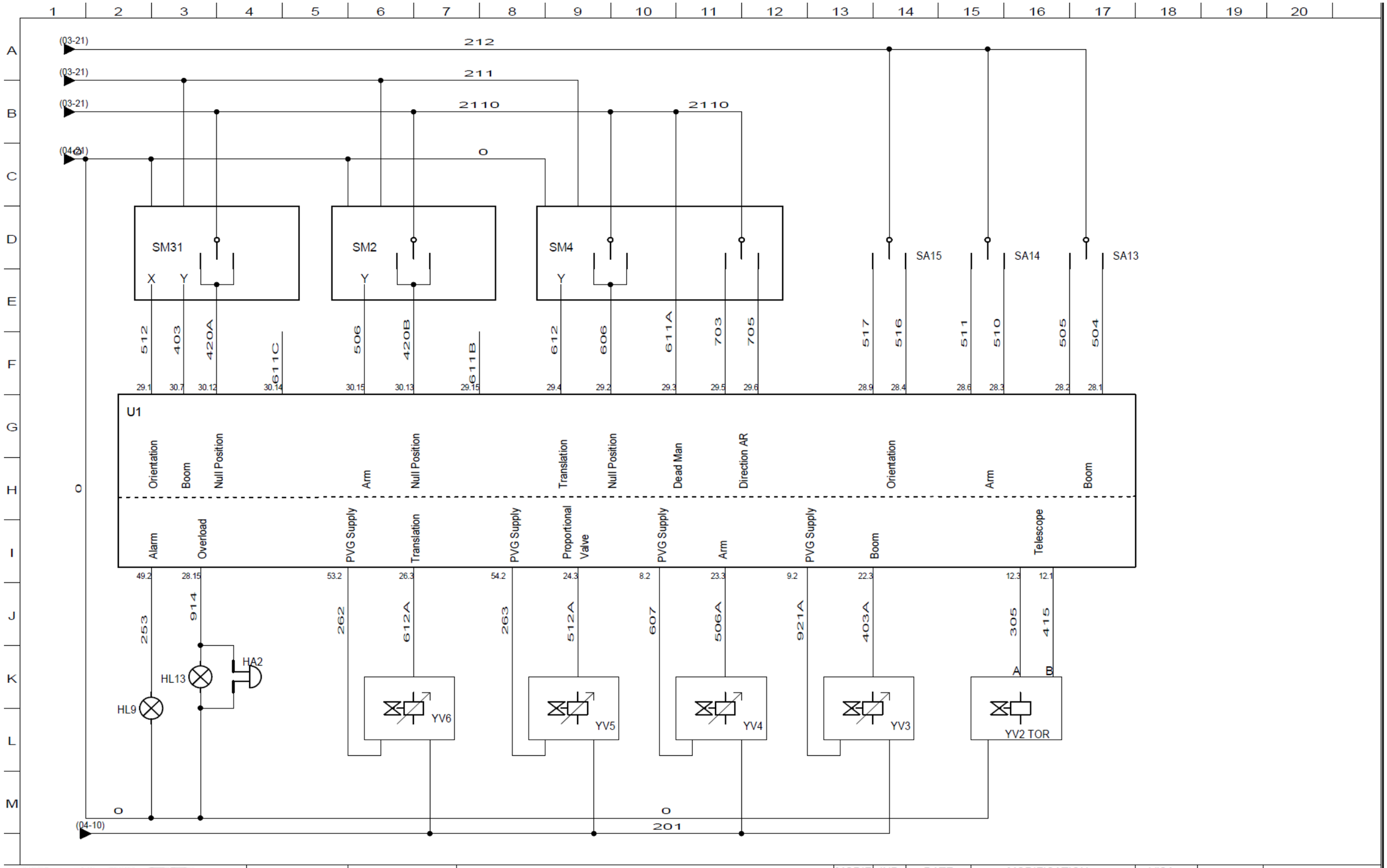
NBRE TOTAL DE FOLIOS 05

SCHEMAS 03

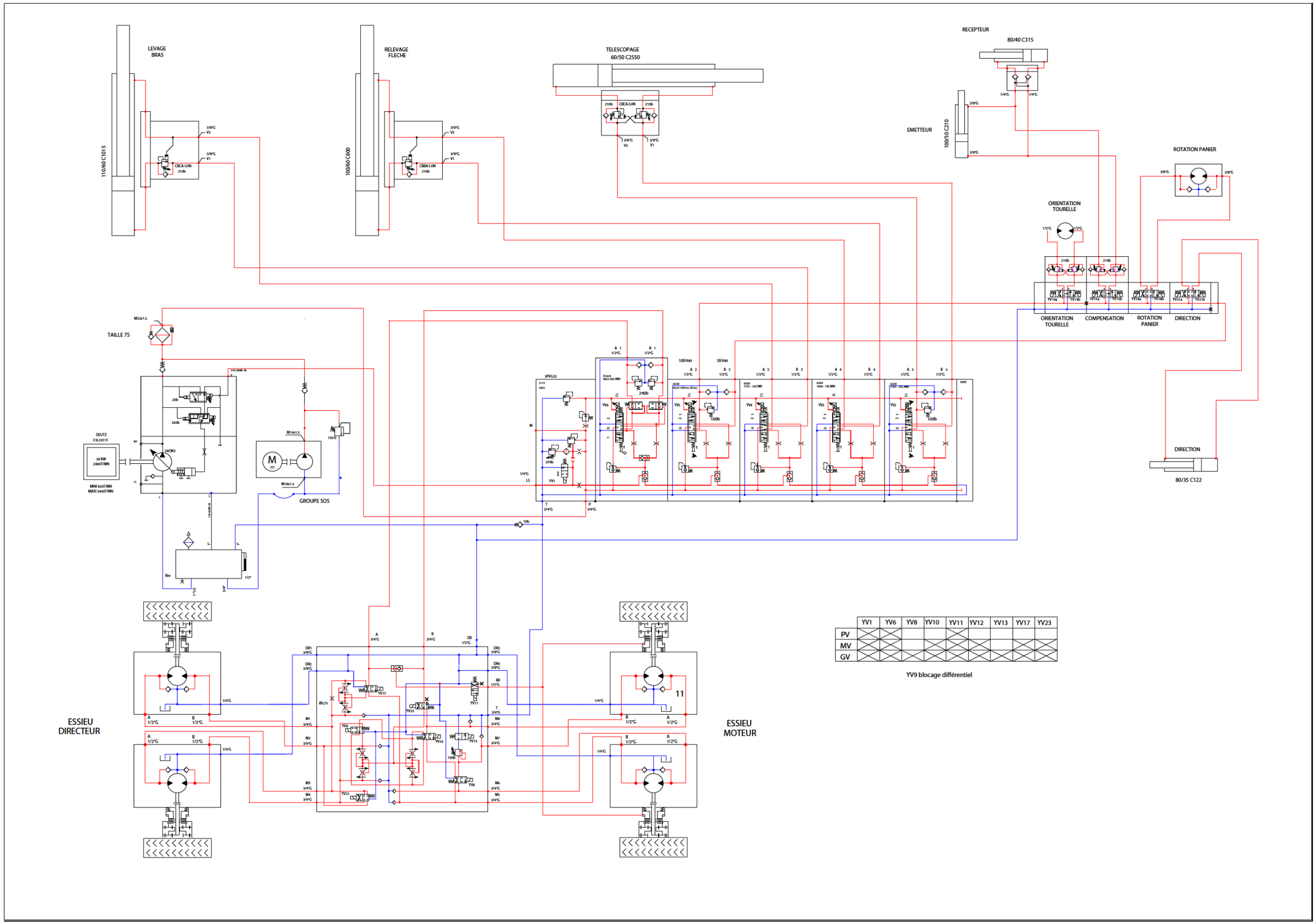


Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

DESSINE PAR	DATE DE CREATION	137P270910	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS
A DURO	05/07/2006		N DEAUX	C	10/07/2008	DM7074 et DM7217	A DURO	05
VERIFIE PAR	DATE DE VERIFICATION	HA16X						SCHEMAS 04



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR A DURO	DATE DE CREATION 05/07/2006	137P270910	MODIF N DEAUX	IND C	DATE 10/07/2008	MODIFICATION DM7074 et DM7217	VISA A DURO		NBRE TOTAL DE FOLIOS 05
	VERIFIE PAR	DATE DE VERIFICATION	HA16X						SCHEMAS	05



	YV1	YV6	YV8	YV10	YV11	YV12	YV13	YV17	YV23
PV	X	X			X			X	X
MV	X	X			X	X		X	X
GV	X	X	X	X	X	X	X	X	X

E595 HA16SPX

IND	MODIFICATION	N°MODIF	VISA	DATE	FOLIO
F	ajout de toutes les opt. (DM7424)	DM7424	D.FERRATON	02/06/2009	
E	mod. câblage YV17 & YV23 (DM7588)		A. DURO	16/03/2009	
D	mod. alim. PVG + bouton HM DM7074 et DM7217		A DURO	12/03/2009	
C			A. DURO	01/07/2008	
B			A DURO	12/03/2009	
A			A.DURO	29/10/2008	

Haulotte GROUP

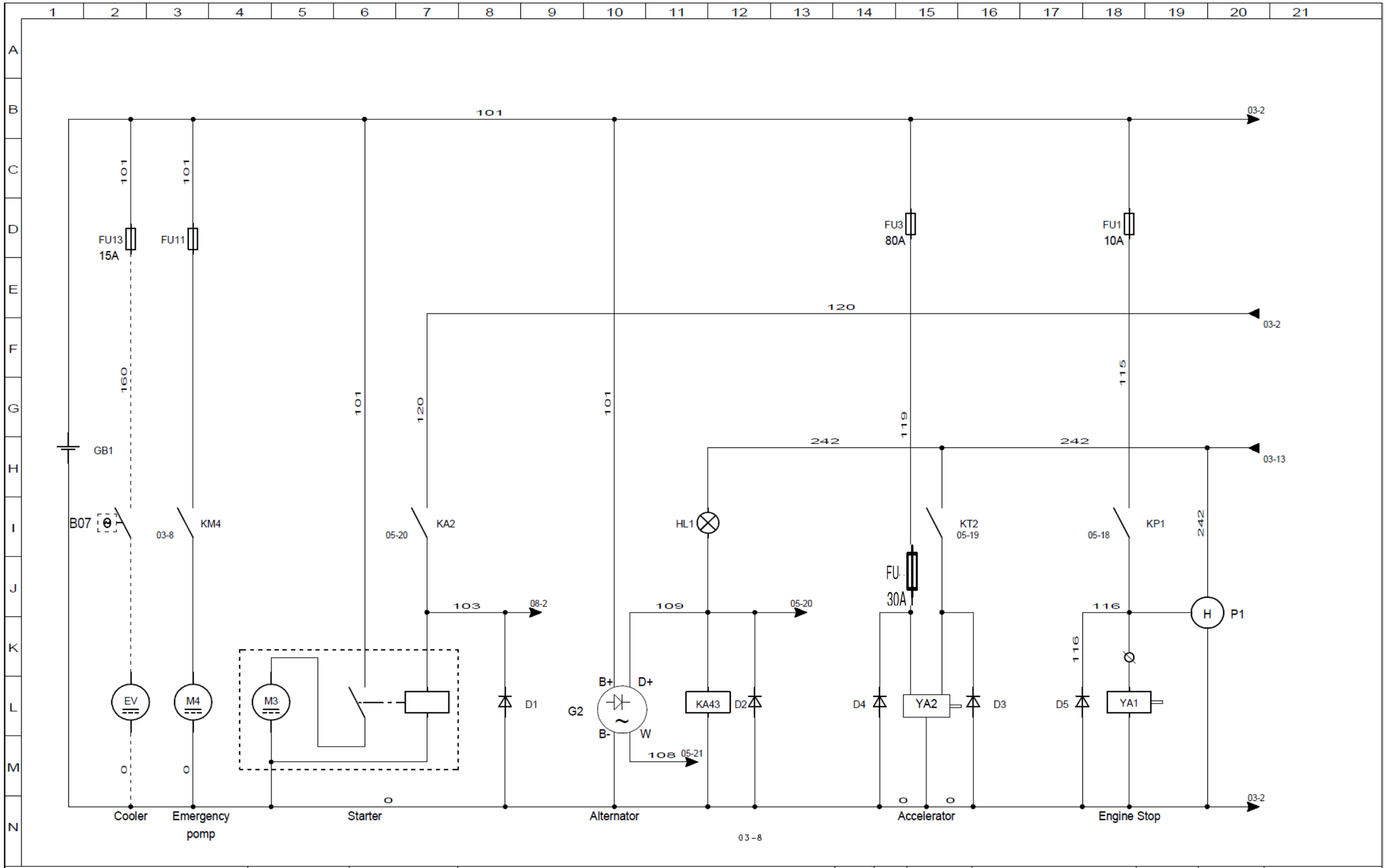
DESSINE PAR	D.FERRATON	DATE DE CREATION	13/03/2009
VERIFIE PAR	N. DEAUX	DATE DE VERIFICATION	30/10/2008

SCHEMAS

Page de garde

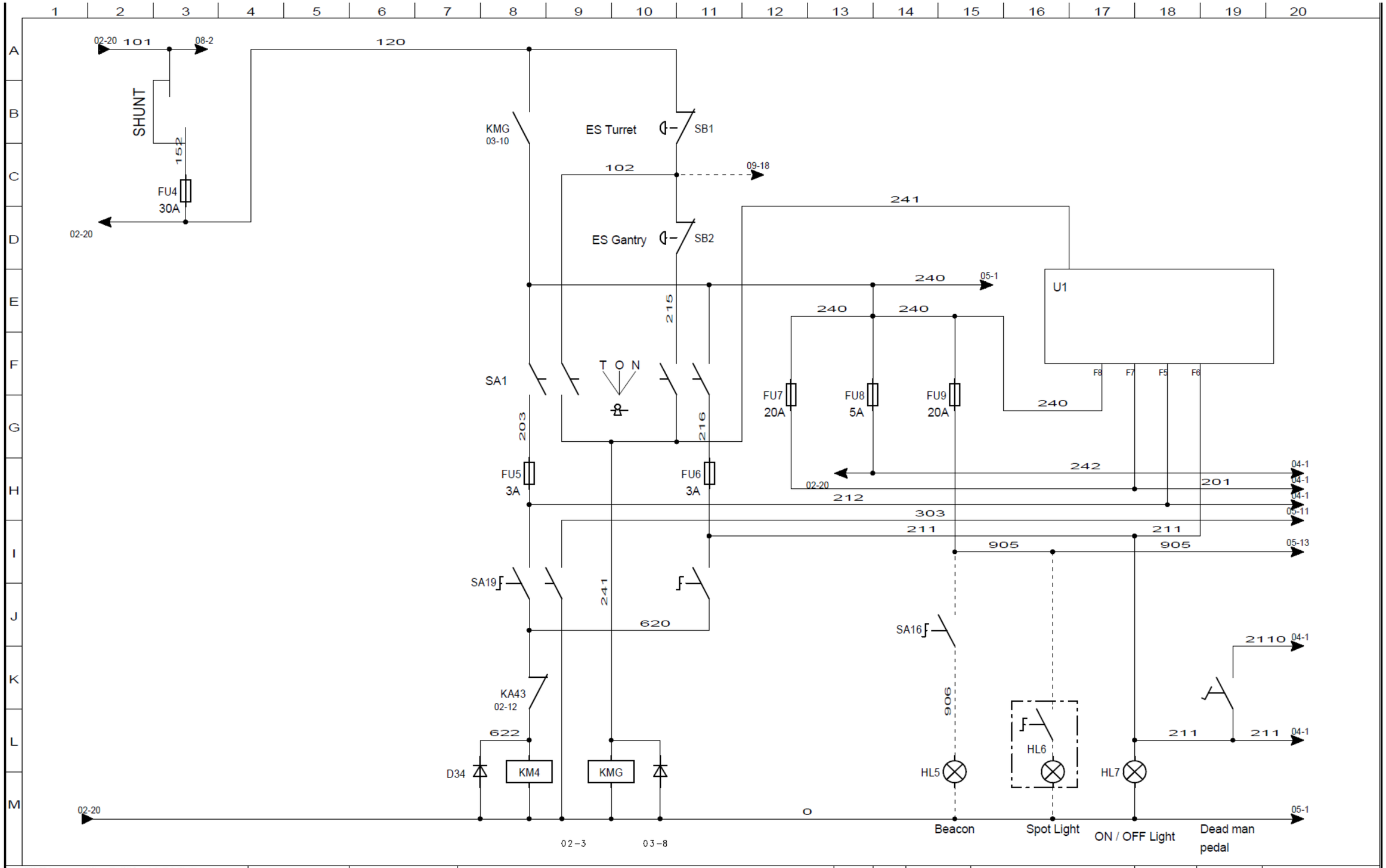
NBRE TOTAL DE FOLIOS	FOLIO
09	01

FOLIO	DESIGNATION	COMMENTAIRES
1	Title page	
2	Power	
3	Station selection	
4	Input-output Calculator	
5	Input-output Calculator	
6	Joysticks	
7	Options	
8	Options	
9	Options	

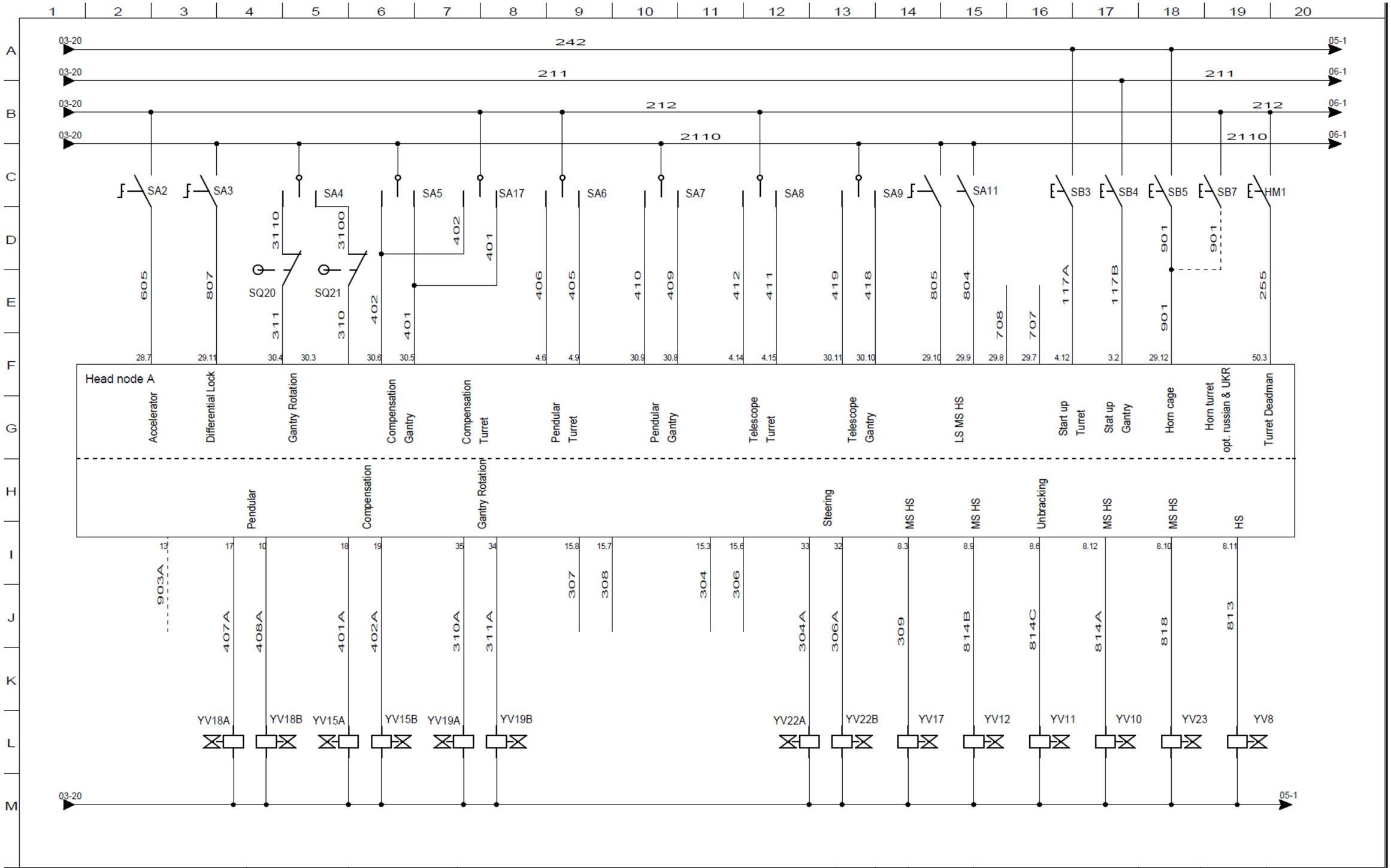


Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

DESSINE PAR	DATE DE CREATION	E595	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS
F DÉNÉZÉ	23/01/2004	D FERRATON	7588	F	10/02/2009	ajout options (DM7424)	A. DURO	09
VERIFIE PAR	DATE DE VERIFICATION	HA16-18SPX	N DEAUX	E	18/12/2008	Modif cablage YV17 et YV23	A. DURO	SCHEMAS 02
L DI FLORIO				D	01/07/2008	DM7074 & DM7217	A DURO	
				C	05/10/2005	Mise à jour DM5321	A. DURO	



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 23/01/2004	E595	MODIF	IND	DATE	MODIFICATION	VISA		NBRE TOTAL DE FOLIOS 09
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16-18SPX	D FERRATON 7588 N DEAUX	F E D	10/02/2009 18/12/2008 01/07/2008	ajout options (DM7424) Modif cablage YV17 et YV23 DM7074 & DM7217	A. DURO A. DURO A DURO	SCHEMAS	03



Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

DESSINE PAR	DATE DE CREATION
F DÉNÉZÉ	23/01/2004
VERIFIE PAR	DATE DE VERIFICATION
L DI FLORIO	30/04/1999

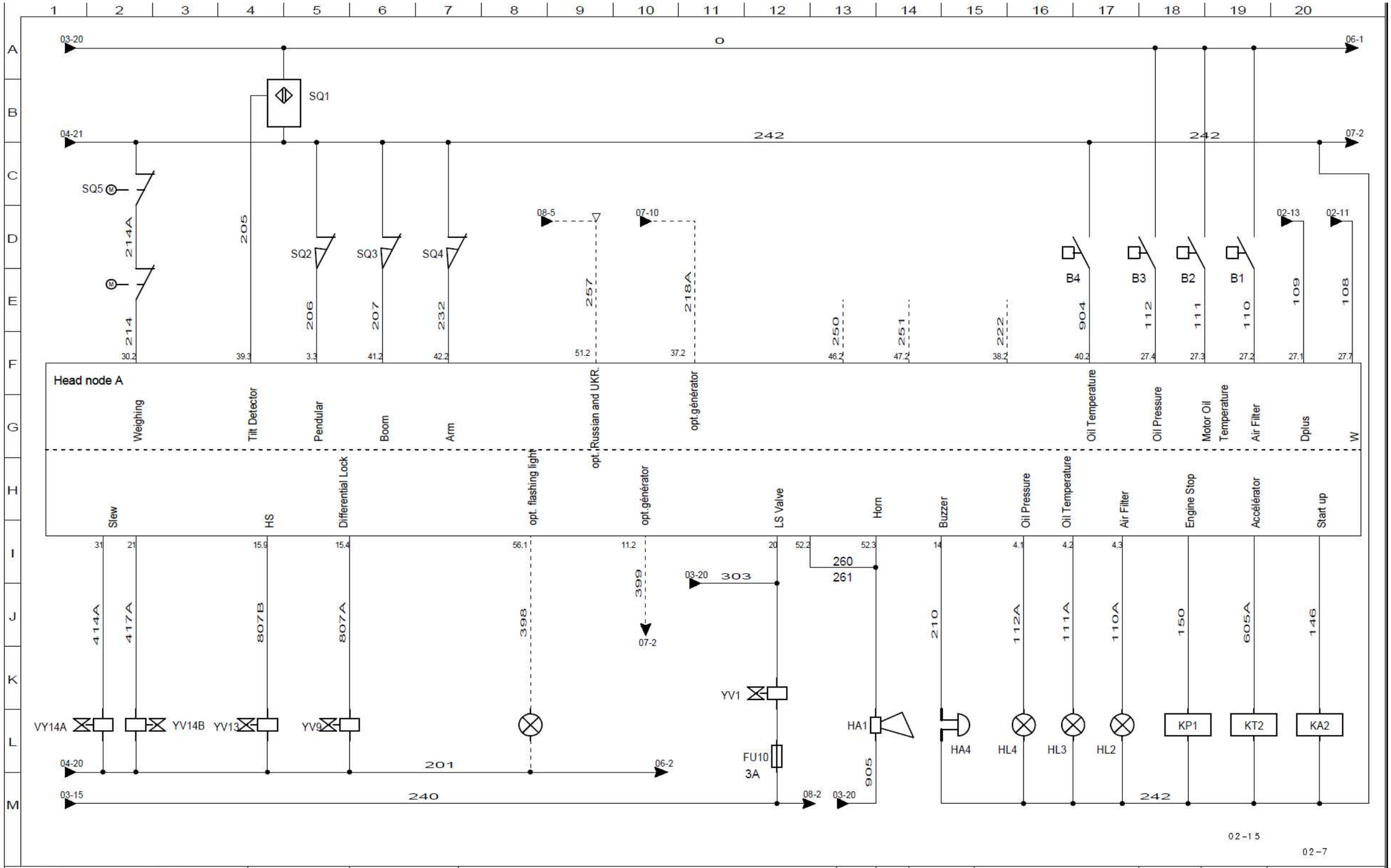
E595

HA16-18SPX

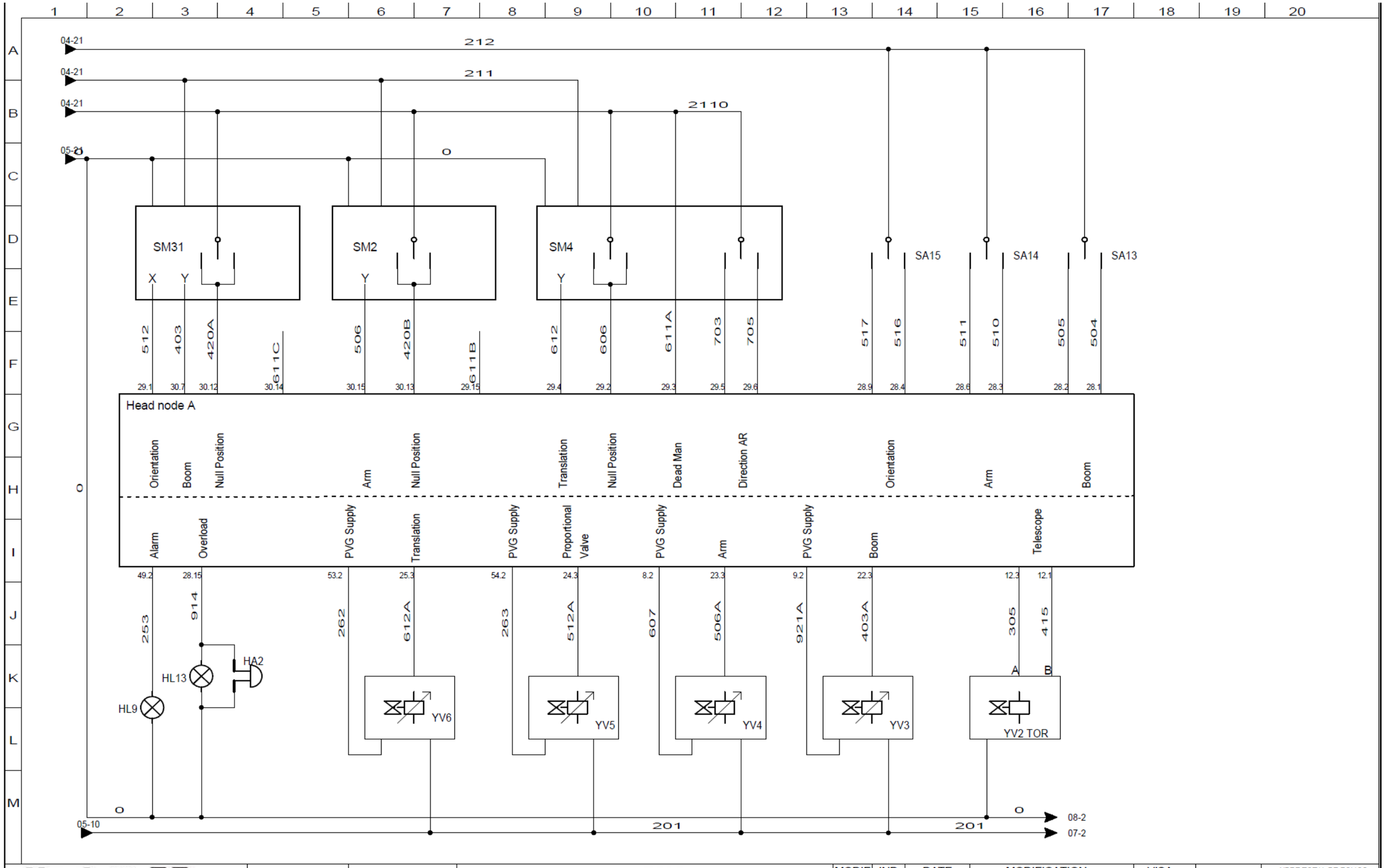
MODIF	IND	DATE	MODIFICATION	VISA
D FERRATON	F	10/02/2009	ajout options (DM7424)	A. DURO
7588	E	18/12/2008	Modif cablage YV17 et YV23	A. DURO
N DEAUX	D	01/07/2008	DM7074 & DM7217	A DURO

NBRE TOTAL DE FOLIOS 09

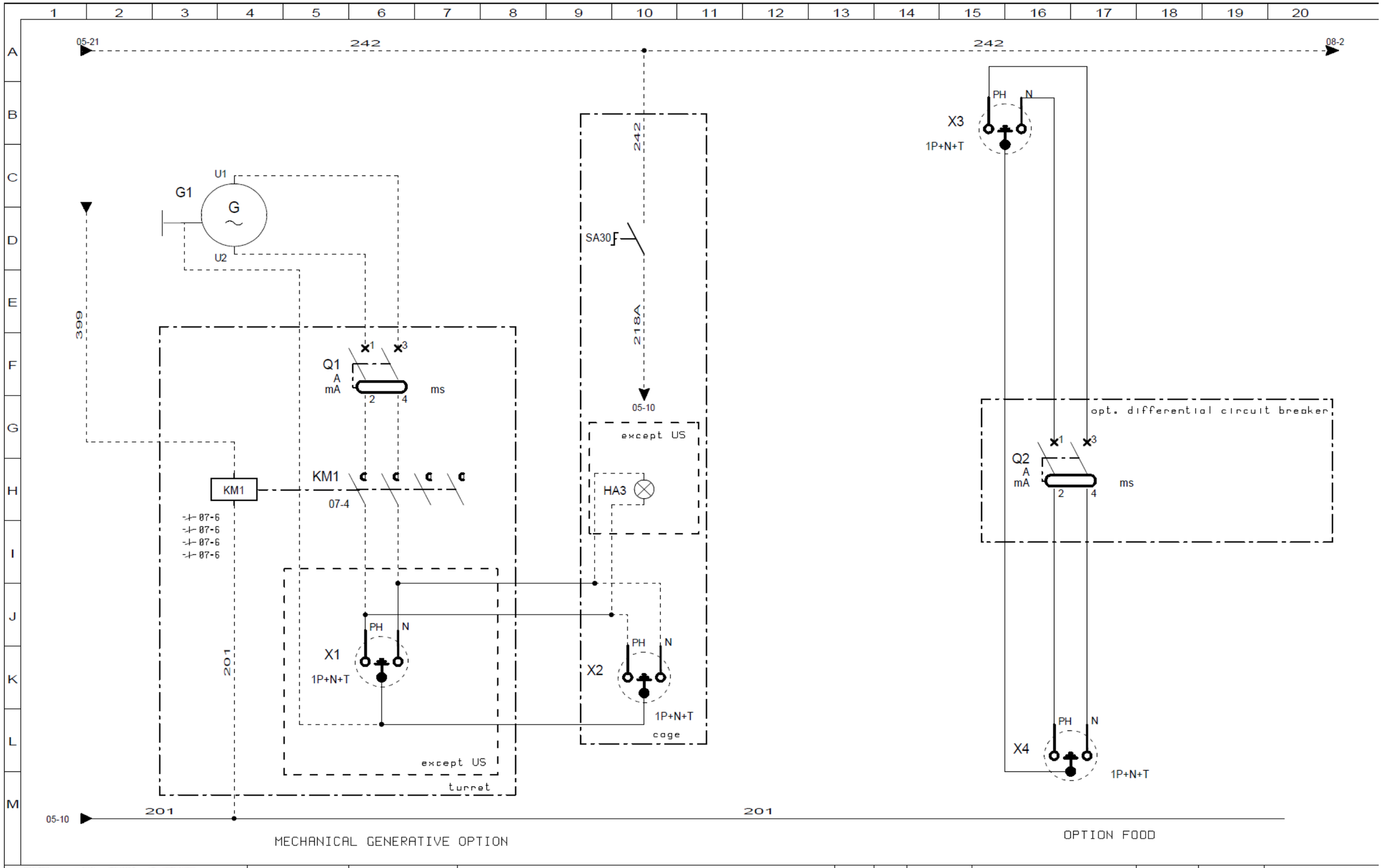
SCHEMAS 04



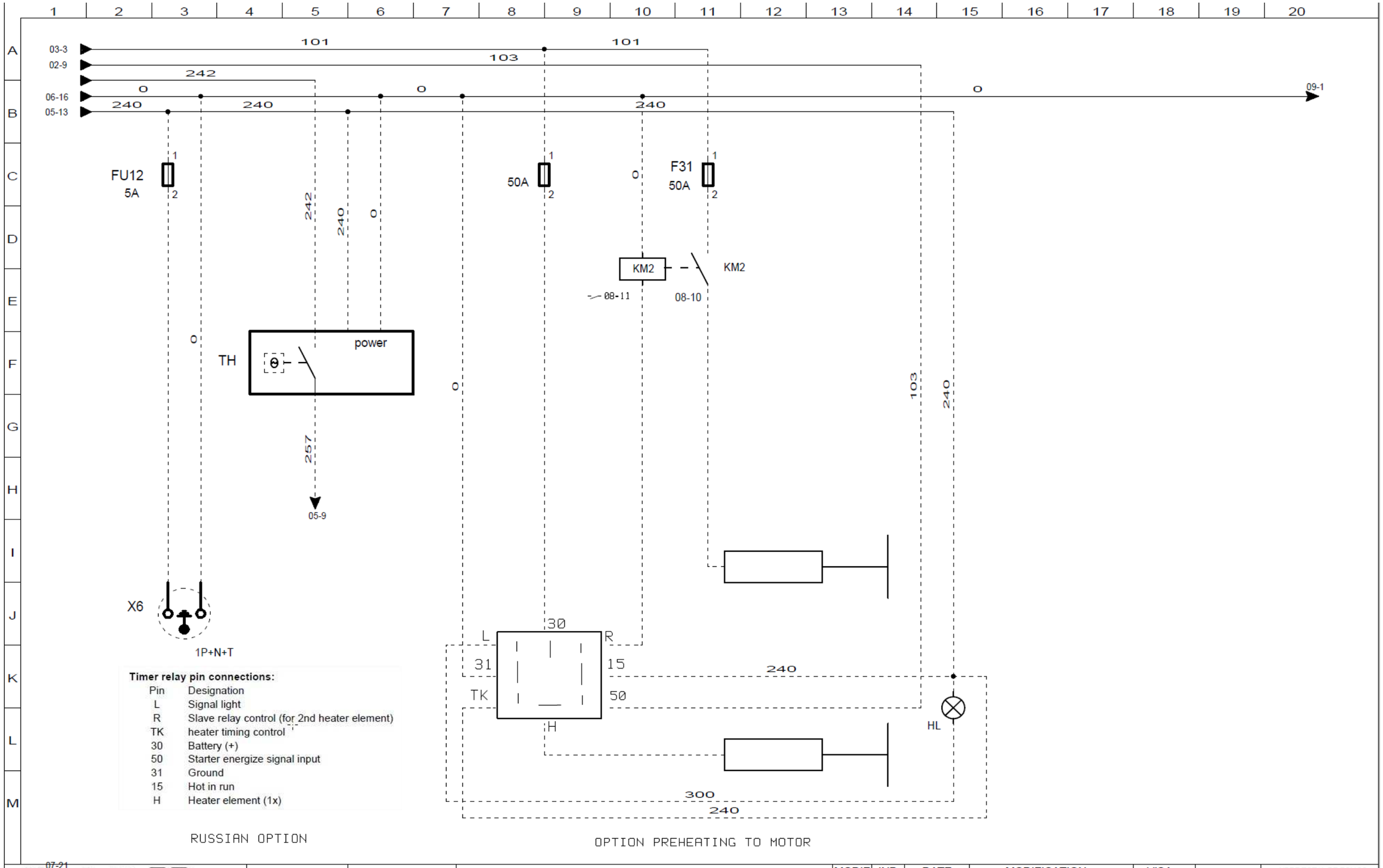
Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 23/01/2004	E595	MODIF	IND	DATE	MODIFICATION	VISA		NBRE TOTAL DE FOLIOS 09
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 30/04/1999	HA16-18SPX	D FERRATON	F	10/02/2009	ajout options (DM7424)	A. DURO	SCHEMAS	05
				7588	E	18/12/2008	Modif cablage YV17 et YV23	A. DURO		
				N DEAUX	D	01/07/2008	DM7074 & DM7217	A DURO		



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR F DÉNÉZÉ	DATE DE CREATION 23/01/2004	E595	MODIF	IND	DATE	MODIFICATION	VISA		NBRE TOTAL DE FOLIOS 09
	VERIFIE PAR L DI FLORIO	DATE DE VERIFICATION 01/01/2001	HA16-18SPX	D FERRATON 7588 N DEAUX	F E D	10/02/2009 18/12/2008 01/07/2008	ajout options (DM7424) Modif cablage YV17 et YV23 DM7074 & DM7217	A. DURO A. DURO A DURO	SCHEMAS	06



Haulotte GROUP La Péronnière BP 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR D FERRATON	DATE DE CREATION 08/10/2008	E595 OPTIONS HA16-18SPX	MODIF D FERRATON	IND F	DATE 10/02/2009	MODIFICATION ajout options (DM7424)	VISA A. DURO		NBRE TOTAL DE FOLIOS 09
	VERIFIE PAR A DURO	DATE DE VERIFICATION 30/04/1999		A. DURO	C	05/02/2009	Mise à jour DM5321	D FERRATON	SCHEMAS	07



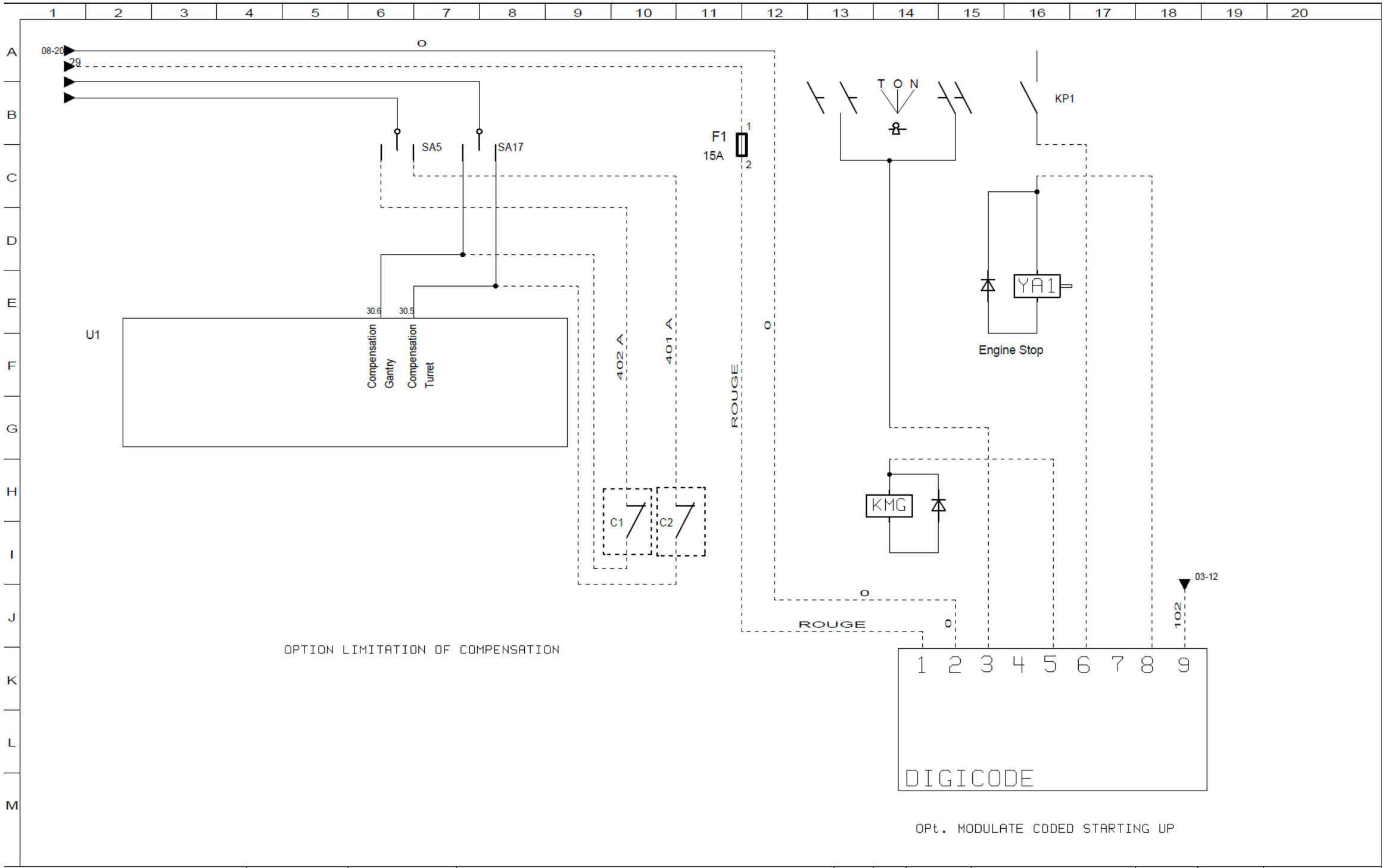
Timer relay pin connections:

Pin	Designation
L	Signal light
R	Slave relay control (for 2nd heater element)
TK	heater timing control
30	Battery (+)
50	Starter energize signal input
31	Ground
15	Hot in run
H	Heater element (1x)

07-21

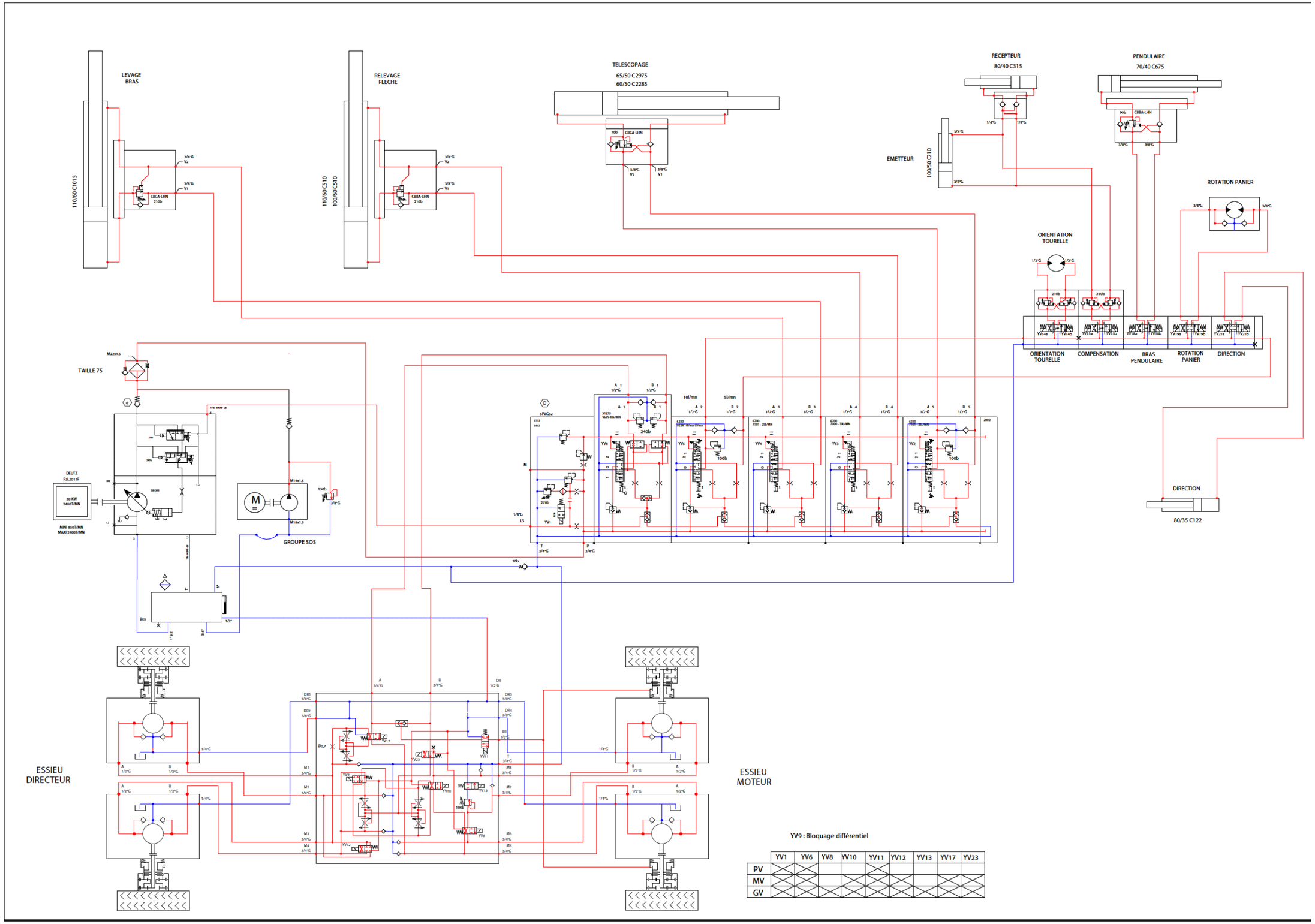
Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

DESSINE PAR	DATE DE CREATION	E595 OPTIONS HA16-18SPX	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS
D FERRATON	08/10/2008		D FERRATON	F	10/02/2009	ajout options (DM7424)	A. DURO	09
VERIFIE PAR	DATE DE VERIFICATION		A DURO	C	01/07/2008	Mise à jour DM5321	D FERRATON	SCHEMAS 08
A DURO	30/04/1999							



Haulotte GROUP
La Péronnière
BP 9 42152 L'HORME TEL: 04 77 29 24 24

DESSINE PAR	DATE DE CREATION	E595 OPTIONS HA16-18SPX	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS
D FERRATON	08/10/2008		D FERRATON	F	10/02/2009	ajout options (DM7424)	A. DURO	09
VERIFIE PAR	DATE DE VERIFICATION		A DURO	C	01/07/2008	Mise à jour DM5321	D FERRATON	SCHEMAS 09
A DURO	30/04/1999							



YV9 : Bloquage différentiel

	YV1	YV6	YV8	YV10	YV11	YV12	YV13	YV17	YV23
PV	X	X			X				
MV	X	X		X	X	X		X	X
GV	X	X	X	X	X	X	X	X	X

E586

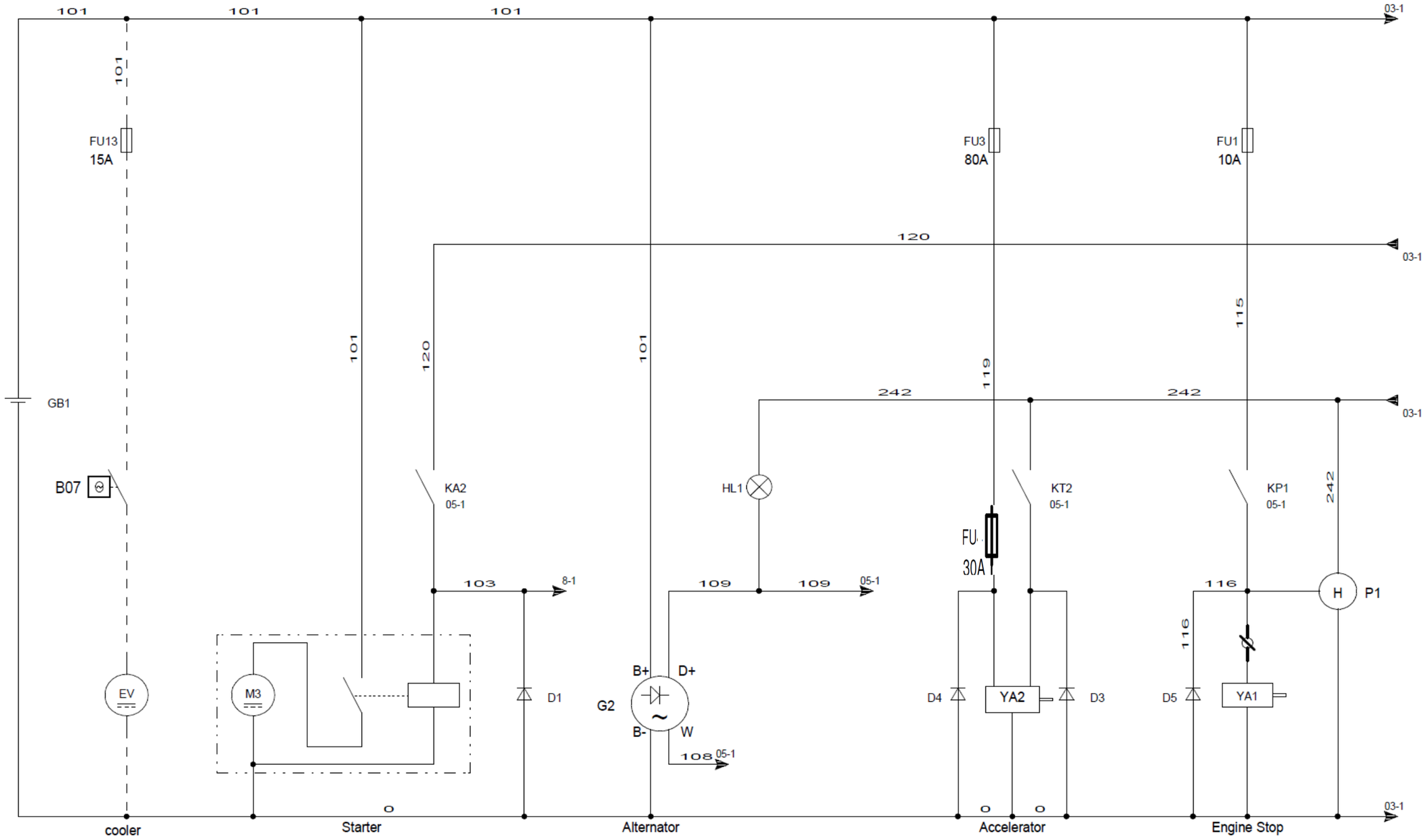
HA16PE

IND	MODIFICATION	N°MODIF	VISA	DATE	FOLIO
E	ajout de toutes les options(DM7424)	DM7424	D FERRATON	17/03/2009	
D	modif. câblage YV17 et YV23 (DM7588)		A. DURO	12/03/2009	
C	mod. alim. PVG + bouton HM (DM7074 et DM7217)		A. DURO	01/07/2008	
B			A DURO	12/03/2009	
A			A.DURO	29/10/2008	

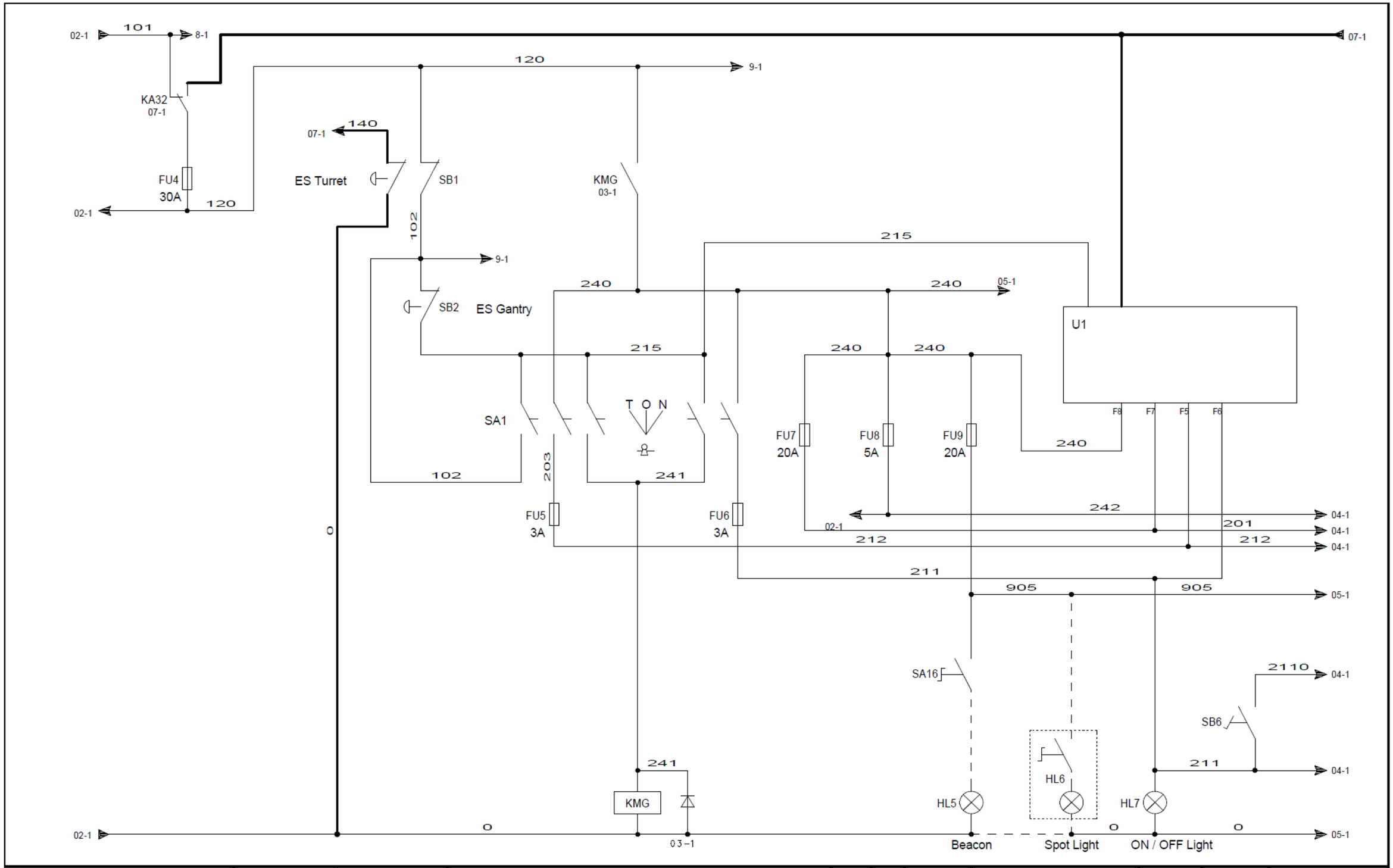
Haulotte GROUP

DESSINE PAR D.FERRATON	DATE DE CREATION 13/03/2009	SCHEMAS	
VERIFIE PAR N. DEAUX	DATE DE VERIFICATION 30/10/2008	Page de garde	
		NBRE TOTAL DE FOLIOS 10	FOLIO 01

FOLIO	DESIGNATION	COMMENTAIRES
1	Title page	
2	Power	
3	Station selection	
4	Input-output Calculator	
5	Input-output Calculator	
6	Joysticks	
7	Options	
8	Options	
9	Options	

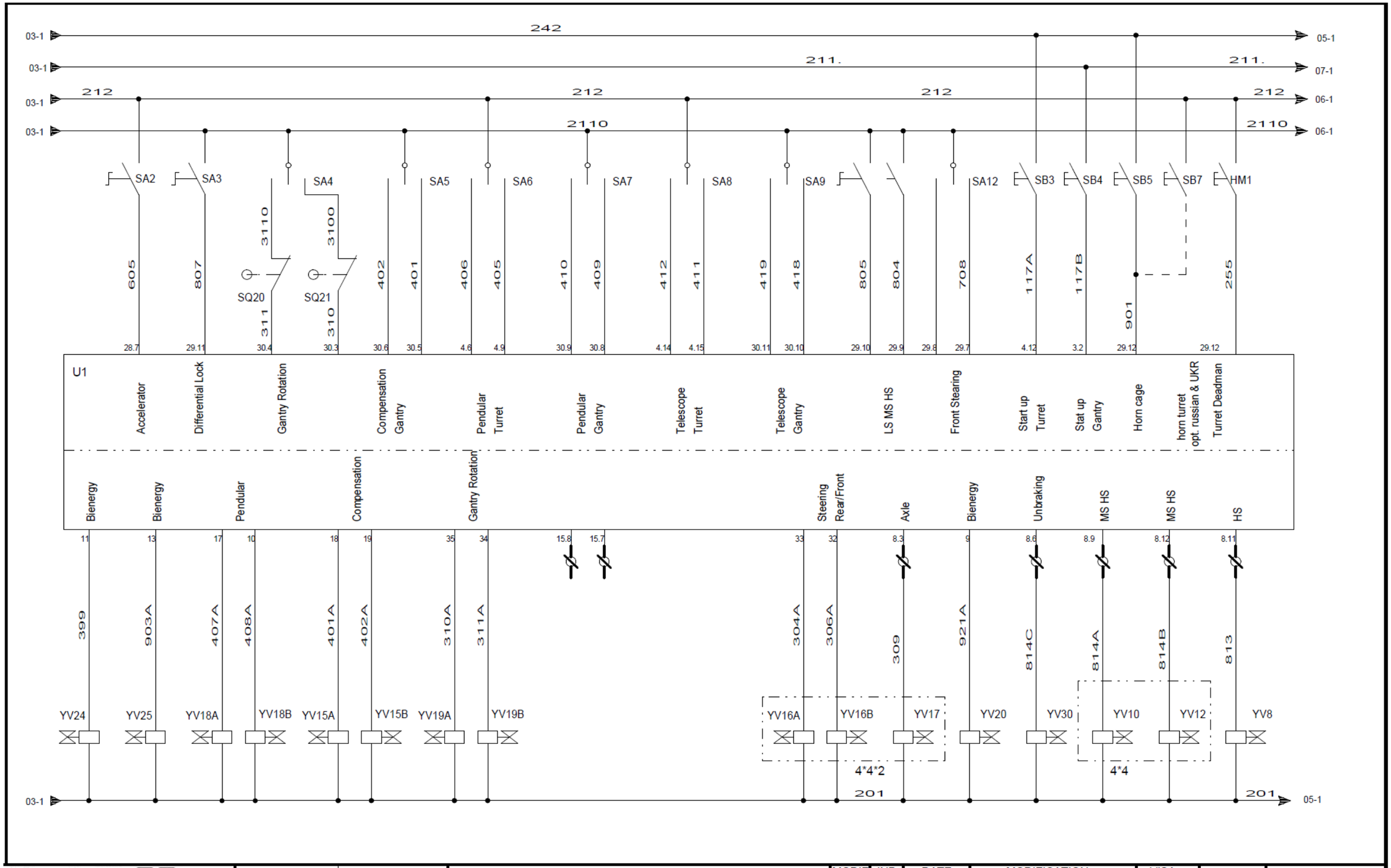


Haulotte GROUP Péronnière 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF D.FERRATONE N DEAUX	IND E B A	DATE 19/03/2009 10/07/2008 21/10/2004	MODIFICATION DM7424 DM7074 et DM7217 Option défreinage YV30	VISA A. DURO A DURO A. DURO	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999							SCHEMAS 02

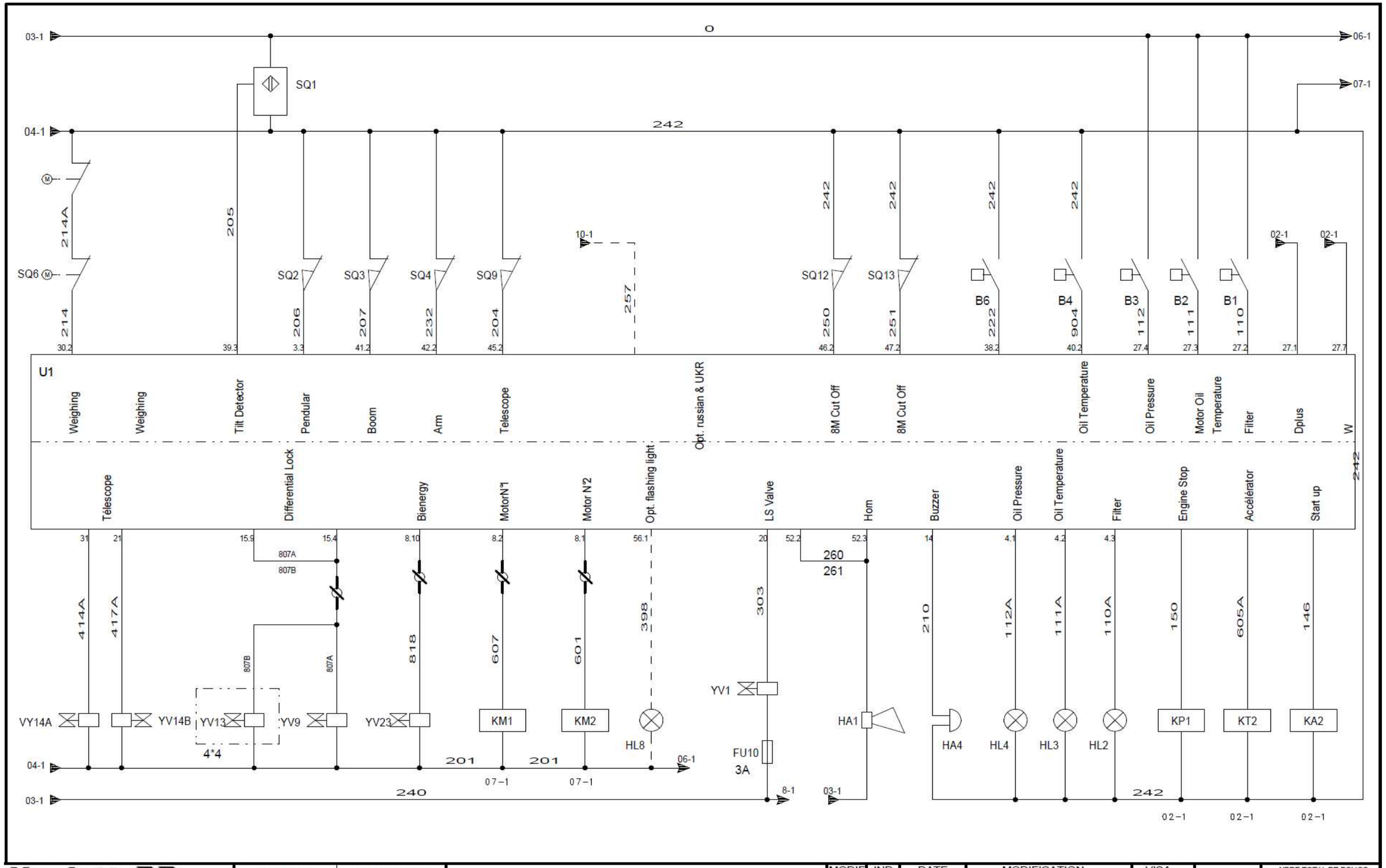


Haulotte GROUP	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999		D.FERRATONE N.DEAUX	B	19/03/2009 10/07/2008	DM7424 DM7074 et DM7217	A DURO A DURO	SCHEMAS 03

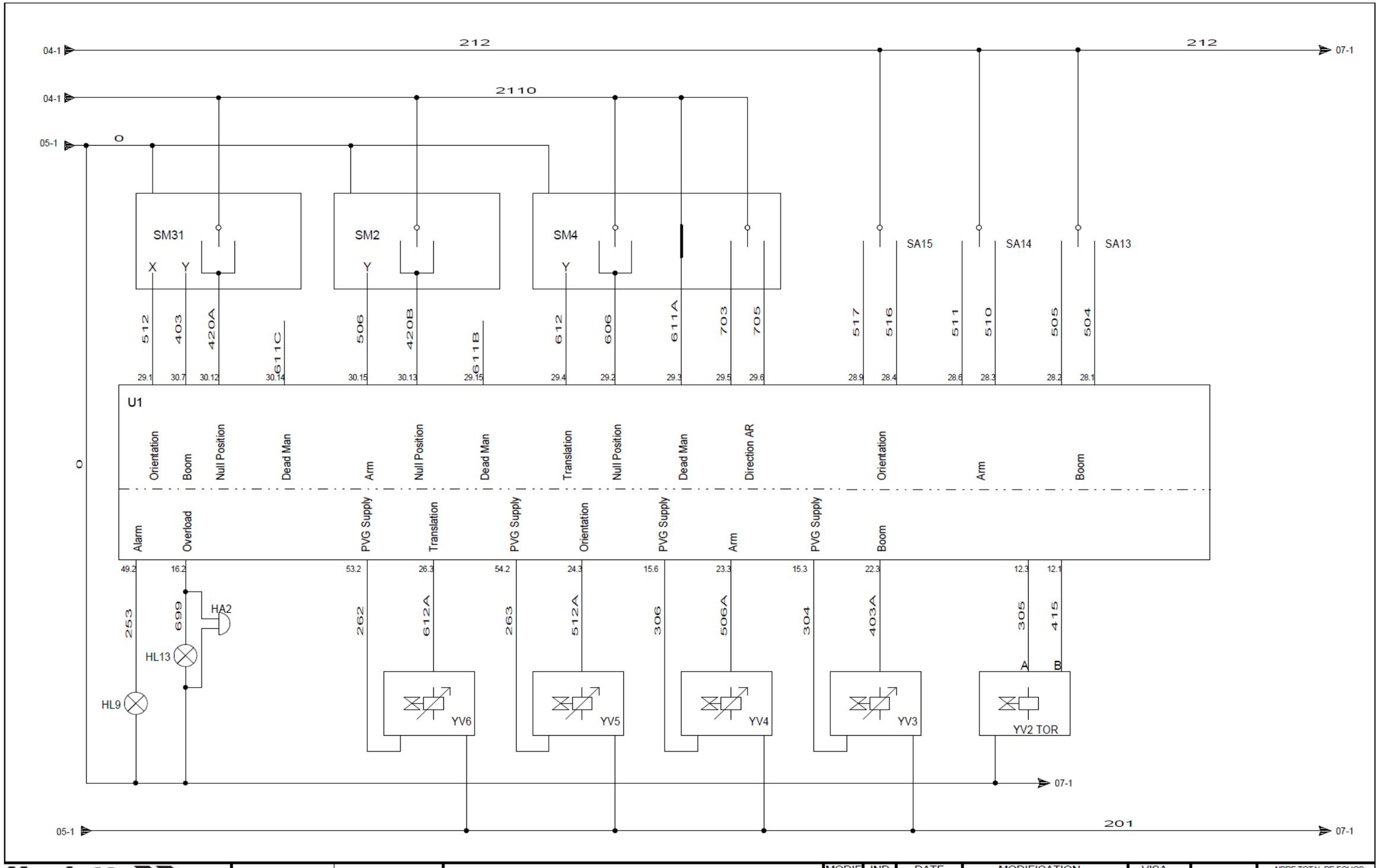
Péronnière
P 9 42152 L'HORME TEL: 04 77 29 24 24



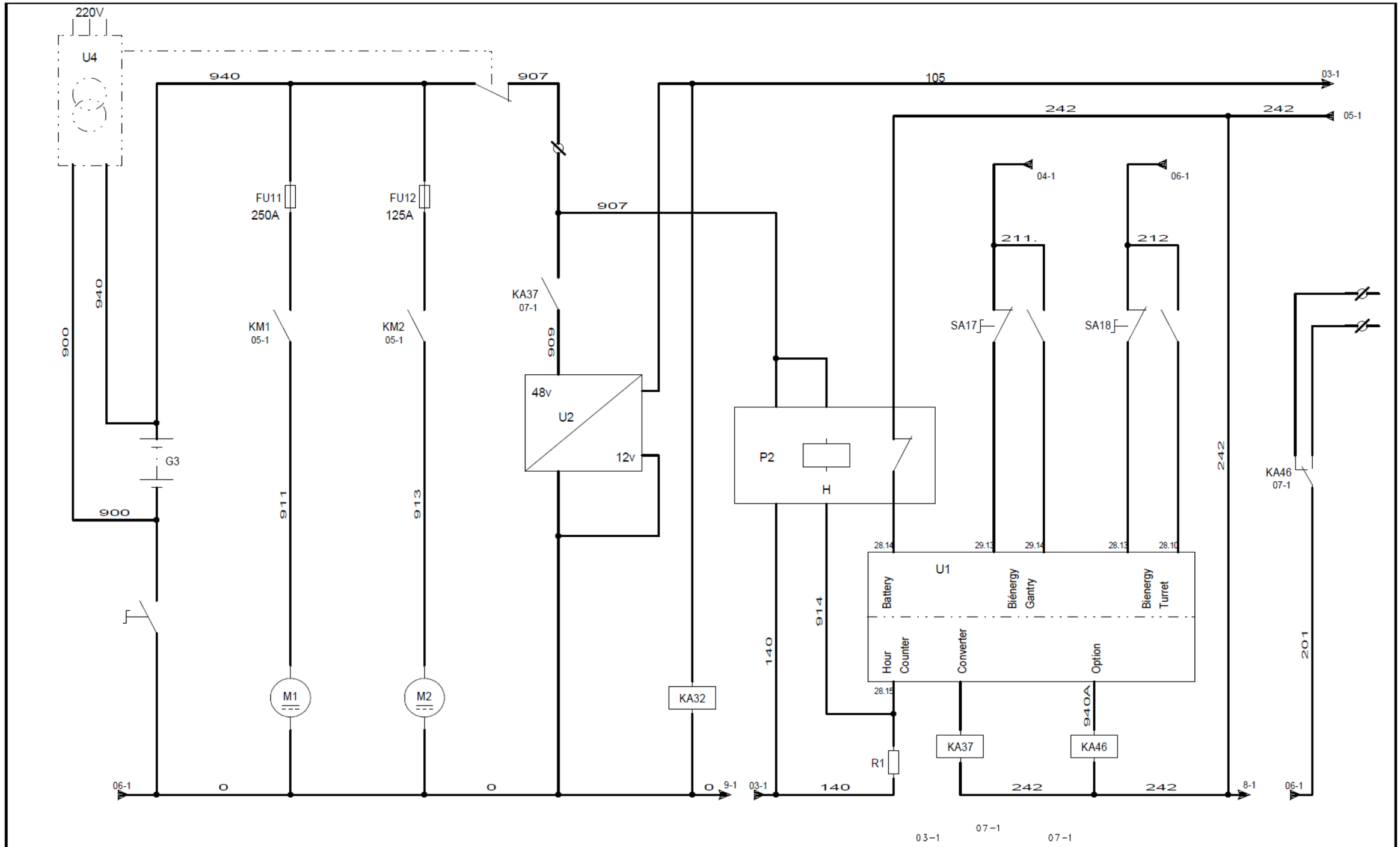
Haulotte GROUP a Péronnière P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999		D.PERRATONE N DEAUX	B A	19/03/2009 10/07/2008 21/10/2004	DM7424 DM7074 et DM7217 Option défreinage YV30	A. DURO A DURO A. DURO	SCHEMAS 04



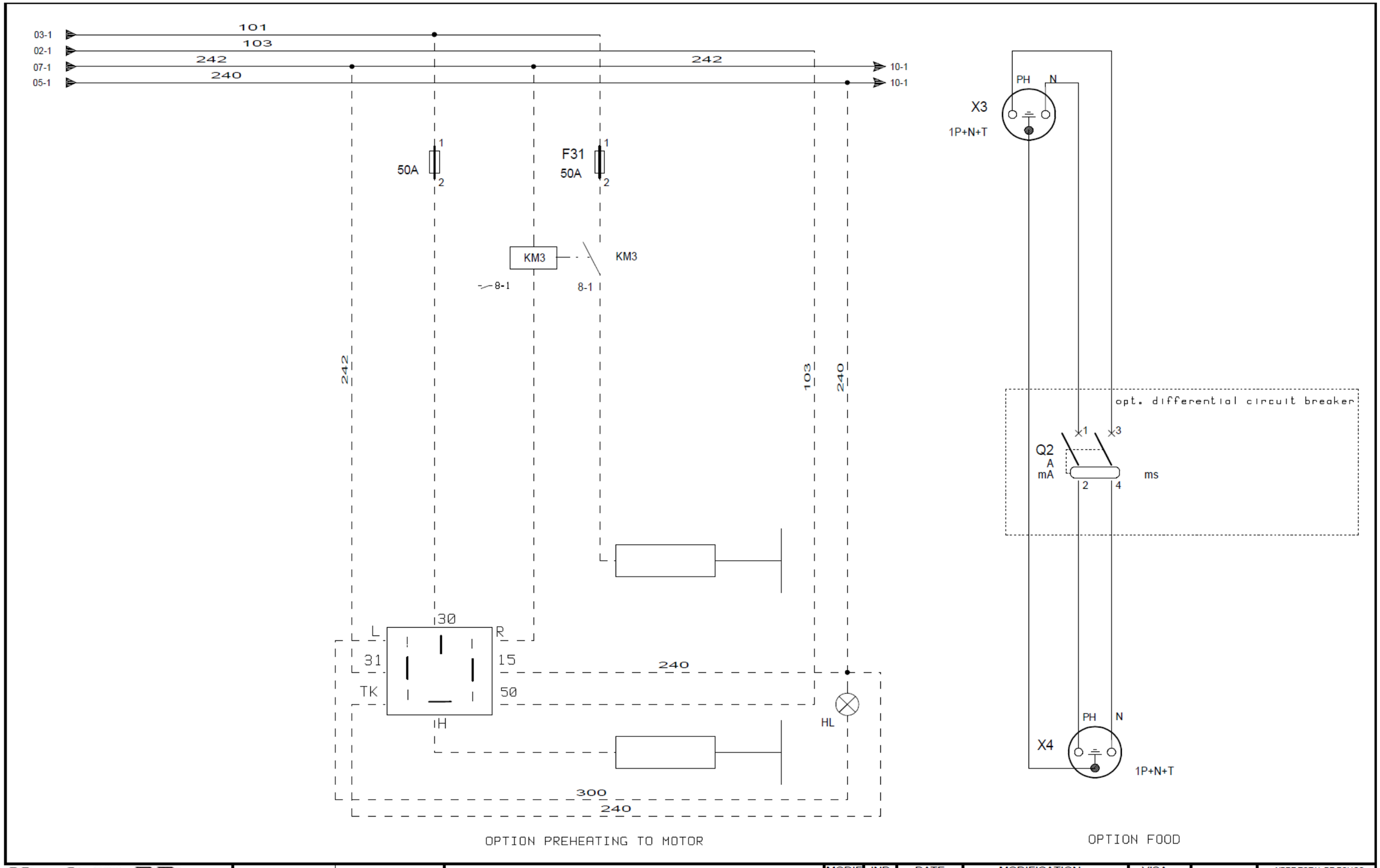
Haulotte GROUP a Péronnière P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF D.FERRATONE	IND A	DATE 19/03/2009	MODIFICATION DM7424	VISA A. DURO	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999		N.DEAUX	B	10/07/2008	DM7074 et DM7217	A DURO	SCHEMAS 05



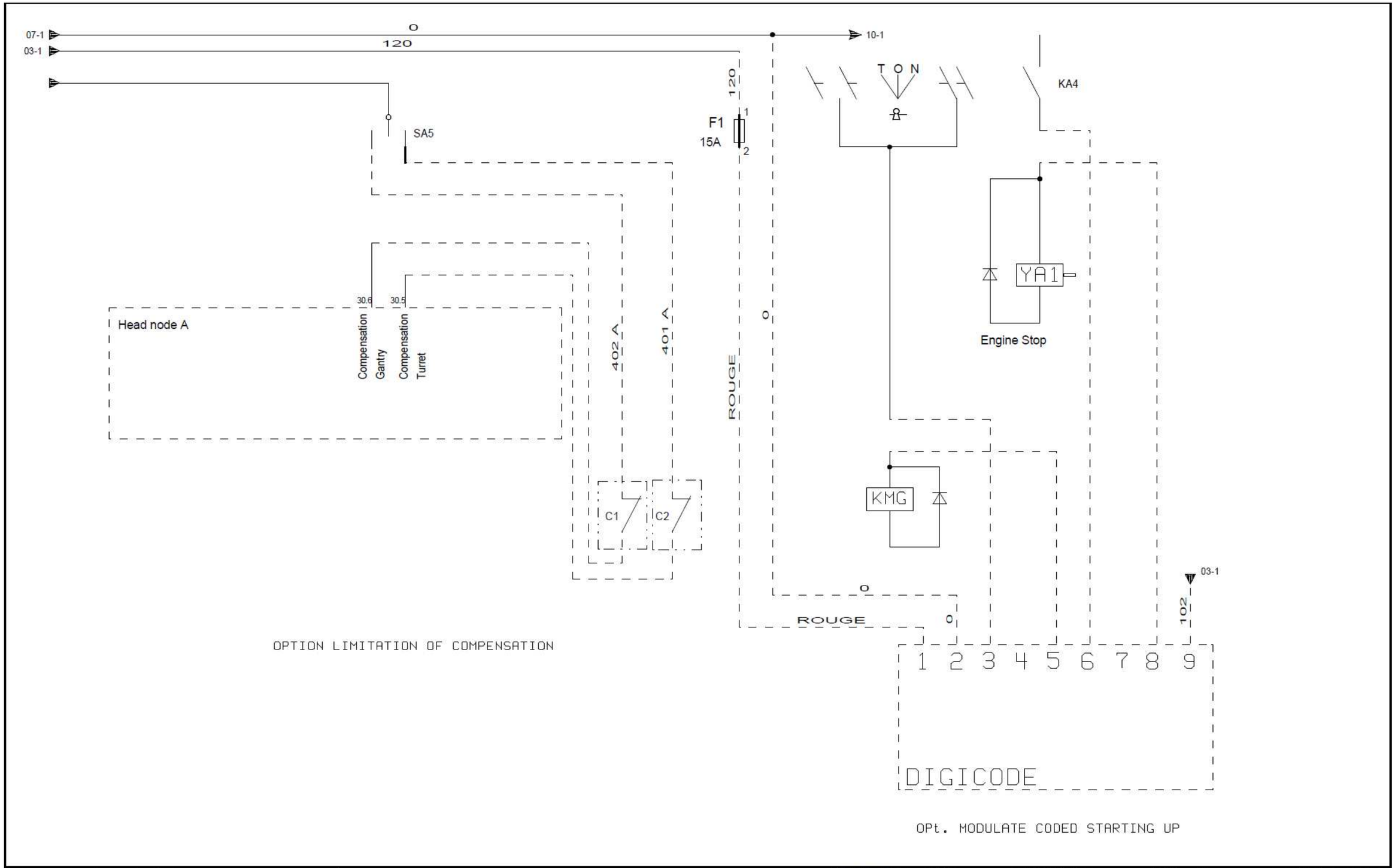
Haulotte GROUP Péronnière 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF D.FERRATONE N DEAUX	IND B	DATE 19/03/2009 10/07/2008	MODIFICATION DM7424 DM7074 et DM7217	VISA A. DURO A DURO		NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999							SCHEMAS	06



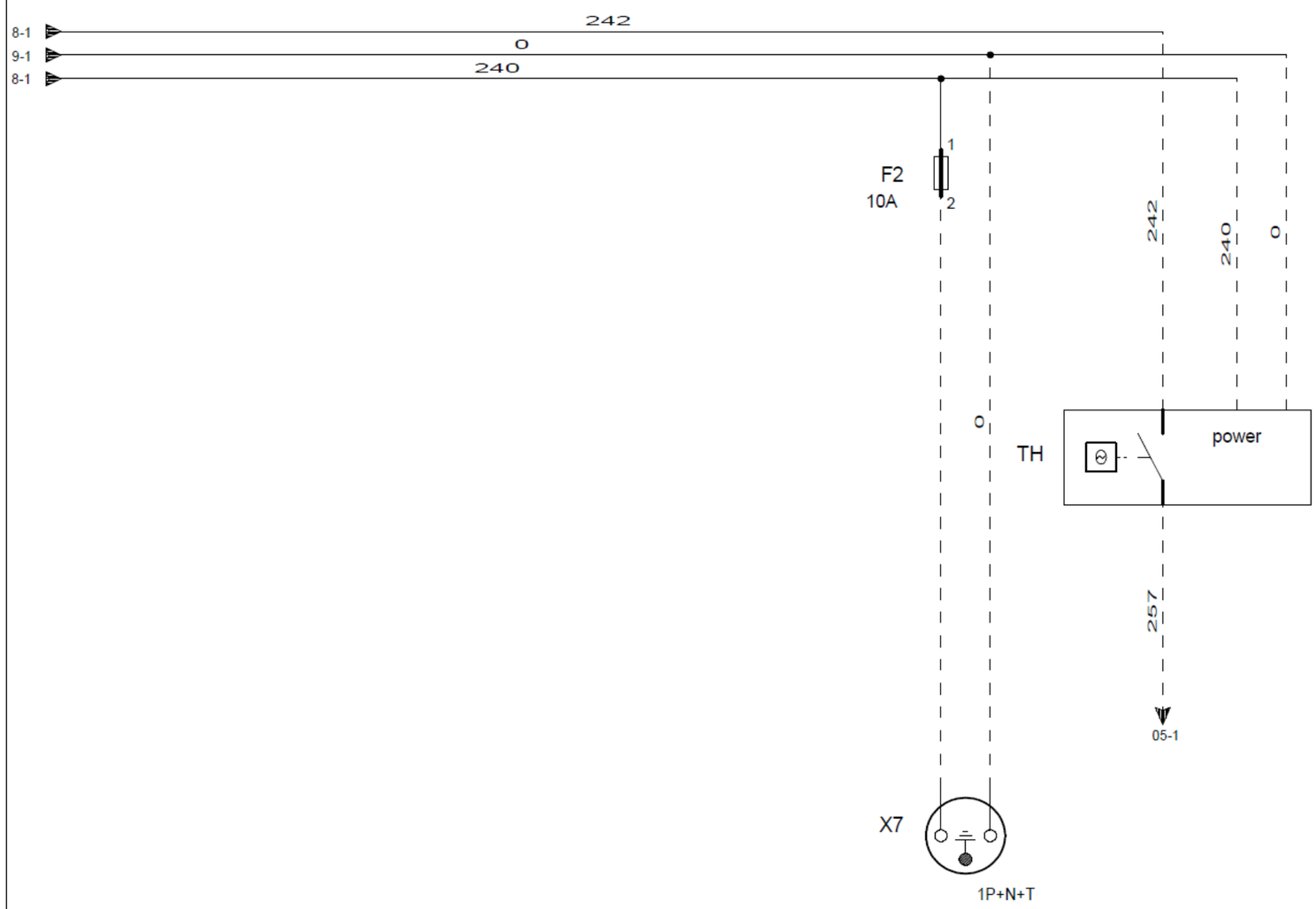
Haulotte GROUP a Péronnière P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR Frédéric DéNéZé	DATE DE CREATION 04/03/2003	HA16PE	MODIF D.PERRATONE N DEAUX	IND E B	DATE 19/03/2009 10/07/2008	MODIFICATION DM7424 DM7074 et DM7217	VISA A. DURO A DURO	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR Laurent DI FLORIO	DATE DE VERIFICATION 30/04/1999							SCHEMAS 07



Haulotte GROUP a Péronnière P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR D FERRATON	DATE DE CREATION 11/02/2009	OPTIONS HA16PE	MODIF D FERRATON	IND C	DATE 17/03/2009	MODIFICATION (DM7424)	VISA A. DURO	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR A DURO	DATE DE VERIFICATION 30/04/1999		A. DURO		01/07/2008	(DM7074 & DM7217)	N DEAUX	SCHEMAS 8



Haulotte GROUP a Péronnière P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR D FERRATON	DATE DE CREATION 11/02/2008	OPTIONS HA16PE	MODIF D FERRATONE	IND	DATE 17/03/2009	MODIFICATION (DM7424)	VISA A. DURO	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR A DURO	DATE DE VERIFICATION 30/04/1999							SCHEMAS 9



RUSSIAN OPTION

Haulotte GROUP, Péronnière, P 9 42152 L'HORME TEL: 04 77 29 24 24	DESSINE PAR D FERRATON	DATE DE CREATION 08/10/2008	OPTIONS HA16PE	MODIF	IND	DATE	MODIFICATION	VISA	NBRE TOTAL DE FOLIOS 10
	VERIFIE PAR A DURO	DATE DE VERIFICATION 30/04/1999		D FERRATON	E	17/03/2009	(DM7424)	A DURO	
				A. DURO	D	12/03/2009		N DEAUX	SCHEMAS 10
				A. DURO	C	01/07/2008	(DM7074 & DM7217)	N.DEAUX	

LOCATION OF COMPONENTS ON MAIN PRINTED CIRCUIT