HA16RTJ - HA16RTJO - HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO

MAINTENANCE BOOK

HA16RTJ - HA16RTJO - HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO

4000865070 E 02.22 USA / GB

CONTENTS

A

Preface - Foreword

1 - Symbols and colors 10

B

Safety

1 - General safety rules 13

1.1 - Maintenance implementation 13
1.2 - Uncontrolled movement Hazard 14
1.3 - Electric Shock Hazards 15
1.4 - Explosion / Fire Hazards 16

2 - Maintenance and repair training 17

2.1 - Owner's responsability 17
2.2 - Technician's responsability 17
2.3 - HAULOTTE Services® 17
2.4 - Training 17
2.5 - Product modification 18
2.6 - After Sales Service 18
2.7 - Product information 18

3 - Conditions of warranty 18

C

Familiarization

1 - Primary machine components 20

1.1 - Description 20
1.2 - Ground control box 22
1.2.1 - Layout - Color screen display 22
1.2.2 - HAULOTTE Activ'Screen 2 26
1.3 - Platform control box 46
1.3.1 - Layout 46
1.3.2 - Display Panel (LED'S 101 - 117) 49

2 - List of actuators and sensors 52

2.1 - Sensors and actuators 52
2.2 - Sensors detail 54
2.2.1 - Proximity sensors 57
2.2.2 - Platform control box 59
2.2.3 - Kubota V1505 engine 61
2.2.4 - PERKINS 403J-17 engine 62
2.2.5 - Upper controls (with Activ'Shield Bar device) 68
2.2.6 - Option Activ' Lighting System 69
2.2.6.1 - Architecture of the system 70
2.3 - Actuators and their location 72
2.3.1 - List of actuators 72
2.3.2 - Engine part 72
2.3.3 - Fuses 73
2.3.4 - Inputs 74
2.3.5 - Outputs 77

3 - Power source - Engine specifications 80

3.1 - General safety and specific interventions on motor 80
3.2 - General Specifications 80
3.3 - Consumables 81

4 - Consumables (Oils - Fuels - Engine oil - Coolant level...) 82

4.1 - Fuel 82
4.1.1 - Other fuels 82
4.2 - Engine oil 83
4.3 - Hydraulic oil 84

5 - Machine specifications 85

5.1 - Movement speed 85

D

Inspection and maintenance schedule

CONTENTS

1 - Inspection program 87
2 - Daily inspection 87
3 - Preventive maintenance 88
4 - Periodic inspection 93
5 - Major inspection 95

Machine sheet

MS0001 - Structural part inspection 97
MS0002 - Pins and bearing inspection 101
MS0003 - Cylinder inspection 105
MS0004 - Braking test procedure 109
MS0005 - Torque Values 111
MS0008 - Oscillating axles - Functional tests 117
MS0009 - Fuel tank - Filling-up 119
MS0010 - Slew ring inspection 121
MS0019 - Hydraulic oil - Level Replacement 127
MS0020 - Hoses inspection - Replacement 131
MS0021 - Hydraulic filter cartridge Replacement . . . 133
MS0029A - KUBOTA diesel engine 137
MS0029C - PERKINS diesel engine 157
MS0030 - Component location 173
MS0031 - Overload system 215
MS0032 - Tires (Tyres) and pressures - Wheel replacement 223
MS0034 - Dismantling / Reassembling wheels reducer 227
MS0035 - Check and replacing the pads 235
MS0036 - Telescopic cylinder replacement 247
MS0038 - Pressure adjustment 257
MS0109 - Draining the wheel reducer. 259
MS0133 - Universal plug 261
MS0165 - Remove/Re-install output compensation cylinder 263
MS0166 - Remove - Replace load cell. 269
MS0167 - Remove - Replace Boom cylinder 279
MS0168 - Remove - Replace arm cylinder 287
MS0169 - Remove/Re-install input compensation cylinder 293
MS0170 - Removal - Replacement of the platform . . 299
MS0171 - Remove - Replace arm assembly. 303
MS0172 - Remove - Replace boom assembly 317
MS0180 - Battery (ies) 333
MS0237 - Remove - Replace counterweight 337
MS0238 - Links to engine manufacturer manuals - Fuel-powered machines 343
MP0001 - Wheel tightening procedure 345
MP0002 - Wheel reducer level procedure. 349
MP0003A - Procedure for checking the level of engine oil - Kubota V1505 engine 353
MP0003I - Procedure for checking the level of engine oil - Perkins 403J-17 engine 357

CONTENTS

MP0004A - Replacing the engine oil filter - Kubota V1505 engine 361
MP0004K - Replacing the engine oil filter - Perkins 403J-17 engine 363
MP0005A - Diesel filter replacement - Kubota V1505 / V2403 / V2607 engine 367
MP0005H - Diesel filter replacement - Perkins 403J-17 engine 371
MP0006 - Hydraulic oil filter replacement 377
MP0007B - Procedure for checking engine belt tension - Kubota - V1505 / V2403 engine 381
MP0007G - Procedure for checking engine belt tension - Perkins 403J-17 engine 385
MP0008 - Front axle locking function check 389
MP0010 - Air filter replacement 393
MP0011 - Wear pad check 397
MP0013 - Hydraulic tank level 399
MP0014 - Emptying the hydraulic tank 403
MP0015 - Load cell tightness check 407
MP0016 - Rotary cylinder tightness check 409
MP0017 - Checking the platform 413
MP0018 - Slew ring clearance check 417
MP0019 - Torque tightening of the slew ring 425
MP0020 - Emptying the diesel tank 429
MP0021A - Draining the cooling circuit - Kubota D1803 CRTE5 / V1505 / V2403 / V2607 engine 431
MP0021E - Draining the cooling circuit - Perkins 403J-17 engine 435
MP0023 - Starter battery inspection 439
MP0024 - Checking the bushings and pins 443
MP0025 - Checking the condition of belts 447
MP0026A - Checking and cleaning the fuel filter - Kubota Engine 449
MP0026D - Checking and cleaning the fuel filter (Pre-filter) - Perkins 403J-17 Engine 451
MP0027 - Steering system greasing 453
MP0028 - Greasing the pads 455
MP0030 - Cleaning of air cleaner element 457
MP0031 - Coolant level 459
MP0032B - Replace the belt 461
MP0032G - Replace the belt - Perkins 403J-17 Engine 465
MP0036A - Drain the engine oil - Kubota - D1803 CRTE5 / V1505 / V2403 engine . . . 467
MP0036F - Drain the engine oil - Perkins 403J-17 engine 471
MP0037 - Greasing the cage rotation cylinder 475
MP0043 - Draining the wheel reducer 477
MP0044 - Greasing the turntable rotation gearbox . . 481

E

Trouble shooting and diagram

1 - Trouble shooting 483

1.1 - Recommendations 483
1.2 - Description 483
1.3 - Requirements 483
1.4 - Failures list 484
1.4.1 - List of failures per category 487

2 - Legend 506

2.1 - PCB Turret 506

3 - Electric diagram 510

4 - Hydraulic diagram 524

F

Records

1 - Intervention register 535

A - Preface - Foreword

You have just purchased a HAULOTTE® product and we would like to thank you for your business.

The Aerial Work Platform is a mechanical device primarily designed and manufactured with the intent to position people with the necessary tools and material to overhead elevated temporary workplaces. All other uses or alterations/modifications to the aerial work platform must be approved by HAULOTTE®.

This manual shall be considered a permanent component of the machine and shall be kept with the aerial work platform in the designated Manual Holder, at all times.

Safe operation of this product can only be assured if you follow the operating instructions contained in this manual are followed. To ensure proper and safe use of this equipment, it is strongly recommended that only trained and authorized personnel operate and maintain the aerial work platform.

We would particularly like to draw your attention to 2 essential points :

- Compliance with safety instruction (machine, use, environment).
- Use of the equipment within the performance limits.

With regard to the designation of our equipment, we stress that this is purely for commercial purposes and not to be confused with the technical specifications. Only the specifications in this manual should be used to study the suitability of the equipment for the intended use.

This maintenance and repairs book is specific to the HAULOTTE® products listed on the cover page of this manual. The maintenance book is intended for the on-site maintenance technician.

It is the on-site maintenance technician's duty to carry out the regular maintenance work recommended by HAULOTTE Services®.

This maintenance work is essential for correct machine operation.

If regular maintenance is not carried out, this may :

Void the warranty.

Cause machine malfunction.

Reduce machine reliability and shorten its service life.

Jeopardize operator safety.

To ensure that the regular maintenance requirements are fully satisfied, contact HAULOTTE Services®.

HAULOTTE Services® technicians are specially trained to carry out extensive repairs, interventions or adjustments on the safety systems or elements of HAULOTTE® machines. They carry genuine HAULOTTE spare parts and tools as required, and also provide fully documented reports on all work completed.

A - Preface - Foreword

1 - Symbols and colors

Symbols and colors are used to alert the operator of safety precautions and/or to highlight important safety information.

The following safety symbols are used throughout this manual to indicate specific hazards and the hazard severity level when operating or maintaining the Aerial Work Platform.

Symbol

Symbol	Description
	Danger : Risk of injury or death
	Caution : Risk of material damage
	Prohibition relating to work safety and quality
	Reminder to use good practice or follow pre-operation checks
	Cross-reference to another part of the manual
	Cross-reference to another manual
	Cross-reference to repair (contact HAULOTTE Services®)
	Maintenance sheet
	Recommended tools
	Recommended part
	Safety
N.B. :	Additional technical information

A - Preface - Foreword

Decals

Color	Title	Description
		Danger : Indicates a hazardous situation which if not avoided, WILL result in death or serious injury.
		Warning : Indicates a hazardous situation which if not avoided, COULD result in death or serious injury.
		Caution : Failure to comply could result in minor or moderate injury.
		Notice : Indicates practices not related to personal injury.
		Procedure : Indicates a maintenance operation.

N.B.-:-THE FOLLOWING SAFETY ADVISORIES ARE USED THROUGHOUT THIS MANUAL TO INDICATE SPECIFIC HAZARDS WHEN OPERATING OR MAINTAINING THE TELEHANDLER.

Notes

1 - General safety rules

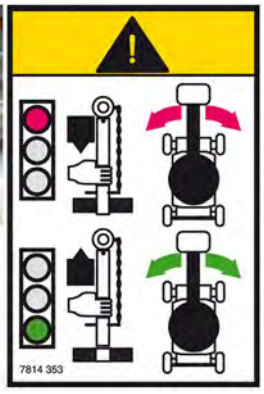
1.1 - MAINTENANCE IMPLEMENTATION

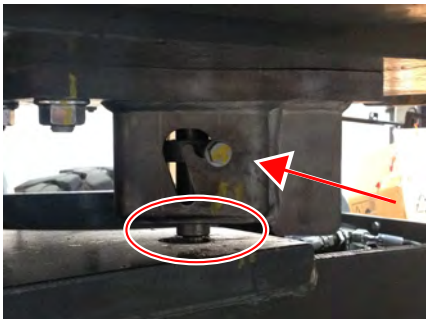
Your safety and the safety of the people around are essential.

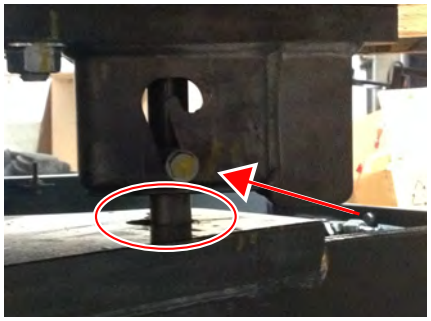
Make sure the work area is clean in order to not to pollute the system of the machine.

Before performing any maintenance interventions, place the machine in maintenance configuration.

1. Place the machine on firm, level ground.
2. Stow the machine completely.
3. Push the E-stop button to cut off the electricity supply.
4. Insert the turntable rotation locking pin.







Never leave the hydraulic cylinders fully extended before switching off the machine, or when stationary for an extended period of time. Keep the elements of the machine in configuration of maintenance thanks to mechanics devices.

Report that the machine is under maintenance by tagging the platform and ground control boxes.

Note :

- Using the machine during maintenance is strictly forbidden.
- Do not climb onto the covers.
- The handling of parts must be carried out using appropriate equipment (Chains, Lifting slings, Lifting anchors).
- Plug the end of any hoses removed, and cap any open ports to prevent contamination during maintenance.

Return the machine to operating configuration after maintenance has been completed :

1. Remove the turntable rotation locking pin.
2. Pull the E-stop button.

1.2 - UNCONTROLLED MOVEMENT HAZARD

Be aware of uncontrolled movement and always respect the following :

- Maintain clearance from high voltage lines.
- Maintain clearance from generators, radar, electromagnetic fields.
- Never expose the batteries or electrical components to water (high pressure washer, rain).
- Never tow the machine over extended distances.
- In case of a machine breakdown, it is possible to tow short distance to load it onto a trailer.
- Never leave the hydraulic cylinders fully extended before switching off the machine, or when stationary for an extended period of time.
- Retract and lower the boom to the stowed position rotate the turntable so that the boom is between the non-steering wheels.
- Select a safe parking location, on a firm level surface, clear of obstruction and traffic.
- Ensure all compartments are closed and secured.
- Chock the wheels.

1.3 - ELECTRIC SHOCK HAZARDS

The machine is not electrically insulated and does not provide protection from contact or proximity to electrically charged conductors.

Always position the lift at a safe distance from electrically charged conductors to ensure that no part of the machine is within an unsafe area.

Respect the local rules and the minimum safety distance from power lines.

Minimum safe approach distances

Electric voltage	Minimum safety distance	
	Mètre	Feet
0 - 300 V	Avoid contact	
300 V - 50 kV	3	10
50 - 200 kV	5	15
200 - 350 kV	6	20
350 - 500 kV	8	25
500 - 750 kV	11	35
750 - 1000 kV	14	45

N.B.-:-THIS TABLE IS APPLICABLE, EXCEPT WHEN THE LOCAL REGULATIONS ARE MORE STRICT.

Do not operate the machine :

- Do not operate the machine when close to live power lines, consider the movement of the machine and the sway of the electric power lines particularly in windy conditions.
- Do not operate the machine during lightning, thunderstorms, snow/ice or any weather condition that could compromise operator safety.
- Do not operate the machine during lightning or storms.
- Do not use the machine as a welding earth.
- Do not wash electrical components with a high pressure washer.
- Do not weld on the machine without first disconnecting the battery terminals.
- The machine must not be used while charging the batteries.
- When using the platform AC power line, ensure it is protected with a circuit breaker.

Keep away from the machine if it contacts energized power lines. Personnel on the ground or in the platform must not touch or operate the machine until energized power lines are shut off.

In the event of accidental contact with a high voltage line, wait for the power to the line be de-energized before attempting to operate the machine.

1.4 - EXPLOSION / FIRE HAZARDS

Always wear protective clothing and eye wear when working with batteries and power sources/systems.

N.B.-:-ACID IS NEUTRALIZED WITH SODIUM BICARBONATE AND WATER.

- Do not start the engine if you smell or detect liquid propane gas (LPG), gasoline, diesel fuel or other explosive substances.
- Do not work in an explosive or flammable atmosphere / environment.
- Do not touch hot components.
- Do not bridge the battery terminals with metallic objects.
- Do not service the battery in proximity of spark, open flame, lit cigarettes.
- Do not fill up the fuel tank, when the engine is running and/ or near a flame.

2 - Maintenance and repair training

2.1 - OWNER'S RESPONSABILITY

The owner (or hirer) has the obligation to inform technician of the instructions contained in the Operator Manual and Maintenance Book.

The owner (or hirer) has the obligation to renew all manuals or decals that are either missing or in bad condition.

Additional copies can be ordered from HAULOTTE Services®.

The owner (or hirer) is responsible for applying the local regulations regarding maintenance of the machine.

2.2 - TECHNICIAN'S RESPONSABILITY

The technician must read and understand the contents of this manual, operators manuals and the decals affixed on the machine.

The technician must inform the owner (or hirer) if the manual or any decals are missing or in poor condition, and of any malfunction of the machine.

Only authorized and qualified operators may operate HAULOTTE® machines.

2.3 - HAULOTTE SERVICES®

The HAULOTTE® is at your service in all 5 continents of the world via an extensive network of its own factory trained technicians, who are ready to respond to your every need.

2.4 - TRAINING

Whether you want to just service your equipment or carry out a complete overhaul, HAULOTTE® can provide you with a structured training program or we can tailor a program to suit your specific requirements or circumstances. Training can cover the general operation of the equipment, breakdowns, engine maintenance and repairs and electrical/hydraulic/mechanical repairs and trouble shooting.

2.5 - PRODUCT MODIFICATION

In a constant effort to improve the quality of machines, HAULOTTE continually monitors technical improvements that enable to develop products with improved safety and greater reliability. The target being that HAULOTTE® always work to build confidence in the relationships with our customers.

These improvements will be shared via the following documents :

- OI : Obligatory Intervention, Safety information requiring immediate action (take into account by HAULOTTE®).
- NI : Technical improvement requiring immediate action (take into account by HAULOTTE®).
- RI : Improvement proposed to customers to take into account during maintenance operation.
- PI : Product information for knowledge.

2.6 - AFTER SALES SERVICE

Our HAULOTTE Services® After Sales Service is at your disposal throughout your machine's service life to ensure the optimum use of your HAULOTTE product :

- When contacting our After Sales Service, ensure that you provide the machine model and serial number.
- When ordering any consumables or spare parts, please use this manual and the HAULOTTE® Essential catalogue to receive your genuine HAULOTTE® spare parts, your only guarantee of parts interchangeability and correct machine operation.
- If there is an equipment malfunction involving a HAULOTTE® product, then contact HAULOTTE Services® immediately even if the malfunction does not involve material and/or bodily damage.

2.7 - PRODUCT INFORMATION

Without the written permission from Haulotte, modifying a HAULOTTE® product is a Safety concern. Any modification may violate Haulotte design parameters, local regulations and industry standards.

If you desire a modification to the product, submit a request in writing to HAULOTTE.

With the utmost care to ensure enhanced reliability and greater safety of the HAULOTTE® products, it is pertinent that when a "Service or Safety Bulletin" is issued, action is taken immediately. Once the bulletin has been addressed, make sure that the completed form is submitted to HAULOTTE Services®.

Do not hesitate to contact HAULOTTE Services® , should you have any questions relating to the issued bulletin(s) or with questions on the policy itself.

3 - Conditions of warranty

Our warranty conditions and extension contracts are now available on the websites of our sales network : www.haulotte.com

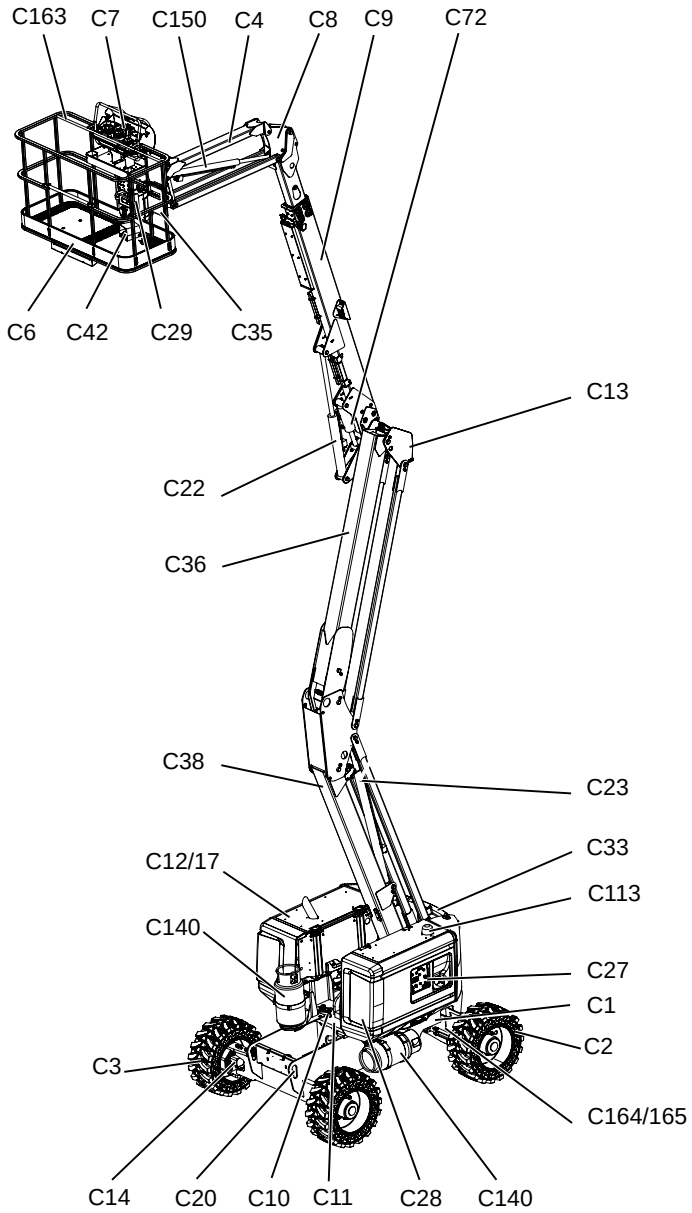
C - Familiarization

Notes

1 - Primary machine components

1.1 - DESCRIPTION

HA16RTJ - HA16RTJ O - HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO



C - Familiarization

Marking	Description	Marking	Description
C1	Chassis	C23	Arm lifting cylinder
C2	Front driven steering axle	C27	Ground control box + Universal plug
C3	Rear drive wheel (and steer wheel if 4WS)	C28	Tilt sensor
C4	Jib	C29	Platform rotation cylinder
C6	Platform	C33	Counterweight
C7	Platform control box	C35	Document holder
C8	Input jib leveling cylinder	C36	Top arm
C9	Upper boom	C38	Bottom arm
C10	Slew ring	C42	Foot Switch
C11	Turntable assembly	C72	Output jib compensation cylinder
C12	Right side compartment	C113	Beacon light
C13	Arm/Boom link piece	C140	Propane bottles - (For ANSI / CSA standard only)
C14	Hydraulic drive motor and reducer	C150	Jib lifting cylinder
C17	Left side compartment (engine, pump and starter battery)	C163	Handrail
C20	Tie-down (and/or lifting) points	C164	Front steering axle
C22	Boom lift cylinder	C165	Front steering and oscillating axle (For HA16RTJO / HA16RTJPRO / HA46RTJO / HA46RTJPRO only)

Universal plug

1.2 - GROUND CONTROL BOX

1.2.1 - Layout - Color screen display

General view

C - Familiarization

Controls and indicators

Marking	Name	Description	Function
1	SA720U	Platform tilt control	By pressing on : Tilt the platform towards the front of the machine
	SA720D		By pressing on : Tilt the platform towards the back of the machine
2	SA620U	Jib lifting / lowering switch [1]	By pressing on : Jib lifting
	SA620D		By pressing on : Jib lowering
3	SA530O	Boom telescoping switch	By pressing on : Boom extend
	SA530I		By pressing on : Boom in
4	SA520U	Boom raising switch	By pressing on : Boom raising
	SA520D		By pressing on : Boom lowering
5	SA420U	Arm lifting switch	By pressing on : Arm raises
	SA420D		By pressing on : Arm lowers
6	SB800	Enable Switch / Back-up unit selector	By pressing on : • Validation of controls when engine started • automatic switching of emergency electropump if the engine is stopped
7	SA250L	Turntable rotation switch	By pressing on : Counter clockwise (CCW) rotation
	SA250R		By pressing on : Clockwise (CW) rotation
8	SA750L	Platform rotation switch	By pressing on : Clockwise (CW) rotation
	SA750R		By pressing on : Counter clockwise (CCW) rotation
9	SB801	E-stop button	Pulled out : Ground control box energized Pushed in (activated) : De-energizes control system
10	HL905	Indicator of the ground control box selection	LED lights up - ground control box icon

C - Familiarization

Marking	Name	Description	Function
11	SA801	"Overriding system" control	By pressing on : Authorize movements from the ground control box in case of overload (Use ONLY in case of emergency)
12	SB807	Horn button	By pressing on : Horn activation
13	HL906	Indicator of the platform control box selection	LED lights up - platform control box icon
14	SA903	Beacon light on/off	By pressing on : Beacon light ON / OFF
15	HL909	Overload indicator / Fault	Alarm icon : • Is ON at power up of the machine, at the same time as the icon (19) Is blinking if overriding is active : • An active or detected failure is displayed on on-board screen • Or Hydraulic oil temperature icon is active on on-board screen • Or Engine pressure icon is active on on-board screen • Or Engine stop icon is active on on-board screen • Or Overload machine status is active on on-board screen
16	SA303	Engine start-up selector	By pressing on : Engine start / stop
17	SA300	Propane Gas supply[2]	By pressing on : Propane Gas supply selection
18	SA305	Petrol/Gasoline or diesel supply[3]	By pressing on : Fuel supply selection
19	HL908	Engine warning indicator / Engine pre-heating	Alarm icon : • Is ON at power up of the machine at the same time as the icon (15) Is blinking if overriding is active Warning icon is ON if : • Engine warning icon is active on on-board screen • Or Tilt machine status is active on on-board screen • Or Engine is pre-heating
20	SA600F	DPF regeneration inhibited[4]	By pressing on : Refusal of the request for regeneration
21	SA600D	DPF regeneration required[5]	By pressing on : Regeneration start-up

C - Familiarization

Marking	Name	Description	Function
22	SA900	Control box activation key switch	: De-energizes control system
			: Platform control box energized
			: Ground control box energized
23		Activ'Screen 2	

1. For machines fitted with
2. For machines fitted with
3. For machines fitted with
4. For machines fitted with
5. For machines fitted with

1.2.2 - HAULOTTE Activ'Screen 2

Upon starting and during operation of the machine, the LCD screen "Activ'Screen" located on the ground control box displays in real time the machine operating status. All functions and icons described below might not be present on this model.

HAULOTTE Activ'Screen 2

Icon	Description	Function	Icon	Description	Function
HAULOTTE Activ'Screen 2					
Navigation buttons - Above Activ'Screen display					
	Home Button	Allows return to the home screen at any time		Up Navigation	Permits scrolling up through the screen (if present)
	Left navigation	Permits navigation to screens to the left (if present)		Down Navigation	Permits allows scrolling down through the screen and onto the following screen (if present)
	Right Navigation	Permits navigation to screens to the right of the current screen (if present)		Cancel Button	Used to refuse or cancel a selection within the menu
	Back button	Returns the user to the previous screen		Validation Button	Used to confirm selection within the menus

C - Familiarization

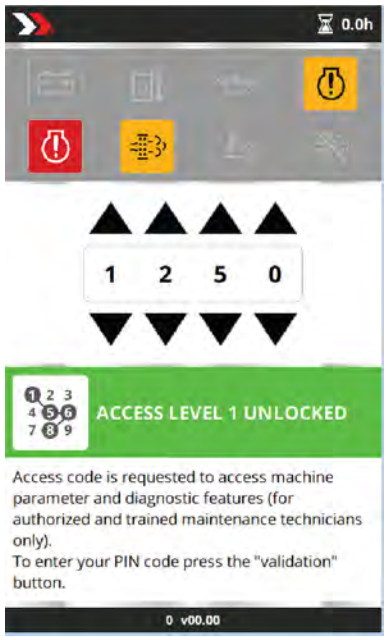
On initial start-up of the machine or after 3 day of inactivity, the following screens are displayed in order.

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Machine power up (Start-up screen)					

C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
		Access code (Will be visible - depending on the machine)		Access code not yet entered	
				Access code entered is correct (Level 1, 2 or 3 depending on authorization of technician)	
				Access code entered is incorrect	
		Access code NIV 1 (Will be visible - depending on the machine)	The machine can be personalized with a user identification code. Personalization is only possible with level 1 access. Machine properties display : Soft version, machine serial number, adjustment parameters. Possible change of parameters : Language, fault display format, brightness setting, time, and some options availables.		
				Operator PIN code not yet entered	
				Operator PIN code entered is correct	
				Operator PIN code entered is incorrect	

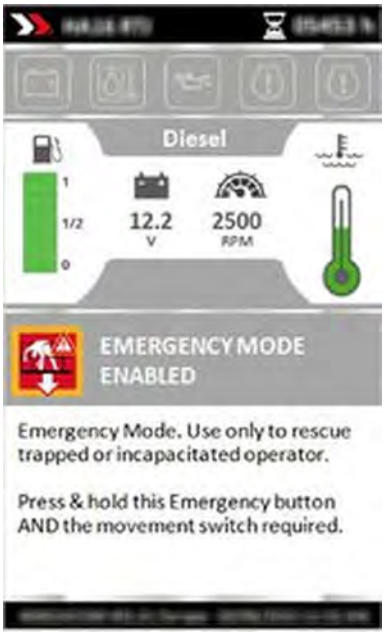
C - Familiarization

Controls and indicators

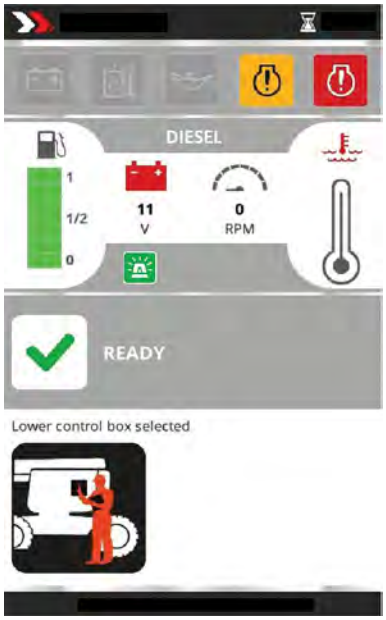
Icon	Description	Function	Icon	Description	Function
		Operator PIN code (Will be visible - depending on the machine)	The machine can be personalized with a user identification code. Personalization is only possible with level 2 access. Contact HAULOTTE Services®.		
				Operator PIN code not yet entered	
				Operator PIN code entered is correct	
				Operator PIN code entered is incorrect	

C - Familiarization

Controls and indicators

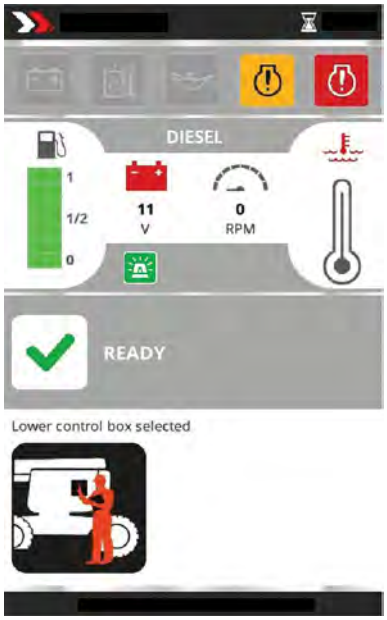
Icon	Description	Function	Icon	Description	Function
		Emergency mode		Emergency mode is activated when : • The E-Stop at platform control box is pushed in (de-energized). • The machine is in overload state. • Ground control box is selected/energized. • The emergency overriding button is activated.	
				Emergency mode is deactivated when : • The E-Stop at platform control box is pulled out (energized). • The machine is NOT in overload state. • Ground control box is NOT selected/ energized.	
				The Emergency mode is out of service/non-functional	
				Emergency mode has been used and activation of its function saved in the memory of the machine. A HAULOTTE® certified technician is required to reset the Emergency Mode system.	

Controls and indicators

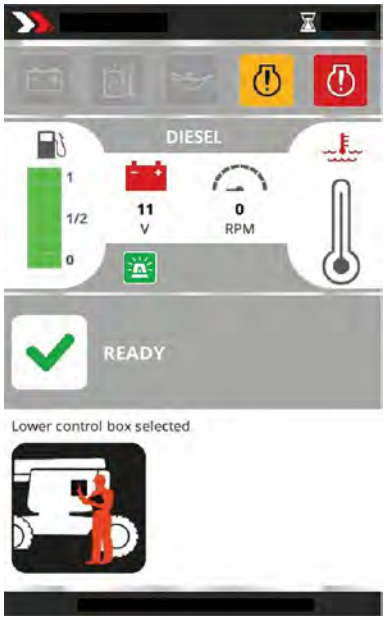
Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
	Machine model zone		HT23RTJPRO	Machine Model	• Machine model display
	Hour meter/next maintenance zone		05453 h	Hourmeter	• The timer flashes if the engine is switched on and the hourmeter increases.
			05453 h	Maintenance use	The Maintenance Tool icon and the number of hours remaining until the next maintenance are displayed for 5 seconds when the machine is started up. Maintenance Tool icon blinks; if maintenance is due.
			05453h		The maintenance tool icon turns RED when the next scheduled maintenance must be carried out in under 25 hours.

C - Familiarization

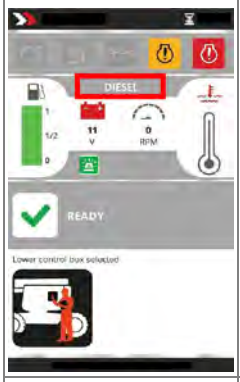
Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
	Warning icons zone			Battery State	• Icon is ON if there is no charge output detected from the alternator • Icon is flashing if a failure code for the alternator is detected (code F09.10)
				Hydraulic oil temperature	Icon is ON when the temperature in the hydraulic reservoir has exceeded the maximum required temperature. Stop using the machine and allow the oil to cool down.
				Engine oil pressure	Icon is ON if engine oil pressure is lower than required limit while engine is running. The Engine must be switched OFF immediately to avoid damaging the motor.
				Stop motor	• Icon is ON if an engine failure is detected (coolant, pressure, alternator etc) • Or if the Engine shuts down after 3 seconds of running. • Or after 1 second when engine fails to start.

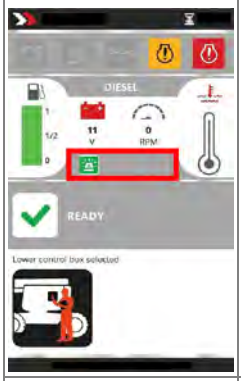
Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
	Warning icons zone			Engine warning	• Icon is ON if Engine warning is detected. Or one of the engine maintenance schedules has been exceeded.
	Warning icons zone			Engine decontamination fault (If fitted)	• Engine decontamination system fault. In this case, you must contact HAULOTTE Services® as soon as possible.

Controls and indicators

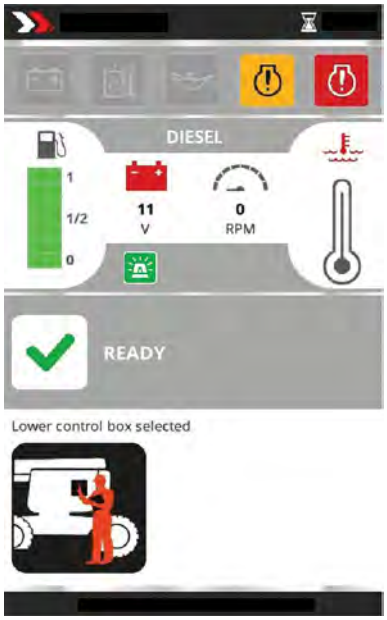
Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
	Functional information zone			Power mode used	• Diesel • GPL / LPG • Electrical
				Bargraph	
				Digital Gauge - Fuel reserve indicator (ON/OFF)	The indicator changes from GREEN to RED when the fuel level is low and indicator is activated
				Analog Gauge - Fuel level gauge	The fuel level indicator switches from GREEN to RED when the fuel level is low

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
	Functional information zone			Charge Battery	Displays the machine battery voltage. The indicator switches to RED if the voltage is low.
				Engine Speed (rpm)	Engine speed display
				Temperature motor	Displays Engine coolant temperature. The indicator switches from GREEN to RED when the engine overheats
				Additional functions	
				Beacon	• The icon is ON when the flashing light is switched on
				Working light	• The icon is ON when the work light is switched on
				Activ' Lighting System	• The icon is ON when the Activ' Lighting System is switched on in auto or manual mode
				Stop Emission System	• The icon is ON if the system is active on the machine

C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
	Machine status zone			Pictogram and title	• Displays the pictogram and machine status
				Ready	Machine ready, displayed when no failures and no other machine state icons is active
				Alarm	Alarm icon is flashing slowly If there is either an active or detected machine failure, or if the machine is in an overload or tilt is active. When the Alarm symbol is displayed, there will also be a symbol displayed to show either the type of machine state, or machine failure that corresponds.

C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
				Layout	
				Platform control selected	Selector switch is in platform control box position
				Ground control selected	Selector switch is in ground control box position
				Tilt	The machine is elevated , and is on a slope greater than the permitted slope. Depending on the machine configuration, the lifting and extension functions are slowed or stopped.
				Overload	The platform is overloaded. Remove the excessive load to or below the rated capacity, to restore functions. In case of an emergency, to rescue the operator in platform, use the Overriding system.

C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
				Layout	
				Pre-heating	Engine's automatic preheat system is active. The time to pre-heat will vary according to engine and ambient temperature. The machine can be started as soon as the indicator goes out.
				Radius limitation	Icon is ON if the range limit is active or faulty
				Machine is charging	The machine is charging by the engine

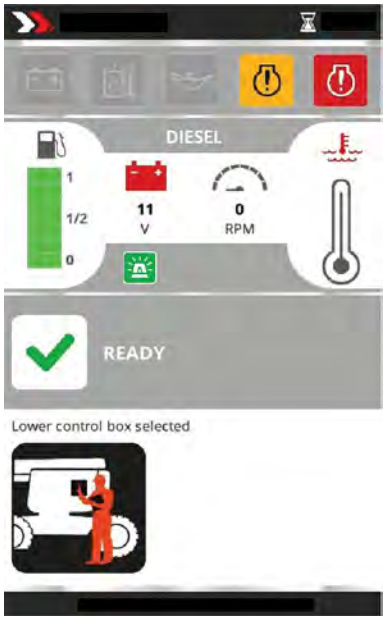
C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
				Low fuel level	Fuel level is low. Refill the fuel tank to the marked level. Attention: Lack of fuel may damage the motor/ engine and will not be covered under warranty.
				Stop Emission System	Icon is ON when the function cuts the engine
				Activ' Lighting System	The function is off. To switch it on, go to the 'Settings' menu

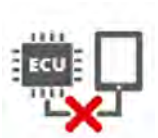
C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
				Layout	
				Diagnostic in progress	The HaulotteDiag console is connected to the machine
				Screen software obsolete	Screen software update essential Contact HAULOTTE Services®

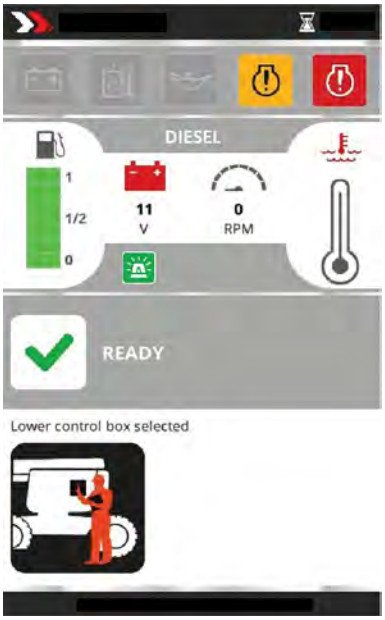
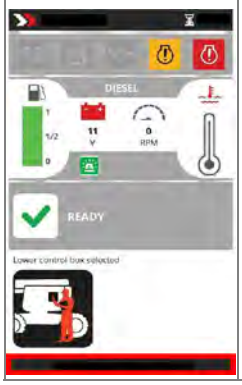
C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
				F12.01 bus CAN fault	CAN network fault between the screen and the rest of the machine
				Activ' Shield Bar disable	The secondary safety system is switched off
				Activ' Shield Bar triggered	 The secondary safety system is triggered. An operator may be trapped on the platform : In this situation, supervisor(s) at ground level must turn the control box key selector (22) to the ground control box position to take control. The platform box controls are now de-energized. Check that the E-Stop button (9) at ground is not pressed in. To safely activate movements from the ground control box, the Enable Switch (6) must be pressed and held.

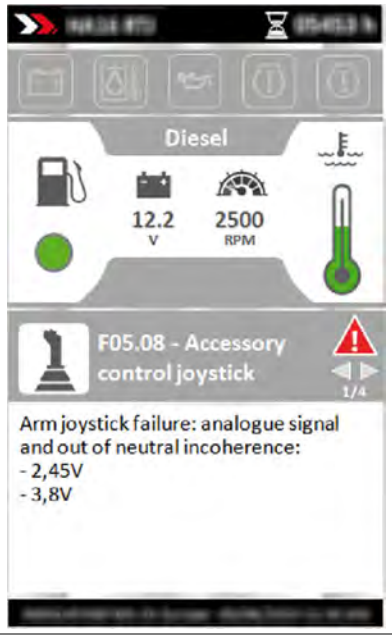
C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Home screen (dashboard) (Will be visible - depending on the machine)					
					
	General information zone			Machine software version and code	• Displays the reference and version of the software installed on the machine
				Machine date and time	• Displays the date and time of the machine ECU

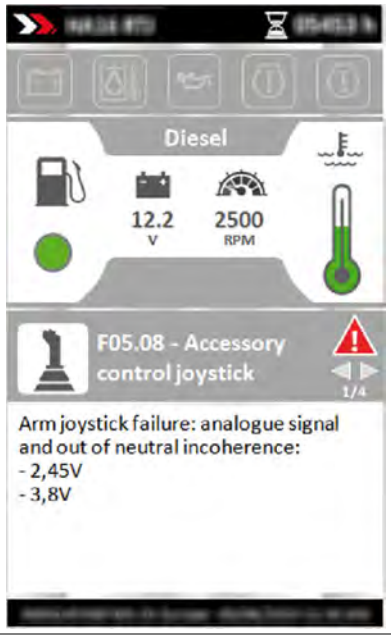
C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Machine fault (Will be visible - depending on the machine)					
					
Machine fault icons					
	Failure code F01.xx	Fault - Variator		Failure code F09.xx	Fault - IC Engine
	Failure code F02.xx	Fault - power contactor		Failure code F10.xx	Fault - Functions
	Failure code F03.xx	Fault - command relay		Failure code F11.xx	Fault - machine safety
	Failure code F04.xx	Fault - electro-valve		Failure code F12.xx	Fault - electronic control unit ECU

C - Familiarization

Controls and indicators

Icon	Description	Function	Icon	Description	Function
Machine fault (Will be visible - depending on the machine)					
					
Machine fault icons					
	Failure code F05.xx	Fault - joystick		Failure code F13.xx	Fault - Switches
	Failure code F06.xx	Fault - weight management system		Failure code F14.xx	Fault - Driving pump
	Failure code F07.xx	Fault - limit switch or sensor		Failure code F15.xx	Fault - data communication system CAN
	Failure code F08.xx	Fault - electrical circuit		Failure code F16.xx	Fault - Electric motor

C - Familiarization

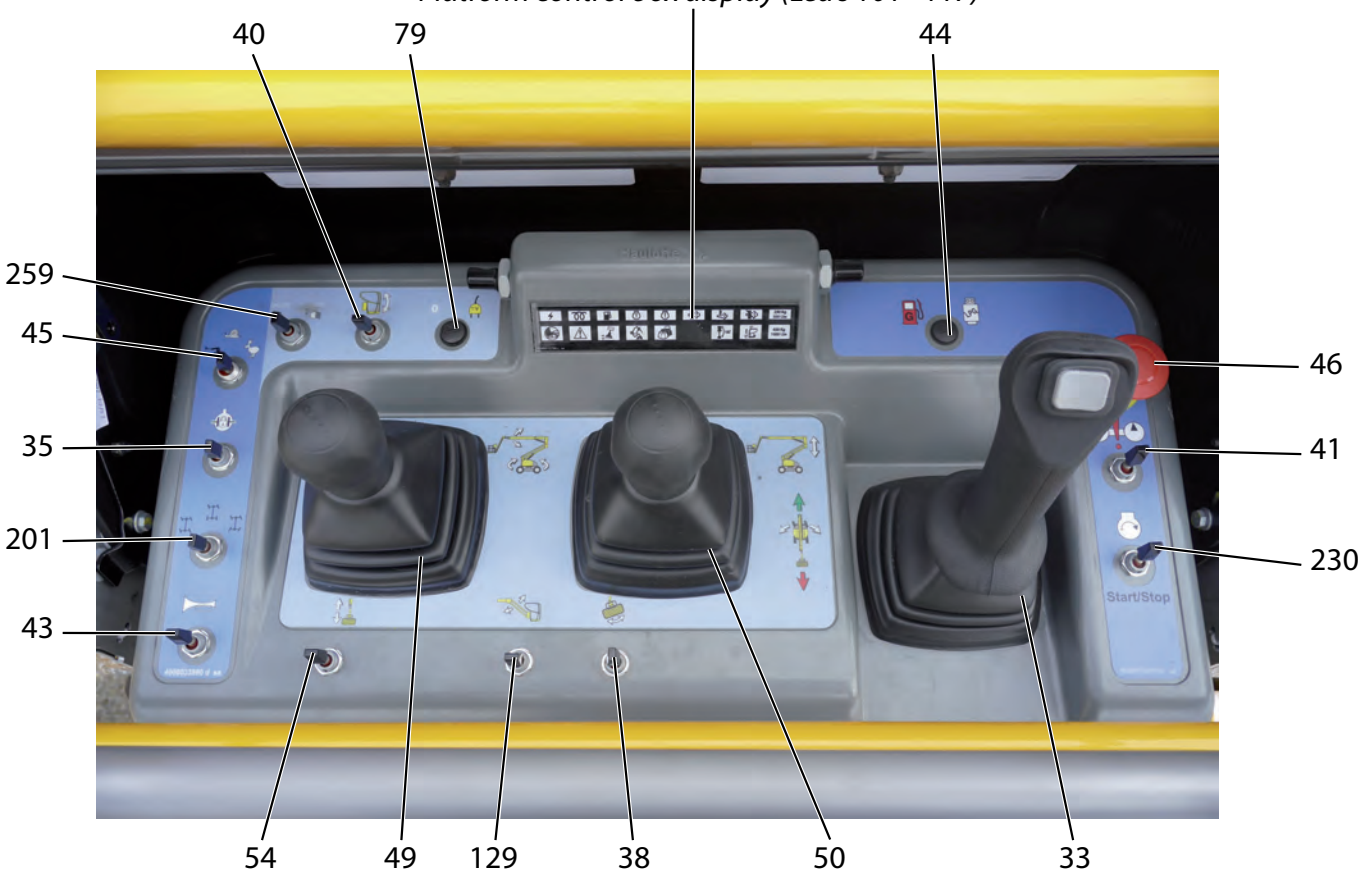
Notes

1.3 - PLATFORM CONTROL BOX

1.3.1 - Layout

General view

Affichage pupitre de commandes haut (Led 101 - 117)
Platform control box display (Led's 101 - 117)



C - Familiarization

Controls and indicators

Marking	Name	Description	Function
33	SM902	Drive joystick	Move forward : Forward drive
			Move backwards : Reverse drive
		Steering rocker switch	Press right side of button : Steer right - According to selected mode (201)
			Press left side of button : Steer left - According to selected mode (201)
35	SA100	Differential lock selector	Toggle left and hold(Activated) : Maximum drive torque (on difficult or sloping ground)
			Release (deactivated) : Standard torque
38	SA751	Platform rotation switch	Move to the right : Counter clockwise (CCW) rotation
			Move to the left : Clockwise (CW) rotation
40	SA721	Platform leveling switch	Move upwards : Raise platform
			Move downwards : Platform lowers
41	SA800	Auxiliary power switch	Toggle and hold : Back-up unit activated
			Release : Back-up unit deactivated
43	SA907	Horn button	Push the horn selector down to sound the horn
			The horn stops when the selector switch is released
44	SA304	Fuel selector[1]	Push switch to the right for LPG (liquid propane gas supply)
			Push switch to the left for gasoline (petrol) or diesel fuel supply
45	SA110	Drive speed selector	High-speed drive
			Medium speed drive
			Low-speed drive
46	SB802	E-stop button	Pulled out : Platform control box energized
			Pressed in : De-energizes control system (Engine stopped)
49	SM900	Turntable rotation joystick	Move to the right : Counter clockwise (CCW) rotation
			Move to the left : Clockwise (CW) rotation
		Boom lift joystick	Move forward : Raise boom
			Move backwards : Lower boom
50	SM901	Arm lift joystick	Move forward : Arm raises
			Move backwards : Arm lowers
54	SA531	Boom telescoping switch	Hold upwards : Boom retracts
			Move downwards and hold : Boom extends
79	SA906	Generator selector[2]	Move to the left : Generator deactivated
			Move to the right : Generator activated

C - Familiarization

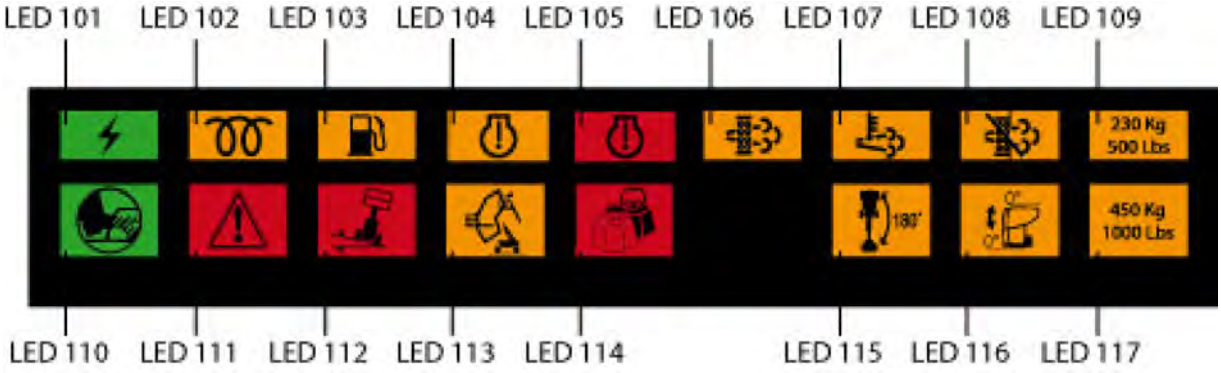
Marking	Name	Description	Function
129	SA621	Jib raising / lowering switch[3]	Hold upwards : Lifting
			Move downwards and hold : Lowering
201	SA101	Steering mode selector[4]	All 4 wheels steer
			Front 2 wheels steer
			Crab mode
230	SA303	Engine start-up / stop selector	Move backwards : Starts or Stops the engine (depending on the engine's operating (ON/OFF) mode
259	SA907B	Activ' Lighting System selector	ON / OFF
			Automatic lighting

1. For machines fitted with
2. For machines fitted with
3. For machines fitted with
4. For machines fitted with

C - Familiarization

1.3.2 - Display Panel (LED'S 101 - 117)

Upper control box display



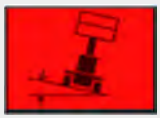
Marking	Name	Symbol	Function
LED 101	HL900		Power ON
LED 102	HL300		Combustion engine pre-heating
LED 103	HL307		Low fuel level
LED 104	HL304		Engine warning
LED 105	HL305		Engine shutdown
LED 106	HL301		Not used
LED 107	HL302		Not used
LED 108	HL303		Not used
LED 109[1]	HL805	230 kg 500 lbs	Not used
LED 110	HL807		Foot Switch / Stop Emission System
LED 111	HL801		Fault
LED 112	HL800		Tilt

C - Familiarization

Marking	Name	Symbol	Function
LED 113	HL804		Not used
LED 114	HL802		Overload
LED 115	HL250		Not used
LED 116	HL720		Platform leveling
LED 117[2]	HL806		Not used

1. If machine equipped with dual load
2. If machine equipped with dual load

C - Familiarization

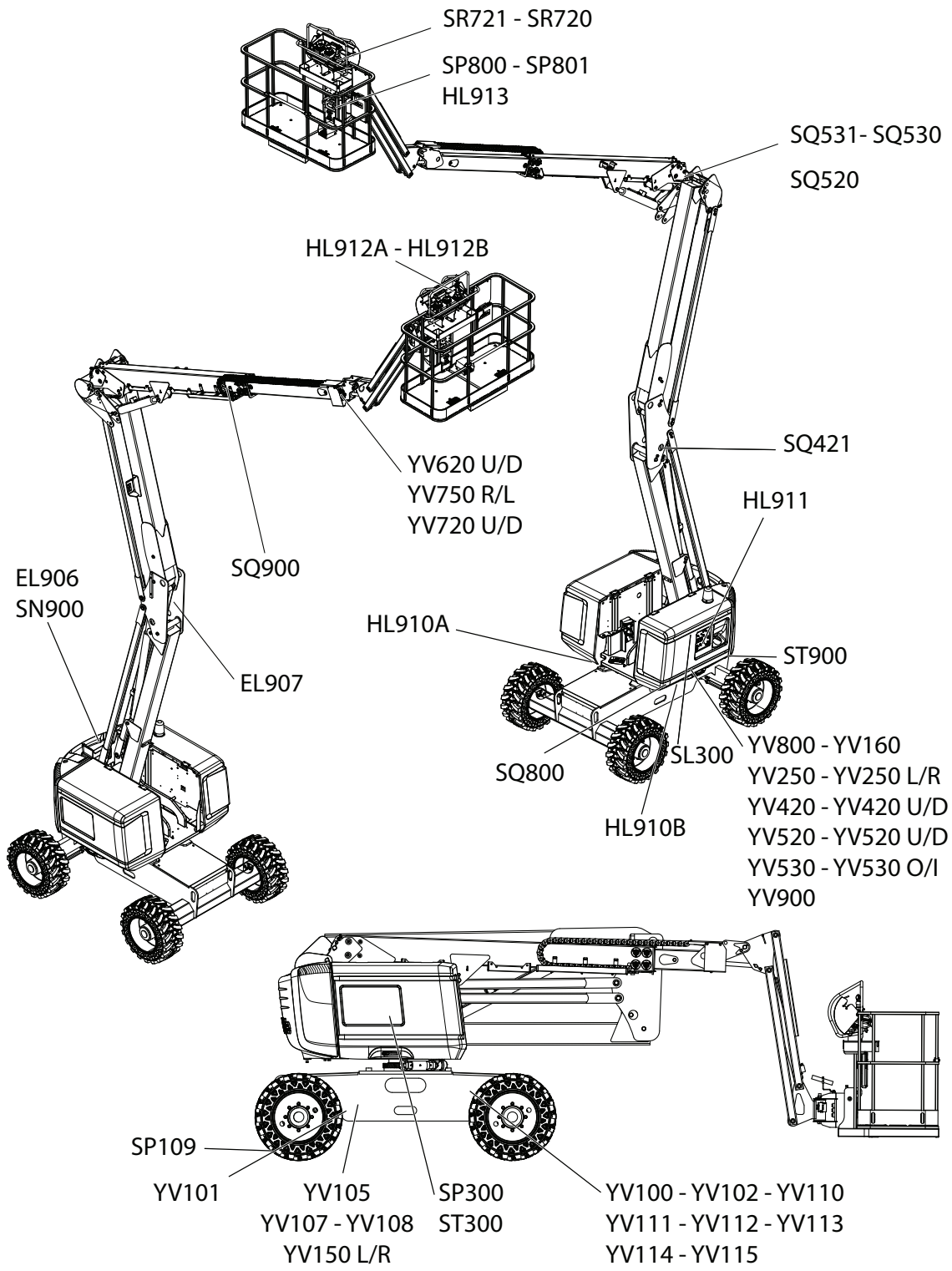
Symbol	Description
	Machine switched on : • Rapid flashing : Machine is ON, but platform control box is not active but the ground control box is ON. Also flashes with either E-stop pressed in • Illuminated : Machine is turned on and platform control panel is active.
	Foot Switch : • Illuminated when Foot Switch activated • Blinks after 90 s of inactivity
	Faults : • Rapid flashing : If a fault is active (current fault)
	Overload : • Rapid flashing : Faulty weighing / overload system • Illuminated when overloaded
	**Tilt sensor :** • Illuminated when in tilt, machine stowed or unfolded
	Basket levelling +/- 10° : • Illuminated if the angle of the platform reaches +/- 10° in relation to the horizontal and movement control
	Low fuel level
	Combustion engine pre-heating : • Illuminated while engine is pre-heating • Off if engine started and if post-heating
	Engine warning : • Lighted in case of minor engine fault (e;g. water in the diesel, clogged air filter, etc.) • Lighted or flashing in case of fault managed by the engine ECU
	Engine shutdown : • Lighted in case of major engine fault (e.g. engine overheating, oil pressure, alternator fault, etc.) • Lighted in case of faults managed by the engine ECU
	DPF regeneration required : • Permanently lighted if the particle filter requires regeneration with a high clogging level[1]
	DPF regeneration in progress, high temperature in the exhaust system (HEST) : [2]
	DPF regeneration inhibited[3]

1. If engine equipped with Particulate Filter Regeneration
2. If engine equipped with Particulate Filter Regeneration
3. If engine equipped with Particulate Filter Regeneration

2 - List of actuators and sensors

2.1 - SENSORS AND ACTUATORS

Sensors and actuators



C - Familiarization

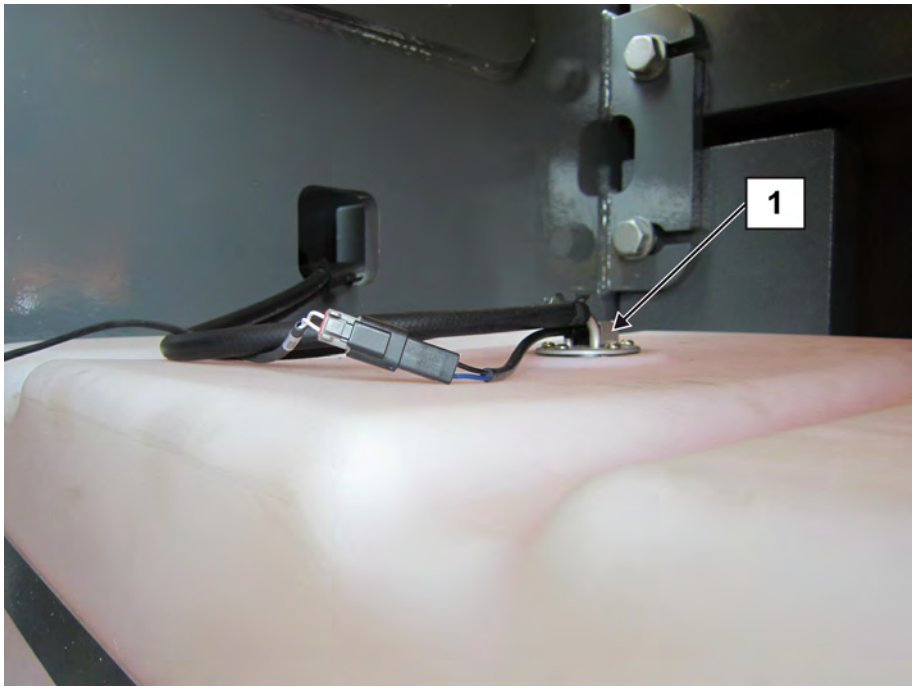
Description	Name
EL906	Light - Activ' Lighting System Counterweight light
EL907	Light - Activ' Lighting System Boom light
HL910 A	Light - Activ' Lighting System Turret light
HL910 B	Light - Activ' Lighting System Turret light
HL911	Light - Activ' Lighting System Ground control box light
HL912 A	Light - Activ' Lighting System Platform control box light
HL912 B	Light - Activ' Lighting System Platform control box light
HL913	Light - Activ' Lighting System Under basket light
SL300	Fuel level sensor
SN900	Twilight sensor
SP109	Pressure sensor for oscillating axle
SP300	Engine oil pressure sensor (TIER III engine only)
SP800	Strain gauges
SP801	Weight sensor
SQ421	Arm's position sensor (= 5V : boom is down)
SQ520	Boom's position sensor (= 5V : boom is down)
SQ530	Telescope's position sensor (= 5V : telescope is retracted)
SQ531	Redundancy of telescope's position (= 5V : telescope is retracted)
SQ800	Tilt sensor (OFF = excessive tilt position)
SQ900	Boom and arm down sensor (Redundancy of SQ420 + SQ520)
SR720	Platform tilt sensor - 10° (ON when tilt is above - 10°)
SR721	Platform tilt sensor + 10° (ON when tilt is above + 10°)
ST300	Engine temperature sensor(TIER III engine only)
ST900	Hydraulic oil overheating sensor
YV100	Differential lock electrovalve
YV101	Oscillating axle unlock electrovalve
YV102	Brake release electrovalve
YV105	Axle brake release electrovalve with 4 WS
YV107	Steering mode electrovalve
YV108	Steering mode electrovalve
YV110	High speed drive electrovalve
YV111	High speed drive electrovalve
YV112	High and medium speed drive electrovalve
YV113	High and medium speed drive electrovalve
YV114	High and medium speed drive electrovalve
YV115	High and medium speed drive electrovalve
YV150 L / R	Front axle steering electrovalve - Left / Right
YV160	PVG drive proportional valve
YV250	Turret rotation PWM electrovalve
YV250 L/R	Turret rotation electrovalve - Left / Right
YV420	Arm PWM electrovalve
YV420 U / D	Arm electrovalve : Direction - Up / Down
YV520	PWM - Electrovalve : Boom
YV520 U / D	Boom electrovalve : Direction - Up / Down
YV530	PWM - Electrovalve : Telescope
YV530 O / I	Telescope electrovalve : Direction - Out / In
YV620 U / D	Jib movement electrovalve - Up / Down
YV720 U / D	Platform rotation movement electrovalve - Up / Down
YV750 R / L	Platform level movement electrovalve - Right / Left
YV800	Load Sensing electrovalve
YV900	PWM Jib and platform movement and steering motion electrovalve

2.2 - SENSORS DETAIL

- SQ800 Tilt sensor (SQ800 = 0 if tilting < 5°(+Vbat on cable marked 150))

C - Familiarization

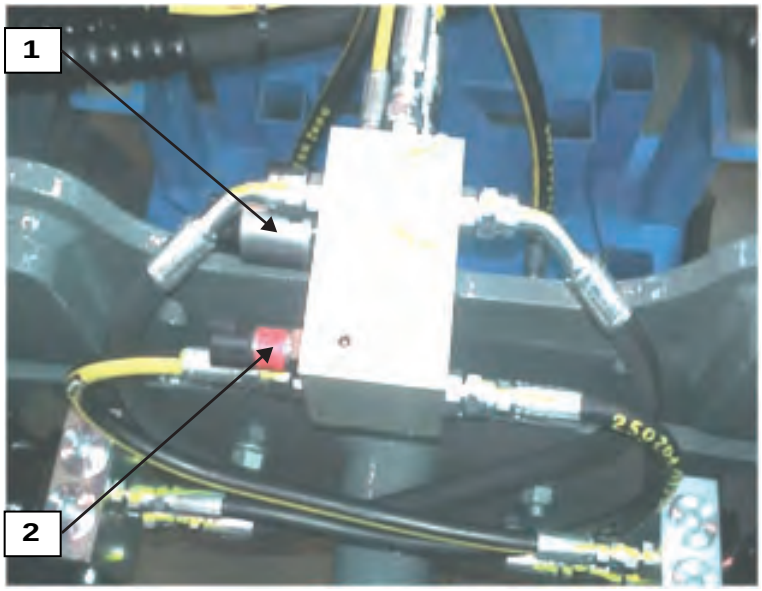
- ST900 Hydraulic oil temperature detection



Marking	Item	Function
1	SL300	Fuel level. The input signal resistance should move from 20 ohms (tank full) to 200 ohms (tank level low) when the fuel level decreases.

C - Familiarization

- SP109 pressure detection (only if machine equipped with oscillating axle)

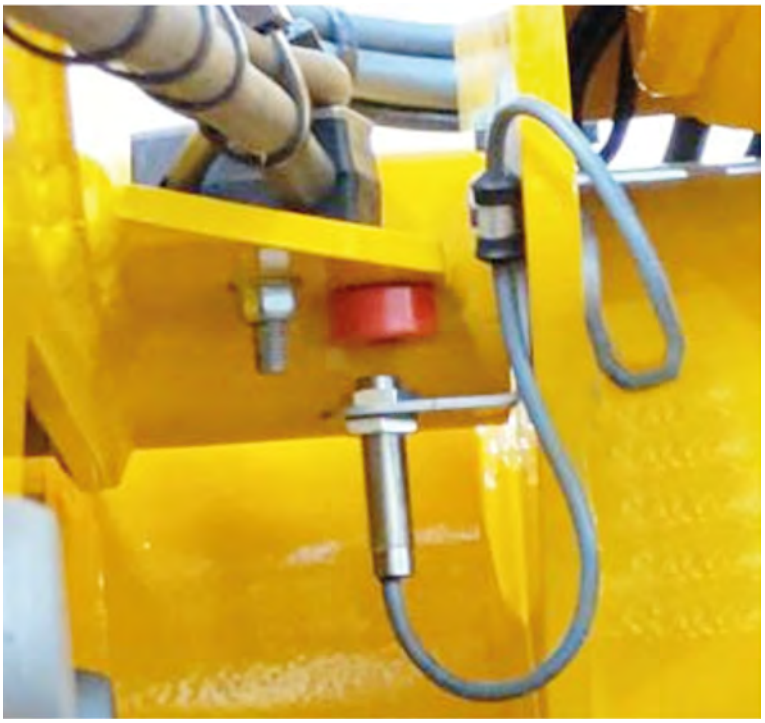


Marking	Name	Function
1	YV101	Oscillating axle lock (YV101 = 1 if driving ongoing and machine folded)
2	SP109	Analog pressure sensor : • If pressure > 10 bar, the information transmitted to the module is: unlocked axle • If pressure < 4 bar, the information transmitted to the module is: locked axle

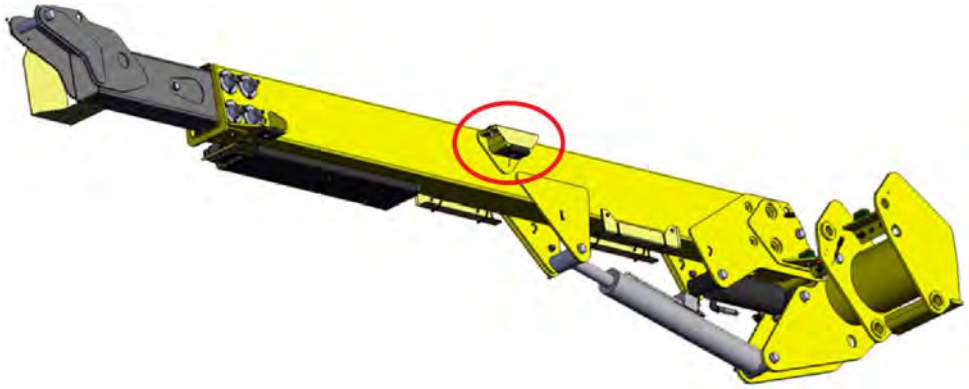
2.2.1 - Proximity sensors

- SQ421 arm angle sensor (= 1 if machine stowed).

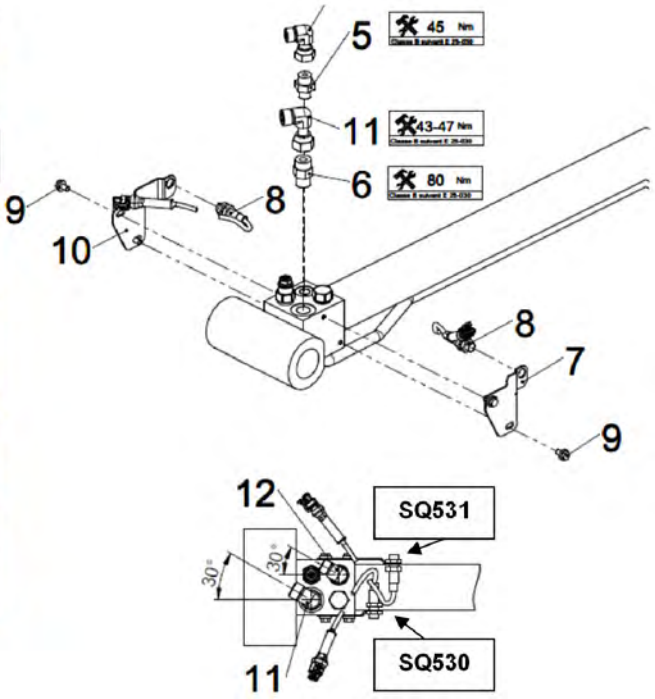
- SQ520 boom angle detection (= 1 if stowed).



- ILS boom angle SQ900 sensor (= 1 if stowed and only if machine equipped with oscillating axle).

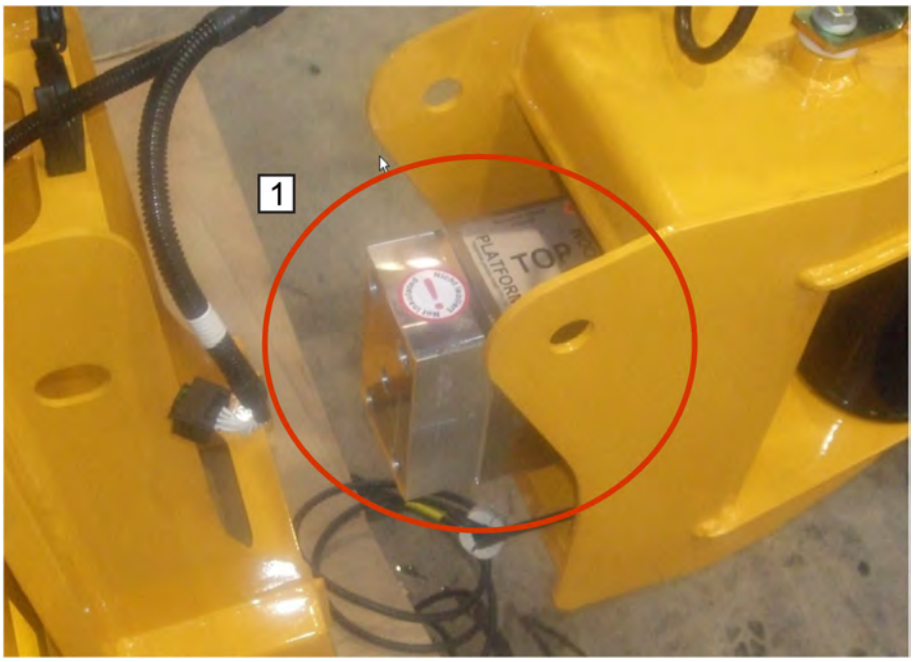


- SQ530 ILS telescope detection (= 1 if retracted).
- SQ531 ILS telescope detection (= 1 if retracted and only if machine equipped with oscillating axle).



2.2.2 - Platform control box

SP800 / SP801 strain gauges for basket weight detection

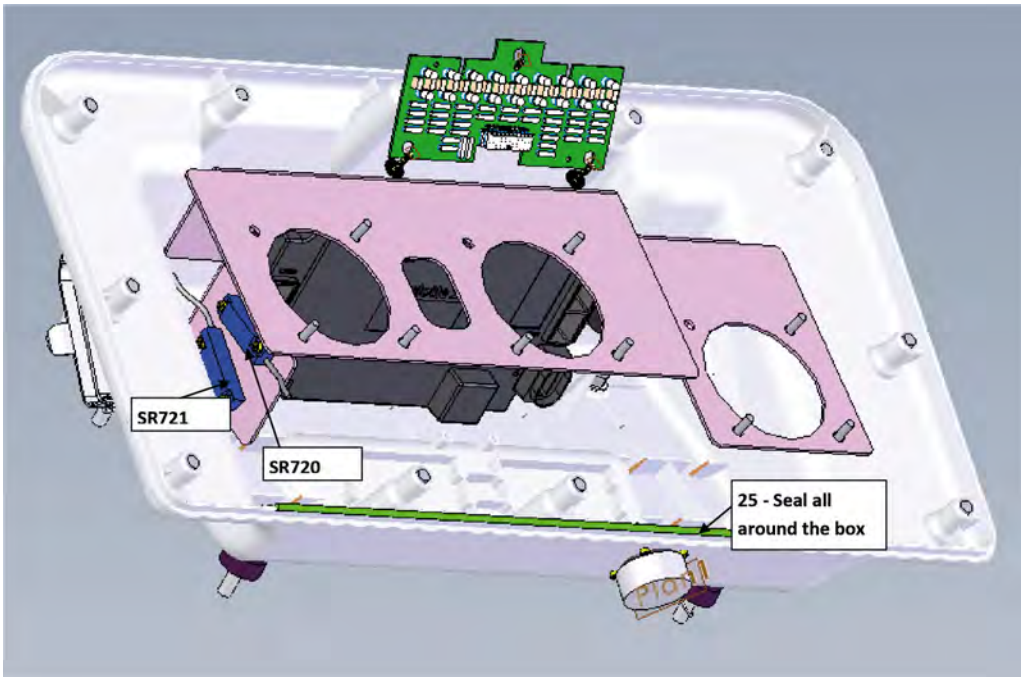


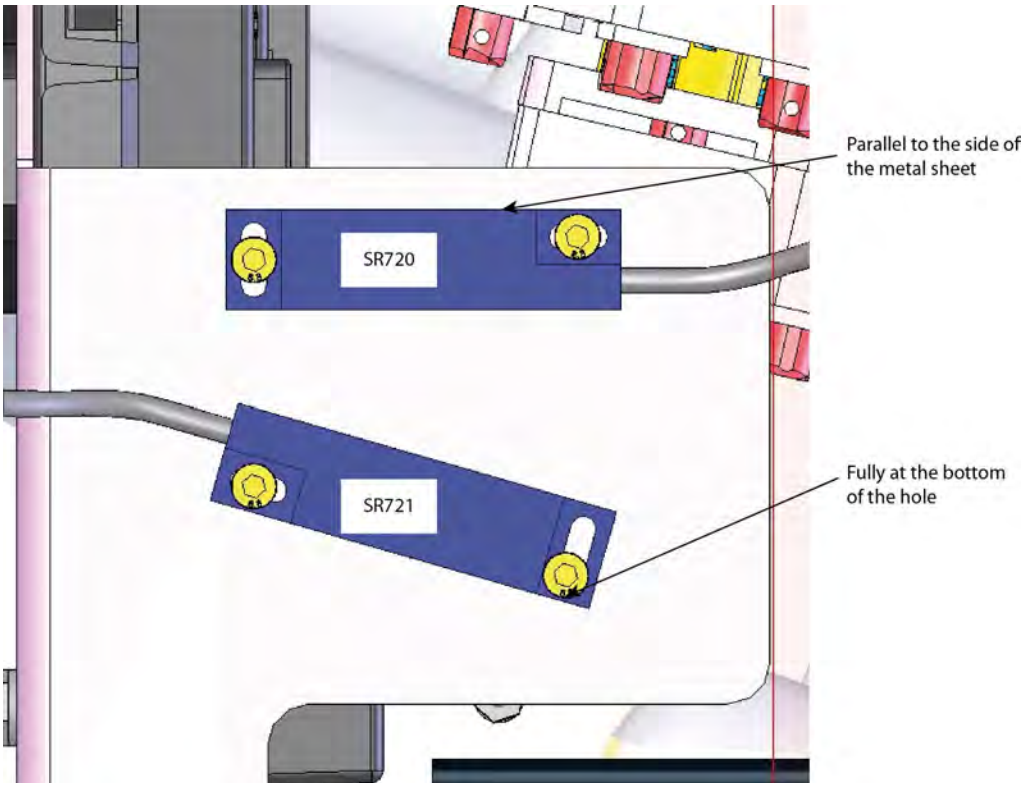
Marking	Item	Description
1	SP800 - SP801	Strain gauge

C - Familiarization

The tilt sensors SR720 / SR721 must be adjusted in order to limit the inclination of the basket at +/- 10° (as shown below).

SR720 (+ 10°) / SR721 (- 10°) tilt sensors for basket inclination

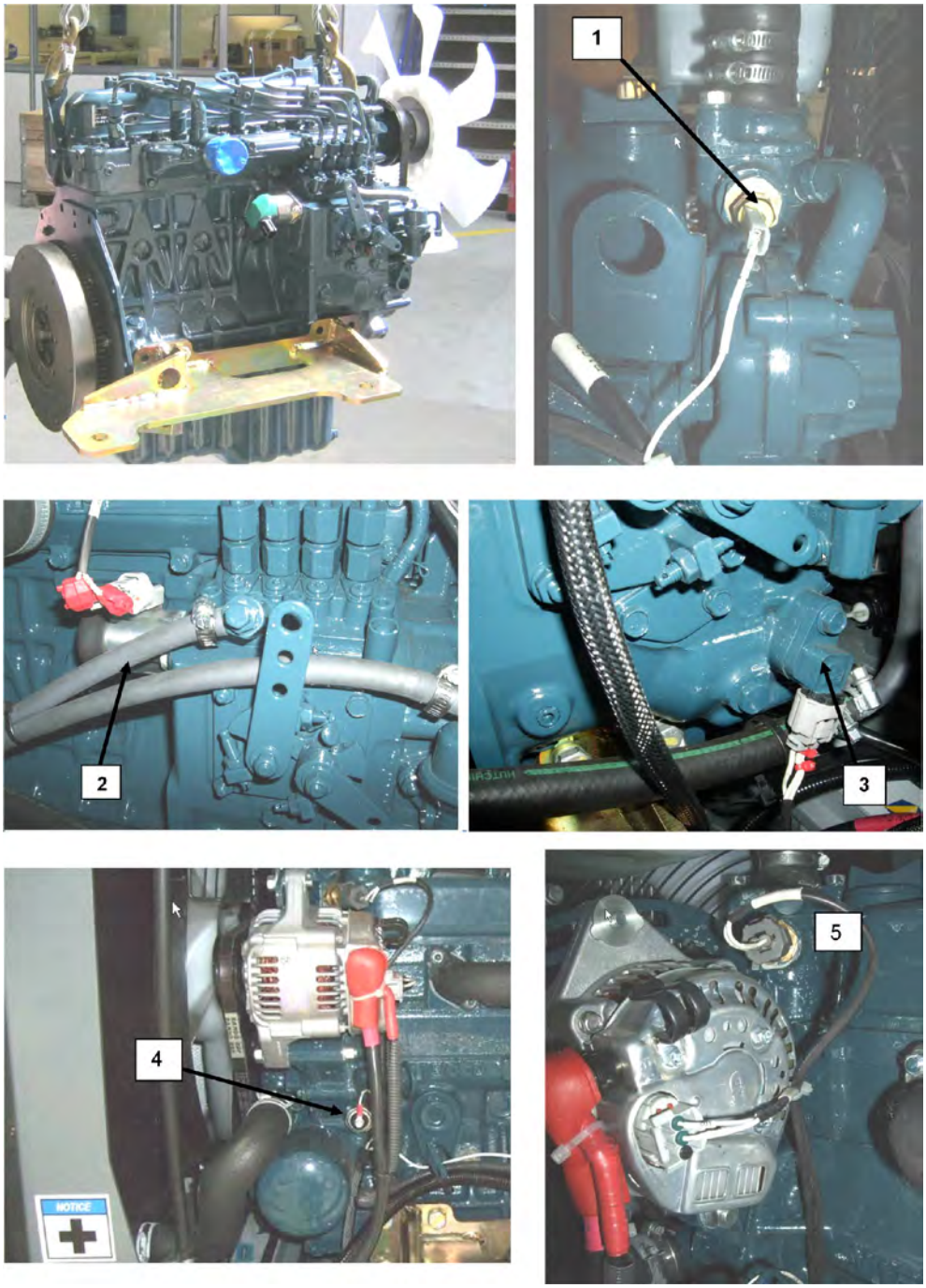




SR720 : Parallel to the side of the metal sheet.

SR721 : Fully at the bottom of the hole.

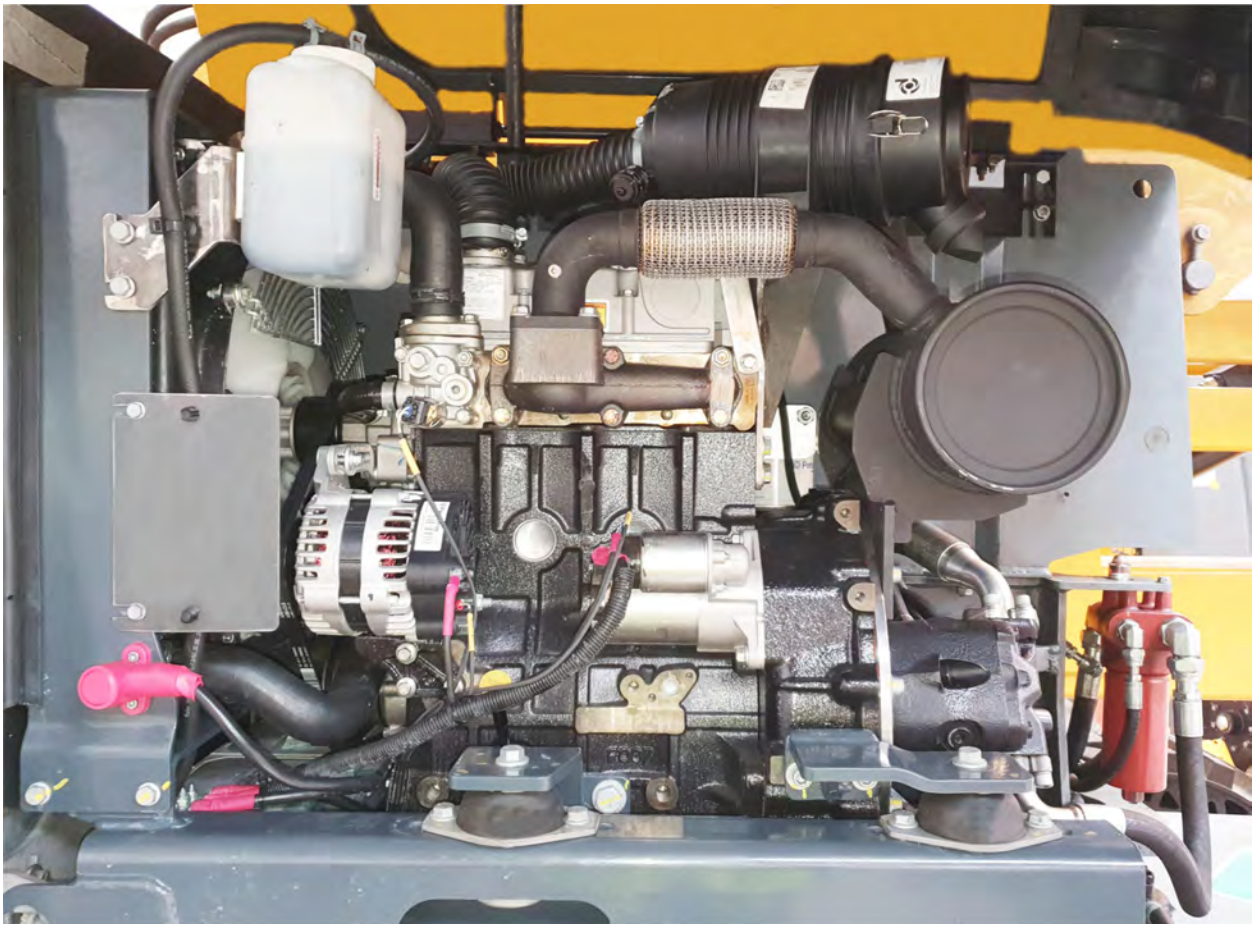
2.2.3 - Kubota V1505 engine



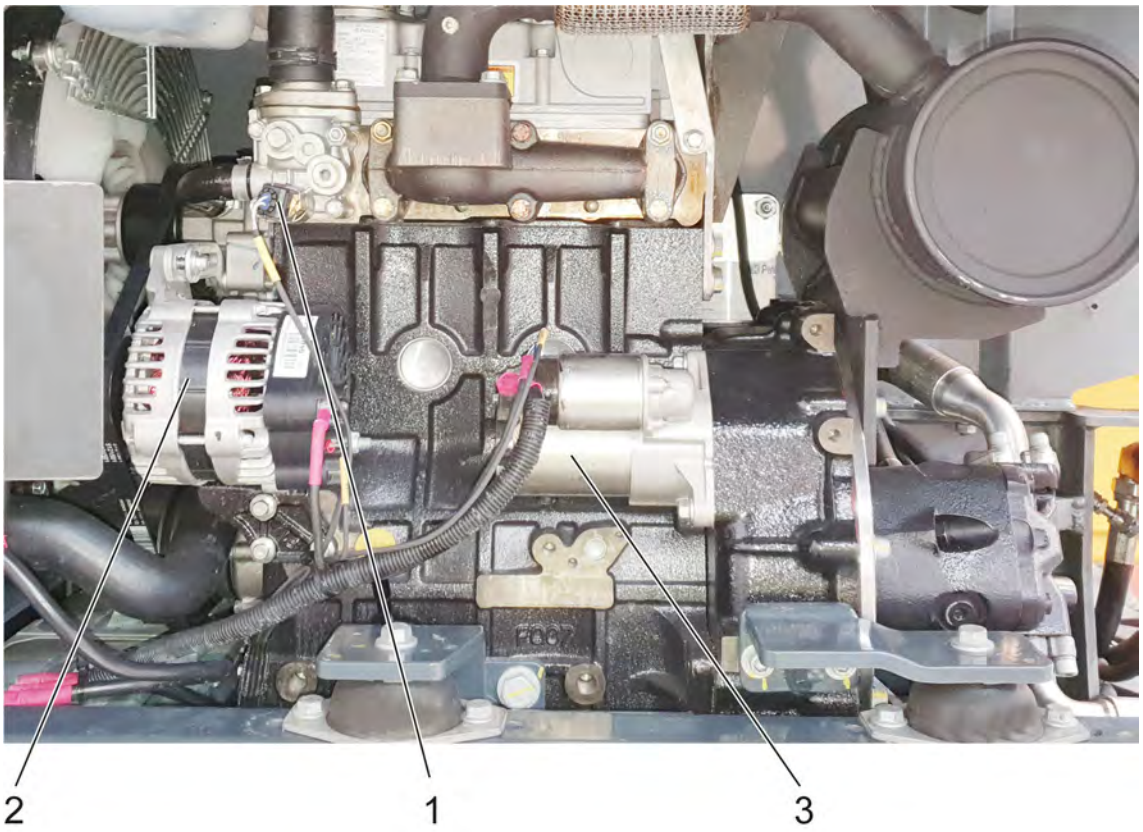
Marking	Item	Description
1	ST300	Overheating detection
2	YA300	Electronic start/stop accelerator
3	SV300	Speed engine sensor
4	SP300	Oil engine pressure detection
5	ST302	Water temperature sensor

2.2.4 - PERKINS 403J-17 engine

Overview

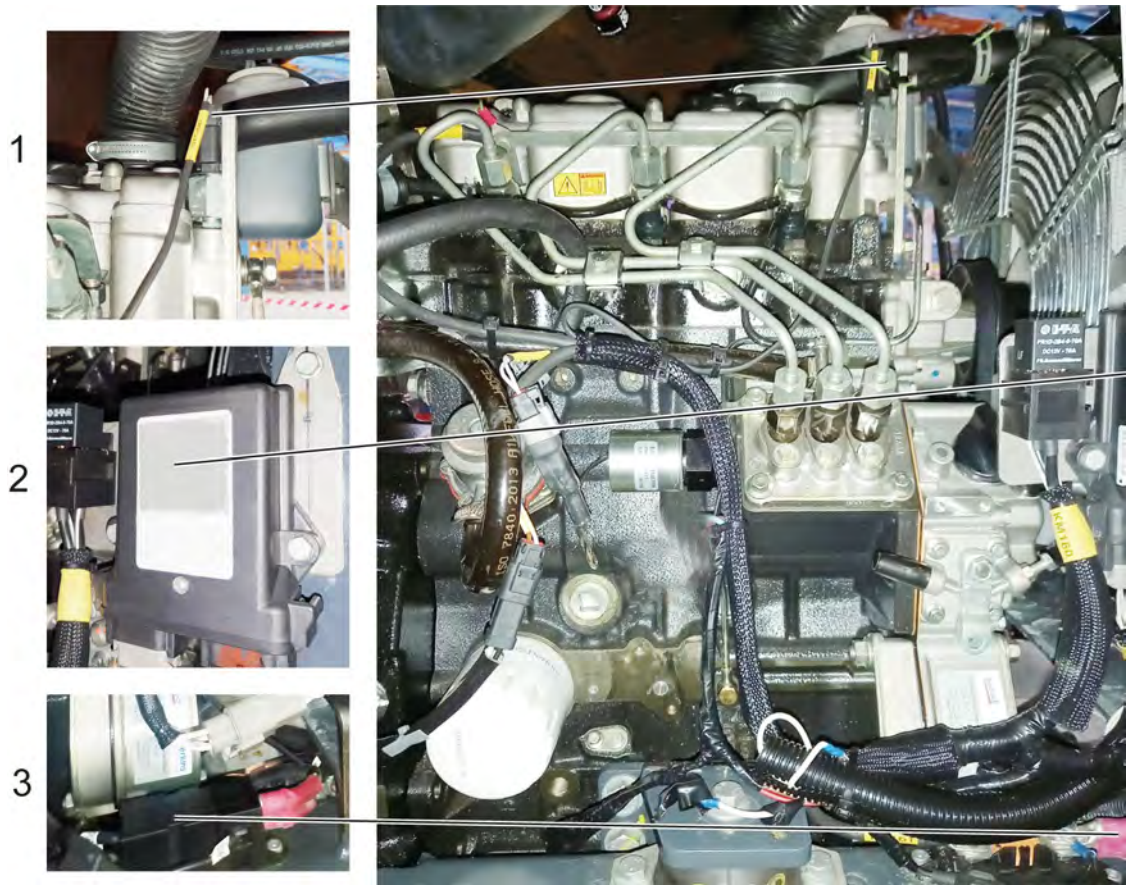


C - Familiarization



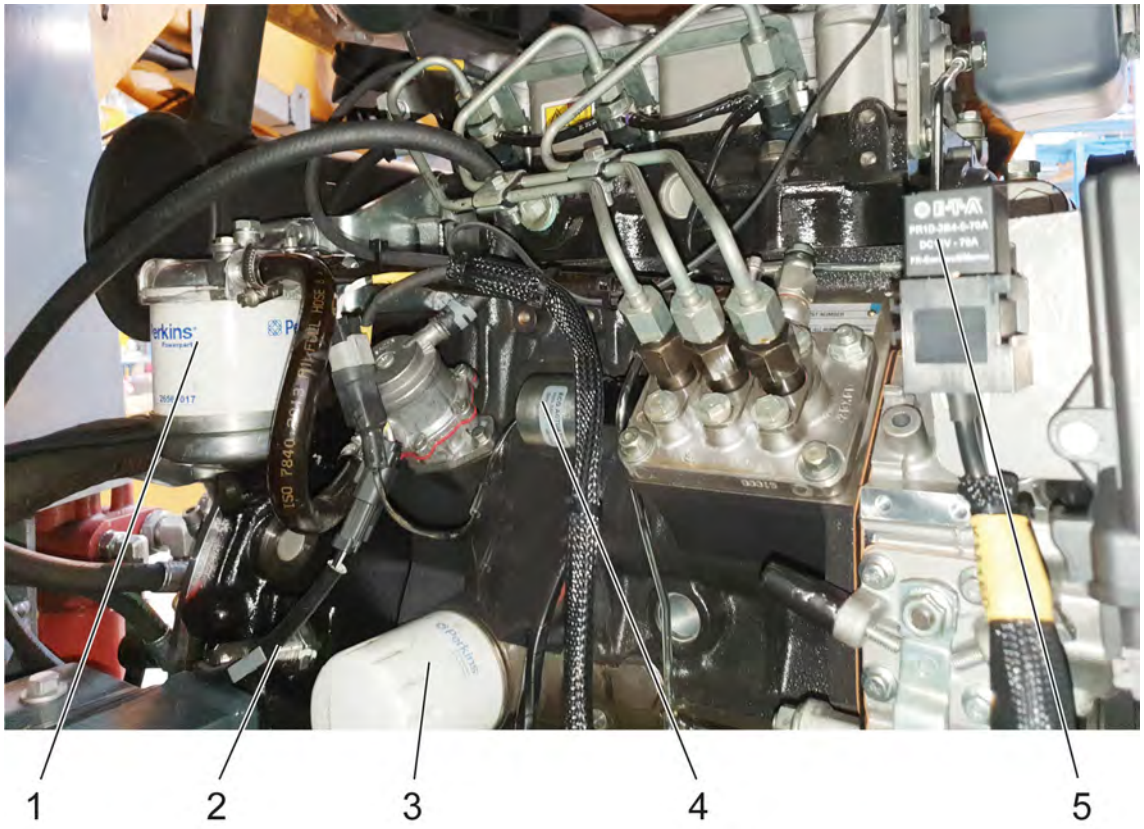
Marking	Item	Description
1	ST302	Sensor - Engine coolant temperature
2	ALT	Alternator
3	M300	Starter

C - Familiarization



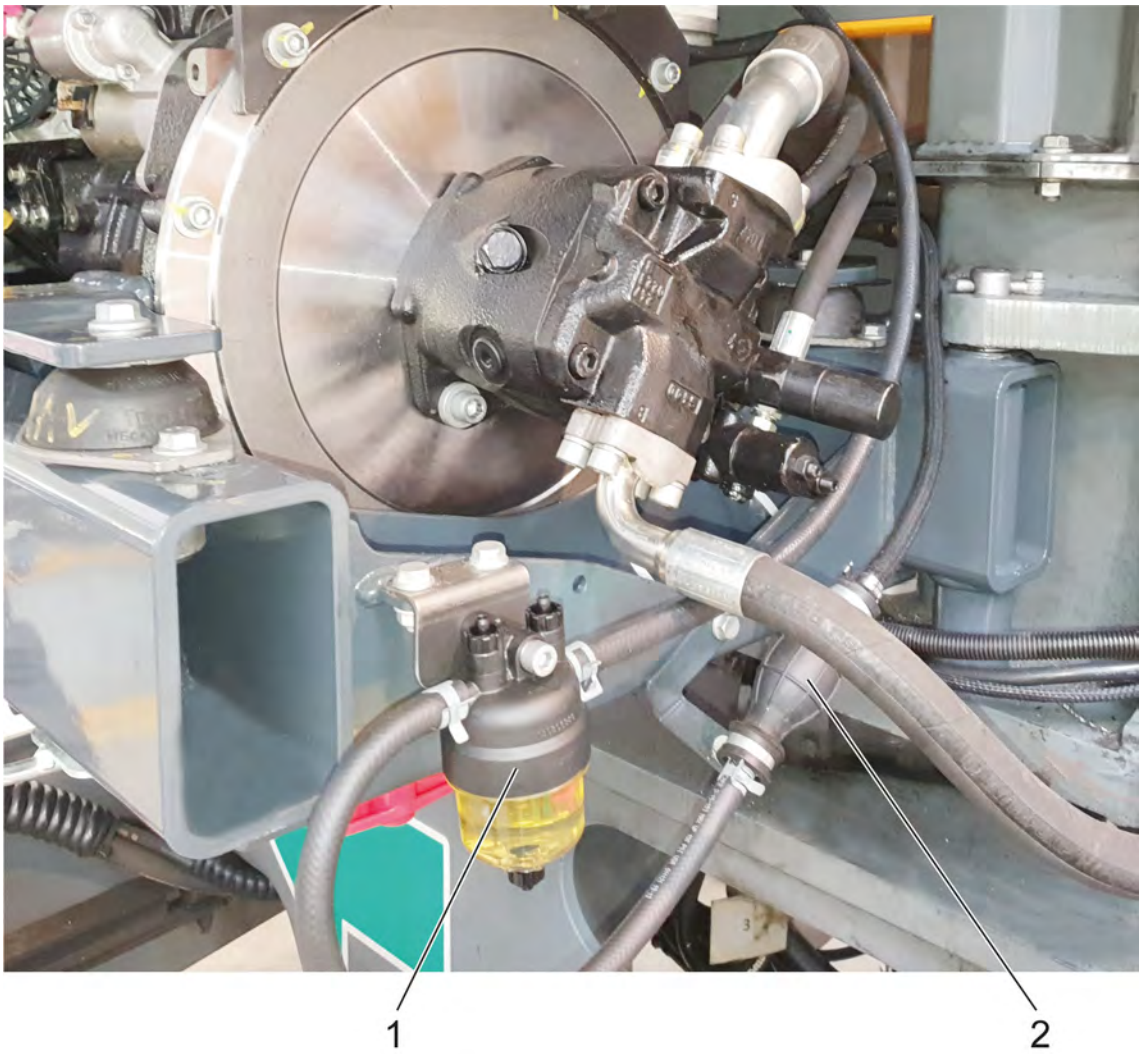
Marking	Item	Description
1	SP300	Engine oil pressure sensor
2	ECM	Electronic Control Module - PERKINS
3	FU161	Preheating fuse

C - Familiarization



Marking	Item	Description
1		Fuel filter
2	SV300	Engine speed sensor
3		Oil filter
4	YA300	Accelerator coil
5	KM160	Preheating relay

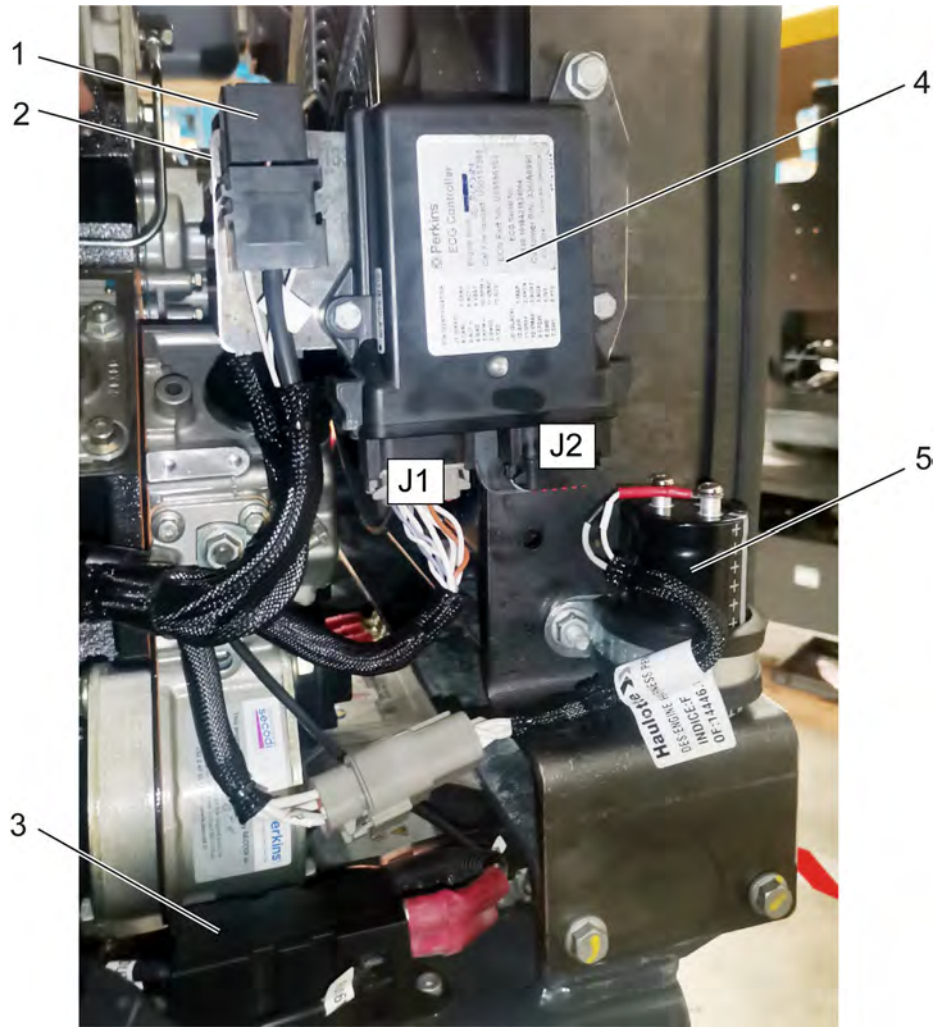
C - Familiarization



Marking	Item	Description
1		The fuel prefilter
2		Manual fuel priming pump

C - Familiarization

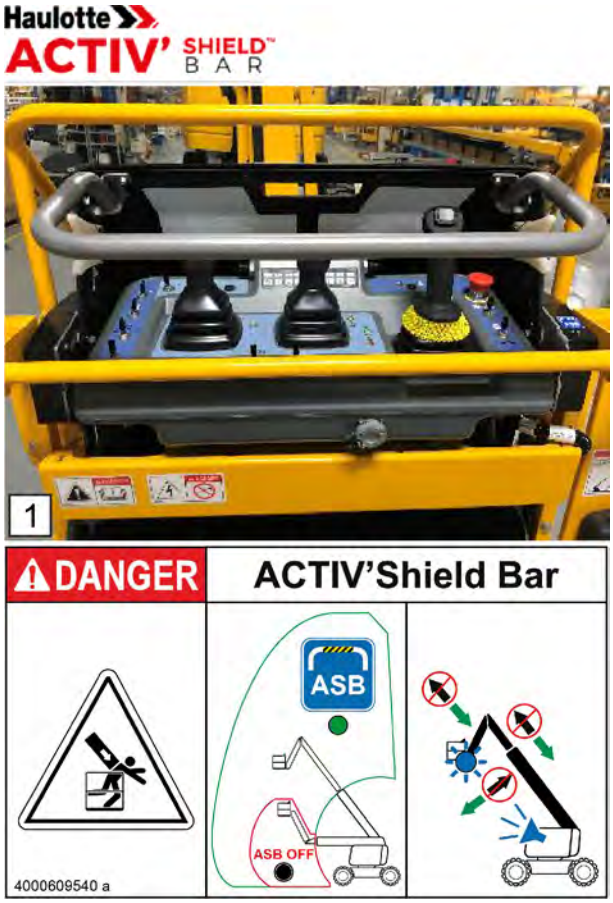
Location : ECM, Relays & Fuses

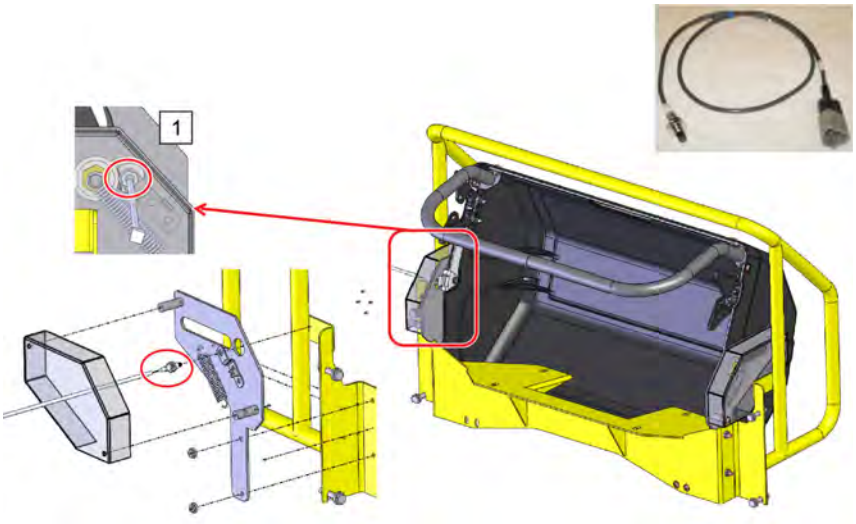


Marking	Item	Description
1	KM160	Preheating relay
2	K1	ECM supply relay
3	FU161	Preheating fuse
4	ECM	Electronic Control Module - PERKINS
5	C1	Capacitor

2.2.5 - Upper controls (with Activ'Shield Bar device)

This anti-entrapement device prevents the operator to be trapped when using the machine.





Marking	Item	Description
1	SQ902	Proximity sensor for ASB bar detection (Reset done by pressing foot switch SB800)

2.2.6 - Option Activ' Lighting System

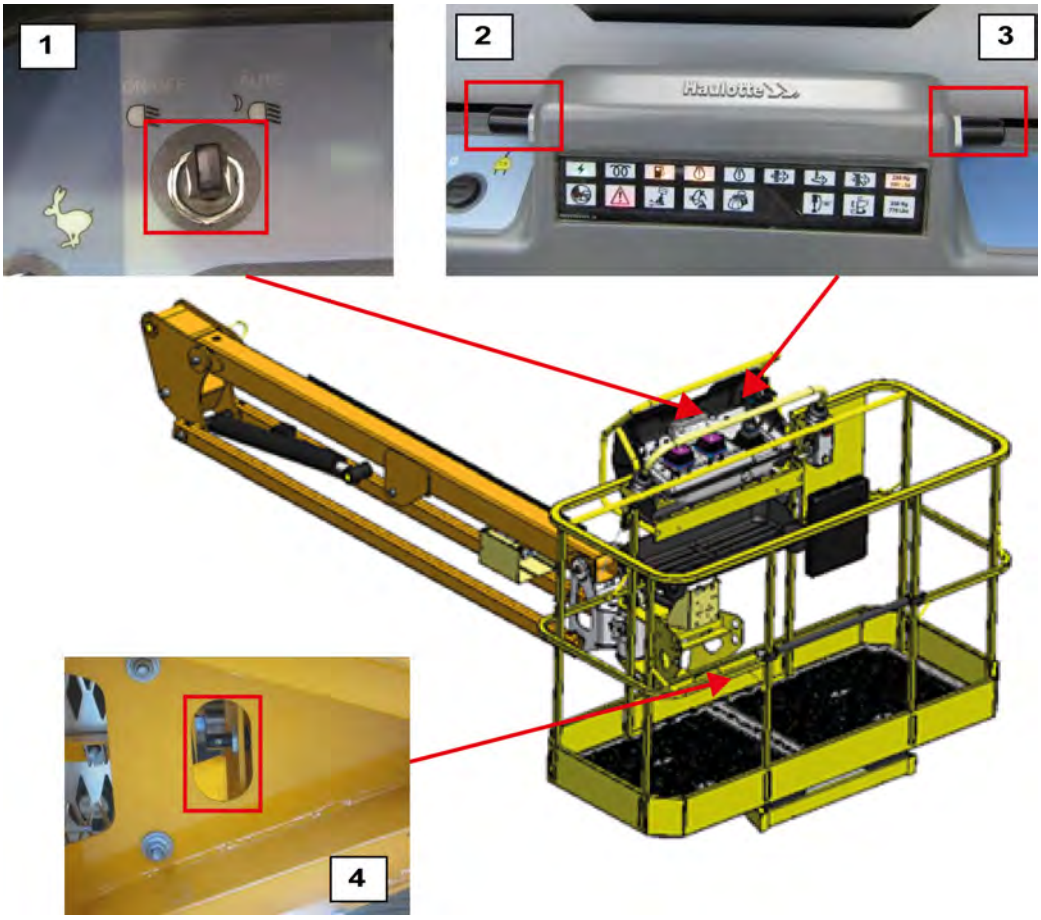
This option will permit the operator to load the AWP on truck in total safety and also keeps working on site when daylight is too dark.

When the luminosity is lower than 50 lumens (night), the auto mode logic is as follow.

Machine state	Light zone		
	Turret light zone	Basket light zone	Movement light zone
Lower control box selected	ON		
Upper control box selected	ON	ON	
Upper control box selected with engine running and movement in process	ON	ON	ON

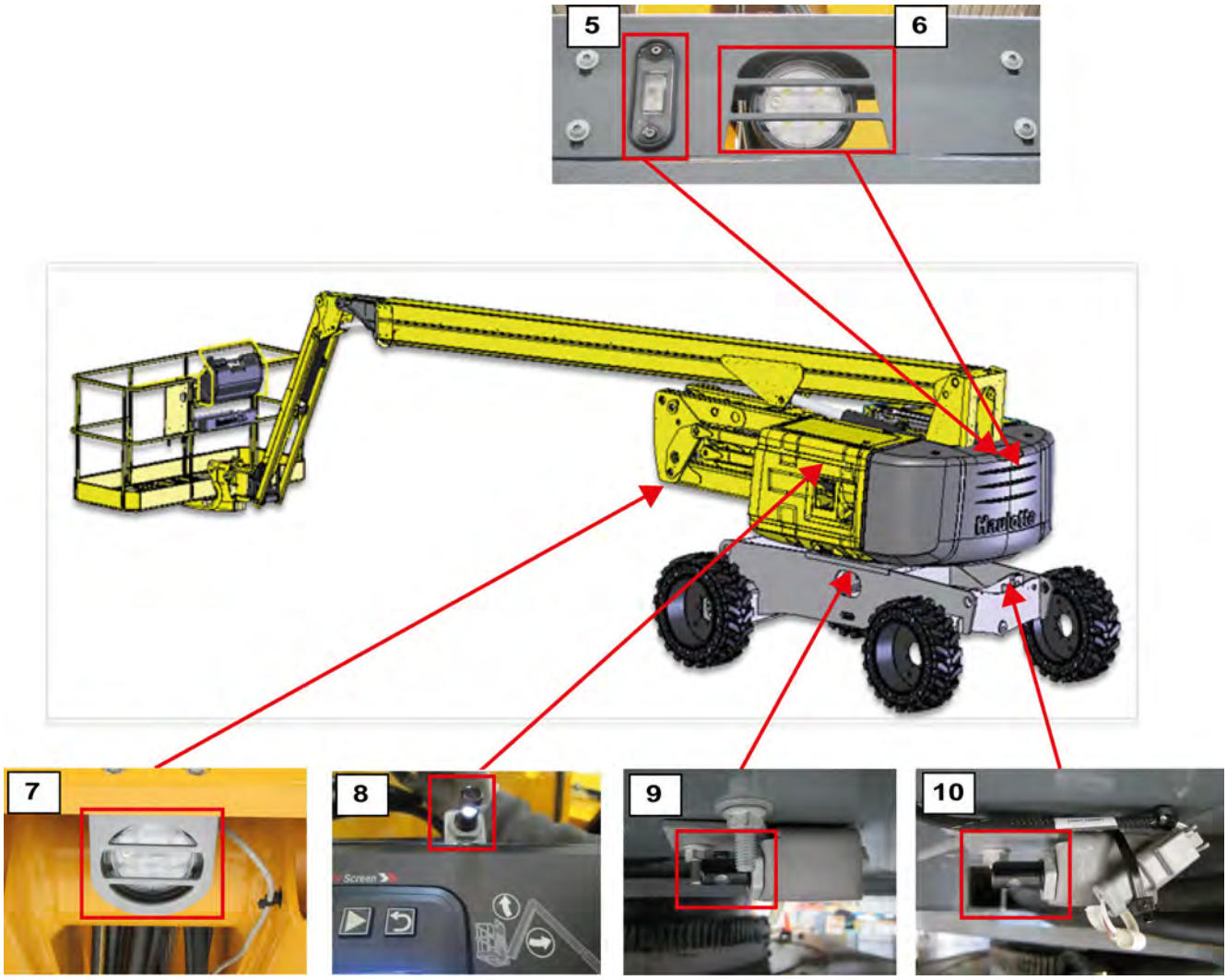
2.2.6.1 - Architecture of the system

Upper controls



C - Familiarization

Turntable



List of components and description

Marking	Item	Description
1	SA910	Selection Activ'lighting system (AUTO, ON/OFF)
2	HL912A	Light on upper controls
3	HL912B	Light on upper controls
4	HL913	Light under basket
5	SN900	Twilight sensor for luminosity detection (ON if < 50 lumens)
6	EL907	Light under boom
7	EL906	Light on Counterweight
8	HL911	Light above LCB
9	HL910A	Light under turret (engine side)
10	HL910B	Light under turret (LCB side)

2.3 - ACTUATORS AND THEIR LOCATION

2.3.1 - List of actuators

In the following tables :

- The column n°2 gives the coordinates of the components on different sheets from the wiring schematics in order to easily find their location.
- The first figure corresponds to the number of pages and the second, to the column (generally from 1 to 20) of the corresponding page.
- The column n°3 indicates the location on the connector on modules.
- The state noted "0" corresponds to 0 V, opened contact or not activated.
- The state noted "1" corresponds to the tension of the circuit, closed or activated contact.

Glossary

Marking	Description
FWD	Forward drive
REV	Reverse drive
FL	Front left
FR	Front right
RL	Rear left
RR	Rear right
PF	Platform
LS	Low speed drive
LS valve/adj	Load sensing valve/adjustment
MS	Medium speed drive
HS	High speed drive
ILS	Magnet reed sensor
UCB	Upper control box
LCB	Lower control box
ECU	Electronic Control Unit
PCB	Printed circuit board
ALS	Activ' Lighting System
E-TOR	Input ON/OFF
S-TOR	Output ON/OFF
E-ANA	Analogic input (Variable signal)
S-ANA	Analogic output (Variable signal)
PWM	Pulse Width Modulation
S-PWM	Analogic output (Variable signal made by Pulse Width Modulation Valve)

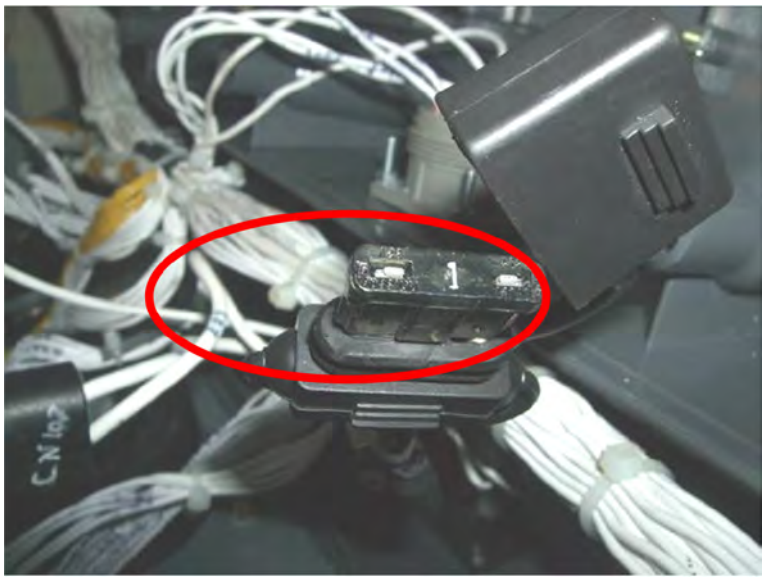
2.3.2 - Engine part

Engine elements		
Name	**Location**	**Function**
M300	**02 - 08**	**Starter = 1 for engine starting (101 - 165)**
ALT	**02 - 10**	**Alternator 60 A, ignition is 12 VDC when engine running (172)**
EGV	**02 - 12**	**Electronic governor for rpm engine Kubota control**
M800	**02 - 04**	**Emergency pump (141 = 1 when running)**
R301-R304	**02 - 06**	**Preheating resistors**

2.3.3 - Fuses

Fuses		
Name	Location	Function
FU2	03 - 02	Generator (20 A)
FU3	03 - 03	Start / stop engine (15 A)
FU4	03 - 04	Engine start (25 A)
FU5	03 - 08	Main supply + Vbat (30 A)
FU6	03 - 08	Overspeed option (20 A)
FU7	03 - 13	Supply V ECU node B2 (15 A)
FU8	03 - 09	Not used (20 A)
FU9	03 - 12	Supply accessories (20 A)
FU11	03 - 09	Supply Vbat permanent (7,5 A)
FU13	03 - 11	Supply V power SPU (20 A)
FU23	02 - 19	Overspeed relay option (40 A)
FU34	08 - 10	Supply strain gauges (1 A)
FU122	02 - 04	Emergency pump (250 A)
FU161	02 - 05	Preheating (100 A)
FU180	02 - 02	Cooler option (30 A)

N.B.-:-THE STRAIN GAUGES ARE PROTECTED BY A FUSE (FU34 = 1 A) LOCATED INSIDE THE UPPER CONTROL BOX.



C - Familiarization

2.3.4 - Inputs

Main commands-Switches/joysticks			
Name	Location	Connector	Function
QS100	02 - 01		Battery cut-out switch (Option) (101)
SA100	07 - 08	CN104.19	Differential lock (B110)
SA101	07 - 12	CN104.13/14	4WS steering mode crab (B104/Synchro B105)
SA110	07 - 17	CN104.7/6	Drive mode (Low speed B111, high speed B112, Medium speed mid position)
SA250	07 - 05	1A11-2A11	Turret orientation (840 - 860)
SA303	07 - 05	CN105.3	Engine start/stop (B128)
SA621	07 - 13	CN104.15/16	Jib lift/descent (B120 / B121)
SA721	07 - 16	CN104.9/10	Basket compensation up/down (B114 / B115)
SA751	07 - 14	CN105.36/35	Basket rotation left/right (B124 / B123)
SA800	07 - 06	CN105.4	Emergency pump (B129)
SA900	03 - 06		Main switch power ON/OFF (104)
SA907	07 - 07	CN104.1	Horn
SA910	12 - 16	CN105.11/13	Activ' Lighting System option (913/918)
SB800	08 - 16	CN105.12	Foot Switch (= 1 for any movement) (B141)
SB801	03 - 14		Main emergency stop button lower controls (143)
SB802	07 - 03		Main emergency push button upper controls (113)
SB900	08 - 11	CN105.10	Active bar reset (1 to reset the active bar mode) (B157)
SM900	08 - 04		Boom / turret rotation Neutral position (B103) Signal range (B302 / B303, 4,5 VDC - 2,5 VDC - 0,5 VDC)
SM901	08 - 06		Arm Signal range (B301, 4,5 VDC - 2,5 VDC - 0,5 VDC)
SM902	08 - 09		Drive Neutral position (B100 / B101) Signal range (B300, 4,5 VDC - 2,5 VDC - 0,5 VDC) Front wheels steering (2WS - B109 / B108)

C - Familiarization

ECU modules		
Name	Location	Function
U101	04 - 17	Multi function CAN display (Activ' screen V2)
U106		Master ECU module SPU
U104		Slave ECU module node B2 (Upper controls)
U107	04 - 14	Keyboard with touch pad button (Lower controls)

C - Familiarization

Sensors			
Name	Location	Connector	Function
SL300	06 - 03	1A8	Fuel level sensor (189)
SN900	05 - 05	1B.22	Option détection Activ Lighting System (ON if < 50 lumens and option selected) (917)
SP109	06 - 07	3B-30	Pressure switch 10 b for oscillating axle (If > 1,5 V axle free) (212)
SP300	02 - 15		Engine oil pressure detection (ON if P < 1 b) (173)
SP800 / SP801	08 - 18	CN106.4/5	Strain gauges for basket load detection (B310 / B311)
SQ421	06 - 18	2B14	Arm detection (ILS in front of magnet = 1 if stowed) (384) OFF if < 4 V, If > 6 V short circuit with Vbat
SQ520	06 - 16	2B12	Boom detection (ILS in front of magnet = 1 if stowed) (384) OFF if < 4 V, If > 6 V short circuit with Vbat
SQ530	06 - 14	2B13	Telescope detection (ILS in front of magnet = 1 if retracted) (380) OFF if < 4 V, If > 6 V short circuit with Vbat
SQ531	06 - 06	3A17	Telescope detection (ILS in front of magnet = 1 if retracted) (332)
SQ800	06 - 10	1B21	Slope detection (Signal wire 150 = 1 if machine levelled)
SQ900	06 - 04	3A11	Arm and boom position (ILS in front of magnet = 1 if stowed) (222)
SQ902	08 - 12	CN105.5	Activ'Shield Bar detection (= 1 if detected) (B150)
SR720	08 - 14	CN105.17	Basket inclination (= 1 if at -10°) (B146)
SR721	08 - 13	CN105.16	Basket inclination (= 1 if at +10°) (B145)
ST300	02 - 16		Engine oil overheating detection (= 1 if overheat) (174)
ST302	02 - 11		Water temperature detection in engine (130)
ST900	06 - 12	3B23	Hydraulic oil overheating detection (= 1 if OK) (125)
ST902	02 - 02		Temperature switch detection (oil cooler) (190)
SV300	02 - 13		Engine speed detection (133)

2.3.5 - Outputs

Relays-Contactors			
Name	Location	Connector	Function
KA2	05 - 17	1B4	Option generator command (192)
KA3	05 - 18	1B7	Engine start/stop command (170)
KA4	05 - 19	2A23	Engine start command (169)
KA6	03 - 13		Overriding
KA7	03 - 03		For engine start (Tier IV)
KA8	05 - 14	1B28	For beacon/flashing light option (194)
KA9	05 - 15	1B2	Horn command (187)
KA10	12 - 18	CN105.34	Command - Activ' Lighting System option (915)
KAC	08 - 12	CN105.30	Activ'Shield Bar command (B510)
KMG	03 - 15		Main contactor (142)
KMP	03 - 14		Power relay (Keeps power a few seconds after KMG)
SD85	02 - 19		Option overspeed relay
KM120	02 - 04		Emergency pump (145)
KM160	02 - 07		Preheating (162)
KM300	02 - 08		Starter (165)

C - Familiarization

Valves			
Name	Location	Connector	Function
YA300	02 - 14		Electronic engine speed control coil (135)
YV100	06 - 07	2A5	Differential lock (= 1 if axle unlocked in low speed) (689)
YV101	05 - 08	2A19	Oscillating axle unlocking (780)
YV102	05 - 06	2A26	Brake release (782)
YV105	05 - 07	2A02	Brake release in 4WS (= 1 not in drive/tilt mode) (783)
YV107	06 - 09	1B27	Crab steering mode (YV108 = 1 if right) (621)
YV108	06 - 10	2A24	Synchro steering mode (YV107 = 1 if left) (622)
YV110	06 - 05	3B4	Valve for drive mode (= 1 in HS) (686)
YV111	06 - 06	1B3	Valve for drive mode (= 1 in HS) (686)
YV112	06 - 02	3A25	Valve for drive mode (= 1 in MS/HS) (690)
YV113	06 - 04	2B26	Valve for drive mode (= 1 in MS/HS) (687)
YV114	06 - 03	3B1	Valve for drive mode (= 1 in MS/HS) (690)
YV115	06 - 04	2B28	Valve for drive mode (= 1 in MS/HS) (687)
YV150L	06 - 07	3A2	Front left steering (601)
YV150R	06 - 08	3A14	Front right steering (602)
YV160	05 - 02	3A9 - 1A18	PVG for drive signal wire (124, 25% - 75% Vbat)
YV250	06 - 16	1B31	PWM safety valve for turret rotation (880)
YV250L	06 - 17	2B8	Left turret rotation (841)
YV250R	06 - 18	2B25	Right turret rotation (861)
YV420	05 - 11	2A20	Safety PWM valve for arm lift/descent (282)
YV420D	06 - 14	2B7	Arm descent (221)
YV420U	06 - 15	1B10	Arm lift (201)
YV520	05 - 12	2A4	Safety PWM valve for boom lift/descent (381)
YV520D	06 - 12	2B34	Boom descent (321)
YV520U	06 - 13	2B5	Boom lift (301)
YV530	05 - 13		Safety PWM valve for telescope extension/ retraction (387)
YV530I	06 - 11	3A21	Telescopic boom retraction (361)
YV530O	06 - 12	3A20	Telescopic boom extension (341)
YV620D	08 - 13	CN105.32	Jib descent (B604)
YV620U	08 - 14	CN105.31	Jib lift (B603)
YV720D	08 - 17	CN105.28	Basket compensation down (B600)
YV720U	08 - 18	CN105.27	Basket compensation up (B607)
YV750L	08 - 16	CN105.33	Basket rotation left side (B605)

C - Familiarization

Valves			
YV750R	08 - 15	CN105.34	Basket rotation right side (B606)
YV800	05 - 09	1B1-1B8	Load sensing valve (= 1 for any movement) (120-121)
YV900	06 - 18	1B6	PWM safety valve for ON/OFF jib/basket block (620)

Valves			
Name	Location	Connector	Function
HA901	05 - 14	1B29	Buzzer (186)
HA902	07 - 09	CN106.16	Buzzer (B508)
HA907	03 - 13		Horn (184)
EL901	05 - 05	1B28	Option flashing light (188)
EL903	03 - 11		Option beacon (185)
EL904	08 - 19		Option working light (183)
EL905	08 - 11	CN106.29	Activ'Shield Bar detection (B608)
HL901	08 - 09	CN106.19	Activ'Shield Bar activated (B609)
HL902	08 - 10	CN106.29	Activ'Shield Bar detection (B608)
HLXX	07		Upper controls PCB with leds for indication/ alarms

3 - Power source - Engine specifications

3.1 - General safety and specific interventions on motor

The technician should take all steps to protect themselves or others against all risks of injury inherent in his intervention.

The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).

- Turn off the ignition, remove the key, open the battery switch before working on the engine.
- Accidental engine starting can cause injury or death to personnel working on the equipment. To avoid accidental engine starting, disconnect the battery cable from the negative (-) battery terminal. Completely tape all metal surfaces of the disconnected battery cable end in order to prevent contact with other metal surfaces which could activate the engine electrical system. Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.
- The hot engine parts can cause injury and burns. Before performing maintenance on the engine, cool the engine and parts.
- By touching a functioning engine, there is a risk of burns from contact with hot parts, and injuries by the rotating parts.
- To avoid any risk of accident, using compressed air (example : blowing air filter), always wear a headband and goggles.
- The hot coolant, steam and alkalis can cause injury. At the operating temperature, the engine coolant is hot and under pressure. Do not open the cap of the expansion chamber before letting the circuit cool.
- The radiator and all the pipes going to the heaters or engine contain hot coolant or steam. Contact can cause severe burns.

The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In an enclosed area, evacuate the exhaust outside.

3.2 - General Specifications

N.B.-:-Using unsuitable fuel may cause diminished performance, difficulties starting, excessive pollution and prematurate wear. To established the type of the fuel suitable for the engine fitted on your HAULOTTE®, please refer to the engine manufacturer's manual. The engine may not be covered by the warranty in case of damage caused by using unsuitable fuel.

3.3 - CONSUMABLES

Consumable	HAULOTTE® code	Packaging
Air cleaner	4000044550	
• Primary cartridge	4000211710	
• Secondary cartridge	4000211720	
Hydraulic pressure filter	2427002910	
Kubota Engine		
Engine oil filter	4000007250	
Engine fuel filter	4000079430	
Engine belt	4000210820	
Filter kit full : • Engine fuel filter • Engine oil filter • Hydraulic pressure filter • Air filter (system)	KKIT250H-604	
Filter kit "Light" : • Engine fuel filter • Engine oil filter • Air filter (system)	KKIT250H-604L	
Filter kit full - Petrol / gas (Propane) Engine : • Engine fuel filter • Engine oil filter • Hydraulic pressure filter • Air filter (system)	KKIT250H-WG1605	
Filter kit "Light" - Petrol / gas (Propane) Engine : • Engine fuel filter • Engine oil filter • Air filter (system)	KKIT250H-WG1605L	
PERKINS Engine		
Diesel pre-filter	4001206140	
Diesel filter	4001205910	
Engine oil filter	2324003020	
Engine belt	4001205710	
Engine oil - 5W40	4000010660	60 l(15,8 gal US)
Engine oil - 10W40	4000531300	20 l(5,3 gal US)
Engine oil - 15W40	4000530600	5 l(1,32 gal US)
	2420801360	20 l(5,3 gal US)
	2820305720	209 l(55,2 gal US)
Hydraulic oil - HV32	4000096350	20 l(5,3 gal US)
Hydraulic oil - HV46	4000530620	5 l(1,32 gal US)
	2420801320	20 l(5,3 gal US)
	2420801310	209 l(55,2 gal US)
Biological hydraulic oil - HV46	2505003830	209 l(55,2 gal US)
Transmission oil - 80W90	4000530610	1 l(0.22 gal US)
	2420801370	20 l(5.3 gal US)
Extreme-pressure lithium grease	2820304320	0,4 l(0.1 gal US)
Grease cartridge	2326005400	0,4 l(0.1 gal US)
Grease cartridge	4000561720	0,4 l(0.1 gal US)
Telescope grease	4000813570	1 kg(2.20 lb)
Telescope grease	4000813560	5 kg(11.02 lb)
Coolant	4000813540	5 l(1,32 gal US)
	4000564860	25 l(6,6 gal US)

4 - Consumables (Oils - Fuels - Engine oil - Coolant level...)

4.1 - FUEL

N.B.-:-THESE FUELS CAN BE USED ON ANY TYPE OF MECHANICAL INJECTION ENGINE. PLEASE SEE MACHINE CONFIGURATION.

Table of technically permitted fuels

Engines	Fuels				
Hydraulic filter cartridge	European gas oil according to EN590	European fuel oil according to BS2869 class 2	American gas oil according to ASTMD975-07b	Japanese gas oil according to NATO F54	Paraffinic diesel fuel according to CEN TS15940
HATZ 41C	✓	✓	✓	✓	✗
DEUTZ 2011/2012	✓	✓	✓	✓	✓
PERKINS 403/804/1104	✓	✓	✓	✓	✓
LOMBARDINI LDW 1404	✓	✗	✗	✓	✗
KUBOTA D1105-W1	✓	✗	✓	✗	✗
KUBOTA D1803 CRTE5	✓	✗	✓	✓	✗
KUBOTA V2403	✓	✓	✓	✓	✗
KUBOTA V2403 CR	✓	✗	✓	✓	✗
KUBOTA V2703	✓	✓	✓	✓	✗
KOHLER KDI 1903	✓	✗	✓	✓	✗

Compliant	✓
Not compliant	✗

4.1.1 - Other fuels

- Biofuels : According to EN14214 (EU) and ASTM D6751-07a (USA) biofuels are allowed on some engines and under certain conditions. For more information, please contact HAULOTTE Services®.
- Jet engine fuels (kerosene) : F34 and F35 types under OTAN designation are possible on some engines and under certain conditions. For more information, please contact HAULOTTE Services®.
- The use of vegetable oils is forbidden.

4.2 - ENGINE OIL

The correct SAE viscosity grade of oil is determined by the minimum ambient temperature during cold engine start-up, and the maximum ambient temperature during engine operation.

Refer to Table "Engine Oil Viscosity" (minimum temperature) in order to determine the required oil viscosity for starting a cold engine.

Refer to Table "Engine oil Viscosity" (maximum temperature) in order to select the oil viscosity for engine operation at the highest ambient temperature that is anticipated.

Generally, use the highest viscosity oil that is available to meet the requirement for the temperature at start-up.

N.B.-:-REFER TO CONSOMMABLES

Engine oil viscosity

Viscosity index	Ambient temperature	
	Minimum	Maximum
SAE 0W20	-40°C (-40°F)	10°C (50°F)
SAE 0W30	-40°C (-40°F)	30°C (86°F)
SAE 0W40	-40°C (-40°F)	40°C (104°F)
SAE 5W30	-30°C (-22°F)	30°C (86°F)
SAE 5W40	-30°C (-22°F)	40°C (104°F)
SAE 10W30	-20°C (-4°F)	40°C (104°F)
SAE 15W40	-10°C (14°F)	50°C (122°F)

Classification API

Fuel type	Engine oil classification
High sulfur fuel ≤ [0.05% (500 ppm)] Sulfur content < 0.50% (5000 ppm)	API CJ-4 or CK-4 (If the engine oil is used with a high sulfur level, change the engine oil at shorter intervals, approximately half)

4.3 - HYDRAULIC OIL

Hydraulic oils must comply with the following requirements :
- Oil filterability must be compatible with absolute filters
- Have properties such as :
  - Antifoam and deaeration
  - Anti-wear, anti-shear and antioxydant
  - Rust and corrosion inhibitors (copper)

The recommended viscosity grades depending on the environmental conditions are as follows :

Environmental conditions	ISO Viscosity grade
Ambient temperature between - 15° C (- 9° F) and + 40° C (+ 104° F)	HV 46
Ambient temperature between - 35° C (- 31° F) and + 35° C (+ 95° F)	HV 32
Ambient temperature between 0° C (32° F) and + 45° C (+ 113° F)	HV 68

Biodegradable oils may be used if they comply with the following requirements :
- Ambient operating temperature between - 15° C (- 9° F) and + 40° C (+ 104° F)
- HEES type biodegradable oil only according to standards ISO 15380 and VDMA 24568
- Necessary characteristics :

Viscosity grade	ISO Viscosity grade
Viscosity at + 40° C (+ 104° F)	46 +/- 3 mm² / s
Viscosity at + 100° C (+ 260° F)	> 8 mm² / s
Viscosity index	> 160
Flashpoint	> 220° C (> 572° F)
Pour point	< - 40° C (> - 104° F)

5 - Machine specifications

5.1 - MOVEMENT SPEED

To allow checking operation, refer to the following table about originally time per movement. If the values measured by test are not equal to the following :

- Do not use the machine.
- Setting updating is needed.

Always check speed movement from the ground control box.

	HA16JRT - HA16RTJ O	HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO
Micro drive speed	0,7 km/h / 0.4 mph	0,5 km/h / 0.3 mph
Low drive speed	1,4 km/h / 0.9 mph	
Medium-speed driving	2,8 km/h / 1.7 mph	
High drive speed	5,6 km/h / 3.5 mph	
Maximum towing speed	5,6 km/h / 3.5 mph	
Time for telescopic boom extension	12 s	
Time for telescopic boom retraction	11 s	
Time for raising boom	25 s	
Time for descent boom	25 s	
Time for lifting at maximum height	38 s	
Time for continue turntable rotation	45 s	
Time for complete left / right cage rotation	25 s	
Time for arm lifting	28 s	
Time for descent arm	25 s	
Time for jib lifting	30 s	
Time for jib descent	30 s	

Notes

D - Inspection and maintenance schedule

1 - Inspection program

The machine must be inspected at regular intervals in accordance with the requirements set out in the country of use and at least once a year. The purpose of the inspection is to detect any defect which could lead to an accident during routine use of the machine.

Inspections and maintenance must be carried out by a qualified company or person chosen by the owner of the machine.

The results of these visits must be recorded in a safety register created by the owner. This register as well as the list of competent repair persons must made available to the work inspector, government inspector and company safety committee at any time.

Frequency	Person-in-charge	Stakeholder	Type	Documentation
Before each hire	Owner	On-site technician	Daily inspection	Operator's manual
Before each use or each change of user	Operator	Operator	Daily inspection	Operator's manual
At intervals recommended by HAULOTTE®	Owner	On-site technician, qualified HAULOTTE Services® technician	Preventive maintenance	Maintenance Book
Before sale	Owner	On-site technician, qualified HAULOTTE Services® technician	Periodic inspection	Maintenance Book
Annually (1 year) (*)	Owner	On-site technician, qualified HAULOTTE Services® technician	Periodic inspection	Maintenance Book
After 10 years then every 5 years	Owner	Qualified technician HAULOTTE Services®	Major inspection	Maintenance Book

(*) Or according to local regulations.

2 - Daily inspection

The daily inspection must be performed every day, before the start of a new work shift and at every change of user.

This inspection is performed by and under the responsibility of the user and includes the visual and functional inspection of the machine as well as the testing of its safety systems.

A description of the daily inspection can be found in the machine's user manual.

We recommend these forms to be completed daily and stored to assist with your maintenance schedule.

3 - Preventive maintenance

Maintenance operations must be carried out by a qualified technician chosen by the owner and ensure that the machine operates correctly.

Severity of operating conditions may require a reduction in time between maintenance periods.

Maintenance operations performed must be recorded in a register / log book of the machine.

The information contained in our manual is to be complemented by the information found in the engine manufacturer's maintenance manual, which can be found on the link in the associated maintenance sheet MS0238.

Symbol meanings

	Oil change		To check by test		Tightening
	Levelling		Visual inspection		Functional adjustments / Checks / Cleaning
	Lubrication-Lubrication				Systematic replacement

Preventive Maintenance Level 1 - First 50H

First 50H	Page or associated procedure	First 50H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Tighten the wheel nuts	MP0001					
KUBOTA WG1605 engine						
Drain the engine oil	MP0036					
Replace the oil filter	MP0004					
Hydraulic : oils, filters and hoses						
Replace the hydraulic filter	MP0006					

D - Inspection and maintenance schedule

Preventive Maintenance Level 1 - Every 250H

Every 250H	Page or associated procedure	Every 250H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Grease the steering system	MP0027					
Slew ring						
Grease the turntable slew ring	MP0044					
KUBOTA V1505 engine / PERKINS 403J-17 engine						
Clean the fuel filter	MP0026					
Clean the air filter	MP0030					
Check the belt tension and condition	MP0007/ MP0025					
KUBOTA WG1605 engine						
Drain the engine oil	MP0036					
Replace the oil filter	MP0004					
Clean the air filter	MP0030					
Check the belt tension and condition	MP0007/ MP0025					
Arm, boom						
Grease the pads	MP0028					
Jib						
Grease the platform rotation cylinder	MP0037					

D - Inspection and maintenance schedule

Preventive Maintenance Level 1 - Every 6 months or 500H

Every 6 months or 500H	Page or associated procedure	Every 6 months or 500H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Tighten the wheel nuts	MP0001					
Check the wheel reducer level	MP0002					
Drain the wheel reducer**	MP0043					
Slew ring						
Tighten the slew ring	MP0019					
KUBOTA V1505 engine / PERKINS 403J-17 engine						
Drain the engine oil*	MP0036					
Replace the oil filter*	MP0004					
Replace the fuel filter*	MP0005					
Replace the belt*	MP0032					
KUBOTA WG1605 engine						
Replace the belt*	MP0032					
Hydraulic : oils, filters and hoses						
Check the hydraulic oil level	MP0013					
Jib						
Tighten the rotary cylinder	MP0016					
Tighten the load cell	MP0015					
Platform						
Tighten the mounting on the platform support, the platform floor and the platform access	MP0017					

* Do not take into account the deadline of 6 months, only 500H.

** Only the first 6 months or 500H.

D - Inspection and maintenance schedule

Preventive Maintenance Level 2 - Every 1 year or 1000H

Every 1 year or 1000H	Page or associated procedure	Every 1 year or 1000H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Drain the wheel reducer	MP0043					
KUBOTA V1505 engine / PERKINS 403J-17 engine						
Replace the air filter	MP0010					
KUBOTA WG1605 engine						
Replace the fuel filter	MP0005					
Replace the air filter	MP0010					
Hydraulic : oils, filters and hoses						
Replace the hydraulic filter	MP0006					
Arm, boom						
Check the pads-Replacement if necessary	MP0011					

D - Inspection and maintenance schedule

Preventive Maintenance Level 2 - Every 2 years or 2000H

Every 2 years or 2000H	Page or associated procedure	2 year(s) or 2000H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Check the bushings and pins-Replacement if necessary	MP0024					
Slew ring						
Check the slew ring clearance	MP0018					
KUBOTA V1505 engine / PERKINS 403J-17 engine						
Drain the oil tank	MP0020					
Drain the cooling circuit	MP0021					
KUBOTA WG1605 engine						
Drain the oil tank	MP0020					
Drain the cooling circuit	MP0021					
Hydraulic : oils, filters and hoses						
Drain the hydraulic oil	MP0014					

D - Inspection and maintenance schedule

4 - Periodic inspection

The Periodic inspection is a thorough inspection of the operation and safety features of the machine. This must take place prior to the sale or resale of the machine and every 1 year. Local regulations may have specific requirements on frequency, and content of inspections.

This intervention must take place after :

- Extensive dismantling and reassembly
- Repairs involving the machine's essential components
- Any accident causing stress to the machine

This inspection is the responsibility of the owner, and must be conducted by a qualified technician.

Under no circumstances may this inspection replace the control required by local regulations.

Use the detailed program below.

Periodic	Page or associated procedure	Periodic	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Check state of tires/tyres and inflations						
Motor						
Check that there are no leaks from the engine's components (engine, hose, radiator)						
Check the condition of the battery						
Check for visible damage and broken welds on the exhaust system						
Check the operation of the lock on the engine casing						
Turntable						
Test the operation of the turntable locking system						
Hydraulic : oils, filters and hoses						
Check the hoses, blocks and pumps, fittings, cylinders and the tank for the absence of leaks, deformations and damage						
Platform						
Test the automatic closure and locking of access basket						
Check that the harness anchor points are not cracked or damaged						

D - Inspection and maintenance schedule

Periodic	Page or associated procedure	Periodic	OK	NOK	Corrected	Comments
General						
Check for the presence, cleanliness and readability of the manufacturer's plates, security labels, user manual and maintenance manual						
Check the cleanliness and readability of the control box						
Test the opening and closure of covers (chassis, turntable, upper control box)						
Check the condition of electrical harnesses, cables and connectors						
Check for the absence of abnormal noise and jerky movements						
Check for the absence of visible deterioration and damage						
Check for the absence of cracks, broken welds and chipped paintwork on the structure						
Check for the absence of missing or loose screws and bolts						
Check for the absence of deformation, cracking and breakage of axis stops, bushing and axes						
Check for the absence of foreign bodies in joints and sliding parts						
Safety devices						
Test the operation of the upper and lower control boxes: manipulators, switches, buttons, horn, emergency stops, screens and lights						
Check for the absence of visual and audible alarms						
Test the operation of the tilt system						
Test the operation of the emergency lowering system						
Test the operation of the axle locking system	MP0008					
Test the operation of the loading control system (visual alarm on the control box)						
Test the operation of the Activ Shield Bar (If equipped)						
Test the operation of the drive speed limiter systems						
Test the speed and behavior of movements						
Check the operation of the load control system- Calibrate if necessary						

D - Inspection and maintenance schedule

5 - Major inspection

The inspection is a thorough inspection of the machine to ensure that it is fully functional. It must be carried out after 10 years then every 5 years.

This inspection is the responsibility of the owner and must be carried out by a technician HAULOTTE Services® or an authorized and qualified person.

In order to carry it out, contact the subsidiary HAULOTTE® or the authorized distributor.

N.B.-:-THE LIST OF MAINTENANCE SHEETS IS NOT EXHAUSTIVE. OTHER SHEETS MAY BE SENT UPON REQUEST. CONTACT HAULOTTE SERVICES®.

D - Inspection and maintenance schedule

Notes

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Control and maintenance

To guarantee the integrity of the machine, it is necessary to carry out periodical controls on the mechanical structure such as defines hereafter.

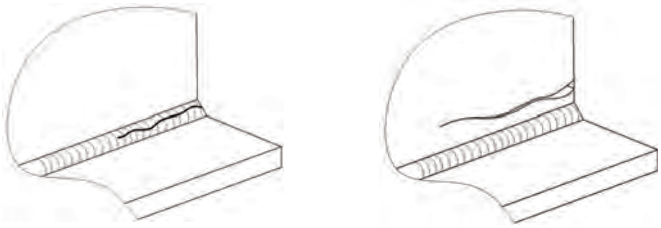
4.1 - DAILY INSPECTION

All the accessible structural part without disassembling must be subjected to a fast visual inspection.

If anomalies are noted, according to the list below, a reinforced control will have to be carried out to judge conformity of the part :

- Absence of foreign body to the articulations and slides.
- Absence of deformation and visible damage.
- Absence of crack, broken welding, oxidation, glare of painting.
- Absence of excessive gap to the articulations and slides.
- Check that locking device are not damaged and are functional.
- No screws or missing part loosened or unscrew.
- Anchorage points firmly fixed and not damaged.

The list of part to check are define Section Familiarization.



4.2 - MAJOR INSPECTION

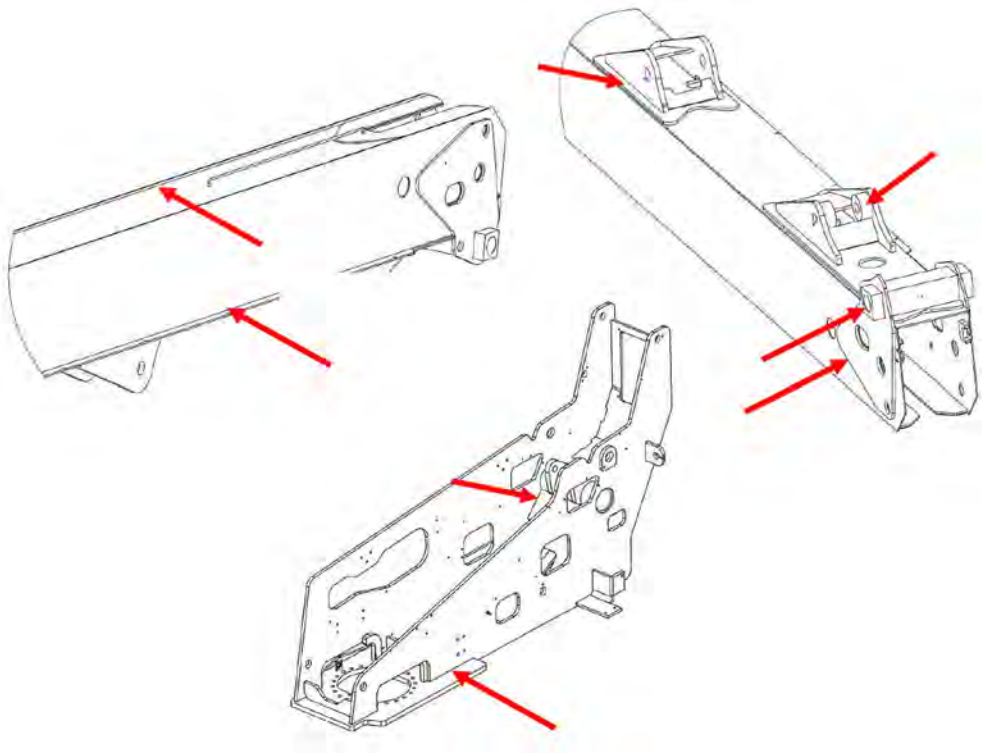
All structural part listed Section Familiarization must be disassembled and all weldsmust be review using non-destructive checks Section D - Inspection and maintenance schedule.

The criteria quoted above are applicable.

The main items to be inspected are :

- Boss welds on chassis, turret, arms, booms and jib.
- Booms and arms welds.

Example



In the event of suspicion of crack, a cleaning and a sweating are to be carried out to guarantee the integrity of the part before reassembly.

Check presence and torque of each bolts and screw used to assembly part listed in Section Familiarization. Refer to spare part catalog for additional information if needed.

Some screws are not reusable and must be systematically changed (ex: screws from the gear ring).

4.3 - FUNCTIONAL TESTS

The following tests must be performed periodically Section D - Inspection and maintenance schedule :
- An important technical intervention.
- An accident resulting from a failure of a major component.

The following tests must be realized by a qualified staff under secure conditions.

The results of the tests must be entirely documented.

To avoid the swing of the machine during the test, it is imperative that a device of reserve (chain, not of anchoring) is used during the test.

4.4 - DYNAMIC TESTS

The machine must be place on level and firm ground.

With 100% of the maximum allowed load, operate from ground control box (or emergency control box) all the movements ; the platform floor must reach a height of about 1 above the ground.

The functional tests must show the following facts :
- The machine carried out all the movements without jolts while supporting the load.
- All the security device function correctly.
- Authorized maximum speeds of operation are not exceeded.

Refer to the user manual for the description of the safety device and technical characteristics to be reached.

4.5 - STRUCTURAL TEST

The following test shows that the structure of the machine is in conformity with the safety requirements.

The machine must be place on level and firm ground.

With 100% of the maximum allowed load, operate from ground control box (or emergency control box) all the movements ; the platform floor must reach a height of about 1 above the ground :
- Measure the distance between the ground and the basket (or of the platform).
- Leave the machine in static during 15 mnn.
- Measure the distance between the ground and the basket (or of the platform).

If the difference between two measurements does not exceed 4 cm (1.575 in) : the test is validated.

If the difference between two measurements exceeds 4 cm (1.575 in), to contact HAULOTTE Services® or to carry out the additional tests described below. MS0003 - § 3.2 Cylinder inspection.

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Control and maintenance

Inspection of the pins, stop pins, bushings and bearings must be carried out according to the recommendations Section D - Inspection and maintenance schedule :

- Fast visual inspection without disassembling Section D - Inspection and maintenance schedule :
    - Check the presence of the pins and visible stops pins without disassembling.
    - Check the presence of the screws.
    - Check absence of deformations, cracks or breakage of pins and/or stops pins.
    - Check absence of heavy abrasion, wear or oxidation of the pins, stops pins.
- Reinforced visual inspection with disassembling of certain elements to reach the bushes or bearing Section D - Inspection and maintenance schedule : In addition to the above cited criteria, verify the following :
    - Check the presence and the position of the bushes and bearings.
    - Check the absence of shaving in periphery of the pins.
    - Check the absence of heavy abrasion, wear or oxidation of the bushes and bearing.
    - Check the absence of deformations, cracks or breakage of the bushes and bearing.
    - Check the absence of radial gap > 0,5 mm (19690 µ in) on the pins.
- Complete disassembling of the pins, bushes and bearing Section D - Inspection and maintenance schedule : In complement of the inspections above cited, it is necessary to check :
    - For the stages :
- Check the presence of material of friction.
    - For the bearings :
- After disassembling, protect the bearing from pollution and shocks.
- Clean the bearing with a suitable solvent.
- Check the absence of shaving in the housing of the bearing and/or the bearing.
- Check the absence of heavy abrasion, wear, oxidation, deformations of the balls (or rollers) and the ball races.

The periodicity can evolve under the following conditions Section D - Inspection and maintenance schedule :

- Abnormal noise during movements of the structure.
- Prolonged storage of the machine (6 months).
- Specific storage and use Environment (strong moisture and salinity of the air).

5 - Criteria of replacement

The pins, stop pins, bushes and bearing must be replaced as soon as one of the anomalies quoted above is noted. Bearing and bushes must be imperatively changed at the end of 10 years of use.

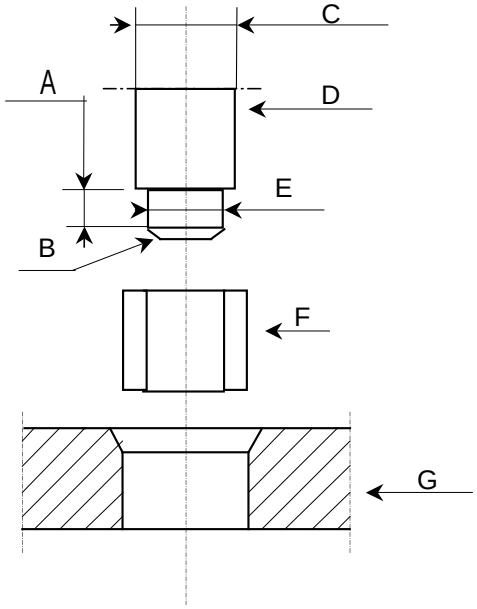
6 - Procedure of reassembly

6.1 - PINS AND BUSHES

When reassembling bearings and pins ensure that :

- Lightly lubricate the housing into which the bearing is to be installed.
- Insert the bearing using a bearing drift, preferably out of mild steel.
- The bearing, the bearing drift and the bearing housing must be correctly aligned during the assembly process.
- The recommended values for the bearing drift are given on the diagram below :

Recommended Values



Marking	Description
A	At least 0,5 times the nominal diameter
B	Make a chamfer
C	Nominal diameter of the bearing - 0,2 / - 0,3 mm (-7874 µ in / -11810 µ in)
D	Bearing drift
E	Diameter of the bearing guide - 0,20 / - 0,25 mm (-7874 µ in / -9843 µ in)
F	Bearing
G	Housing

- After inserting the bearing, lubricate and fit the pin.

6.2 - BEARINGS

For the reassembly of bearings, respect the following stages :

- Clean boring and/or the pins to remove all the foreign bodies.
- Slightly lubricate boring and/or pins.
- Lubricate the ring of the bearing slightly.
- To fit bearing in a boring: take support on the external ring of the bearing.
- To fit bearing on an axis: take support on the interior ring of the bearing.

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Control and maintenance

4.1 - VISUAL INSPECTIONS

The hydraulic actuating cylinders must be subjected to visual inspections periodic all the 250 hours or 6 months such as defined below :

- Absence of leakage.
- Absence of deformations, visible damage , cracks on the body and fixing of the cylinder.
- Absence of rust and shock on the rod.
- Absence of foreign objects on all surfaces.
- Absence of missing or loosened part (bolt, nut, connection, flexible device, etc).

4.2 - FUNCTIONAL TESTS

To guarantee an optimal level of performance and safety, functional tests must be realized all the 250 hours or 6 months.

The periodicity can evolve under the following conditions :

- Anomaly noted during visual inspection.
- Abnormal noise during movements of the structure.
- Prolonged storage of the machine (6 months).
- Specific storage and use Environment (strong moisture and salinity of the air).

Generic Control :

- Position a load equal to the rated capacity on the cage (or platform).
- Raise the cage (or the platform) using the ground control box. To activate the cylinder to be tested, proceed as follows :
  - Lift Arm hydraulic cylinder : Lift the arm to approximately half full height. The telescopic boom should be fully extended and in the horizontal position. (For machines fitted with).
  - Boom lifting cylinder or Jib cylinder : Lift the concerned equipment (boom or jib) of approximately half way. Extend the telescope to its maximum.
  - Telescoping cylinder : Lift the boom to its maximum angle and telescope approximately 50 cm (19.69 in).
- Measure the distance between the floor of the cage (or of the platform) and the ground.
- Leave the machine in this condition for 15 mn (minutes).
- Measure the distance between the floor of the cage (or of the platform) and the ground.
  - If the difference between two measurements does not exceed 4 cm (1.575 in) : the test validates correct operation.
  - If the difference between two measurements exceeds 4 cm (1.575 in), contact HAULOTTE Services® or carry out the additional tests described below.

Control cylinder by cylinder :

- Position a load equal to the rated capacity on the cage (or platform).
- Perform the movement of the concern cylinder to half of its stroke.
- Fix the cylinder with a comparator :
  - Attach the body of the comparator on the cylinder rod.
  - The needle of the comparator must be in contact with the end of the casing of the cylinder.
  - The target is to measure the creep of the cylinder rod.
- If the creep of the cylinder rod is higher than the values indicated in the table below, replace the cylinder.

Type of cylinders	Maximum drift authorised due to an internal leak of the cylinder	
Lift cylinder arm or boom (Machine with working heights > 26 m(85 ft4 in))	After 10 mn, creep < 0,2 mm (7874 µ in)	After 60 mn, creep < 1 mm (0.039 in)
Outriggers cylinder, Oscillating axle locking, Lift cylinder arm or boom (Machine with range-limiting system)	After 10 mn, creep < 0,5 mm (0.01196 in)	After 60 mn, creep < 2,5 mm (0.098 in)
Lift cylinder arm or boom, Telescoping, Compensation, ...	After 10 mn, creep < 1 mm (0.039 in)	After 60 mn, creep < 6 mm (0.236 in)
Steering cylinder	After 10 mn, creep < 1,5 mm (0.059 in)	After 60 mn, creep < 9 mm (0.354 in)

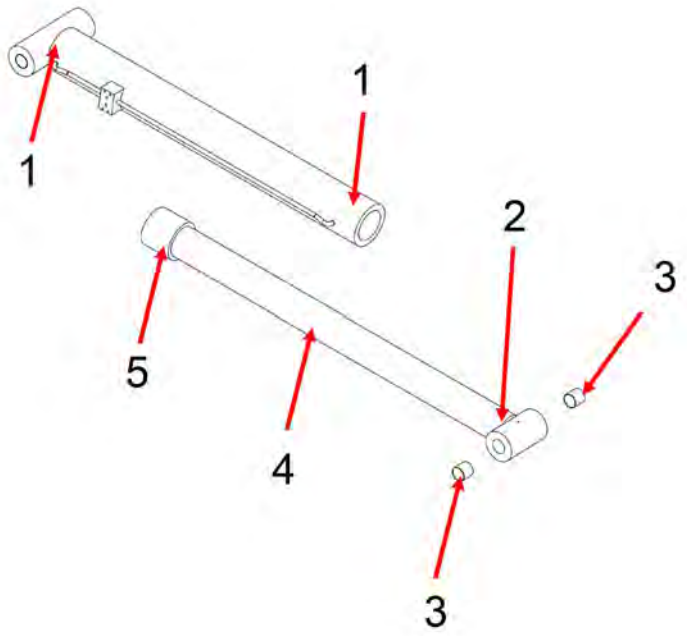
These tests must be made in conditions of equivalent temperatures.

4.3 - MAJOR INSPECTION

A thorough inspection of the structural parts must be realized all the 5000 h or 10 years with disassembling of the element to check the entirety of the welding. Each Cylinder must be disassembled and must be review using non-destructive checks.

The criteria quoted above are applicable :

- Absence of deformation and visible damage.
- Absence of crack, broken welding, oxidation, glare of painting.



Check :

1. Pipe weld connection.
2. Rod weld connection.
3. Ring.
4. Rod.
5. Piston.

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Test procedure

The brake system is a significant component of the safety of the machine. The following tests must be performed periodically Section D - Inspection and maintenance schedule.

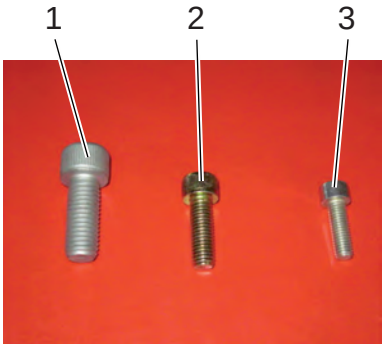
High speed :

- On a flat ground or slightly inclined (always lower than the authorized slope: see plate manufacturer).
- Trace on the ground, a line being used as reference mark of stop.
- Roll moving front until reaching maximum speed :
- Between 3 km/h (1.9 mph) and 6,5 km/h (4,039 mph) according to the machines.
- Release the manipulator as soon as the wheels axles are on the level of the traced reference mark.
- Stopped machine, measure the distance between the wheel axles and traced reference mark on the ground :
- If the distance lies between 0.2 m (0ft 8in) and 2,7 m (8 ft 11 in), the test is validated.
- If not, Contact HAULOTTE Services® to repair the system.

1 - Metric torque chart

For screws HAULOTTE®, use columns (A), (B) and (C) :

- Screw (1) grey dull dry, use colums (A)
- Screw (1) grey dull greasy, use column (B)
- Screw (2) yellow dry, use column (C)
- Screw (2) yellow greasy, use column (B)
- Screw (3) grey bright dry, use column C
- Screw (3) grey bright greasy, use column (B)



Metric fastener torque chart
This charts is to be used as a guide only unless noted elsewhere in this manual

Size (mm)	Class 4.6						Class 8.8												Class 12.9					
	Dull dry (A)		Lubed (B)		Yellow dry (C)		Dull dry (A)		Lubed (B)		Yellow dry (C)		Dull dry (A)		Lubed (B)		Yellow dry (C)		Dull dry		Lubed		Yellow dry	
	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
5	17.7	2	16	1.8	21	2.4	44	5	41	4.63	54	6.18	68	7.7	58	6.63	78	8.84	79	9	68	7.75	91	10.3
6	30	3.4	19	3.05	36	4.07	80	9.1	69	7.87	93	10.5	118	13.4	100	11.3	132	15	139	15.7	116	13.2	155	17.6
Size (mm)	Dull dry		Lubed		Yellow dry		Dull dry		Lubed		Dry		Dull dry		Lubed		Dry		Dull dry		Lubed		Dry	
	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
8	5.9	8	5.4	7.41	7.2	9.88	16.2	22	14	19.1	18.8	25.5	23.6	32	20.1	27.3	26.9	36.5	28	38	23.6	32	31.4	42.6
10	12.17	16.5	10.8	14.7	14.4	19.6	32.45	44	27.9	37.8	37.2	50.5	47.2	64	39.9	54.1	53.2	72.2	55	75	46.7	63.3	62.3	84.4
12	20.65	28	19.8	25.6	25.1	34.1	56	76	48.6	66	64.9	88	81.8	111	69.7	94.5	92.2	125	95.9	130	81	110	108	147
14	33.19	45	30.1	40.8	40	54.3	89.24	121	77.4	105	103	140	131.28	178	110	150	147	200	154.15	209	129	175	172	234
16	52.37	71	46.9	63.6	62.5	84.8	139.4	189	125	170	166	226	205.04	278	173	235	230	313	239.7	325	202	274	269	365
18	72.28	98	64.5	87.5	86.2	117	192.5	261	171	233	229	311	283.2	384	238	323	317	430	331	449	278	377	371	503
20	102.5	139	91	124	121	165	272.9	370	243	330	325	441	401.2	544	337	458	450	610	469.8	637	394	535	525	713
22	140.87	191	124	169	166	225	345.4	509	331	450	442	600	551.7	748	458	622	612	830	645.3	875	536	727	715	970
24	176.27	239	157	214	210	285	469.8	637	420	570	562	762	690.3	936	583	791	778	1055	807.6	1095	682	925	909	1233

2 - SAE fastener torque chart

SAE fastener torque chart This charts is to be used as a guide only unless noted elsewhere in this manual											
Size	Thread	Grade 5				Grade 8				A574 High strength black oxide bolts	
		Lubed		Dry		Lubed		Dry		Lubed	
		in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm	in-lbs	Nm
1/4	20	80	9	100	11.3	110	12.4	140	15.8	130	14.7
	28	90	10.1	120	13.5	120	13.5	160	18	140	15.8
		Lubed		Dry		Lubed		Dry		Lubed	
		ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm	ft-lbs	Nm
5/16	18	13	17.6	17	23	18	24	25	33.9	21	28.4
	24	14	19	19	25.7	20	27.1	27	36.6	24	32.5
3/8	16	23	31.2	31	42	33	44.7	44	59.6	38	51.5
	24	26	35.2	35	47.4	37	50.1	49	66.4	43	58.3
7/16	14	37	50.1	49	66.4	50	67.8	70	94.7	61	62.7
	20	41	55.5	55	74.5	60	81.3	80	108.4	68	92.1
1/2	13	57	77.3	75	101.6	80	108.4	110	149	93	126
	20	64	86.7	85	115	90	122	120	162	105	142
9/16	12	80	108.4	110	149	120	162	150	203	130	176
	18	90	122	120	162	130	176	170	230	140	189
5/8	11	110	149	150	203	160	217	210	284	180	244
	18	130	176	170	230	180	244	240	325	200	271
3/4	10	200	271	270	366	280	379	380	515	320	433
	16	220	298	300	406	310	420	420	569	350	474
7/8	9	320	433	490	583	450	610	610	827	510	691
	14	350	474	470	637	500	678	670	908	560	759
1	8	480	650	640	867	680	922	910	1233	770	1044
	12	530	718	710	962	750	1016	990	1342	840	1139
1 1/8	7	590	800	790	1071	970	1315	1290	1749	1090	1477
	12	670	908	890	1206	1080	1464	1440	1952	1220	1654
1 1/4	7	840	1138	1120	1518	1360	1844	1820	2467	1530	2074
	12	930	1260	1240	1681	1510	2047	2010	2725	1700	2304
1 1/2	6	1460	1979	1950	2643	2370	3213	3160	4284	2670	3620
	12	1640	2223	2190	2969	2670	3620	3560	4826	3000	4067

3 - Hydraulic couplings and hoses tightening torque charts

Hydraulic fitting torque (Tolerance = 0 / +10%)

BSPP threads according to ISO1179		
Thread	Torque	
	ft-lbs	Nm
G1/4	26	35
G3/8	52	70
G1/2	66	90
G3/4	133	180
G1"	229	310
G1"1/4	332	450
G1"1/2	398	540
UNF threads according to ISO11926-2/3		
Thread	Torque	
	ft-lbs	Nm
7/16-20	15	20
1/2-20	30	40
9/16-18	33	45
3/4-16	59	80
7/8-14	100	135
1"1/16-12	136	185
1"5/16-12	199	270
1"5/8-12	251	340
1"7/8-12	306	415

Metric threads according to ISO 6149-2/3 or ISO9974 / DIN 3852-1				
Thread	Torque ISO 6149-2/3		Torque DIN 3852-1	
	ft-lbs	Nm	ft-lbs	Nm
M10x1,0	18	25	18	25
M12x1,5	26	35	26	35
M14x1,5	30	40	33	45
M16x1,5	51	70	41	55
M18x1,5	66	90	52	70
M20x1,5	92	125	59	80
M22x1,5	100	135	74	100
M26x1,5	133	180	125	170
M33x2,0	229	310	229	310
M42x2,0	332	450	243	330

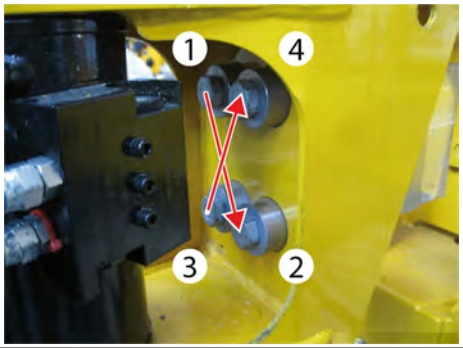
N.B.-:- ISO6149: SEALING WITH O-RING WITHOUT ANY RETAINING RING (OR FORM). ISO9974 / DIN3852: SEALING WITH O-RING AND RETAINING RING (OR FORM).

Hydraulic hose torque (Minimum / Maximum)

Hose size	JIC thread	JIC torque		ORFS thread	ORFS torque	
		ft-lbs	Nm		ft-lbs	Nm
DN06 - 1/4"	7/16-20	11-15	15-21	9/16-18	18-21	25-28
DN10 - 3/8"	9/16-18	22-31	30-42	11/16-16	30-33	40-45
DN12 - 1/2"	3/4-16	37-52	50-70	13/16-16	41-44	55-60
DN16 - 5/8"	7/8-14	51-69	69-94	1"-14	59-66	80-90
DN19 - 3/4"	1"1/16-12	72-99	98-133	1"3/16-12	85-96	115-130
DN25 - 1"	1"5/16-12	103-140	140-190	1"7/16-12	111-125	150-170
DN32 - 1"1/4	1"5/8-12	155-210	210-285	1"11/16-12	148-166	200-225
DN38 - 1"1/2	1"7/8-12	214-280	290-380	2"-12	221-243	300-330
DN50 - 2"	2"1/2-12	332-443	450-600	2"1/2-12	367-406	500-550

4 - HA16RTJ - HA16RTJO - HA16RTJ PRO - HA46RTJO - HA46RTJ PRO

Sub-assemblies	Concerned elements	Torque
Axles	Wheels	320 Nm
	Wheel studs / Driving reducer	Loctite 243 - Normal threadlocker
	Hydraulic motor / Driving reducer	57 Nm
	Wheel reducer / Chassis	190 Nm
	Wheel reducer / Wheel steering pivots	190 Nm
	Steering cylinder / Chassis	190 Nm
Slew ring	Slew ring / Chassis	215 Nm
	Turntable / Slew ring	215 Nm
	Hydraulic motor / Slew ring	45 Nm
ECU	ECU / Carrier	6 Nm
KUBOTA Engine	Hydraulic pump / Engine housing	160 Nm
	Exhaust	80 Nm
	Engine mounting plate	70 Nm
	Screw fastening elastic coupling / Flywheel	35 Nm
PERKINS Engine	Hydraulic pump / Engine housing	100 Nm
	Exhaust	50 Nm
	Engine mounting plate (Silentbloc support)	76 Nm
	Screw fastening elastic coupling / Flywheel	24 Nm
	Screw fastening pump support coupling / Engine	50 Nm
Counterweight	Counterweight / Turntable	320 Nm
Telescope	Pads rear telescope	15 Nm Medium threadlocker
Boom tube	Upper and lower front pads	30 Nm Medium threadlocker
Input jib leveling cylinder	Valve / Cylinder	8 Nm Medium threadlocker
Platform rotation cylinder	Cylinder / Link piece	47 Nm Medium threadlocker
	Screw connecting cylinder / link piece	450 Nm

Sub-assemblies	Concerned elements	Torque
Strain gauge MOBA	Mounting on platform support and link piece Apply torque in 3 times : 1. 70 Nm 2. 140 Nm 3. 215 Nm Tightening crosswise in the order below : 	215 Nm
Platform control box		16 Nm
Silentbloc fastening platform control boxPlatform	Floor	22 Nm

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Oscillating axles

The front axles will oscillate when the boom is in transport position (i.e. when the boom is less than 15° above horizontal and not extended beyond 30 cm (12") on the machine and drive is selected.

Lockout system test must be performed quarterly, any time a system component is replaced, or when improper system operation is suspected.

N.B.-:-ENSURE THE AXLES ARE EXTENDED AND THE BOOM IS FULLY RETRACTED, LOWERED, AND CENTERED BETWEEEN THE REAR WHEELS PRIOR TO BEGINNING LOCKOUT CYLINDER TEST.

1. Place a 15 cm (6 in) high block with ascension ramp in front of left front wheel.
2. From platform control box, start engine.
3. Place the drive control lever to the forward position and carefully drive machine up ascension ramp until left front wheels is on top of block.
4. Carefully extend the boom just enough to get it out of the transport position.
5. With boom in this position, place drive control lever to reverse and carefully drive machine off of block and ramp.
6. Have an assistant check to see that left front or right rear wheel remains elevated in position off of the ground.
7. Carefully return the boom to the transport position. When boom reaches the transport position, carefully activate drive to release cylinders. To lockout cylinders should release and allow the wheel to rest on ground. This operation must be realized with extremes precautions by standing strongly on the platform by the contact with the ground.
8. Repeat the procedure for the right oscillation cylinder checking to see that the right front or left rear wheel remains elevated in position off of the ground.
9. If lockout cylinders do not function properly, have qualified personnel correct the malfunction prior to any further operation.

1 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

3 - You will need

	• Standard tool kit		• Place barriers around the perimeter of the work area

4 - Consumable

Use only oils whose features correspond to HAULOTTE® recommendations (Section C - Familiarization - Consumable) or contact HAULOTTE Services®.

Not mix two different characteristics fuel: if necessary, purge and clean the circuit.

5 - Filling

Touch the exterior of the filling hole with the pump spout before starting pouring to avoid any risk of static electricity causing sparks.

Make sure you are standing up-wind to avoid being splashed by the fuel.

1. Loosen and remove the tank cap .
2. Fill up the tank.
3. Refit and tighten the tank cap .
4. Clean up any fuel that may have escaped from the tank.

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.
For safety reasons, imperatively respect the following stages during the tests :
• Put the machine in stowed position.
• Do not smoke.

2 - Preliminary operation

The operations of disassembling if they exist should be carried out only on the installations completely disconnected and must be entrusted only to people having the necessary technical training.

Respect, in addition to the instructions appearing in the present instructions, the legal tendencies generally applicable for safety accident prevention.

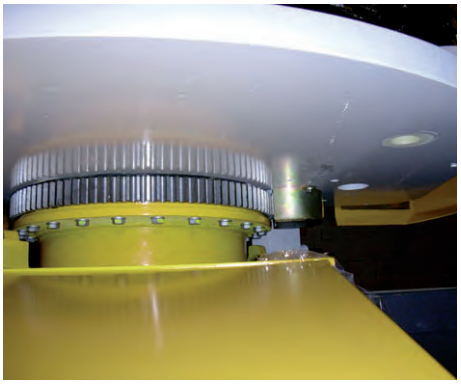
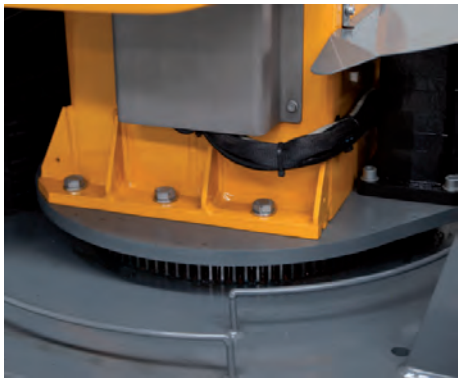
All the precautions must be done in work before intervening on and near the machine.

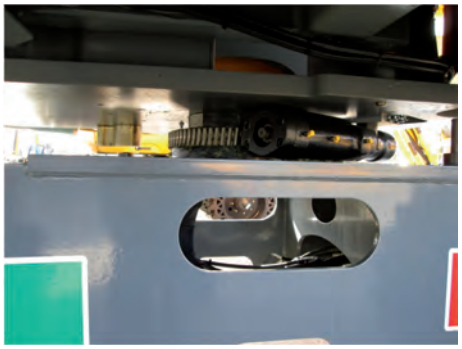
After completion of work, all the covers and safety devices must be positioned back completely and operational.

3 - Lubrication

The maintenance of the slew ring is essential for the safety of the machine and to guarantee its service life. Whatever the type of system installed on the machine, interior or external teeth, follow the recommendations of greasing as indicated in the program.

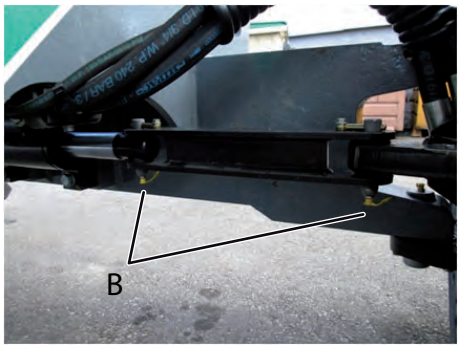
- Grease the (internal and external) crown gear teeth.
- Grease the raceways (access to greasers via the holes situated on the turntable, until the oil escapes from the crown lip seal).

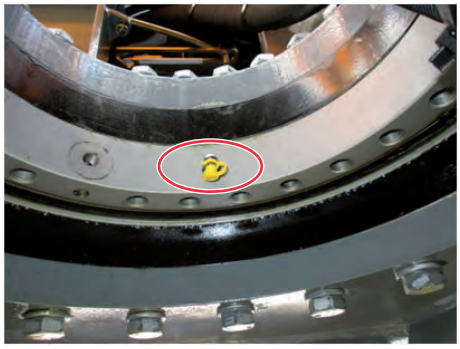


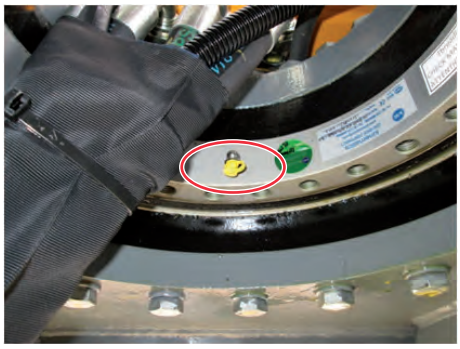
3.1 - FOR HA16RTJ - HA16RTJ O - HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO ONLY

- 2 by tie rod (B)

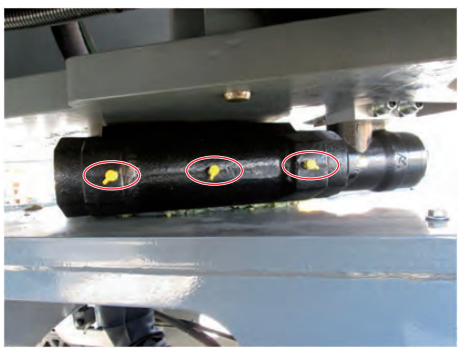


Slew ring :
- 2 nipples on the raceways inside the slew ring

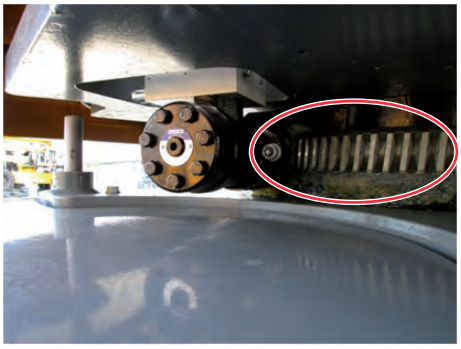




- 3 nipples on the worm screw



- Greasing the crown gear teeth



- Greasing the sidewall telescope

4 - Tightening

To ensure safety operation, tightening check should be performed on slew ring.

Please refer to follow value for this procedure using a torque wrench.

Machine type	Metric torque value	Imperial torque value
HT23RTJ O - HT23RTJ O SW - HT67RTJ O - HT23RTJ PRO - HT23RTJ PRO SW - HT67RTJ PRO	215 Nm	158.6 lb ft
HA16RTJ	215 Nm	158.6 lb ft
HA32PX - HA100JRT	215 Nm	158.6 lb ft
HA41PX-NT - HA130JRT-NT	215 Nm	158.6 lb ft
STAR 10 - STAR 26J - Ring on plate	135 Nm	100 lb ft
STAR 10 - STAR 26J - Plate on mast foot	195 Nm	144 lb ft
STAR 10 - STAR 26J - Ring on chassis	135 Nm	100 lb ft

5 - Slew ring inspection

Section D Inspection and maintenance schedule.

5.1 - VISUAL AND SOUND CHECK

- Check for the presence of all the locating bolts.
- Check that the accessible screws are not loosened. If necessary, tighten the screws. (Refer to the "tightening torque" table.)
- Visually check the presence of the teeth and gear (if possible).
- Check the appearance of the teeth.

A tight spot or grinding sound during rotation or the presence of metal particles escaping from the lip seal are signs of abnormal wear in the raceway (Contact HAULOTTE Services®).

Replace slew ring in the following cases :
- Abnormal noise during the turret rotation.
- Movement jolts during the rotation of the turret.
- Gear teeth missing or damaged.
- Presence of metal particles in the grease.
- Wear on gear teeth.
- Abnormal clearance of the gear ring.

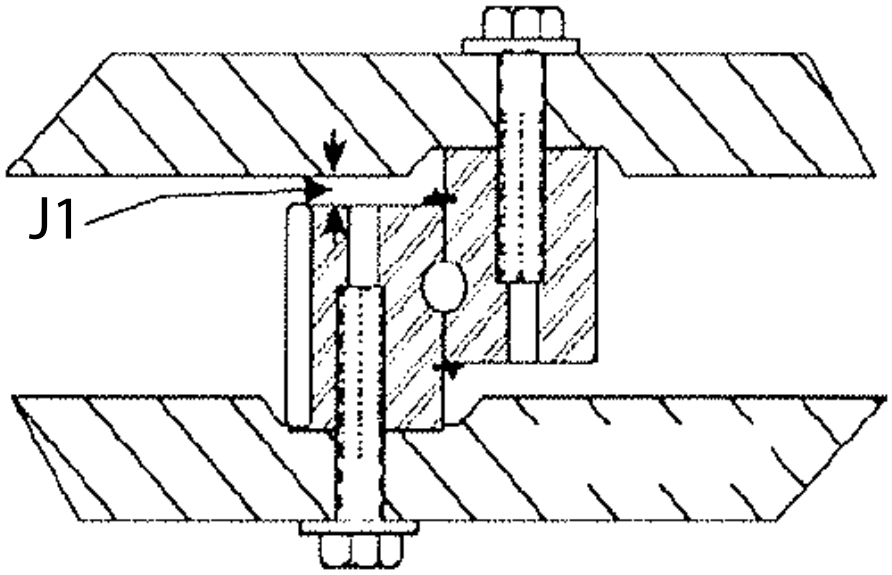
5.2 - MEASUREMENT OF THE CLEARANCE

Place the machine in the following conditions :

- On flat ground, Set up barriers to define the test area.
- No load in the platform.
- From the ground control box, align the turret at 90 ° to the chassis.
- Lift the boom approximatively 30 ° from the ground.
- Completely retract the boom telescope.
- Jib in horizontal position (if fitted).

From the magnetic comparator, note the clearance (J1) between chassis (or turret) and the slew ring.

Clearance between chassis (or turret) and slew ring



After having carried out the measurement :

- Lower the boom at horizontal position.
- Lift the arm (if exists) as its maximum position. Don't extend the telescopic boom.
- Telescope the boom to its maximum angle (completely extend the telescope).
- Jib in horizontal position(if fitted).

In its new configuration, note the clearance (J1) between chassis (or turret) and the slew ring as previously.

- If the difference between two measurements does not exceed 2 mm (0.08 in) : the test validates correct operation.
- Otherwise, contact HAULOTTE Services® to repair the system.

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

2 - Preliminary operation

For safety reasons, imperatively respect the following stages during the tests :

- To set up a beaconing of safety around the test area.
- Put the machine in stowed position.
- Use safety straps.

The operations of disassembling if they exist should be carried out only on the installations completely disconnected and must be entrusted only to people having the necessary technical training.

Respect, in addition to the instructions appearing in the present instructions, the legal tendencies generally applicable for safety accident prevention.

All the precautions must be done in work before intervening on and near the machine.

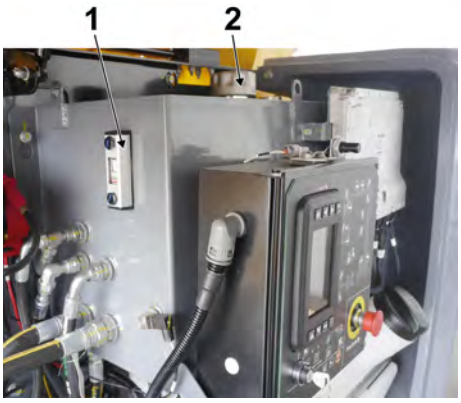
After completion of work, all the covers and safety devices must be positioned back completely and operational.

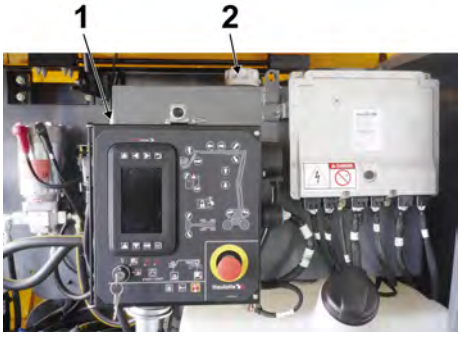
3 - Level control

Each day before use, check the hydraulic oil level to ensure safety operation.

N.B.-:-CHECK THE OIL LEVEL WHEN COLD AND WHEN THE MACHINE IS STOWED (BEFORE BEGINNING A NEW PERIOD OF WORK)

The oil level (1) must be between the upper and lower markers .





If the oil level (1) is not visible :

1. Loosen and remove the tank cap (2).
2. Top up the oil level.
3. Refit and tighten the tank cap .

4 - Replacement of hydraulic oil

Hydraulic oil must be replaced all the 2000 hours or 2 years. This periodicity can be modified so important interventions and/or anomaly was noted.

The state of cleanliness of the oil filter cartouche is another indicator of purging of the system :

- Dismount the cartouche of the oil filter.
- Check the absence of rubber, plastic or metal shaving.

4.1 - CONSUMABLE

Use only oils whose features correspond to HAULOTTE® recommendations (Section C - Familiarization - Consumable) or contact HAULOTTE Services®.

Not mix two different characteristics oils. If necessary, purge and clean the circuit.

4.2 - FILLING

To fill the system correctly; respect the following stages :

- The machine must be completely folded (for the machines equipped: raised stabilizers).
- Fill the tank.
- Carry out a complete cycle (to go/return) of each cylinder.
- Fill the tank if necessary (never more than the maximum level).
- Repeat stages 1 and 2 for each cylinder of the machine.

When filling, it is forbidden to remove the strainer filter.

Notes

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

2 - Control and inspections

The state of hoses devices plays a significant role in the safety of the machines.

Section D - Inspection and maintenance schedule :

- Check the absence of leakage to the junctions of the hoses.
- Check that all the hoses are correctly tightened.
- Check the absence of tear and crack of the external hoses.
- Check that the shielding of the hose is not apparent.
- Check the absence of chemical aggression of the membrane of the hose.

If anomalies are noted, it is necessary to replace the elements by respecting the following recommendations.

3 - Hoses Disassembling

For safety reasons, respect imperatively the following conditions of disassembling :

- Fold the machine on a flat and released ground :
- The machine is not in slope.
- The boom is horizontal.
- Put the turret (if equipped) in the axis.
- Carry out a beaconing of the sector (maximum risk zone = machine height).
- Locate the hoses and their connections points to guarantee the good performance of the machine after intervention.
- Locate the hoses course to facilitate the reassembly.

To recover oil, use an oils container in order not to pollute the environment.

Unscrew the flexible device slowly in order to make fall residual water pressure.

It is imperative to secure and maintain cylinders when removing hoses cylinders. An analysis of the hydraulic system is imperative.

After disassembling :

- Close the hose openings and the hydraulic components to avoid the pollution of the hydraulic system.
- Check the cleanliness of the hoses and the hydraulic components :
- Absence of plastic, rubber or metal shaving.
- If necessary, purge and clean the circuit (tank included).

4 - Hoses Reassembly

For safety reasons, respect imperatively the following conditions of reassembly :

- Using the reference marks carried out previously; carry out the courses of hoses.
- During the fixing of the hoses, respect the tightening torques below.

Tightening torque table

Description	Torque (JIC)	Torque (ORFS)
Hose 1/4" (diameter 6mm)	1,5 daN.m(11,08 lbf.ft)	2,6 daN.m(19,22 lbf.ft)
Hose 3/8" (diameter 10mm)	3,5 daN.m(25,86 lbf.ft)	4,2 daN.m(31,04 lbf.ft)
Hose 1/2" (diameter 12mm)	5 daN.m(36,95 lbf.ft)	5,7 daN.m(42,12 lbf.ft)
Hose 5/8" (diameter 16mm)	8 daN.m(59,12 lbf.ft)	8,5 daN.m(62,82 lbf.ft)
Hose 3/4" (diameter 19)	10 daN.m(73,91 lbf.ft)	12,2 daN.m(90,17 lbf.ft)

Once all the hoses are correctly tight :

- Put the machine in operational configuration
- Carry out some movements implementing the hoses concerned in order to purge the hydraulic system.
- Check the absence of leakage.
- Control the level of hydraulic oil tank.
- Check the pressures.

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

All hydraulic components (pump, tanks….) except cylinders must be subjected to periodic visual inspections such as defined below.

For all the visible components without disassembling a fast visual inspection must be realized every day before use :

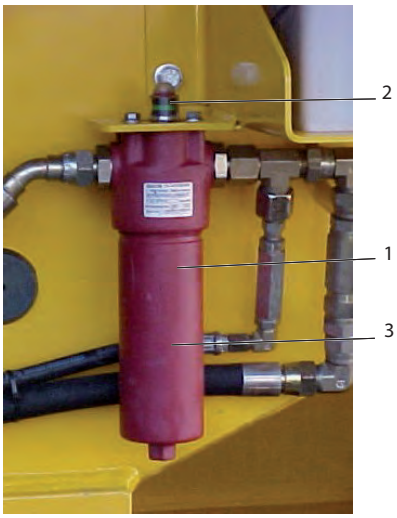
- Absence of leakage (pump, tanks, hydraulic block, connections…).
- Absence of rust on the hydraulic blocks.
- Absence of deformations, damage, crack on tanks, pump and block hydraulics.
- Absence of foreign objects on all surfaces.
- Absence of missing or loosened part (bolt, nut, connection, flexible device, etc).
- Hydraulic oil level (to supplement if necessary, machine in folded up position).
- Presence and good state of the hydraulic oil filter (absence of filling).

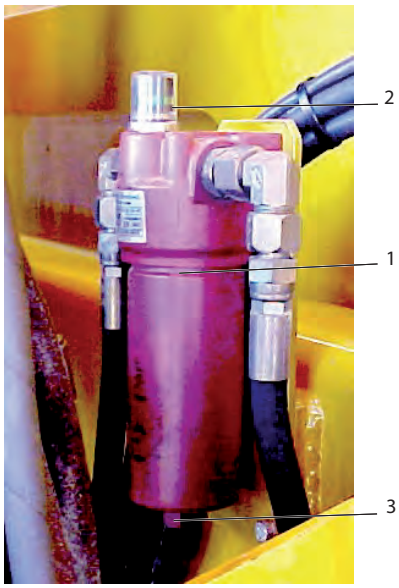
For all the non visible components without disassembling a reinforced visual inspection must be realized all the 250 hours or 1 year with the same criteria as quoted above.

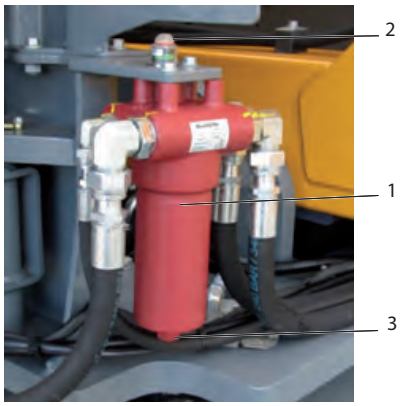
2 - Hydraulic filter cartridge Replacement

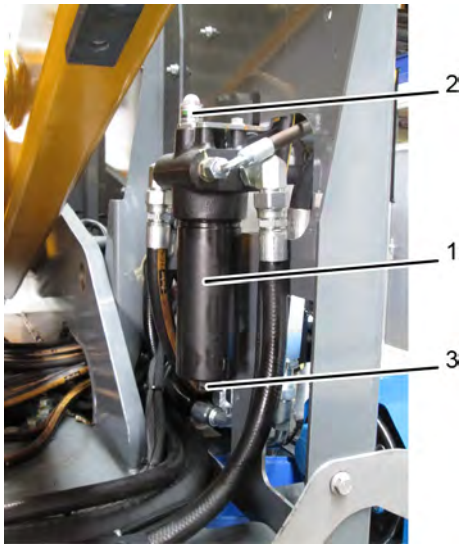
Clogging must be checked when hot. When cold, oil viscosity may simulate filter clogging.

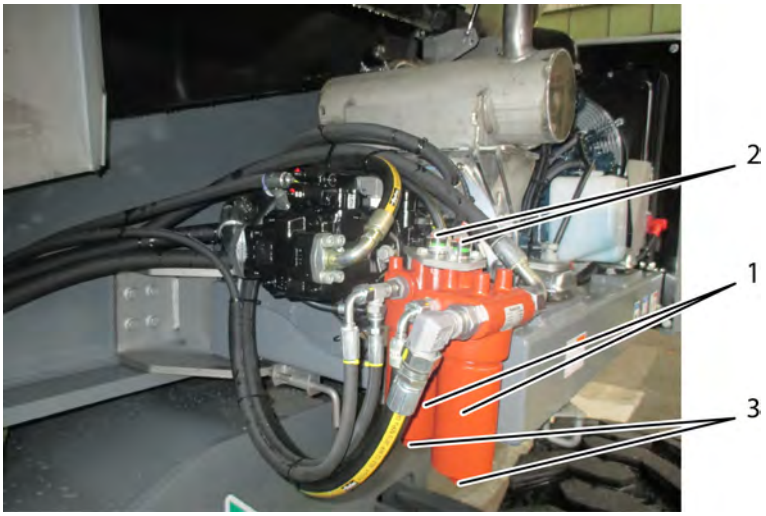
Do not touch the hot parts of the hydraulic power source (engine, filters, etc.).











1. When the clogging indicator (2) comes on, replace the cartridge (1) (Cold oil).
2. Loosen and remove the base nut (3).
3. Loosen and remove the cartridge (1).
4. Screw in a new cartridge.
5. Refit and tighten the base nut (3).
6. Reset the clogging indicator (2) by pressing it until it becomes green again.

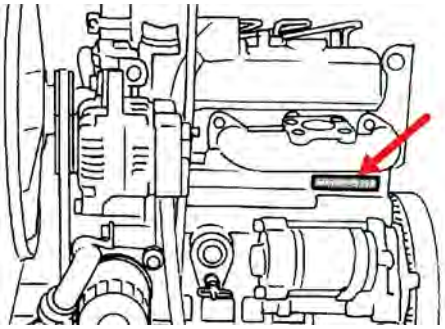
Notes

To ensure the maintenance of the engines, please go to our website https://www.e-technical-information.com to consult the supplier manuals whose reference for this engine is 4000053020 (TIER III), 4001094430 (V2403-CR), 4001094670 (D1803-CR).

If access is denied, contact your HAULOTTE® branch..

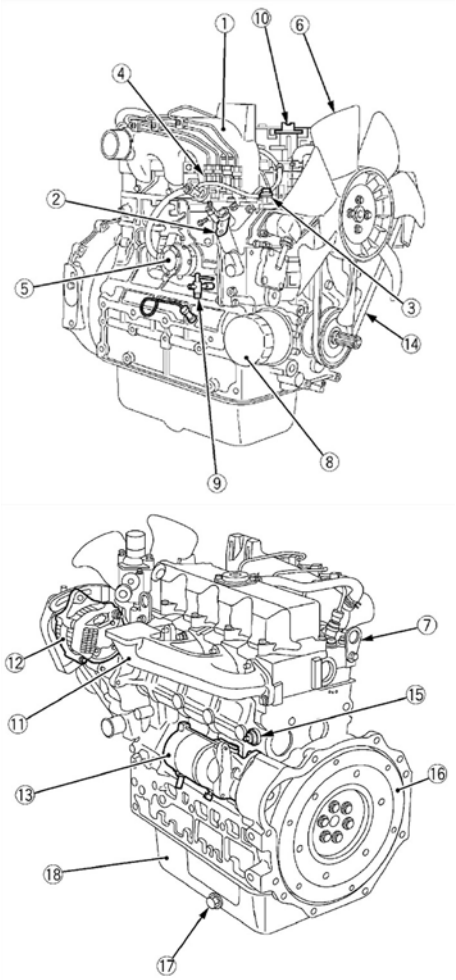
1 - Localization identification plate

- If you need to contact HAULOTTE Services® for spare parts or other, think up the serial number of your engine.

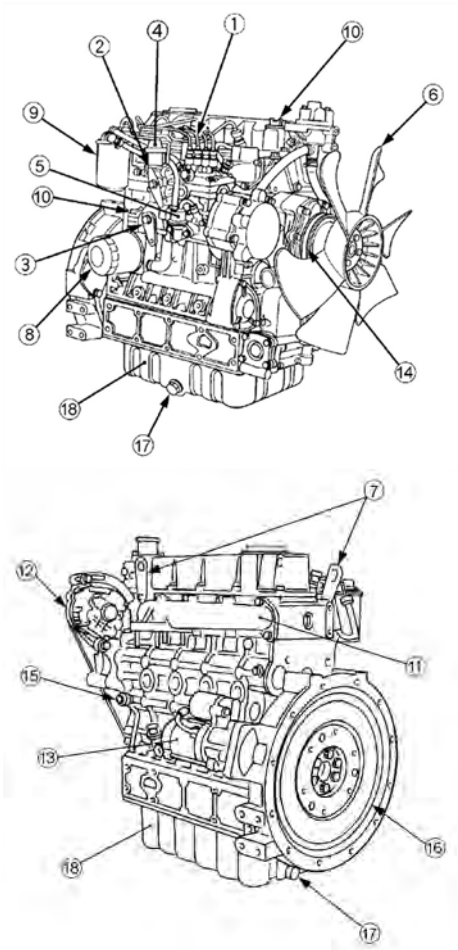


2 - Names of parts

D1503-M-E3 - D1703-M-E3 - D183-M-E3 - V2003-M-E3 -V2403-M-E3 - V2004-M-T-E3 - D1803-M-DI-E3 - V2403-M-DI-E3

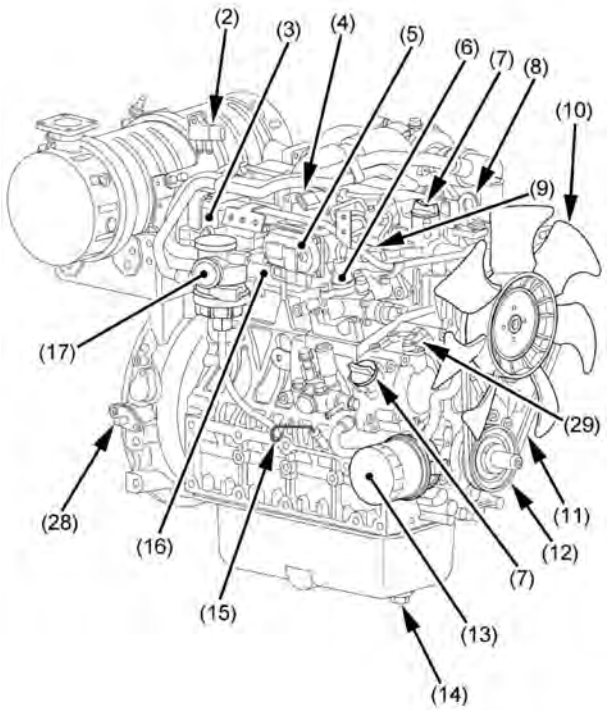


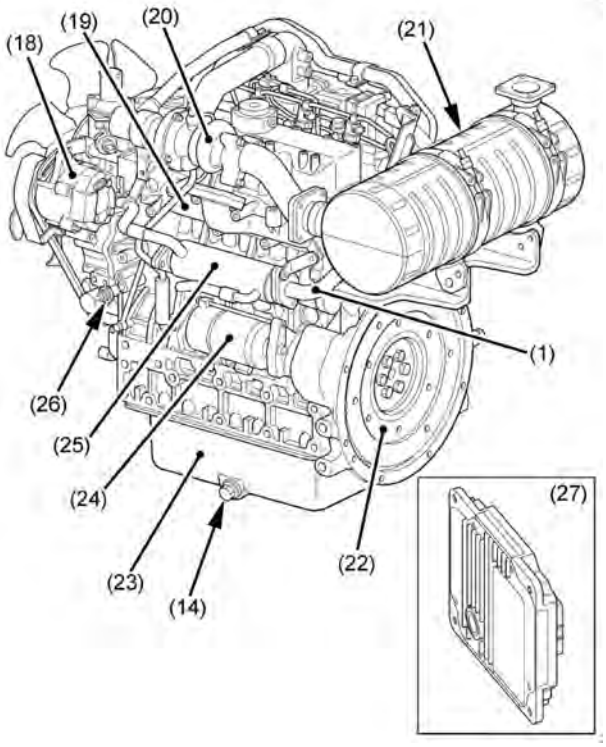
V3600-E3 - V600-T-E3 - V3300-E3BG - V3600-T-E3BG



1	Intake manifold
2	Speed control lever
3	Engine stop lever
4	Injection pump
5	Fuel feed pump
6	Cooling fan
7	Engine hook
8	Oil filter cartridge
9	Fuel filter
10	Oil filler plug
11	Exhaust manifold
12	Alternator
13	Starter
14	Oil gauge
15	Oil pressure switch
16	Flywheel
17	Oil drain plug
18	Oil pan

D1803-CR-E5 – D1803-CR-TE5 – D1803-CR-TIE5 – V2403-CR-E5 – V2403-CR-TE5 – V2403-CR-TIE5





1	EGR pipe (Exhaust Gas Re-circulation)
2	Differential pressure sensor
3	EGR valve (Exhaust Gas Re-circulation)
4	Boost sensor
5	Air intake accelerator
6	Feed pump
7	Oil filler plug
8	Oil pan
9	Fuel line
10	Cooling fan
11	Fan belt
12	Engine hook
13	Oil drain tap
14	Oil drain plug
15	Oil gauge
16	Intake manifold
17	Oil separator
18	Alternator
19	Exhaust manifold
20	Turbo compressor
21	DPF (Diesel Particulate Filter)
22	Steering wheel
23	Oil casing
24	Starter
25	Exhaust gas recirculation cooler
26	Switch
27	ECU (Electronic unit)
28	Crankshaft position sensor
29	Dwell angle sensor

3 - Operating the engine

3.1 - STARTING THE ENGINE (NORMAL)

To avoid personal injury :

- **Do not allow any person to approach the machine while the engine is running.**
- **Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.**
- **Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.**
- **Do not operate the machine while under the influence of alcohol or drugs.**
- **Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accidents. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropiate or required.**
- **Do not wear radio or music headphones while operating engine.**
- **Check to see if it is safe around the engine before starting.**
- **Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenence.**
- **Do not use ether or any starting fluid for starting the engine, or a sever damage will occur.**
- **When starting the engine after a long storage (of more than 3 months), first set the stop lever to the "STOP" position and then activate the starter for about 10 seconds to allow oil to reach every engine part.**

3.2 - CHECKS DURING OPERATION

3.2.1 - Oil pressure lamp

The lamp lights up to warn the operator that the engine oil pressure has dropped below the prescribed level. If this should happen during operation or should not go off even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following :

1. Engine oil level
2. Lubricant system.

3.2.2 - Fuel

To avoid personal injury :

- **Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks ; use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.**
- **Check any leacks from fuel pipes or fuel injection pipes. Use eye protection when checking for leaks.**

Be careful not to empty the fuel tank. Otherwise air may enter the fuel system, requiring fuel system bleeding.

3.2.3 - Immediately stop the engine if :

- The engine suddenly slows down or accelerates.
- Unusual noises are suddenly heard.
- Exhaust fumes suddenly become very dark.
- The oil pressure lamp or the water temperature alarm lamp lights up.

3.3 - REVERSED ENGINE REVOLUTION AND REMEDIES

To avoid personal injury :

- **Reversed engine operation can make the machine reverse and run it backwards. It may lead to serious trouble.**
- **Reversed engine operation may make exhaust gas gush out into the intake side and ignite the air cleaner; it could catch fire.**

Reversed engine revolution must be stopped immediatly since engine oil circulation is cut quickly, leading to serious trouble.

3.3.1 - How to tell when the engine starts running backwards

1. Lubricating oil pressure drops sharply. Oil pressure warning light, if used, will light.
2. Since the intake and exhaust sides are reversed, the sound of the engine changes, and exhaust gas will come out of the air cleaner.
3. A louder knocking sound will be heard when the engine starts running backwards.

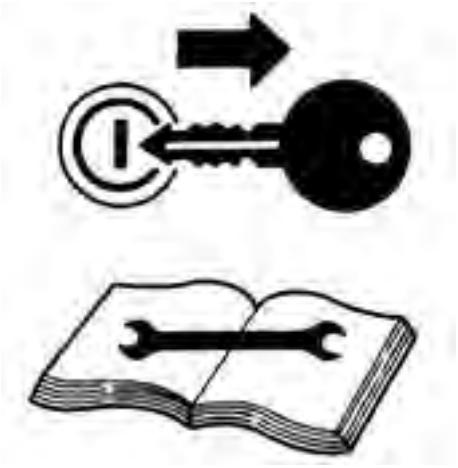
3.3.2 - Remedies

1. Immediately set the engine stop lever to the "STOP" position to stop the engine.
2. After stopping the engine, check the air cleaner, intake rubber tube and then other parts and replace parts as needed.

4 - Maintenance

To avoid personal injury :

- Be sure to conduct daily checks, periodic maintenanc, refueling or cleaning on a level surface with the engine shut off and remove the key.
- Before allowing other people to use your engine, explain how to operate, and have them read this manual before operation.
- When cleaning any parts, do not use gasoline but use regular cleanser.



- Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.
- When installing, be sure to tighten all bolts lest they should be loose. Tighten the bolts by the specified torque.
- Do not put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before the maintenance.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.

Lubricating oil :

- **With strict emission control regulations now in effect, the CG-4, CH-4 and CI-4 engine oils have been developed for use with low sulfur fuels, for On-Highway vehicle engines. When a Non-Road engine runs on high sulfur fuel, it is advisable to use a "CF or better" classification engine oil with a high Total Base Number (a minimum TBN of 10 is recommended).**
- Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.

Lubricating oil classification	Fuel		Comments
	Low-sulfur	High-sulfur	
CF	Recommendable	Recommendable	Total Base Number (TBN) superior or equal 10
CF	Recommendable	Not recommendable	
CF	Recommendable	Not recommendable	
CF	Recommendable	Not recommendable	

- Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emission regulations for the area in which the engine is operated.
- Use of diesel fuel with sulfur content less than 0.10 % (1000 ppm) is strongly recommended.
- If high-sulfur fuel (sulfur content 0.50% (5000 ppm) to 1% (10000 ppm)) is used as a diesel fuel, change the engine oil and oil filter at shorter intervals (approximately half).
- DO NOT USE Fuels that have sulfur content greater than 1.0 % (10000 ppm).
- Since KUBOTA diesel engines of less than 56 kW (75 hp) utilize EPA Tier 4 and Interim Tier 4 standards, the use of ultra low sulfur fuel is mandatory for these engines, when operated in US EPA regulated areas. Therefore, please use No.2-D S15 diesel fuel as an alternative to No.2-D, and use No.1-D S15 diesel fuel as an alternative to No.1-D for ambient temperatures below -10°C (14°F). No.1-Dor No.2-D, S15 : Ultra Low Sulfur Diesel 15 ppm or 0.0015 wt.%.
- CJ-4 classification oil is intended for use in engines equipped with Diesel Particulate Filter and is Not Recommended for use in Kubota E3 specification engines.
- Oil used in the engine should have API classification and Proper SAE Engine Oil according to the ambient temperatures as shown below.

Engine oil viscosity

Viscosity index	Ambient temperature	
	Minimum	Maximum
SAE 0W20	-40°C (-40°F)	10°C (50°F)
SAE 0W30	-40°C (-40°F)	30°C (86°F)
SAE 0W40	-40°C (-40°F)	40°C (104°F)
SAE 5W30	-30°C (-22°F)	30°C (86°F)
SAE 5W40	-30°C (-22°F)	40°C (104°F)
SAE 10W30	-20°C (-4°F)	40°C (104°F)
SAE 15W40	-10°C (14°F)	50°C (122°F)

Classification API

Fuel type	Engine oil classification
High sulfur fuel ≤ [0.05% (500 ppm)] Sulfur content < 0.50% (5000 ppm)	API CJ-4 or CK-4 (If the engine oil is used with a high sulfur level, change the engine oil at shorter intervals, approximately half)

5 - Periodic service

5.1 - FUEL

Fuel is flammable and can be dangerous. You should handle fuel with care.

To avoid personal injury :

- **Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.**
- **Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.**
- **Do not fail to stop the engine before refueling. Keep the engine away from the fire.**
- **Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.**
- **Check the fuel systems at a well ventilated and wide place.**
- **When fuel and lubricant are spilled, refuel after letting the engine cool off.**
- **Always keep spilled fuel and lubricant away from engine.**

5.1.1 - Fuel level check and refueling

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
2. If the fuel is too low, add fuel to the upper limit. Do not overfill.

Flash point °C (°F)	Water and sediment volume %	Carbon redidus on, 10 percent Residuum %	Ash weight %
Minimum	Maximum	Maximum	Maximum
52 (125)	0.05	0.35	0.01

Distillation temperatures °C (°F) 90% Point		Viscosity Kinematic cSt or mm²/s at 40°C		Viscosity Saybolt SUS at 37.8°C (100°F)	
Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
282 (540)	338 (640)	1.9	4.1	32.6	40.1

Sulfur, weight	Copper Strip Corrosion	Cetane Number
Maximum	Maximum	Minimum
0.50	No. 3	40

- Cetane Rating : The minimum recommended Fuel Cetane Rating is 45. A cetane rating greater than 50 is preferred, especially for ambient temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).
- Diesel Fuel Specification Type and Sulfur Content % (ppm) used, must be compliant with all applicable emission regulations for the area in which the engine is operated.
- Use of diesel fuel with sulfur content less than 0.10% (1000 ppm) is strongly recommended.
- If high-sulfur fuel (sulfur content 0.50% (5000 ppm) to 1.0 % (10000 ppm) is used as a diesel fuel, change the engine oil and oil filter at shorter intervals (approximately half).
- DO NOT USE Fuels that have sulfur content greater than1.0 % (10000 ppm).
- Diesel fuels specified to EN 590 or ASTM D975 are recommended. .
- No.2-D is a distillate fuel of lower volatility for engines in industrial and heavy mobile service.
- Since Kubota diesel engines of less than 56 kW (75 hp) utilize EPA Tier 4 and Interim Tier 4 standards, the use of ultra low sulfur fuel is mandatory for these engines, when operated in US EPA regulated areas. Therefore, please use No.2-D S15 diesel fuel as an alternative to No.2-D, and use No.1-D S15 diesel fuel as an alternative to No.1-D for ambient temperatures below -10°C (14°F).
- SAE : Society of Automotive Engineers
- EN : European Norm
- ASTM: American Society of Testing and Materials
- US EPA: United States Environmental Protection Agency
- No 1-D / No 2-D S15 : Ultra Low Sulfur Diesel (ULSD) 15 ppm or 0.0015 wt. %

Important :

- **Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.**
- **For fuel, always use diesel fuel. You are required not to use alternative fuel, because its quality is unknown or it may be inferior in quality. Kerosene, which is very low in cetane rating, adversely affects the engine. Diesel fuel differs in grades depending on the temperature.**
- **Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.**

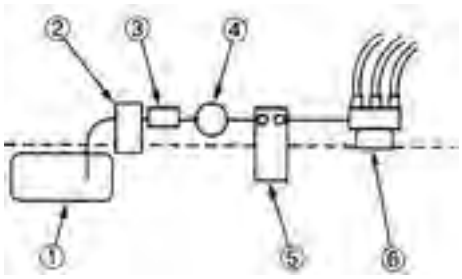
5.1.2 - Air bleeding the fuel system

To avoid personal injury :
• Do not bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.

Air bleeding of the fuel system is required if :
- After the fuel filter and pipes have been detached and refitted.
- After the fuel tank has become empty.
- Or before the engine is to be used after a long storage.

5.1.2.1 - Procedure : Fuel tanks lower than injection pump

For fuel tanks that are lower than the injection pump :
1. The fuel system must be pressurized by the fuel system electric fuel pump.
2. If an electric fuel pump is not used, you must manually actuate the pump by lever to bleed.
3. The primary fuel filter must be on the pressure side of the pump if the fuel tank is lower than the injection pump.
4. To bleed, follow (3) through (5) above.

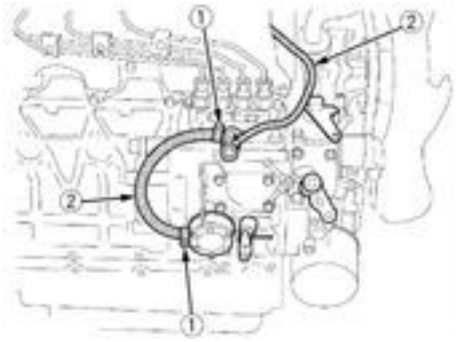


Tighten air vent plug of the fuel injection pump xcept when bleeding, or it may stop the engine suddenly.

1	Fuel tank below injection pump	4	Electric or Mechanical pump
2		5	Main Filter
3	Pre-filter	6	Injection pump

5.1.3 - Checking the fuel pipes

To avoid personal injury :
• Check or replace the fuel pipes after stopping the engine. Broken fuel pipes can cause fires.



Check the fuel pipes every 50 hours of operation :

- If the clamp band is loose, apply oil to the screw of the band, and tighten the band securely.
- If the fuel pipes, made of rubber, became worn out, replace them and clamp bands every 2 years.
- If the fuel pipes and clamp bands are found worn or damaged before 2 years' time, replace or repair them at once.
- After replacement of the pipes and bands, air-bleed the fuel system.

When the fuel pipes are not installed, plug them at both ends with clean cloth or paper to prevent dirt from entering. Dirt in the pipes can cause fuel injection pump malfunction.

1	Clamp band
2	Fuel pipe

5.2 - RADIATOR

5.2.1 - Checking radiator hoses and clamp

To avoid personal injury :
• Be sure to check radiator hoses and hose clamps periodically. If radiator hose is damaged or coolant leaks, overheats or severe burns could occur.

Check to see if radiator hoses are properly fixed every 200 hours of operation or 6 months, whichever comes first. :

1. If hose clamps are loose or water leaks, tighten hose clamp securely.
2. Replace hoses and tighten hose clamps securely, if radiator hoses are swollen, hardened or cracked.

Replace hoses and hose clamps every 2 years or earlier, if checked and found that hoses are swollen, hardened or cracked.

5.2.2 - Precaution at overheating

The event that the coolant temperature is nearly or more than the boiling point is called "OVERHEATING".

While running, make the following checks to see that all parts are working correctly. If anything is unusual, inspect it, referring to the relevant description in "MAINTENANCE" and "PERIODIC SERVICE" section.

5.2.2.1 - Coolant

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and keep the engine idling (COOLING-DOWN) for at least 5 minutes to let it cool down gradually. Then stop the engine and take the following inspection and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak.
2. Check to see if there is any obstacle around the cooling air inlet or outlet.
3. Check to see if there is any dirt or dust between radiator fins and tube.
4. Check to see if the fan belt is too loose.
5. Check to see if radiator water pipe is clogged.

5.2.3 - Cleaning radiator core (outside)

If dust is between the fin and tube, wash it away with running water.

Do not clean radiator with firm tools such as spatulas or screwdrivers. They may damage specified fin or tube. It can cause coolant leaks or decrease cooling performance.

5.2.4 - Anti-freeze

To avoid personal injury :

- **When using anti-freeze, put on some protection such as rubber gloves (Anti-freeze contains poison).**
- **If should drink anti-freeze, throw up at once and take medical attention.**
- **When anti-freeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different types of antifreeze. The mixture can produce chemical reaction causing harmful substances.**
- **Anti-freeze is extremely flammable and explosive under certain conditions. Keep fire and children away from anti-freeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour waste onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of anti-free.**

Always use a 50/50 mix of long-life coolant and clean soft water in Kubota engines. Contact HAULOTTE Services® concerning coolant for extreme conditions. :

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed cooling water, flush the radiator with fresh water. Repeat this procedure 2 or 3 times to clean up the radiator and engine block from inside.
3. Mixing the LLC. Premix 50% LLC with 50% clean soft water. When mixing, stir it up well, and then fill into the radiator.
4. The procedure for the mixing of water and antifreeze differs according to the make of the antifreeze. Refer to SAE J1034 standard, more specifically also to SAE J814c.
5. Adding the LLC :

- Add only water if the coolant level reduces in the cooling system by evaporation.
- If there is a coolant leak, add the LLC of the same manufacturer and type in the same coolant percentage.

6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anti-corrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota genuine long-life coolant has a service life of 2 years. Be sure to change the coolant every 2 years.

Never add any long-life coolant of different manufacturer. Different brands may have different additive components, and the engine may fail to perform as specified.

N.B.-:-THE ABOVE DATA REPRESENT INDUSTRY STANDARDS THAT NECESSITATE A MINIMUM GLYCOL CONTENT IN THE CONCENTRATED ANTI-FREEZE.

Vol % anti-freeze	Freezing point		Boiling point	
	°C	°F	°C	°F
50	- 37	- 34	108	226

6 - Carriage and storage

6.1 - CARRIAGE

To avoid personal injury :
- **Fix the engine securely not to fall during operation.**
- **Do not stand near or under the engine while carrying it.**
- **The engine is heavy. In handling it, be very alert not to get your hands and body caught in.**

1. Use carrier such as crane when carrying the engine, or hurt your waist and yourself. Support the engine securely with rope not to fall while carrying it.
2. When lifting the engine, put the hook securely to metal fittings attached to the engine. Use strong hook and fittings enough to hang the engine.

6.2 - STORAGE

To avoid personal injury :
- **Do not clean the machine with engine running.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.**
- **When storing the engine just after running, let the engine cool off.**

Before storing the engine for more than a few months, remove any dirt on the machine, and :

1. Drain the coolant in the radiator. Open the cock at the bottom of the radiator, and remove the pressure cap to drain water completely. Leave the cock open. Hang a note written "No water" on the pressure cap. Since water may freeze when the temperature drops below 0°C (32°F), it is very important that no water is left in the machine.
2. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
3. Check all the bolts and nuts, and tighten if necessary.
4. Remove the battery from the engine, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
5. When the engine is not used for a long period of time, run it for about 10 minutes under no load every 2 to 3 months to keep it free from rust. If the engine is stored without any running, moisture in the air may condense into dew over the sliding parts of the engine, resulting in rust there.
6. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valve works smoothly before starting the engine.
7. Store the engine in a flat place and remove the key from engine.
8. Do not store the engine in a place where has flammable materials such as dry grass or straw.
9. When covering the engine for storage, let engine and muffler cool off completely.
10. Operate the engine after checking and repairing damaged wirings or pipes, and clearing flammable materials carried by mouse.

7 - Troubleshooting

If the engine does not function properly, use the following chart to identify and correct the cause.

Diagnosis

Problem	Probable cause	Solution
When it is difficult to start the engine	Fuel is thick and doesn't flow	• Check the fuel tank and fuel filter. • Remove water, dirt and other impurities. • As all fuel will be filtered by the filter, if there should be water or other foreign matters on the filter, clean the filter with kerosene.
	Air or water mixed in fuel system	• If air is in the fuel filter or injection lines, the fuel pump will not work properly. • To attain proper fuel injection pressure, check carefully for loosened fuel line coupling, loose cap nut, etc. • Loosen joint bolt stop fuel filter and air vent screws of fuel injection pump to eliminate all the air in the fuel system.
	Valve clearance is not as specified	• Adjust valve clearance when the engine is cold
	Leaking valves	• Grind valve.
	Fuel injection timing is not as specified	• Check injection timing.
	Engine oil becomes thick in cold weather and engine cranks slow	• Change grade of oil according to the weather (temperature).
	Low compression	• Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
	Battery is discharged and the engine will not crank	• Charge battery. • In winter, always remove battery from machine, charge fully and keep indoors. Install in machine at time of use.

Problem	Probable cause	Solution
When output is insufficient	Compression is insufficient.	• Bad valve and excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
	Leaking valves	• Grind valve.
	Fuel is insufficient	• Check fuel system
	Overheating of moving parts	• Check lubricating oil system • Check to see if lubricating oil filter is working properly. • Filter element deposited with impurities would cause poor lubrication. Change element. • Check the clearance of bearing are within factory specs. • Check injection timing. • Adjust timing.
	Valve clearance is not as specified	• Adjust to proper valve clearance when the engine is cold.
	Air cleaner is dirty	• Clean the element every 100 hours of operation.
	Fuel injection pressure is not as specified	• Check injection pressure.
	Injection pump wear	• Do not use poor quality fuel as it will cause wear of the pump. Only use No.2-D diesel fuel. • Check the fuel injection pump element and delivery valve assembly and replace as necessary
When engine suddenly stops	Lack of fuel	• Check the fuel tank and refill the fuel, if necessary • Also check the fuel system for air or leaks.
	Bad nozzle	• If necessary, replace with a new nozzle.
	Moving parts are overheated due to shortage of lubrication oil or improper lubrication	• Check amount of engine oil with oil level gauge. • Check lubricating oil system. • At every 2 times of oil change, oil filter cartridge should be replaced. • Check to see if the engine bearing clearances is within factory specs.
When color of exhaust is especially bad	Fuel governing device bad	• Contact HAULOTTE Services® for repairs
	Fuel is of extremely poor quality	• Select good quality fuel.
	Nozzle is bad	• If necessary, replace with new nozzle.
	Combustion is incomplete	• Cause is poor atomization, improper injection timing, etc. Because of trouble in injection system or in poor valve adjustment, or compression leakage, poor compression, etc. Check for the cause.
When engine must be stopped immediately	Engine revolution suddenly decreases or increases	• Check the adjustments, injection timing and the fuel system.
	Unusual sound is heard suddenly	• Check all moving parts carefully.
	Color of exhaust suddenly turns dark	• Check the fuel injection system, especially the fuel injection nozzle.
	Bearing parts are overheated	• Check the lubricating system.
	Oil lamp lights up during operation	• Check the lubricating system. • Check, if the engine bearing clearances are within factory specs. • Check the function of the relieve valve in the lubricating system. • Check pressure switch. • Check filter base gasket.

Problem	Probable cause	Solution
When engine overheats	Engine oil insufficient	• Check oil level. Replenish oil as required.
	Fan belt broken or elongated	• Change belt or adjust belt tension.
	Coolant insufficient	• Replenish coolant.
	Excessive concentration of antifreeze	• Add water only or change to coolant with the specified mixing ratio.
	Radiator net or radiator fin clogged with dust	• Clean net or fin carefully.
	Inside of radiator or coolant flow route corroded	• Clean or replace radiator and parts.
	Fan or radiator or radiator cap defective	• Replace defective parts.
	Thermostat defective	• Check thermostat and replace if necessary.
	Temperature gauge or sensor defective	• Check temperature with thermometer and replace if necessary.
	Overload running	• Reduce load.
	Head gasket defective or water leakage	• Replace parts.
	Incorrect injection timing	• Adjust to proper timing.
	Unsuitable fuel used	• Use the specified fuel.

N.B.-:-IF THE CAUSE OF TROUBLE CAN NOT BE FOUND, CONTACT HAULOTTE SERVICES®.

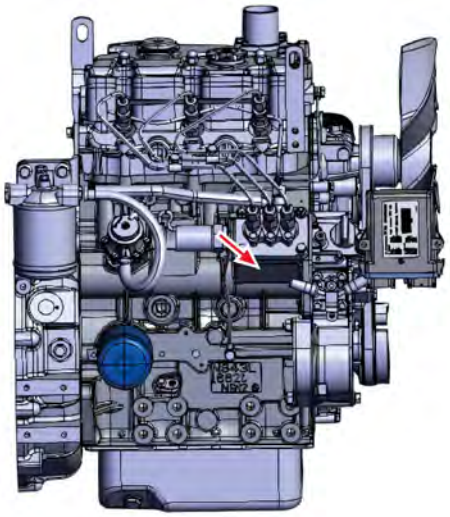
Notes

To ensure the maintenance of the engines, please go to our website https://www.e-technical-information.com to consult the supplier manuals whose reference for this engine is 4001180940.

If access is denied, contact your HAULOTTE® branch..

1 - Localization identification plate

- If you need to contact HAULOTTE Services® for spare parts or other, think up the serial number of your engine.



2 - Safety precautions

- Do not change the engine specification.
- Do not smoke. Wipe up any spilled fuel. Any materials contaminated by fuel must be put away in a safe place.
- Do not clean the engine, add oil, fill the fuel tank or tune the engine while it is running.
- Do not attempt tuning if you do not understand it.
- Do not run the engine in a place where there is a risk of build up of toxic gases.
- Other people present must be kept at a safe distance while the engine or auxiliary equipment is running.
- Keep loose clothing or long hair away from moving parts.
- Do not approach moving parts while the engine is running.

Certain moving parts are not clearly visible while the engine is running.

- Do not run the engine if protective covers have been removed.
- Do not remove the top-up cap or any part of the cooling circuit while the engine is still hot and the liquid is still under pressure. Very hot liquid may splash out.
- Do not bring sparks or flames near the batteries. The electrolyte emits highly inflammable gas. Battery liquid is very dangerous for skin and especially eyes.
- Disconnect the battery terminals before any intervention on the electrical equipment.
- The engine should only be controlled by one person at a time.
- If fuel under high pressure comes into contact with the skin, consult a doctor immediately.
- Diesel and lubricating oil, especially used oil, can cause skin lesions in some people. Operators must wear gloves or use a suitable skin protection product.
- Do not wear clothes which are contaminated with lubricating oil. Do not put oily rags in your pockets.
- Dispose of used lubricating oil in compliance with local regulations to avoid pollution.
- The inflammable material of certain engine parts can become extremely dangerous if it is burnt. Never allow burnt materials to come into contact with skin or eyes.
- Proceed with extreme caution if emergency repairs are required under special conditions.
- Do not allow compressed air to come into contact with the skin. If compressed air gets under the skin, consult a doctor immediately.
- Only use genuine spare parts.

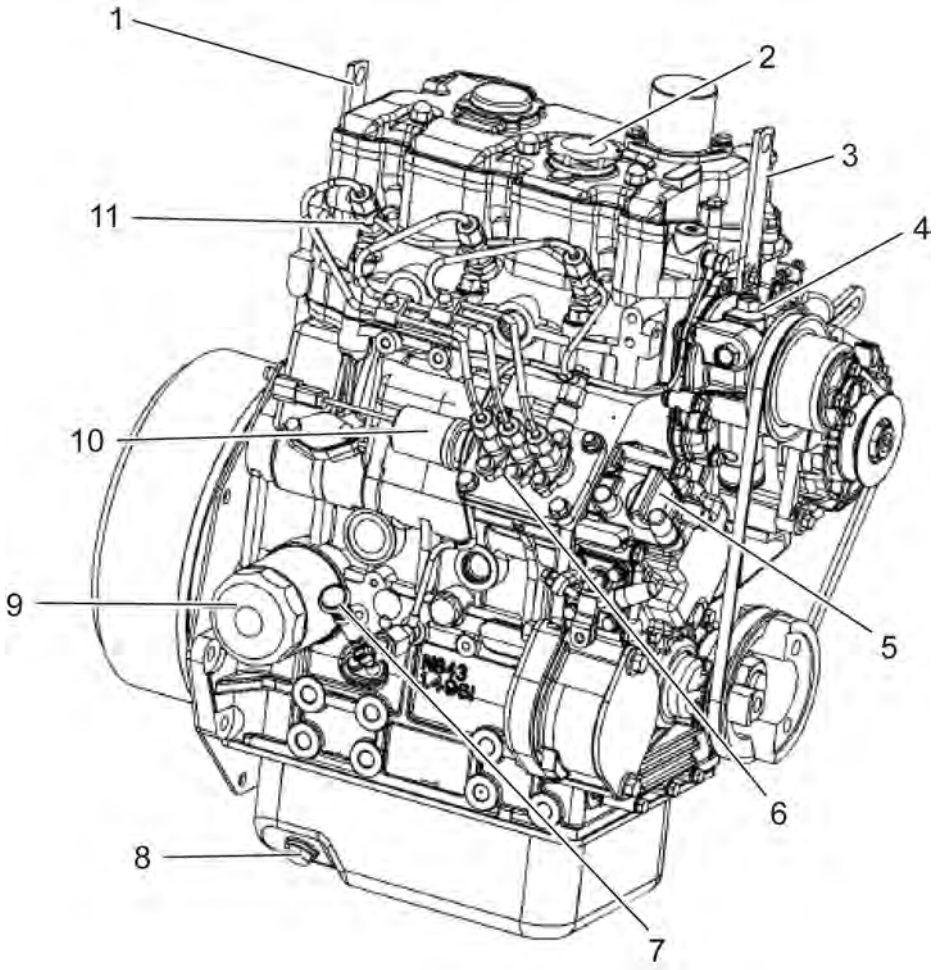
Do not clean an engine while it is running. If cold cleaning fluids are applied to a hot engine, certain engine parts may be damaged.

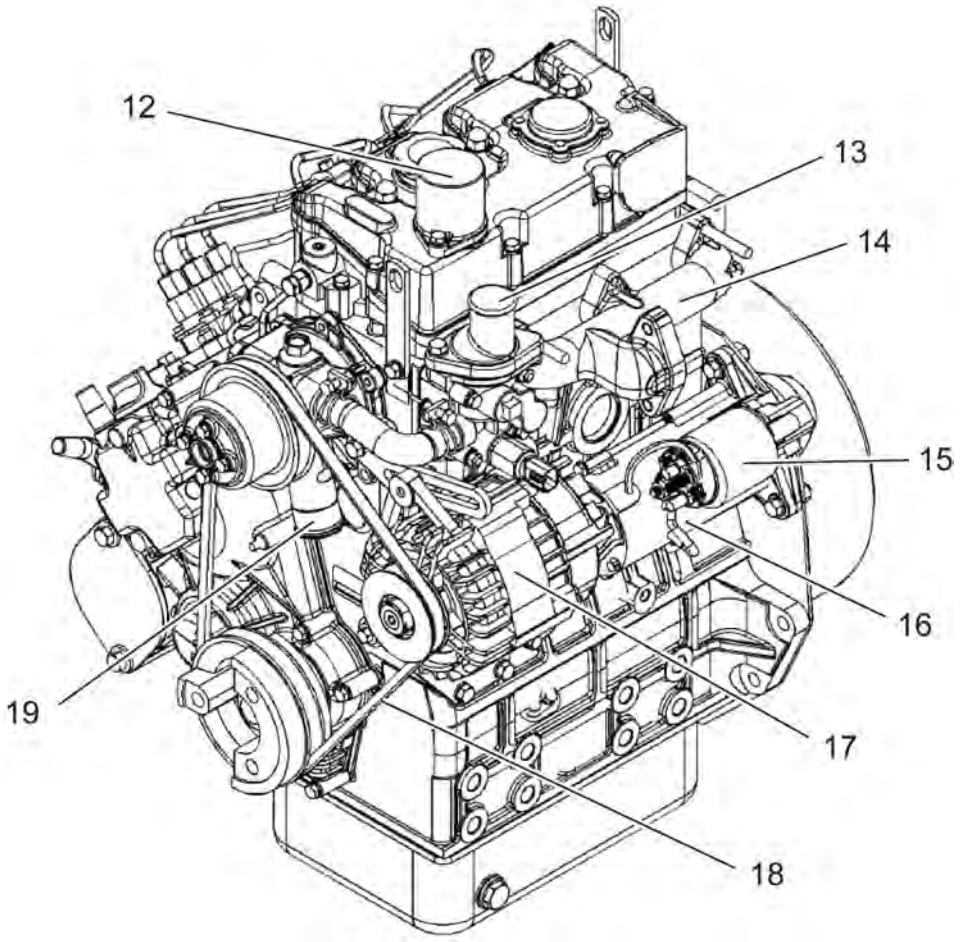
3 - Technical specifications

Engine type	403J-17
Maximum operating speed (rpm)	2800 rpm
Number of cylinders	3
Cylinder arrangement	In line
Bore	84 mm (3.31 inch)
Stroke	100 mm (3.94 inch)
Cubic capacity	1.663 L (101.5 in^3)
Intake system	Natural aspiration
Compression ration	23:1
Firing order	1-2-3
Maximum capacity of lubricating oil housing and filter	6 l
Minimum capacity of lubricating oil housing and filter	4,5 l
Direction of rotation	Clockwise as seen from the front
Combustion system	Indirect injection

4 - Names of parts

PERKINS 403J-17 - TIER IV Final / Stage V





1	Rear-Lifting eye
2	Oil filler cap
3	Front-Lifting eye
4	Water pump
5	Oil filler cap
6	Injection pump
7	Oil gauge
8	Oil drain plug
9	Oil filter
10	Stop solenoid
11	Injector
12	Air intake
13	Coolant outlet
14	Exhaust manifold
15	Solenoid for starter
16	Starter motor
17	Alternator
18	Fan belt
19	Coolant intake connection

5 - Operating the engine

5.1 - STARTING THE ENGINE (NORMAL)

To avoid personal injury :

- **Do not allow any person to approach the machine while the engine is running.**
- **Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.**
- **Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.**
- **Do not operate the machine while under the influence of alcohol or drugs.**
- **Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accidents. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropiate or required.**
- **Do not wear radio or music headphones while operating engine.**
- **Check to see if it is safe around the engine before starting.**
- **Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenence.**
- **Do not use ether or any starting fluid for starting the engine, or a sever damage will occur.**
- **When starting the engine after a long storage (of more than 3 months), first set the stop lever to the "STOP" position and then activate the starter for about 10 seconds to allow oil to reach every engine part.**

5.2 - CHECKS DURING OPERATION

5.2.1 - Oil pressure lamp

The lamp lights up to warn the operator that the engine oil pressure has dropped below the prescribed level. If this should happen during operation or should not go off even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following :

1. Engine oil level
2. Lubricant system.

5.2.2 - Fuel

To avoid personal injury :

- **Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks ; use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.**
- **Check any leacks from fuel pipes or fuel injection pipes. Use eye protection when checking for leaks.**

Be careful not to empty the fuel tank. Otherwise air may enter the fuel system, requiring fuel system bleeding.

5.2.3 - Immediately stop the engine if :

- The engine suddenly slows down or accelerates.
- Unusual noises are suddenly heard.
- Exhaust fumes suddenly become very dark.
- The oil pressure lamp or the water temperature alarm lamp lights up.

5.3 - REVERSED ENGINE REVOLUTION AND REMEDIES

To avoid personal injury :

- **Reversed engine operation can make the machine reverse and run it backwards. It may lead to serious trouble.**
- **Reversed engine operation may make exhaust gas gush out into the intake side and ignite the air cleaner; it could catch fire.**

Reversed engine revolution must be stopped immediatly since engine oil circulation is cut quickly, leading to serious trouble.

5.3.1 - How to tell when the engine starts running backwards

1. Lubricating oil pressure drops sharply. Oil pressure warning light, if used, will light.
2. Since the intake and exhaust sides are reversed, the sound of the engine changes, and exhaust gas will come out of the air cleaner.
3. A louder knocking sound will be heard when the engine starts running backwards.

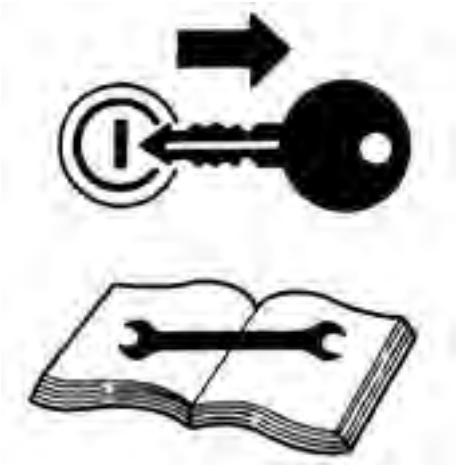
5.3.2 - Remedies

1. Immediately set the engine stop lever to the "STOP" position to stop the engine.
2. After stopping the engine, check the air cleaner, intake rubber tube and then other parts and replace parts as needed.

6 - Maintenance

To avoid personal injury :

- Be sure to conduct daily checks, periodic maintenanc, refueling or cleaning on a level surface with the engine shut off and remove the key.
- Before allowing other people to use your engine, explain how to operate, and have them read this manual before operation.
- When cleaning any parts, do not use gasoline but use regular cleanser.



- Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.
- When installing, be sure to tighten all bolts lest they should be loose. Tighten the bolts by the specified torque.
- Do not put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before the maintenance.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.

7 - Fuel

To avoid personal injury :

- **Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.**
- **Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.**
- **Do not fail to stop the engine before refueling. Keep the engine away from the fire.**
- **Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.**
- **Check the fuel systems at a well ventilated and wide place.**
- **When fuel and lubricant are spilled, refuel after letting the engine cool off.**
- **Always keep spilled fuel and lubricant away from engine.**

- **Use of other types of fuel could damage the engine. Do not use dirty diesel fuel or mixtures of diesel fuel and water since this will cause serious engine faults.**
- **Any failures resulting from the use of fuels other than recommended will not be warranted.**

- **Operating with fuels that do not meet the Perkins recommendations can cause the following effects :**
- **Starting difficulty.**
- **Reduced fuel filter service life.**
- **Poor combustion.**
- **Deposits in the fuel injectors**
- **Significantly reduce service life of the fuel system.**
- **Also, the creation of deposits in the combustion chamber and reduced service life of the engine.**

- **The Perkins 400J series of diesel engine must be operated using Ultra Low Sulfur Diesel. The sulphur content of this fuel must be lower than 15 PPM. This fuel complies with the emissions regulations that are prescribed by the Environmental Protection Agency of the United States.**

Fuel specifications
EN 590
ASTM D 975 Grade 1-D S15
ASTM D 975 Grade 2-D S15
JIS K 2204
BS 2869: 2010 CLASS A2 or EU equivalent
CEN TS15940
B20 Biodiesel Blend

8 - Oil

- **The engine may be damaged if operated with improper oil level.**
- **Do not exceed the max. level because a sudden increase in engine rpm could be caused by its combustion.**
- **Use only the recommended oil to ensure adequate protection, efficiency and service life of the engine.**
- **The use of lubricants other than recommended may shorten the engine life.**
- **Viscosity must be appropriate to the ambient temperature to which the engine is to be exposed.**
- **Prolonged skin contact with the exhausted engine oil can cause cancer of the skin.**
- **If contact with oil cannot be avoided, thoroughly wash your hands with soap and water as soon as possible.**

8.1 - ENGINE OIL CLASSIFICATION

- Oil used in the engine should have API classification and Proper SAE Engine Oil according to the ambient temperatures as shown below :

Engine oil viscosity

Viscosity index	Ambient temperature	
	Minimum	Maximum
SAE 0W20	-40°C (-40°F)	10°C (50°F)
SAE 0W30	-40°C (-40°F)	30°C (86°F)
SAE 0W40	-40°C (-40°F)	40°C (104°F)
SAE 5W30	-30°C (-22°F)	30°C (86°F)
SAE 5W40	-30°C (-22°F)	40°C (104°F)
SAE 10W30	-20°C (-4°F)	40°C (104°F)
SAE 15W40	-10°C (14°F)	50°C (122°F)

Classification API

Only use API CK-4 oil or equivalent. Please refer to the table of permitted engine oils.

Not using the appropriate specification of engine oil may reduce the service life of the engine and post-treatment system.

API CK-4 and ACEA E9 oil categories have the following chemical limits :

- 0,1 % maximum sulfated ash
- 0,12 % maximum phosphorous
- 0,4 % maximum sulfur

Table of permitted engine oils

Engines	Engine oil specification
PERKINS 403J-17	CK-4 ACEA E9 ECF-3

CC, CD, CD-2, CF-4, CG-4, CH-4, CI-4 engine oils, not approved, must not be used.

9 - Anti-freeze

To avoid personal injury :

- **When using anti-freeze, put on some protection such as rubber gloves (Anti-freeze contains poison).**
- **If should drink anti-freeze, throw up at once and take medical attention.**
- **When anti-freeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different types of antifreeze. The mixture can produce chemical reaction causing harmful substances.**
- **Anti-freeze is extremely flammable and explosive under certain conditions. Keep fire and children away from anti-freeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour waste onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of anti-free.**

Coolant

N.B.-:-THE ENGINE FITTED IN YOUR HAULOTTE® MACHINE MUST OPERATE WITH A 1:1 SOLUTION OF WATER AND GLYCOL. THIS CONCENTRATION ALLOWS THE NOX REDUCTION SYSTEM TO OPERATE CORRECTLY IN ENVIRONMENTS WHERE THE TEMPERATURES ARE HIGH.

Glycol in the coolant helps to provide protection against the following conditions :

- Boiling
- Freezing
- Cavitation of the water pump

Coolant service life

Coolant type	Service life [1]. [2].
Recommended : Extended Life Coolant	Every 6000 hours of operation (or every 3 years)
Commercial heavy-duty antifreeze that meets ASTM D6210	Every 3000 hours of operation (or every 2 years)
Water and commercial SCA inhibitor	Every 3000 hours of operation (or once a year)

1. Use the interval that occurs first
2. The cooling system must also be flushed out at this time

10 - Carriage and storage

10.1 - CARRIAGE

To avoid personal injury :
• Fix the engine securely not to fall during operation.

• Do not stand near or under the engine while carrying it.

• The engine is heavy. In handling it, be very alert not to get your hands and body caught in.

1. Use carrier such as crane when carrying the engine, or hurt your waist and yourself. Support the engine securely with rope not to fall while carrying it.
2. When lifting the engine, put the hook securely to metal fittings attached to the engine. Use strong hook and fittings enough to hang the engine.

10.2 - STORAGE

To avoid personal injury :
• Do not clean the machine with engine running.

• To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.

• When storing the engine just after running, let the engine cool off.

Before storing the engine for more than a few months, remove any dirt on the machine, and :

1. Drain the coolant in the radiator. Open the cock at the bottom of the radiator, and remove the pressure cap to drain water completely. Leave the cock open. Hang a note written "No water" on the pressure cap. Since water may freeze when the temperature drops below 0°C (32°F), it is very important that no water is left in the machine.
2. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
3. Check all the bolts and nuts, and tighten if necessary.
4. Remove the battery from the engine, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
5. When the engine is not used for a long period of time, run it for about 10 minutes under no load every 2 to 3 months to keep it free from rust. If the engine is stored without any running, moisture in the air may condense into dew over the sliding parts of the engine, resulting in rust there.
6. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valve works smoothly before starting the engine.
7. Store the engine in a flat place and remove the key from engine.
8. Do not store the engine in a place where has flammable materials such as dry grass or straw.
9. When covering the engine for storage, let engine and muffler cool off completely.
10. Operate the engine after checking and repairing damaged wirings or pipes, and clearing flammable materials carried by mouse.

11 - Troubleshooting

Do not carry out any checks or operations on the engine when it is running.

The table below provides a complete list of diagnostic codes that may be triggered by the engine Electronic Control Module (ECM) :

Number of flashs code	Fault indicated	Engine shutdown	Solution
1	Unit not calibrated	Yes	• ECM requires calibration.
2	Excessive engine speed	Yes	• Check overspeed parameter setting. • Check electrical interference. • Check wiring and connections. • Check ECM ground connections. • Check actuator connections and fitment.
3	Engine speed unusually low	Yes	• Check parameter settings. • Check actuator connections and fitment. • Check machine loading upon engine.
4	Engine protection input triggered	Yes	• Check parameter settings. • Check engine protection inputs. • Check engine protection run time setting.
5	Factory calibration lost	Yes	• Reload calibration file. • Contact distributor.
8	ECM failure	Yes	• Check wiring, shielding and ECM connections. • Cycle ignition key. • Check electrical interference. • Consult distributor.
9	Excessive actuator current limiting	No	• Check actuator wiring. • Check actuator fitment. • Check parameter settings.
10	No engine speed signal	Yes - No start	• Check speed pick up fitment. • Check speed pick up wiring. • Check electrical interference on pick up sensor and wiring. • Check contamination on sensor.
14	Actuator disconnected or open circuit	Yes	• Check actuator wiring. • Check actuator fitment. • Check electrical interference. • Check actuator resistance (less than 10 ohms).

The flash code is displayed on ECM

Marking (1) : FLASH

Notes

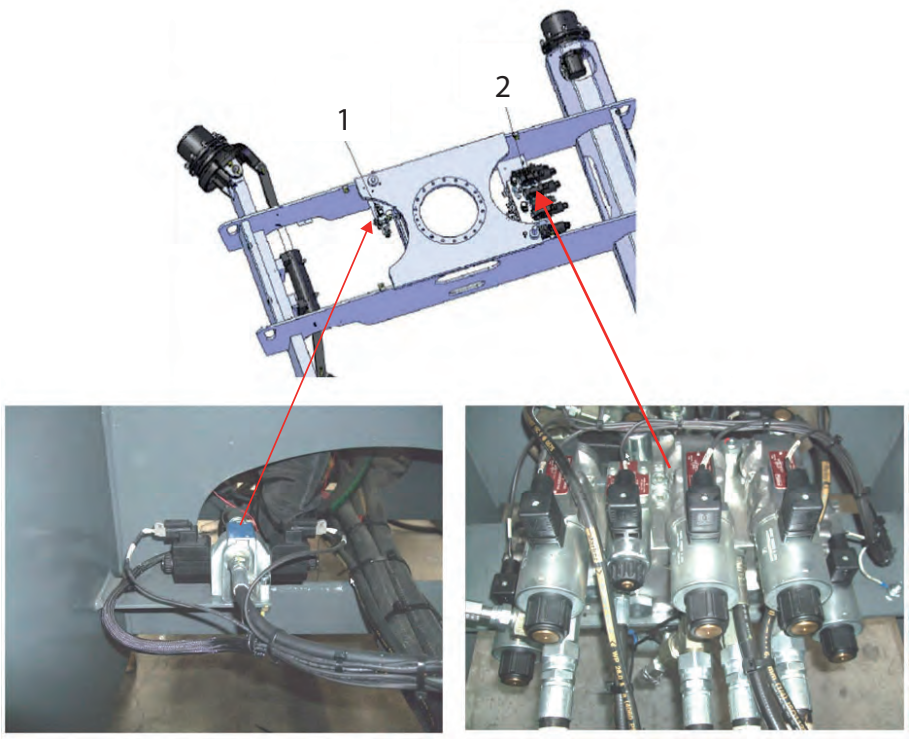
1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

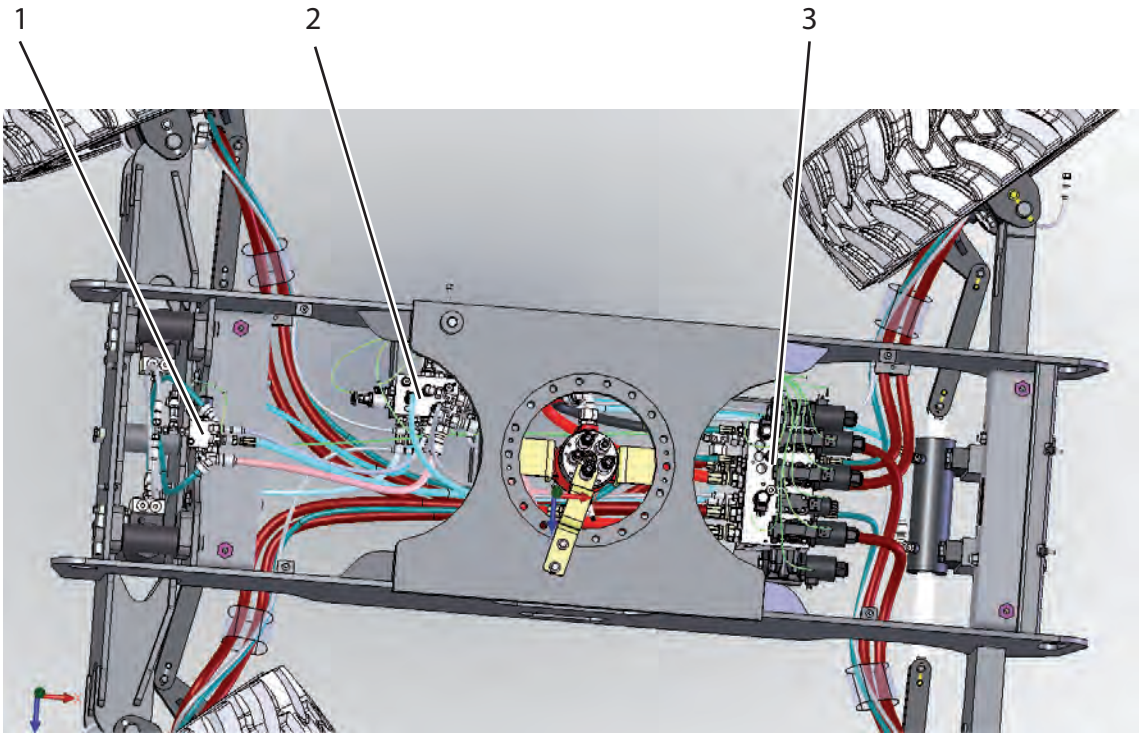
2 - Localization of hydraulic blocks in the chassis

2.1 - CHASSIS HA16RTJ (RIGID CHASSIS + STEERING AXLE)



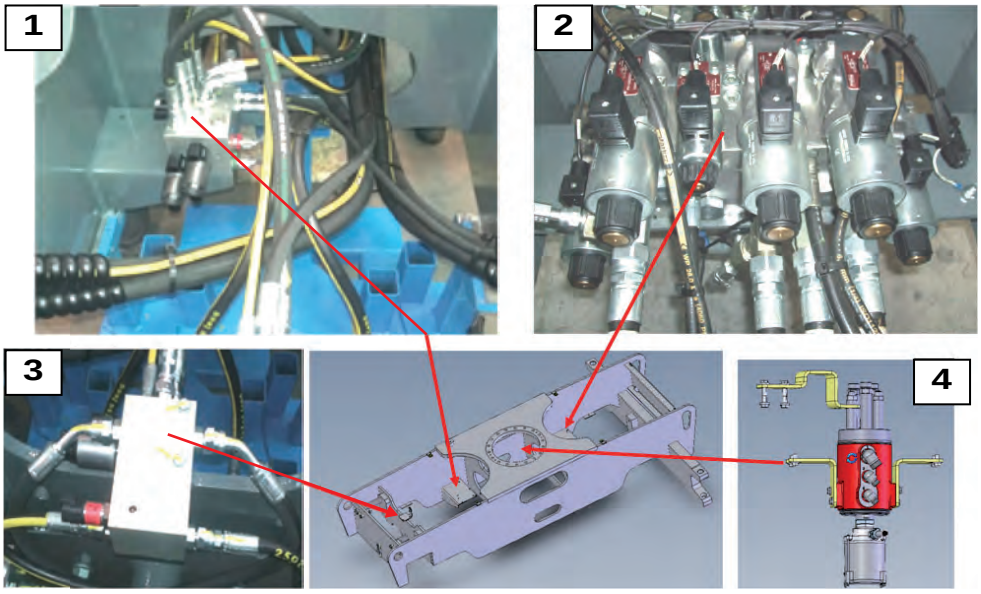
Marking	Description
1	Steering unit
2	Drive unit

2.2 - CHASSIS HA16RTJO - HA46RTJO (FRONT STEERING AND OSCILLATING AXLE)



Marking	Description
1	Oscillating axle locking block
2	Steering unit
3	Drive unit

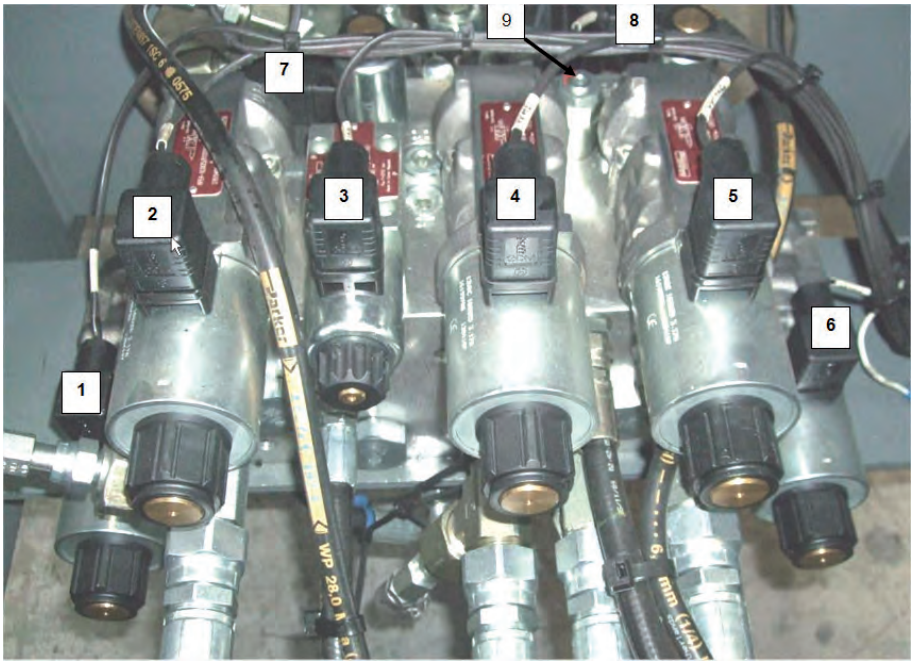
2.3 - CHÂSSIS HA16RTJ PRO - HA46RTJ PRO (FRONT STEERING AXLE 2 + STEERING AXLE + REVOLVING JOINT + SLIP RING)



Marking	Description
1	Steering unit
2	Drive unit
3	Oscillating axle locking block
4	Revolving joint and Slip ring

3 - Drive unit

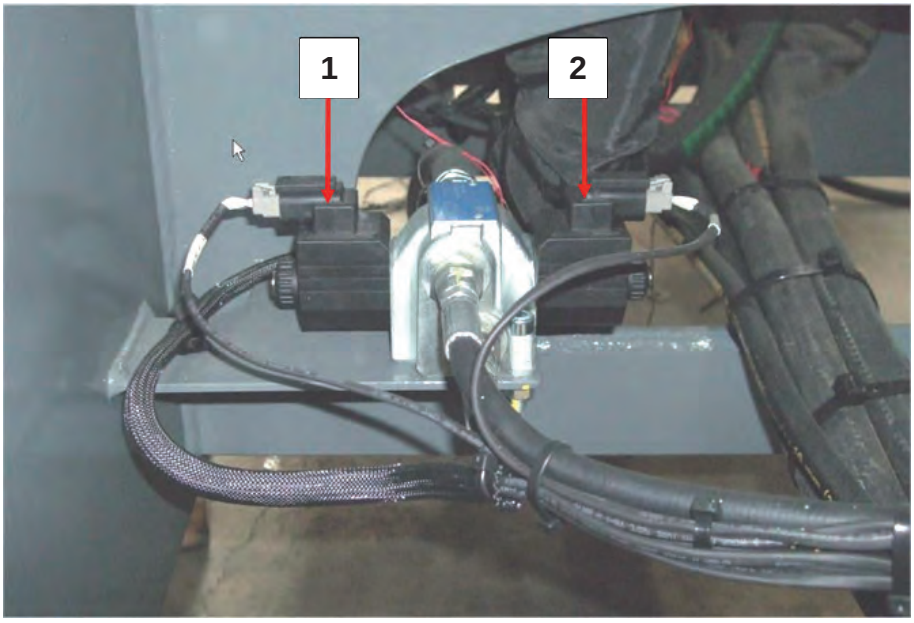
3.1 - DISTRIBUTORS IDENTIFICATION



Marking	Name	Function
1	YV113	Micro drive speed - High speed 2
2	YV114	Micro drive speed - High speed 3
3	YV100	Differential lock
4	YV115	Micro drive speed - High speed 4
5	YV110	High speed drive 1
6	YV112	Micro drive speed - High speed 1
7	YV111	High speed drive 2
8	YV102	Brake release
9		Pressure relief valve 100 b

4 - Steering unit HA16RTJ - HA16RTJO - HA46RTJO

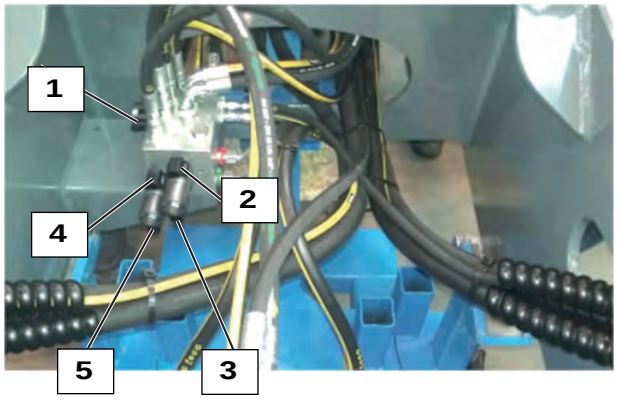
4.1 - IDENTIFICATION OF THE COILS

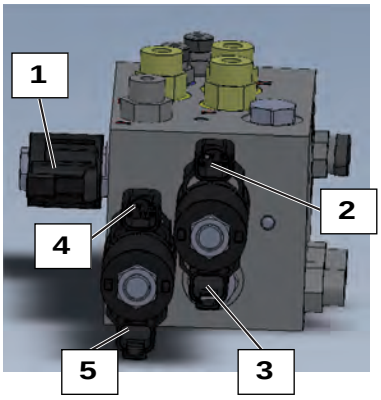


Marking	Name	Function
1	YV150L	Left side steering
2	YV150R	Right side steering

5 - Steering unit HA16RTJ PRO - HA46RTJ PRO

5.1 - IDENTIFICATION OF THE COILS

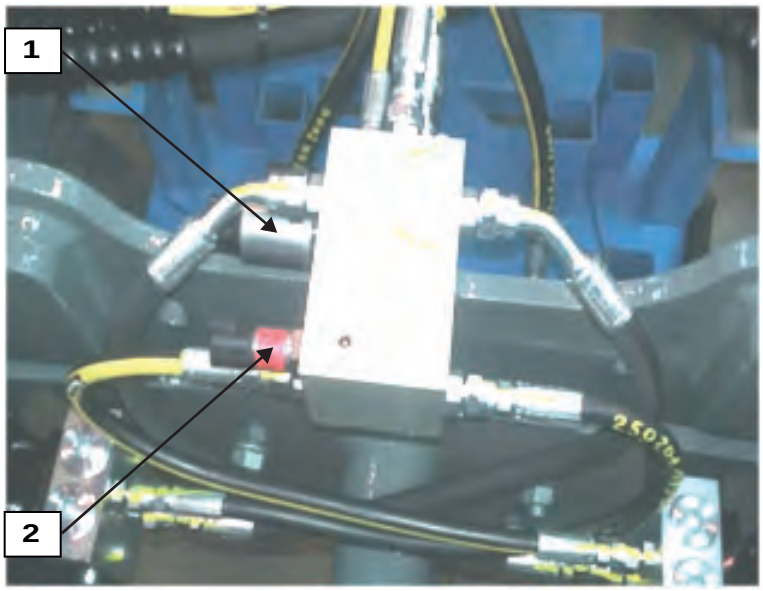




Marking	Name	Function
1	YV105	If tilt exceed 5° and crab steering control or Sync enabled steering and without driving control, rear axle remains braked. YV105 = 0
2	YV107	Crab steering control
3	YV108	Sync steering control
4	YV150L	Left steering
5	YV150R	Right steering

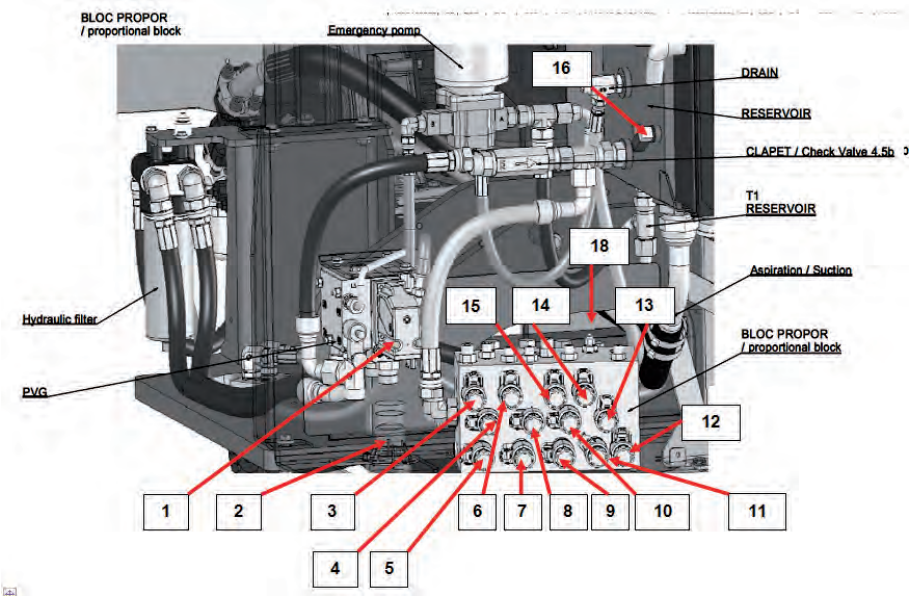
6 - Oscillating axle locking block HA16RTJ O / PRO - HA46RTJ O / PRO

6.1 - IDENTIFICATION OF THE COILS

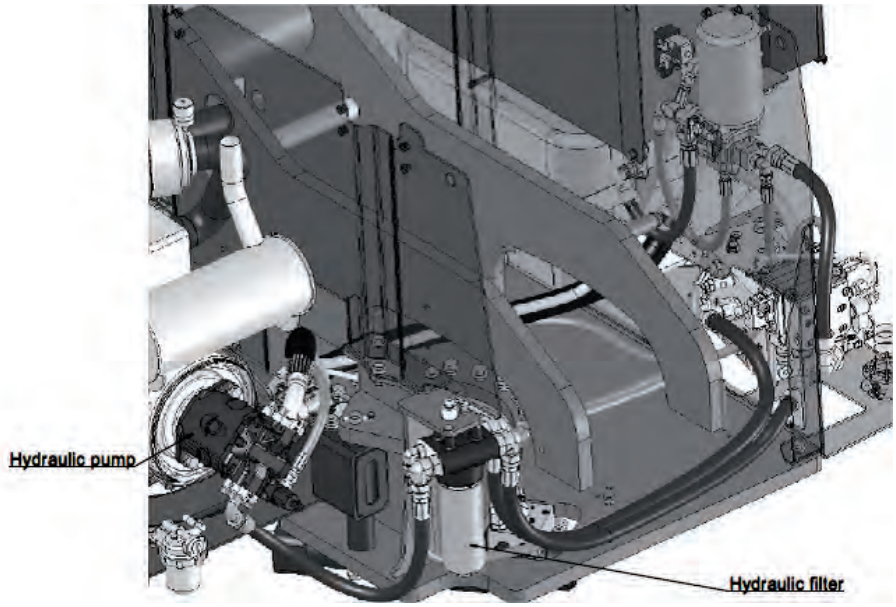


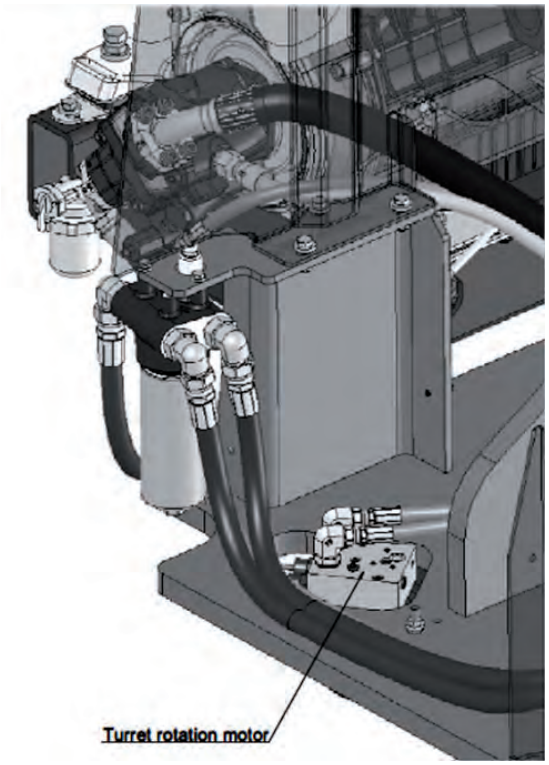
Marking	Name	Function
1	YV101	Oscillating axle lock (YV101 = 1 if driving ongoing and machine folded)
2	SP109	Analog pressure sensor : • If pressure > 10 bar, the information transmitted to the module is: unlocked axle • If pressure < 4 bar, the information transmitted to the module is: locked axle

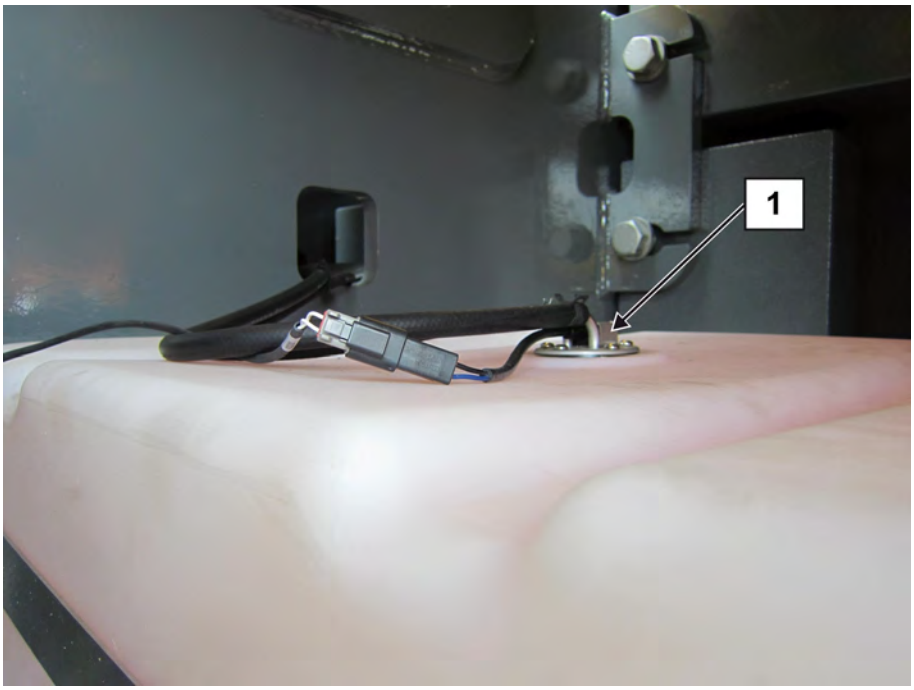
7 - Location of the turntable components



Marking	Name	Function
1	YV160	Driving
2	SQ800	Tilt sensor
3	YV420U	Arm lift up
4	YV420D	Arm lowers
5	YV420	Arm lifting PWM
6	YV520U	Boom lift up
7	YV520	PWM boom raising
8	YV520D	Boom lowering
9	YV530	Boom télescoping PWM
10	YV530I	To extend the boom out
11	YV250	Turntable orientation PWM
12	YV900	Upper movement and steering PWM
13	YV250R	Right turntable rotation
14	YV250L	Left turntable rotation
15	YV530O	To extend the boom out
16	ST900	Hydraulic oil temperature probe
17	YV800	LS valve
18		Relief valve 100 bar on turntable rotation


Hydraulic pump
Hydraulic filter

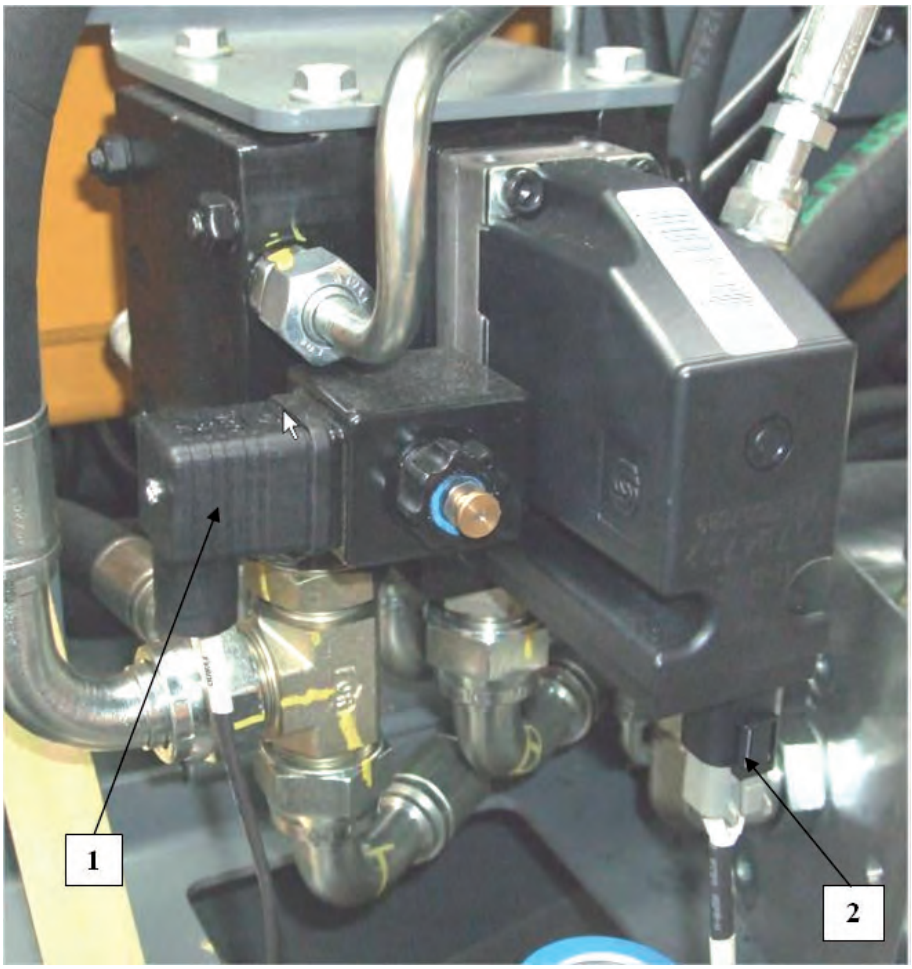

Turret rotation motor



Marking	Name	Function
1	SL300	The input signal resistance should move from 20 ohms (tank full) to 200 ohms (tank level low) when the fuel level decreases.

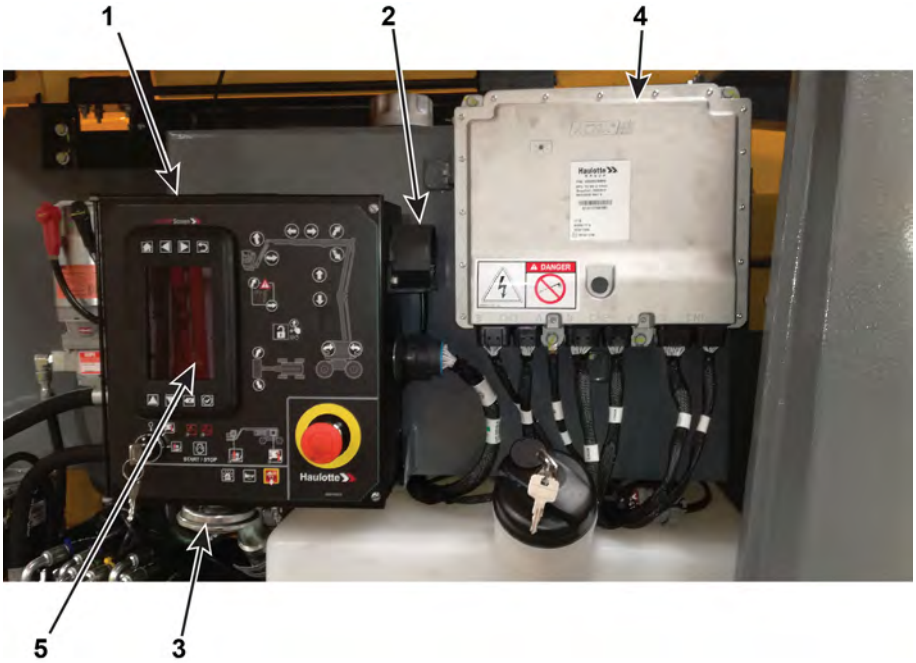
8 - Unit PVG

8.1 - IDENTIFICATION OF THE COILS



Marking	Name	Function
1	YV800	LS valve
2	YV160	Driving coil

9 - Ground control box and SPU



Marking	Name	Function
1		Turntable box
2	HA901	Buzzer est active if : • Overload active : BuzzerTon = 600 ms / BuzzerToff = 720 ms • Slope actif : BuzzerTon = 1 (Continuous activation, 2 tons) • Hydraulic oil temperature > 80° - ST125=OFF -> BuzzerTon = 320 ms / BuzzerToff = 360 ms • If the buzzer option is OFF , no buzzer with movements • If the buzzer option is «DESCENT», the buzzer sounds in descent - BuzzerTon = 600 ms / BuzzerToff = 720 ms • If the buzzer option is MOVEMENTS, the buzzer sounds with movements (excepted drive and steering) - BuzzerTon = 600 ms / BuzzerToff = 720 ms • If the buzzer option is DRIVE, the buzzer sounds with drive and steer - BuzzerTon = 600 ms / BuzzerToff = 720 ms • If the buzzer option is DRIVE + MOVEMENTS, the buzzer is active for any movement including drive and steer - BuzzerTon = 600 ms / BuzzerToff = 720 ms
3	HA907	Horn
4	U106	SPU module
5	U101	Multifunction display

Notes

10 - Ground control box details

Marking	Name	Description	Function
1	SA720U	Platform tilt control	By pressing on : Tilt the platform towards the front of the machine
	SA720D		By pressing on : Tilt the platform towards the back of the machine
2	SA620U	Jib lifting / lowering switch [1]	By pressing on : Jib lifting
	SA620D		By pressing on : Jib lowering
3	SA530O	Boom telescoping switch	By pressing on : Boom extend
	SA530I		By pressing on : Boom in
4	SA520U	Boom raising switch	By pressing on : Boom raising
	SA520D		By pressing on : Boom lowering
5	SA420U	Arm lifting switch	By pressing on : Arm raises
	SA420D		By pressing on : Arm lowers
6	SB800	Enable Switch / Back-up unit selector	By pressing on : • Validation of controls when engine started • automatic switching of emergency electropump if the engine is stopped
7	SA250L	Turntable rotation switch	By pressing on : Counter clockwise (CCW) rotation
	SA250R		By pressing on : Clockwise (CW) rotation
8	SA750L	Platform rotation switch	By pressing on : Clockwise (CW) rotation
	SA750R		By pressing on : Counter clockwise (CCW) rotation
9	SB801	E-stop button	Pulled out : Ground control box energized Pushed in (activated) : De-energizes control system
10	HL905	Indicator of the ground control box selection	LED lights up - ground control box icon

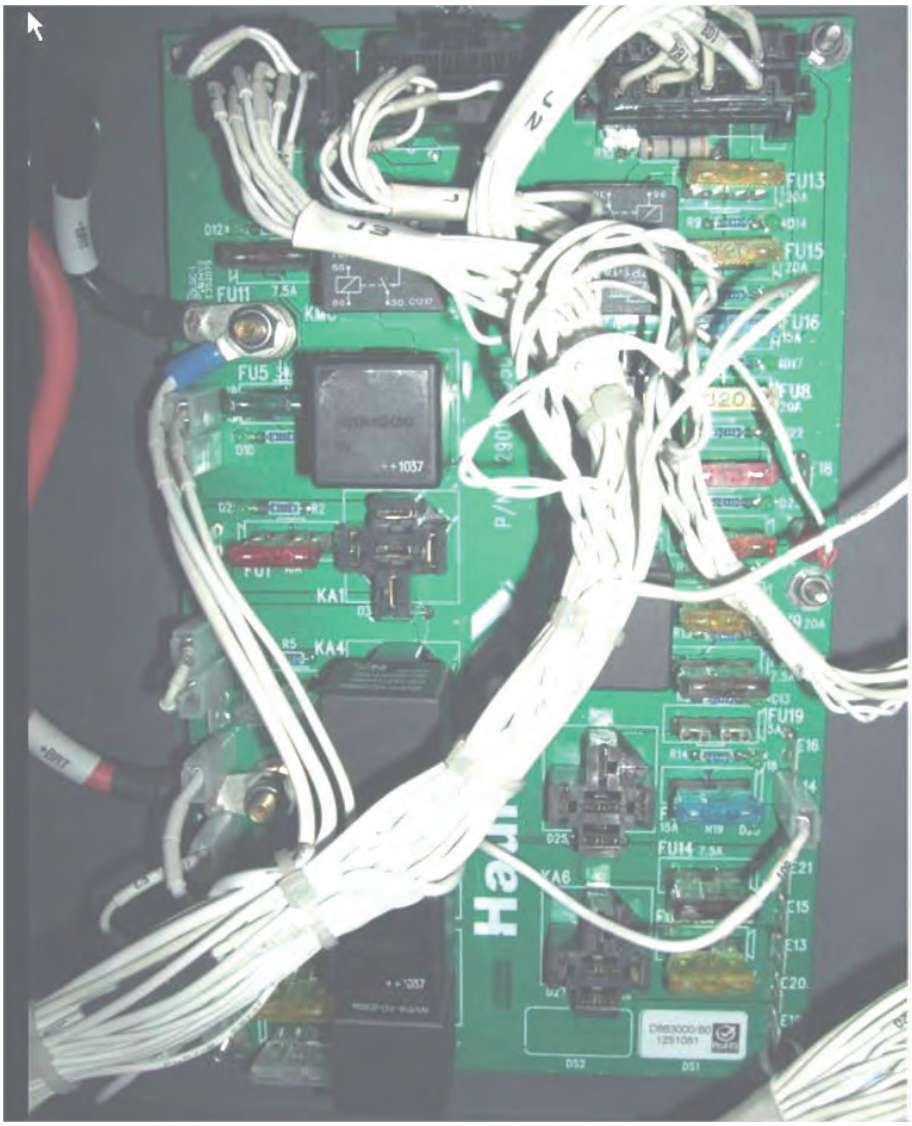
Marking	Name	Description	Function
11	SA801	"Overriding system" control	By pressing on : Authorize movements from the ground control box in case of overload (Use ONLY in case of emergency)
12	SB807	Horn button	By pressing on : Horn activation
13	HL906	Indicator of the platform control box selection	LED lights up - platform control box icon
14	SA903	Beacon light on/off	By pressing on : Beacon light ON / OFF
15	HL909	Overload indicator / Fault	Alarm icon : • Is ON at power up of the machine, at the same time as the icon (19) Is blinking if overriding is active : • An active or detected failure is displayed on on-board screen • Or Hydraulic oil temperature icon is active on on-board screen • Or Engine pressure icon is active on on-board screen • Or Engine stop icon is active on on-board screen • Or Overload machine status is active on on-board screen
16	SA303	Engine start-up selector	By pressing on : Engine start / stop
17	SA300	Propane Gas supply[2]	By pressing on : Propane Gas supply selection
18	SA305	Petrol/Gasoline or diesel supply[3]	By pressing on : Fuel supply selection
19	HL908	Engine warning indicator / Engine pre-heating	Alarm icon : • Is ON at power up of the machine at the same time as the icon (15) Is blinking if overriding is active Warning icon is ON if : • Engine warning icon is active on on-board screen • Or Tilt machine status is active on on-board screen • Or Engine is pre-heating
20	SA600F	DPF regeneration inhibited[4]	By pressing on : Refusal of the request for regeneration
21	SA600D	DPF regeneration required[5]	By pressing on : Regeneration start-up

Marking	Name	Description	Function
22	SA900	Control box activation key switch	: De-energizes control system
			: Platform control box energized
			: Ground control box energized
23		Activ'Screen 2	

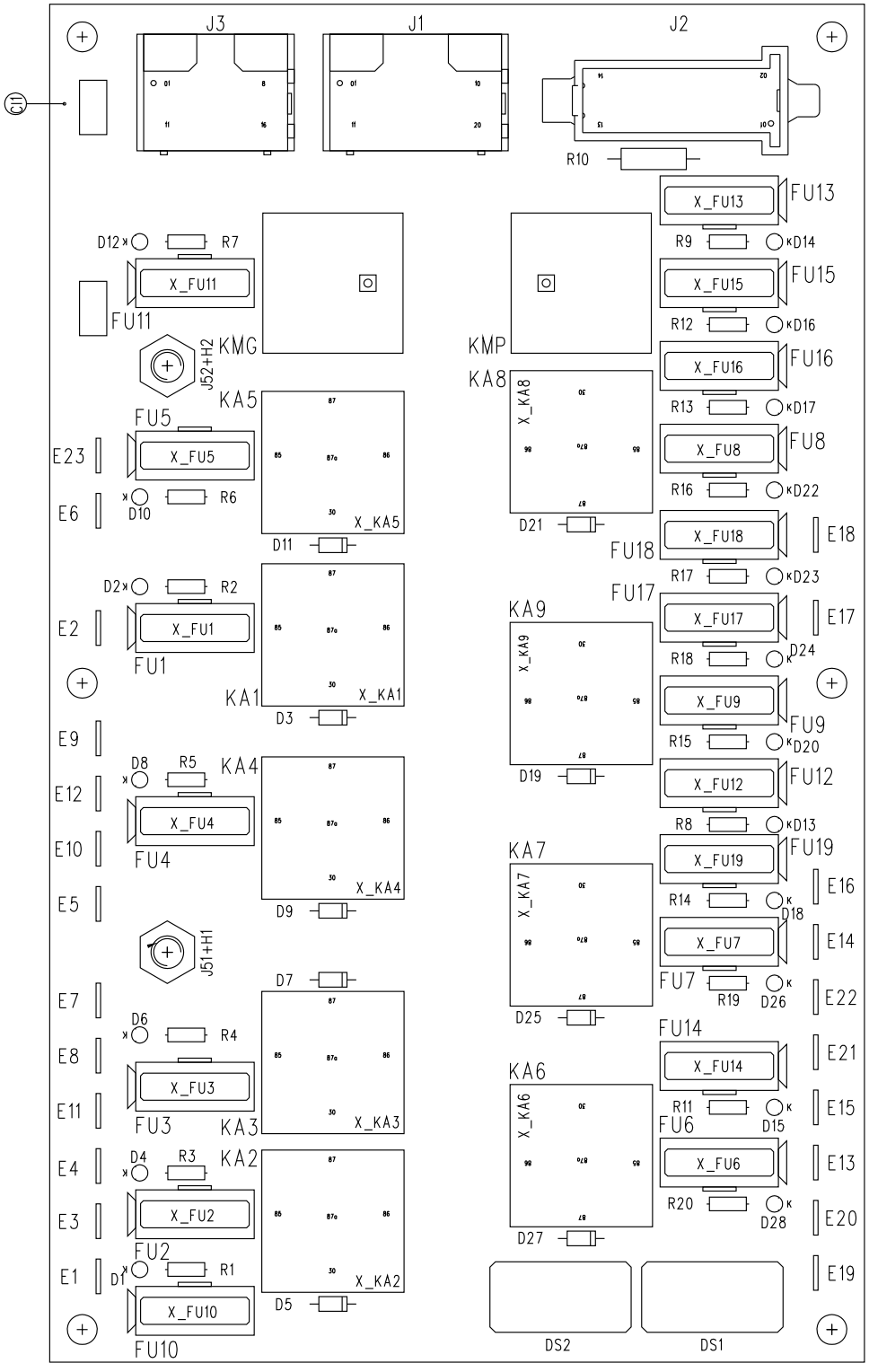
1. For machines fitted with
2. For machines fitted with
3. For machines fitted with
4. For machines fitted with
5. For machines fitted with

11 - PCB inside the ground control box

11.1 - PHOTO

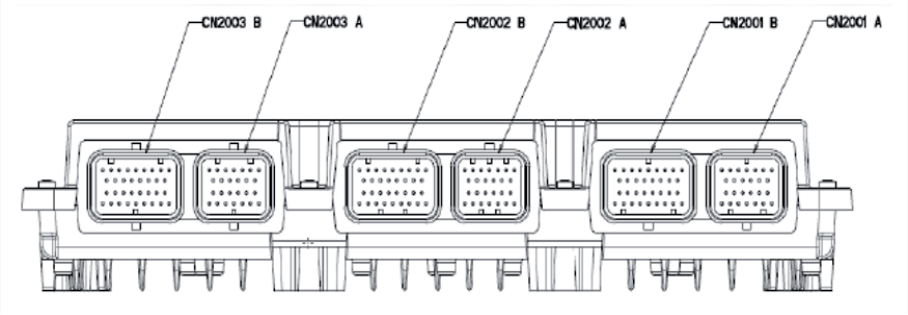


11.2 - DETAILS

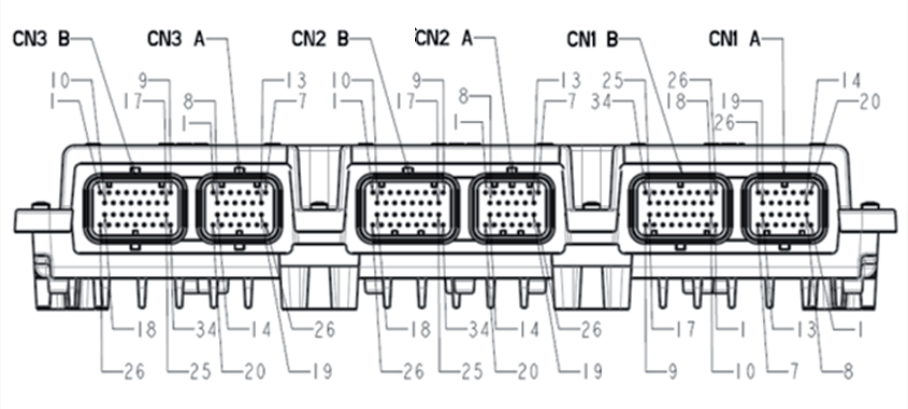

J3
J1
J2
R10
X_FU13
FU13
R9
D14
X_FU15
FU15
R12
D16
X_FU16
FU16
R13
D17
X_FU8
FU8
R16
D22
X_FU18
FU18
R17
D23
X_FU17
FU17
R18
D24
X_FU9
FU9
R15
D20
X_FU12
FU12
R8
D13
X_FU19
FU19
R14
D18
X_FU7
FU7
R19
D26
X_FU14
FU14
R11
D15
X_FU6
FU6
R20
D28
D12
R7
X_FU11
FU11
KMG
J52+H2
KMP
KA8
X_KA8
D21
KA5
FU5
X_FU5
E23
E6
D10
R6
X_KA5
D11
D2
R2
X_FU1
FU1
KA1
X_KA1
D3
KA9
X_KA9
D19
E2
E9
E12
E10
E5
D8
R5
KA4
X_FU4
FU4
X_KA4
D9
J51+H1
KA7
X_KA7
D25
E7
E8
E11
E4
E3
E1
D6
R4
X_FU3
FU3
KA3
X_KA3
D7
D4
R3
KA2
X_FU2
FU2
X_KA2
D5
D1
R1
X_FU10
FU10
KA6
X_KA6
D27
DS2
DS1
E18
E17
E16
E14
E22
E21
E15
E13
E20
E19

12 - SPU7066

12.1 - LOCATIONS

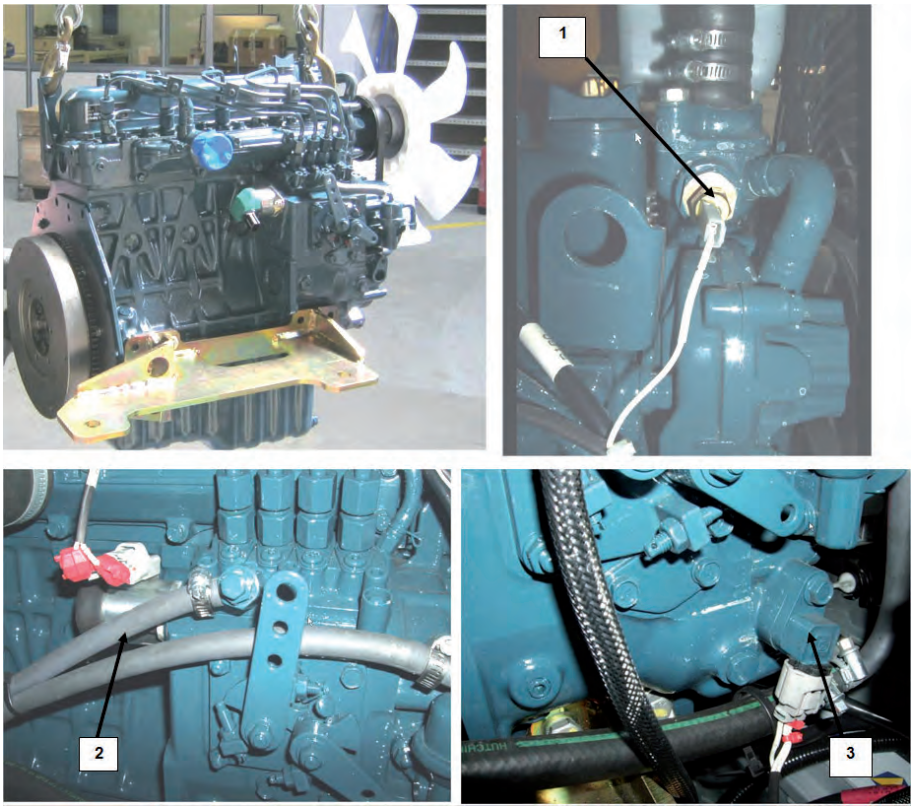


12.2 - DESCRIPTION

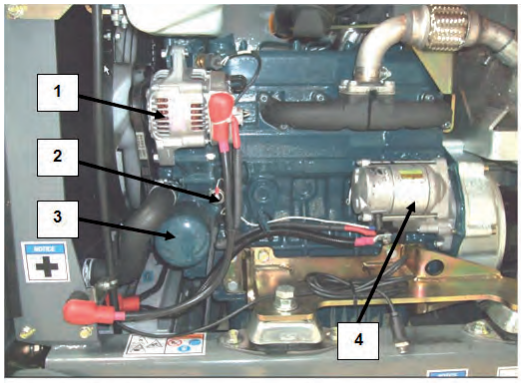


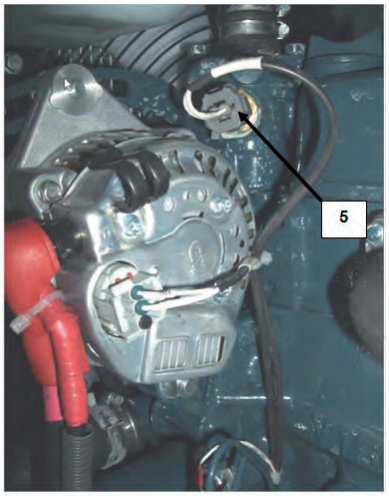
13 - Engine

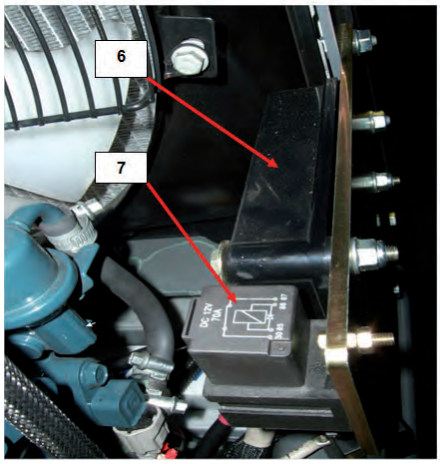
13.1 - KUBOTA V1505 ENGINE



Marking	Name	Function
1	ST300	Engine overheat
2	YA300	Motor speed control solenoid (including stop)
3	SV300	Engine speed sensor



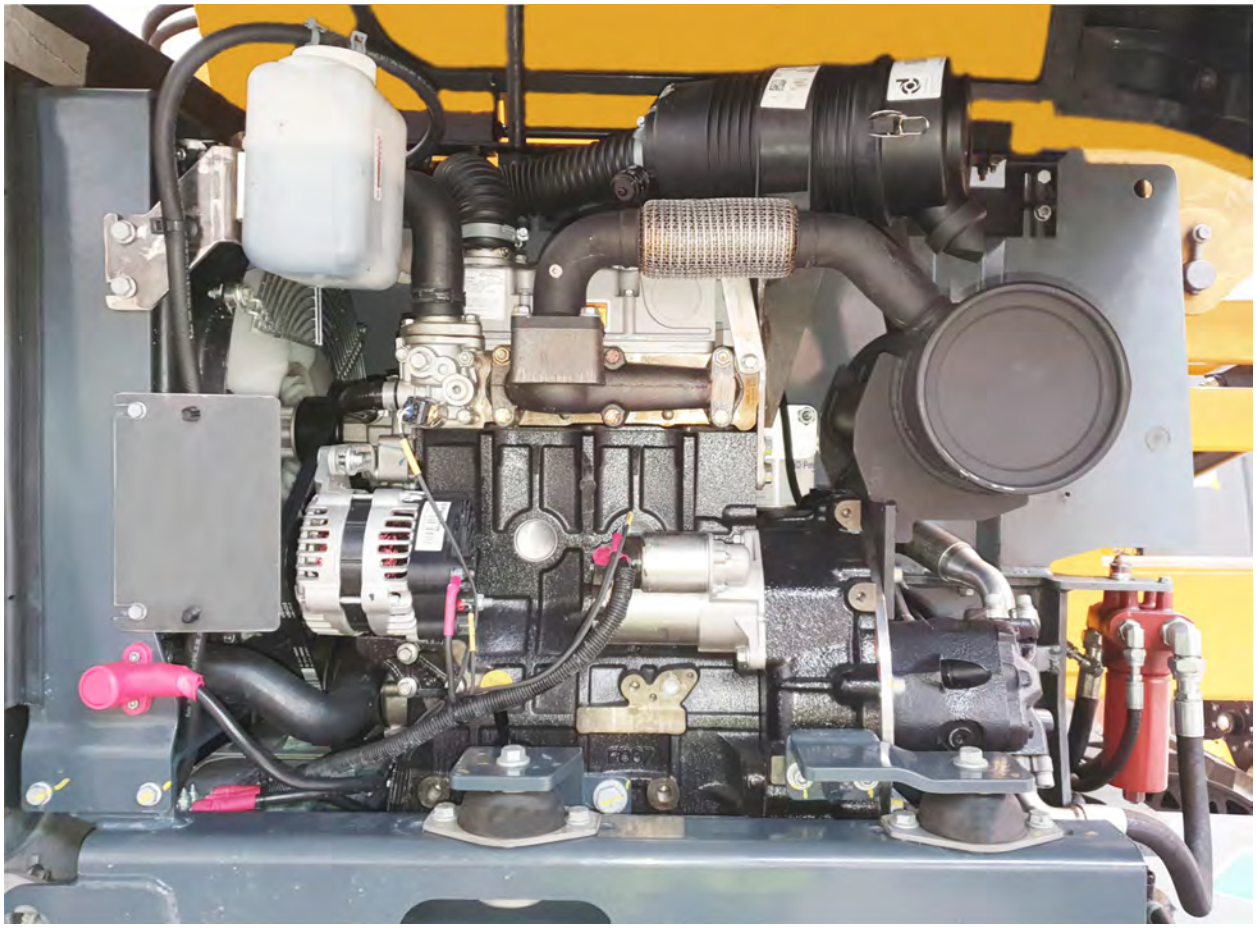


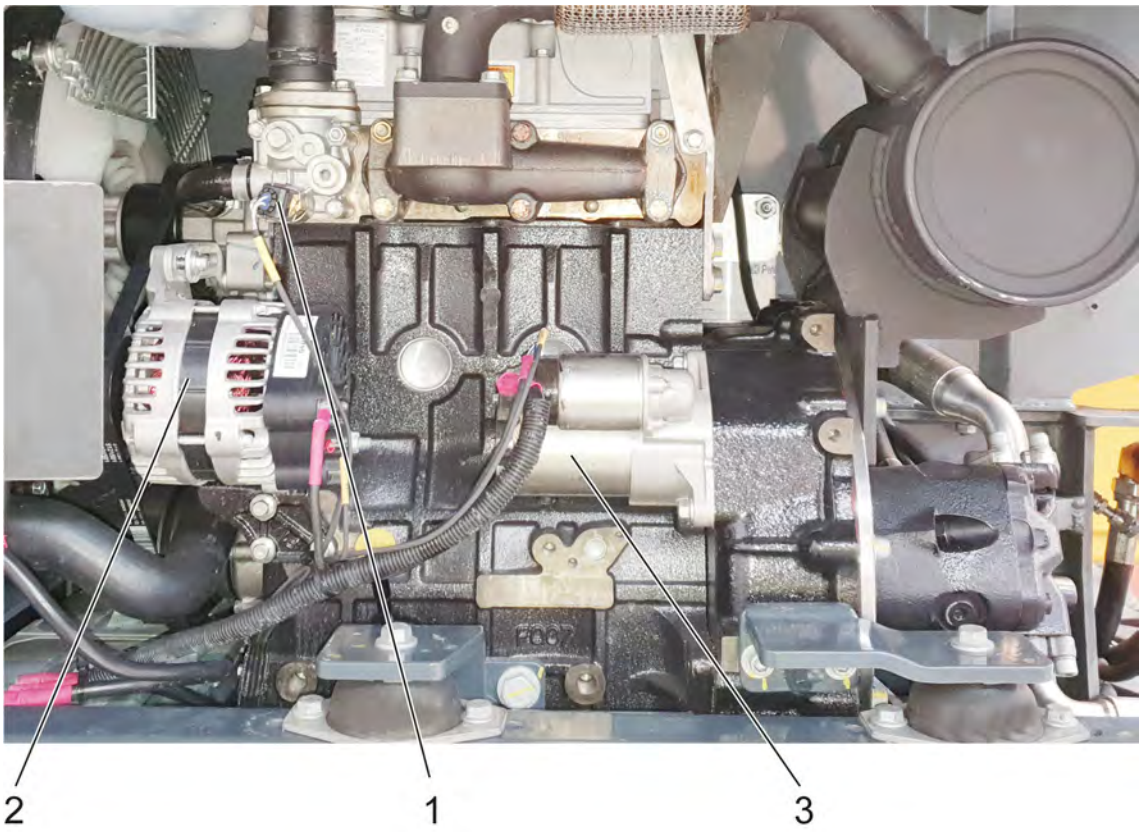


Marking	Name	Function
1		Alternator
2	SP300	Engine oil pressure switch
3		Engine oil filter
4	M300	Starter
5	ST302	Water temperature sensor
6	EGV D6	KUBOTA ECU module
7	KM160	Pre-heating relay control

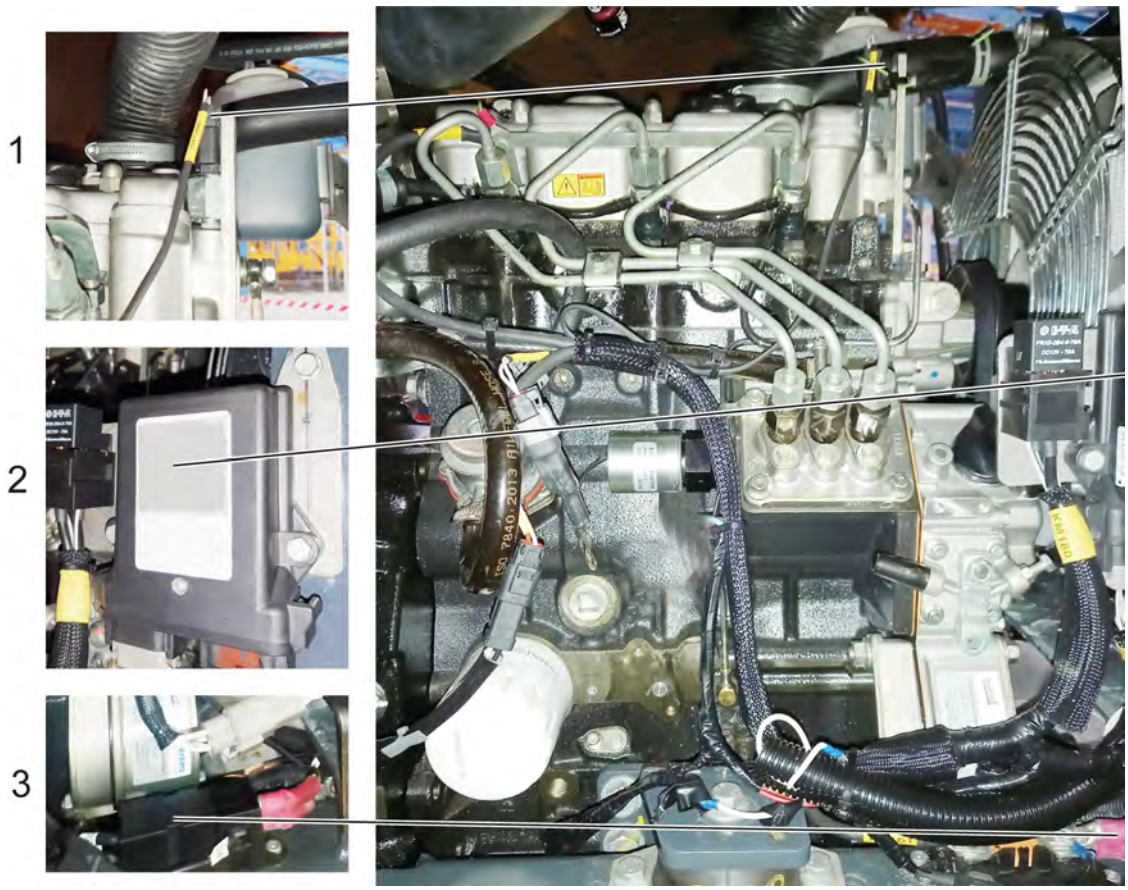
13.2 - PERKINS 403J-17 ENGINE

Overview

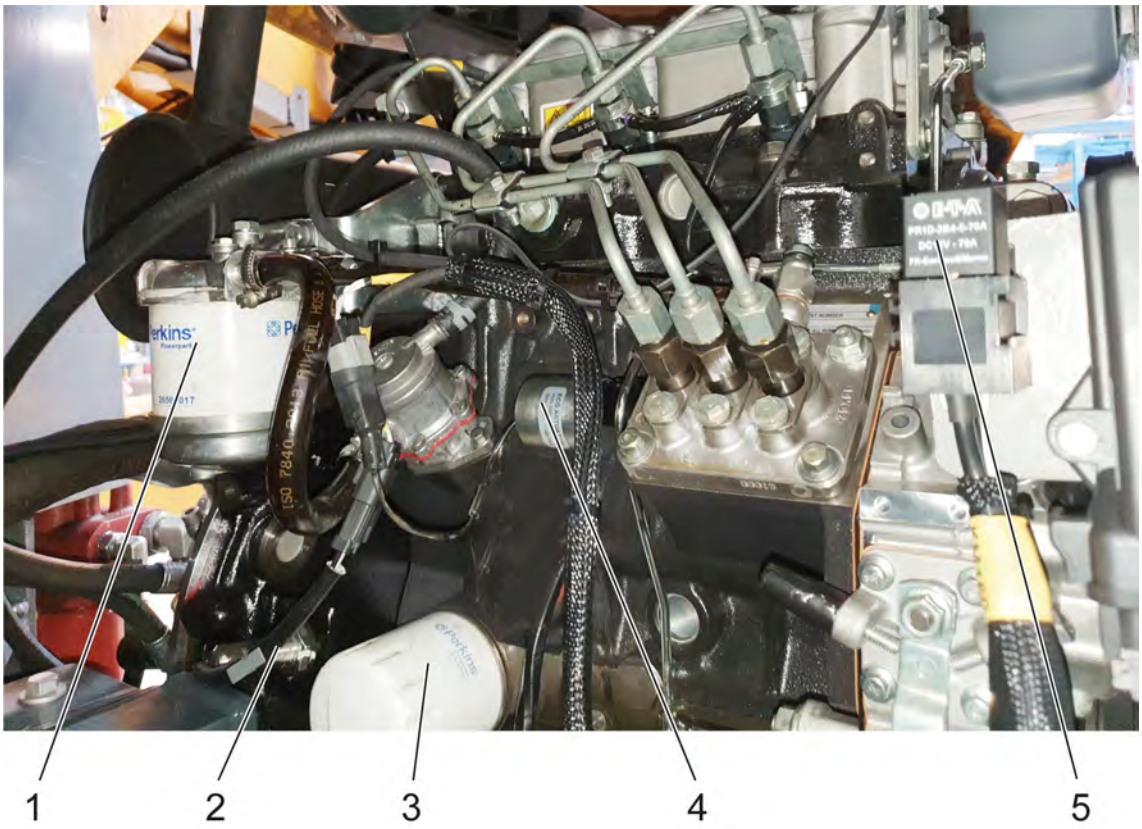




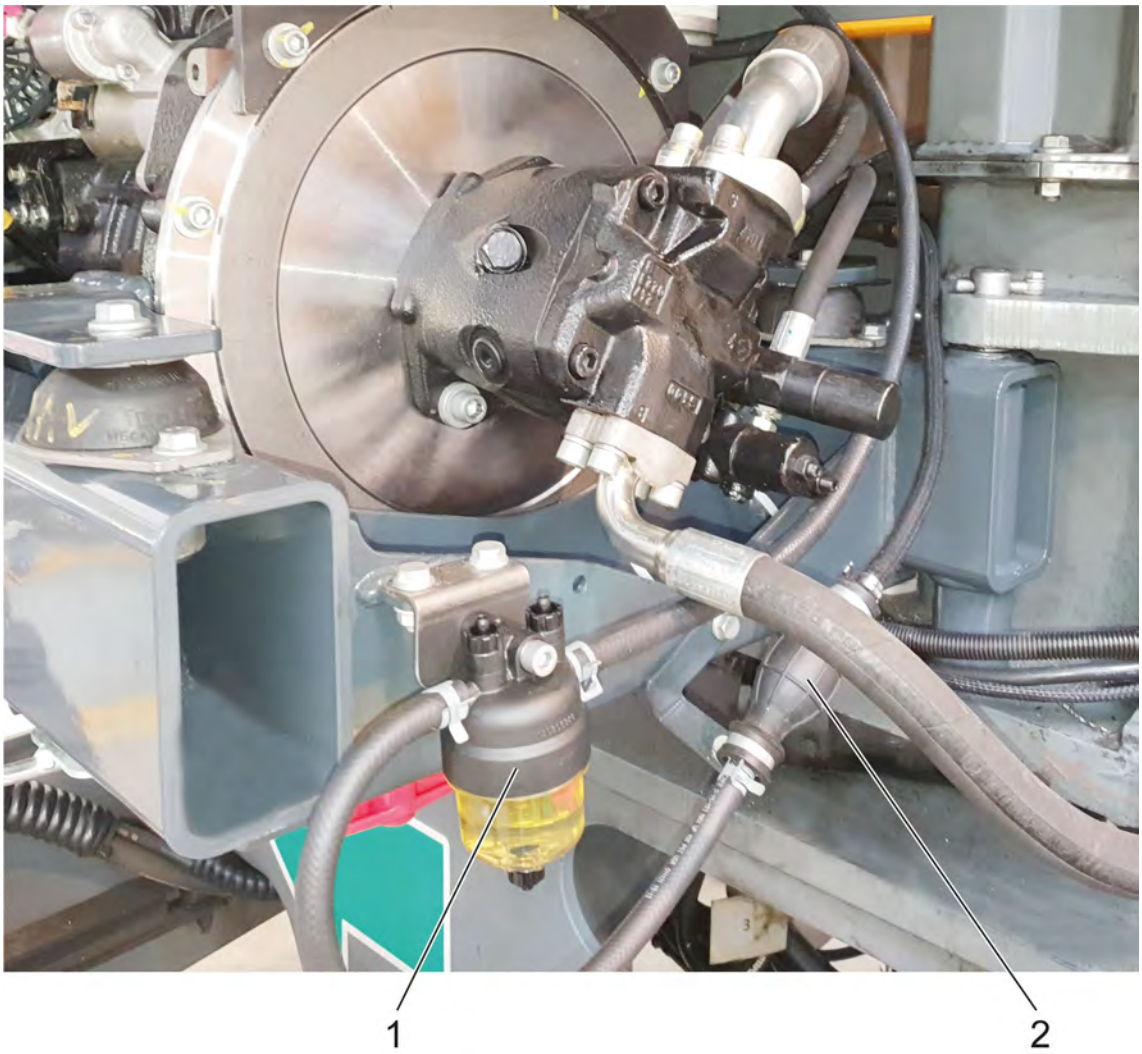
Marking	Item	Description
1	ST302	Sensor - Engine coolant temperature
2	ALT	Alternator
3	M300	Starter



Marking	Item	Description
1	SP300	Engine oil pressure sensor
2	ECM	Electronic Control Module - PERKINS
3	FU161	Preheating fuse

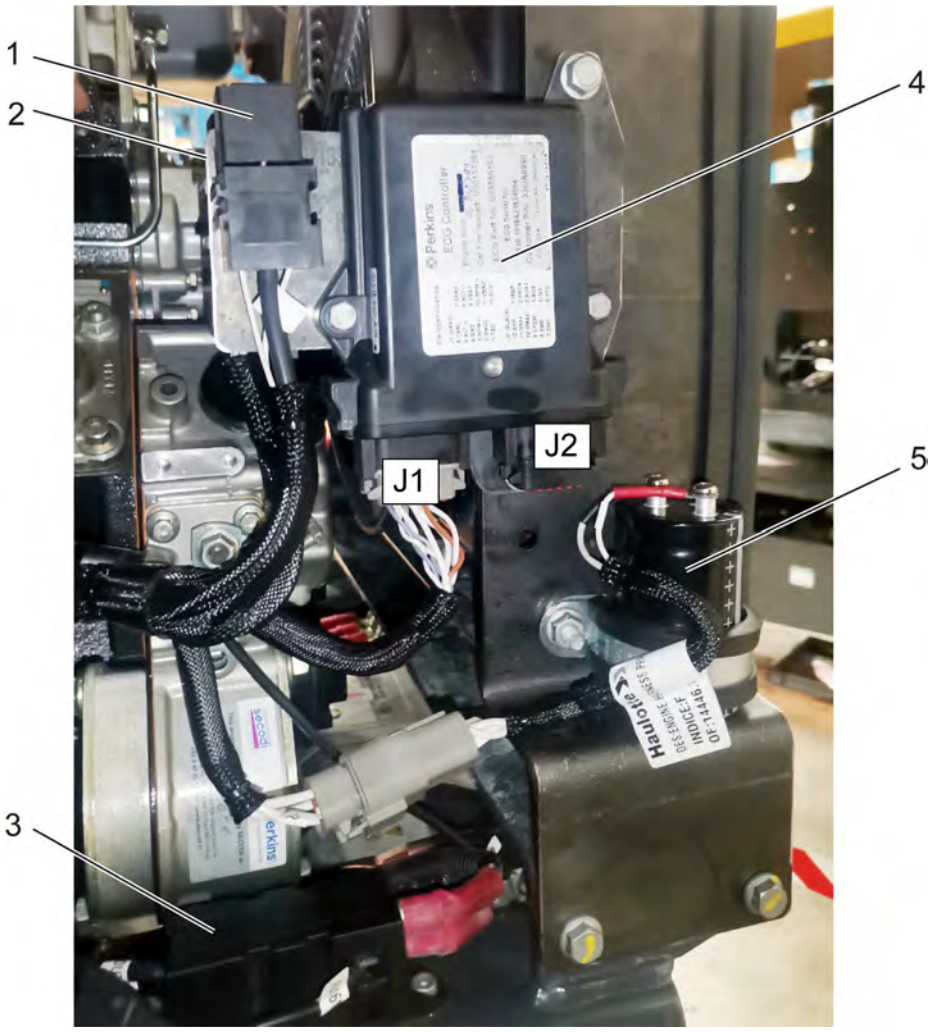


Marking	Item	Description
1		Fuel filter
2	SV300	Engine speed sensor
3		Oil filter
4	YA300	Accelerator coil
5	KM160	Preheating relay



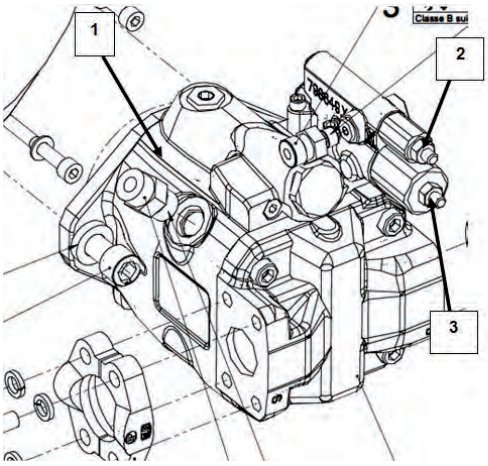
Marking	Item	Description
1		The fuel prefilter
2		Manual fuel priming pump

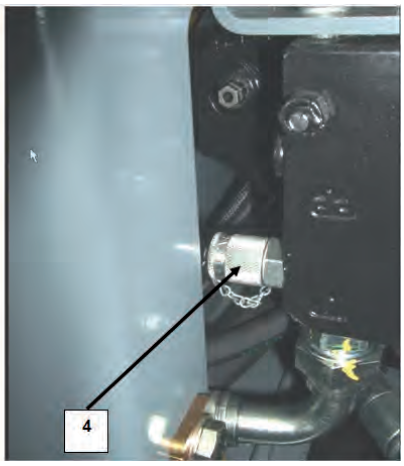
Location : ECM, Relays & Fuses



Marking	Item	Description
1	KM160	Preheating relay
2	K1	ECM supply relay
3	FU161	Preheating fuse
4	ECM	Electronic Control Module - PERKINS
5	C1	Capacitor

14 - Hydraulic pump





Marking	Function
1	Pump 21cc (0/-0,5cc)
2	LS 22b (+/-2b) adjustment
3	P max 240b (+/-5b) adjustment
4	Pressure reading

14.1 - TECHNICAL SPECIFICATIONS

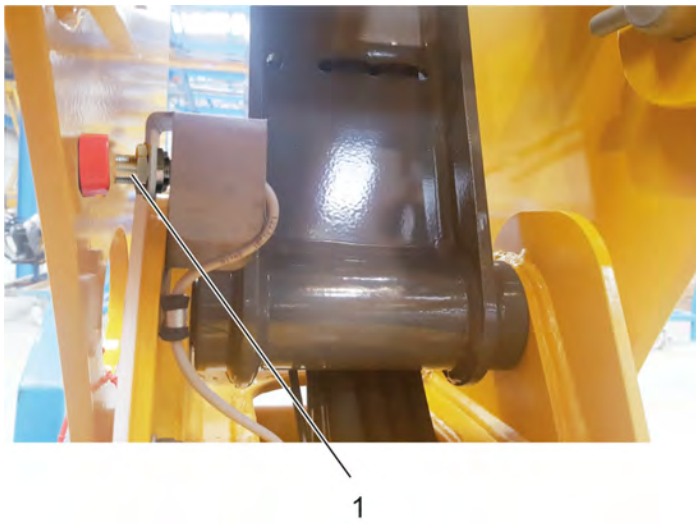
Max speed	3200 rpm
Max pressure setting	240b (+/-5b)
LS adjustment	22b (+/-2b)
Cubic capacity	21cc (0/-0,5cc)
Maximum flow rate	63l/mn - 3000tr/mn

15 - Recapitulation of pressures

Description	Pressure
General pressure:	240b (+/-5b)
LS adjustment	22b (+/-2b)
Pressure turret orientation	120b (+/-5b)
Boom lowering	130b (+/-5b)
Emergency pump	160b (+/-10b)

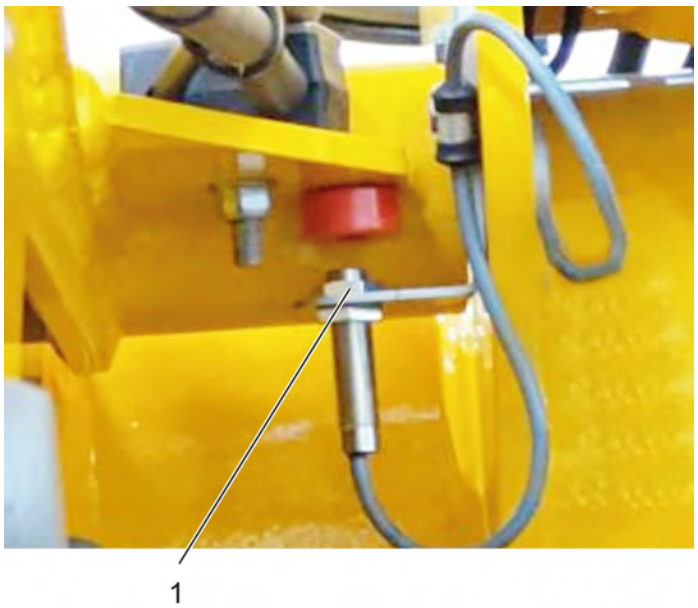
16 - Position of ILS sensors, arm, boom and telescop

16.1 - ARM SENSOR



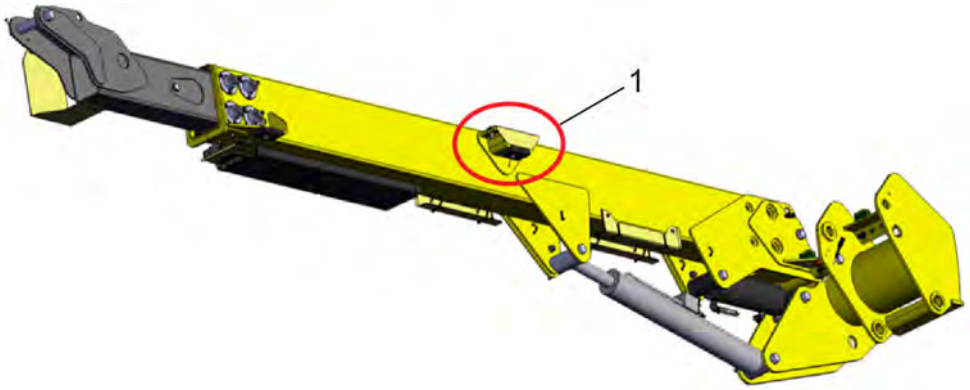
Marking	Name	Function
1	SQ421	Arm angle sensor ILS (SQ421 = 1 if arm folded)

16.2 - BOOM SENSOR



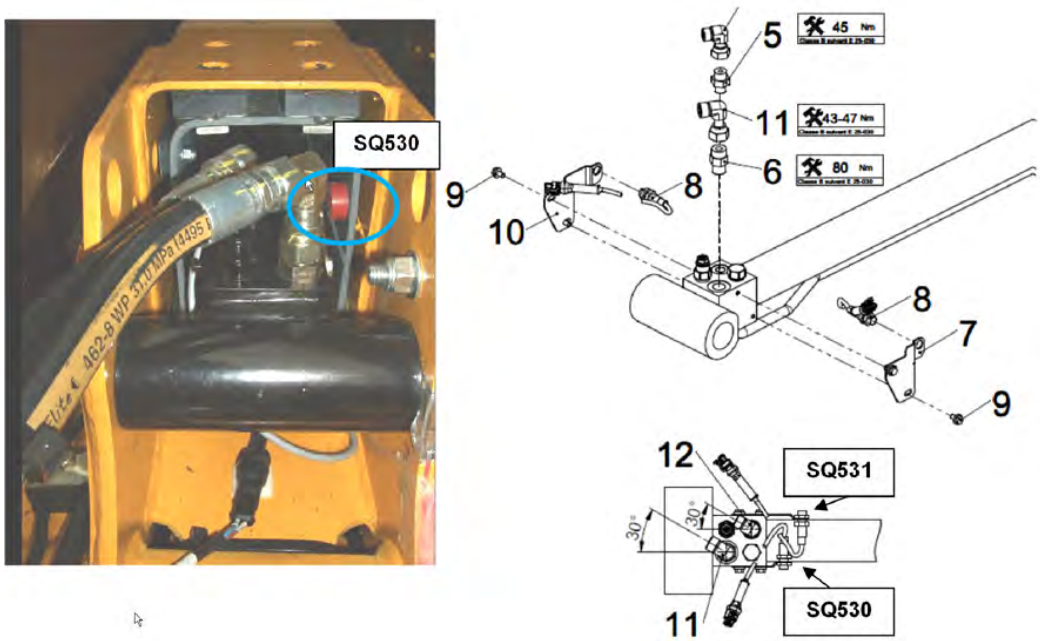
Marking	Name	Function
1	SQ520	ILS angle arm (SQ520 = 1 if boom folded)

16.3 - BOOM SENSOR (ONLY ON MACHINE WITH OSCILLATING AXLES HA16RTJPRO OR HA16RTJO)



Marking	Name	Function
1	SQ900	ILS angle arm (SQ900 = 1 if boom folded)

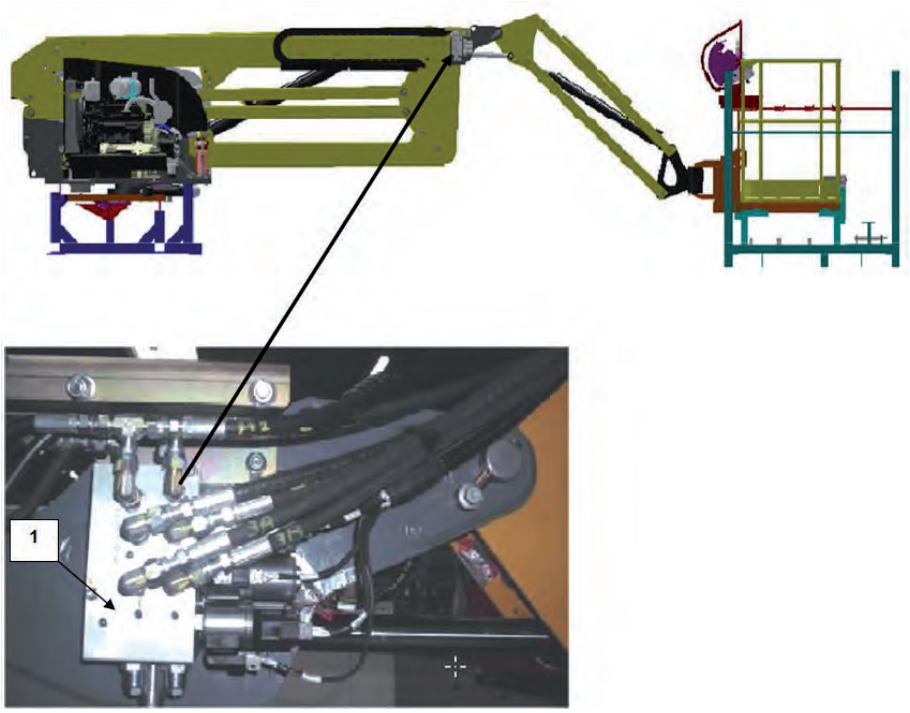
16.4 - SENSOR ON TELESCOP



Marking	Name	Function
1	SQ531	ILS telescop sensor only on machine with oscillating axles HA16RTJPRO (SQ531 = 1 if telescope retracted)
2	SQ530	ILS telescop sensor (SQ530 = 1 if telescope retracted)

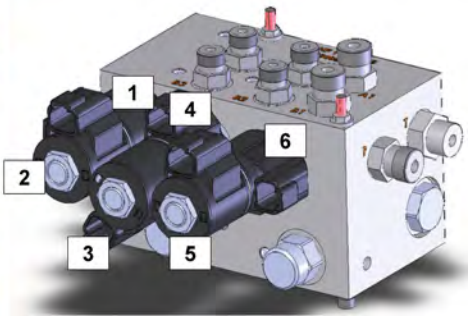
17 - Hydraulic block on/off

17.1 - LOCATIONS



Marking	Function
1	Hydraulic block on/off (Jib raising / lowering, compensation, cage rotation)

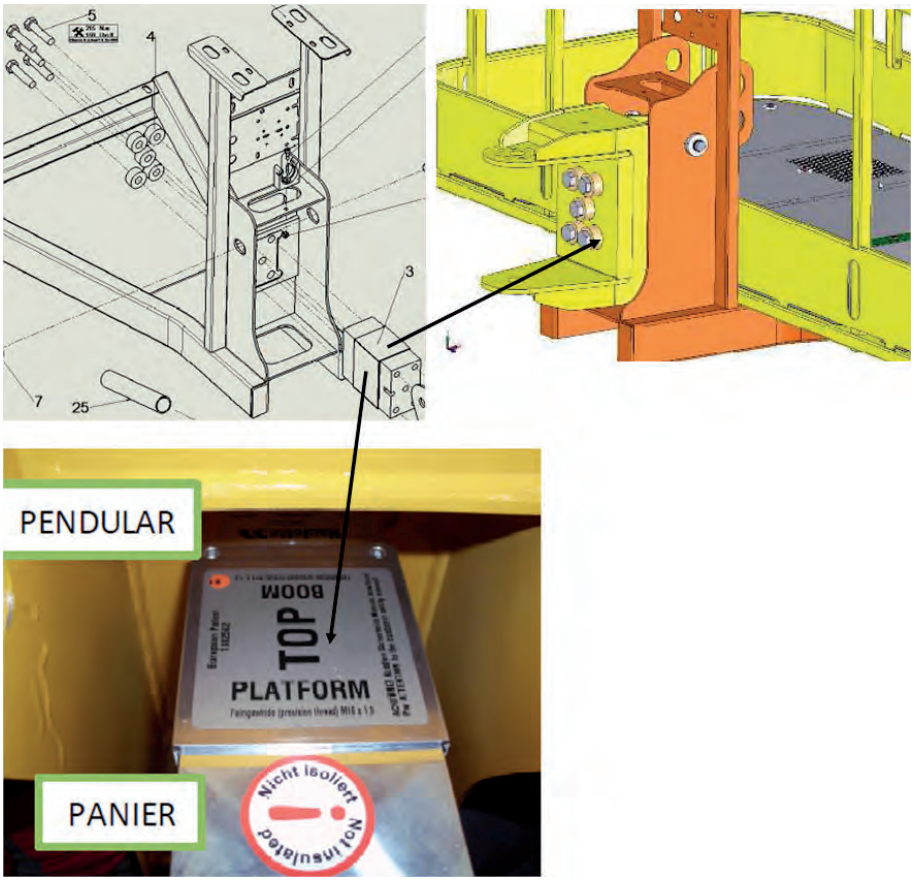
17.2 - IDENTIFICATION OF THE COILS



Marking	Item	Description
1	YV620U	Jib lift valve
2	YV620D	Jib descent valve
3	YV750L	Basket rotation valve (left side)
4	YV750R	Basket rotation valve (right side)
5	YV720D	Basket compensation valve (down)
6	YV720U	Basket compensation valve (up)

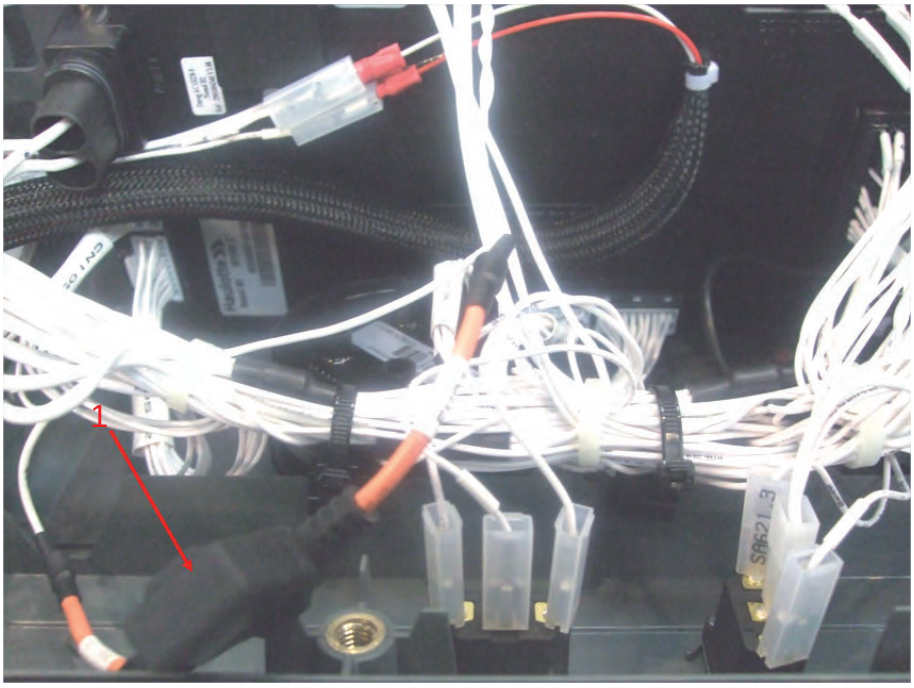
18 - Load cell

18.1 - LOCATIONS



Marking	Name	Function
3	SP800/SP801	Load cell

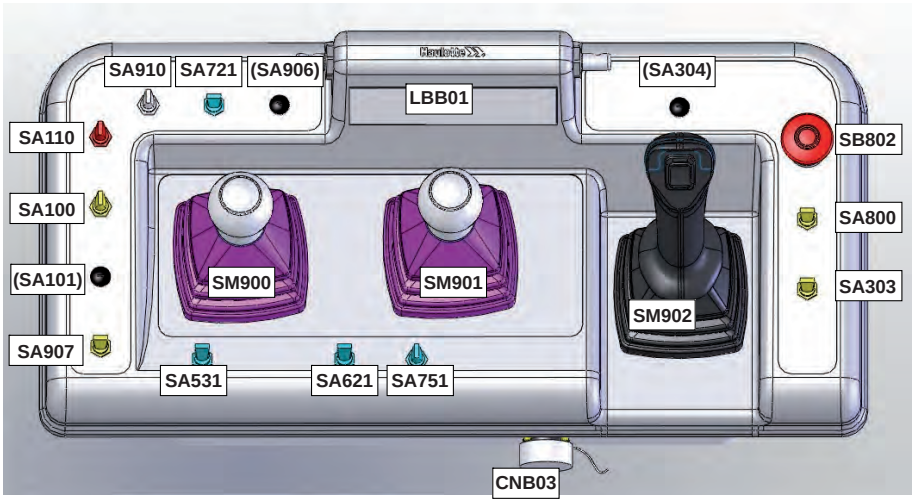
18.2 - LOCATION FU34



Marking	Name	Function
1	FU34	Fuse of the load cell (Located in platform control box)

19 - Platform control box

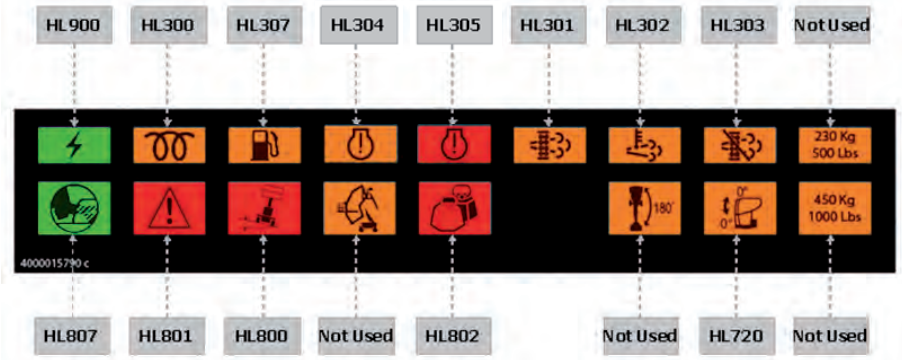
19.1 - DÉTAILS OF THE EXTERNAL PARTS



Part number for the wiring bundle : 4000032440

Name	Function
CNB03	Platform control box mains supply plug
SA751	Platform rotation
SA621	Jib lifting
SA531	Boom telescoping switch
SA907	Horn
SA101	Steering mode
SA100	Differential locking switch
SA110	Drive speeds selector
SA721	Compensation
SA910	Activ' Lighting System selector
SA906	Generator option
LBB01	LEDs (PCB)
SM902	Drive and steering joystick
SM901	Arm raising/lowering joystick
SM900	Boom lifting and turntable rotation joystick
SB802	Platform control box E-stop button
SA800	Emergency pump control
SA303	Engine start-up / stop selector

19.2 - DETAILS OF LEDS



Description	Name	LED	Function
Power ON indicator	HL900	ON	When power is switched on
		ON	Platform control selected
		Flashing	Machine is ON, but platform control box is not active but the ground control box is ON
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Foot Switch indicator	HL807	ON	When power is switched on
		ON	Pedal pressed
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Fuel level indicator	HL307	ON	When power is switched on
		ON	Fuel low level
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Fault indicator	HL801	ON	When power is switched on
		Flashing	If a fault is active (current fault)
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Tilt indicator	HL800	ON	When power is switched on
		ON	Slope sensor active
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Overload indicator	HL802	ON	When power is switched on
		Flashing	Overload is detected
		Flashing	A default with the overload is detected
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Engine pre-heating indicator	HL300	ON	When power is switched on
		ON	Engine pre-heating
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Particle filter indicator	HL301	ON	When power is switched on
		Flashing	Machine or motor configuration not correct
		ON	DPF regeneration required
		OFF	Other

Description	Name	LED	Function
Regeneration of particle filter indicator	HL302	ON	When power is switched on
		Flashing	Machine or motor configuration not correct
		ON	Regeneration DPF in progress
		OFF	Other

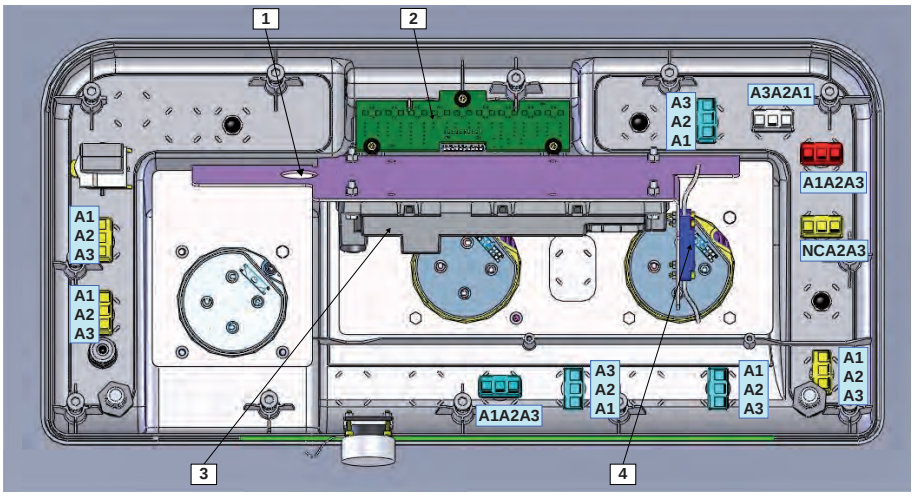
Description	Name	LED	Function
Indicator for inhibition of regeneration of particle filter	HL303	ON	When power is switched on
		Flashing	Machine or motor configuration not correct
		ON	DPF regeneration inhibited
		OFF	Other

Description	Name	LED	Function
Leveling fault indicator	HL561	ON	When power is switched on
		ON	Angle of cage +10° (SR720=1)
		ON	Angle of cage -10° (SR721=1)
		Flashing	Machine or motor configuration not correct
		OFF	Other

Description	Name	LED	Function
Indicator after engine shutdown	HL305	ON	When power is switched on
		ON	Drive motor faulty
		ON	Activation of the stop motor function
		Flashing	Machine or motor configuration not correct
		OFF	Other

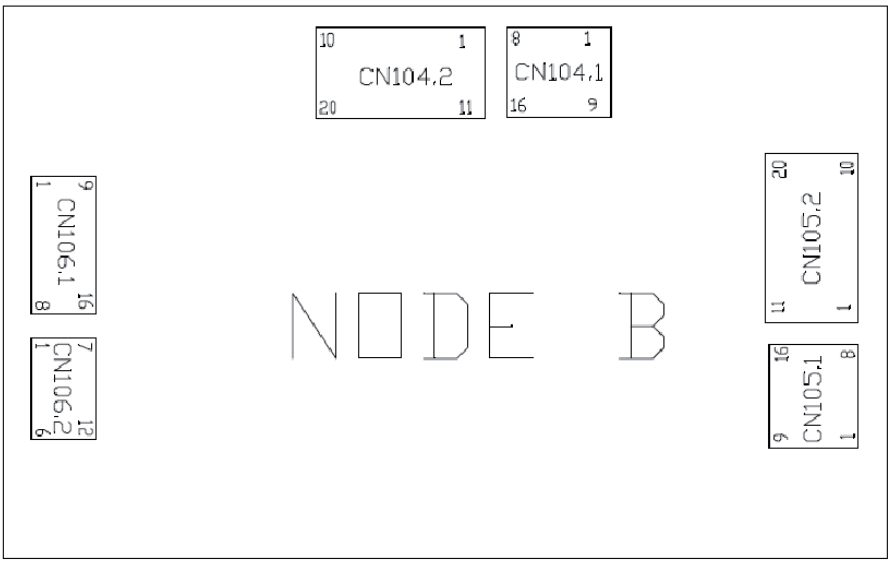
Description	Name	LED	Function
Engine warning indicator	HL304	ON	When power is switched on
		ON	Drive motor faulty
		Flashing	5 times during power up : The next service is due in under 20h
		ON	The service is due, service counter must be reset
		Flashing	Machine or motor configuration not correct
		OFF	Other

19.3 - DÉTAILS OF THE INTERNAL PARTS

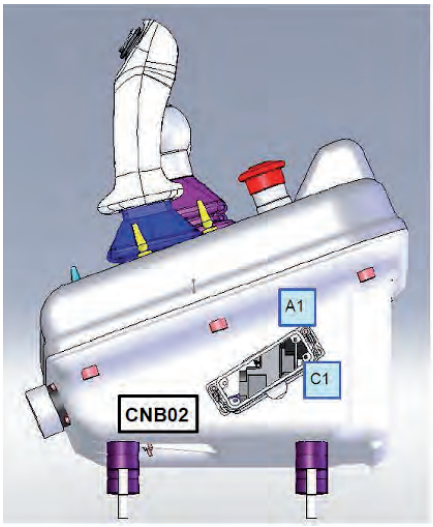


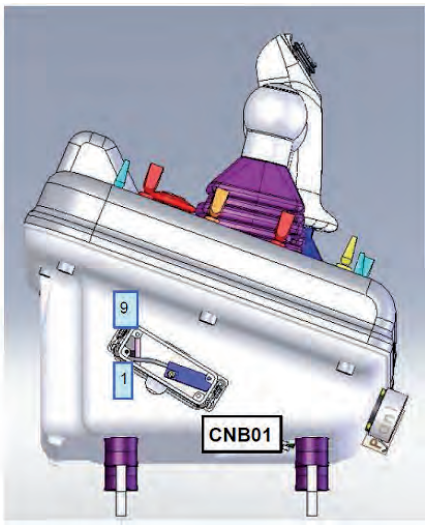
Marking	Name	Function
1	HA902	**Buzzer est active if :** • Overload active • Slope active and machine elevated • Machine start-up
2		LEDs (PCB)
3	U104	B2 module
4	SR720/SR721	Inclinometer

19.4 - DETAILS OF THE CONNECTORS ON B2

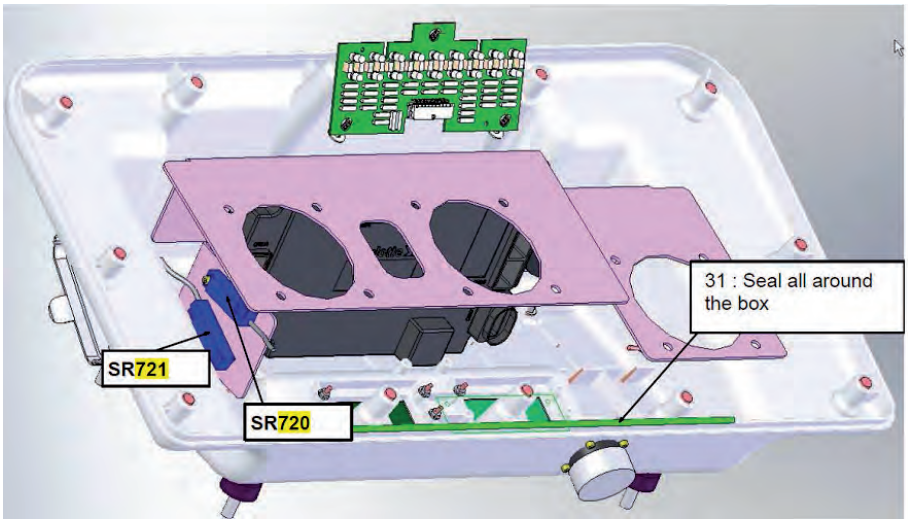


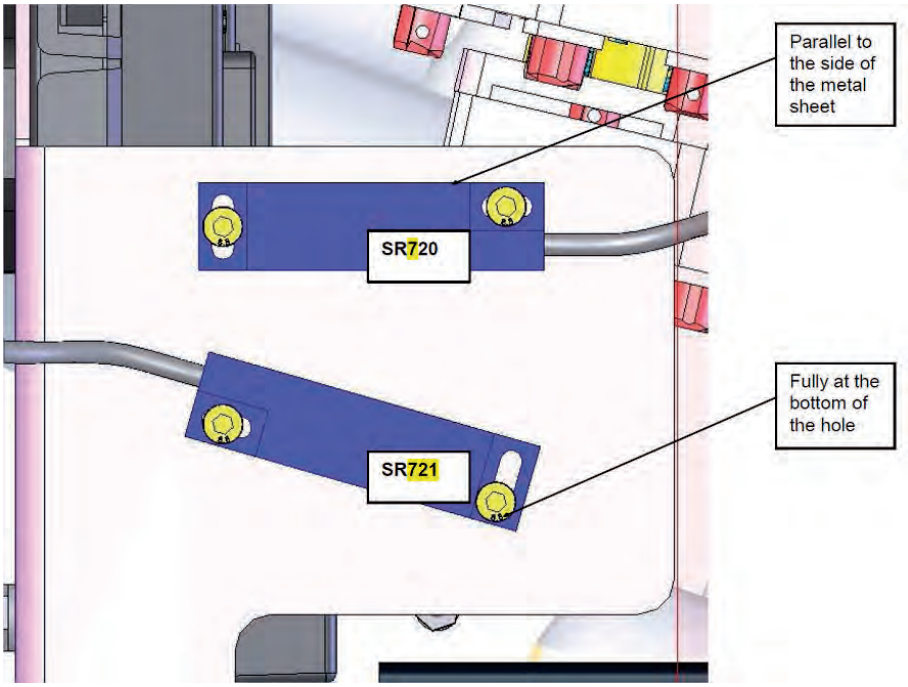
19.5 - DETAILS OF THE CONNECTIONS ON THE CONTROL BOX





19.6 - DETAILS OF THE MOUNTING OF THE LEVEL SWITCHES SR721 AND SR720





Notes

1 - You will need

	• Standard tool kit • Protective goggles • Gloves • Weight of 250 kg / 551 lb (for procedure reset 250 kg / 551 lb) • Weight between 75 kg / 165 lb and 300 kg / 662 lb (for procedure reset using variable weight) • Lifting equipment adapted and suitable for placing and removing the load from the platform • Computer with HaulotteDiag and diagnostic kit (4000009300) or DiagPad diagnostic console (400031760)		• Place barriers around the perimeter of the work area

2 - Level of knowledge required

The use of this card implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative, following the program for DIAG LEVEL II.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

Only an authorized and qualified technician can work on HAULOTTE® machines.

3 - Safety instructions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Mark out the work area.**
- **Cut the contact, to remove the key, open the battery cut if fitted.**
- **Place a "DO NOT USE" decal near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of the engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. In a closed room, you must use a suitable system to evacuate the exhaust to the outside.**

4 - Periodic inspection

To test the function :

- Put the machine in lower position on flat ground.
- Select turret control box using the key selector.
- Level the platform if needed
- Put a load of 300 kg (662 lb) in the center of the platform (as drawn below), using adequat tools.

- Verify that audible and visual warning device are actuated.

If not, overload system setting is needed. Do not use the machine. Refer to maintenance book for operation setting.

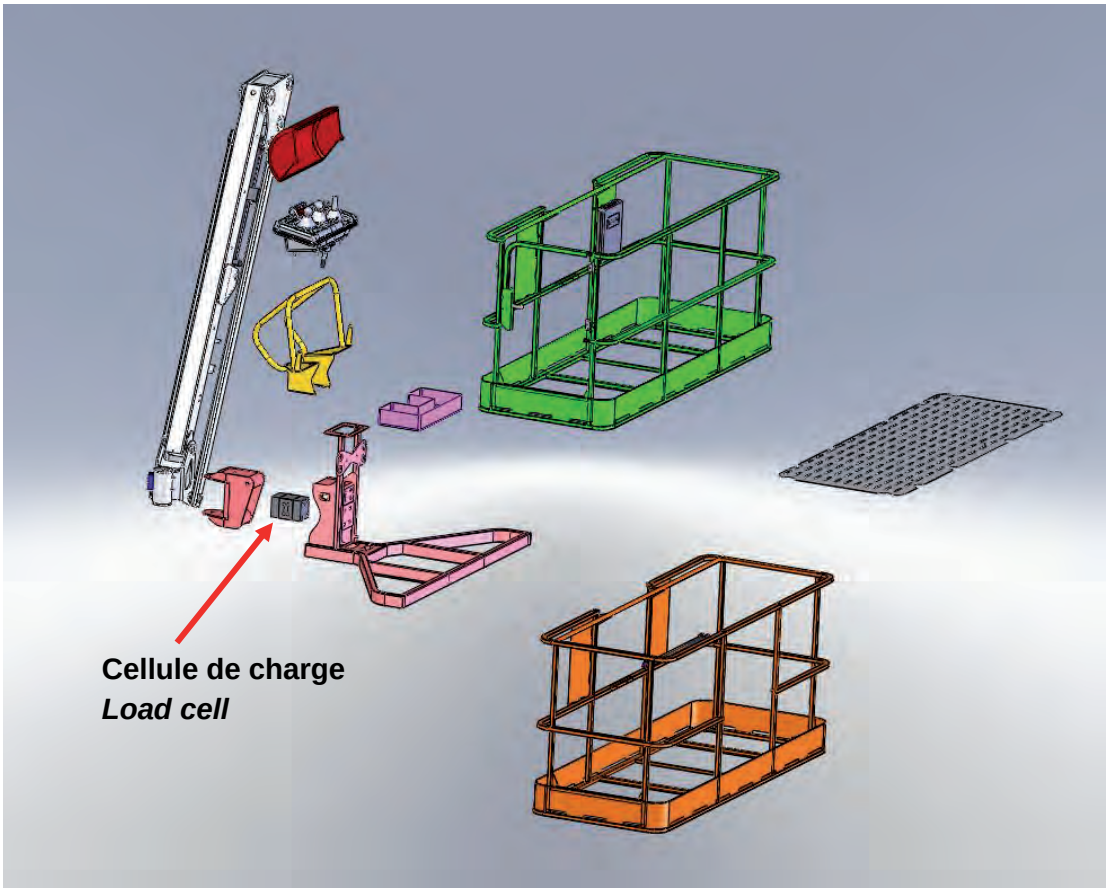
5 - Calibration procedure

The machine is equipped with a 2 channel load cell type weight management system, mounted between the platform and the boom assembly.

The location of the load cell means calibration is required when the system values become out of correct range, or when any of the platform sub assembly components (cage, support, flooring etc) are replaced.

The system can be recalibrated in 3 ways depending on the software version :

- Reset of the Zero (empty cage) value.
- Calibration using a fixed known weight of 250 kg (551 lb).
- Calibration with a known weight of any value between 50 kg (110 lb) and 300 kg (662 lb).



5.1 - CONFIGURING THE MACHINE BEFORE START CALIBRATION

- The machine must be completely stowed.
- Tilt inactive
- Weight sensors not out of range.
- Platform tilt in **- 10°, + 10°**.
- Ground control box selected.

5.2 - CONNECTION AND USE CONSOLE

N.B.-:-CONTACT HAULOTTE SERVICES®

5.3 - PROCEDURE

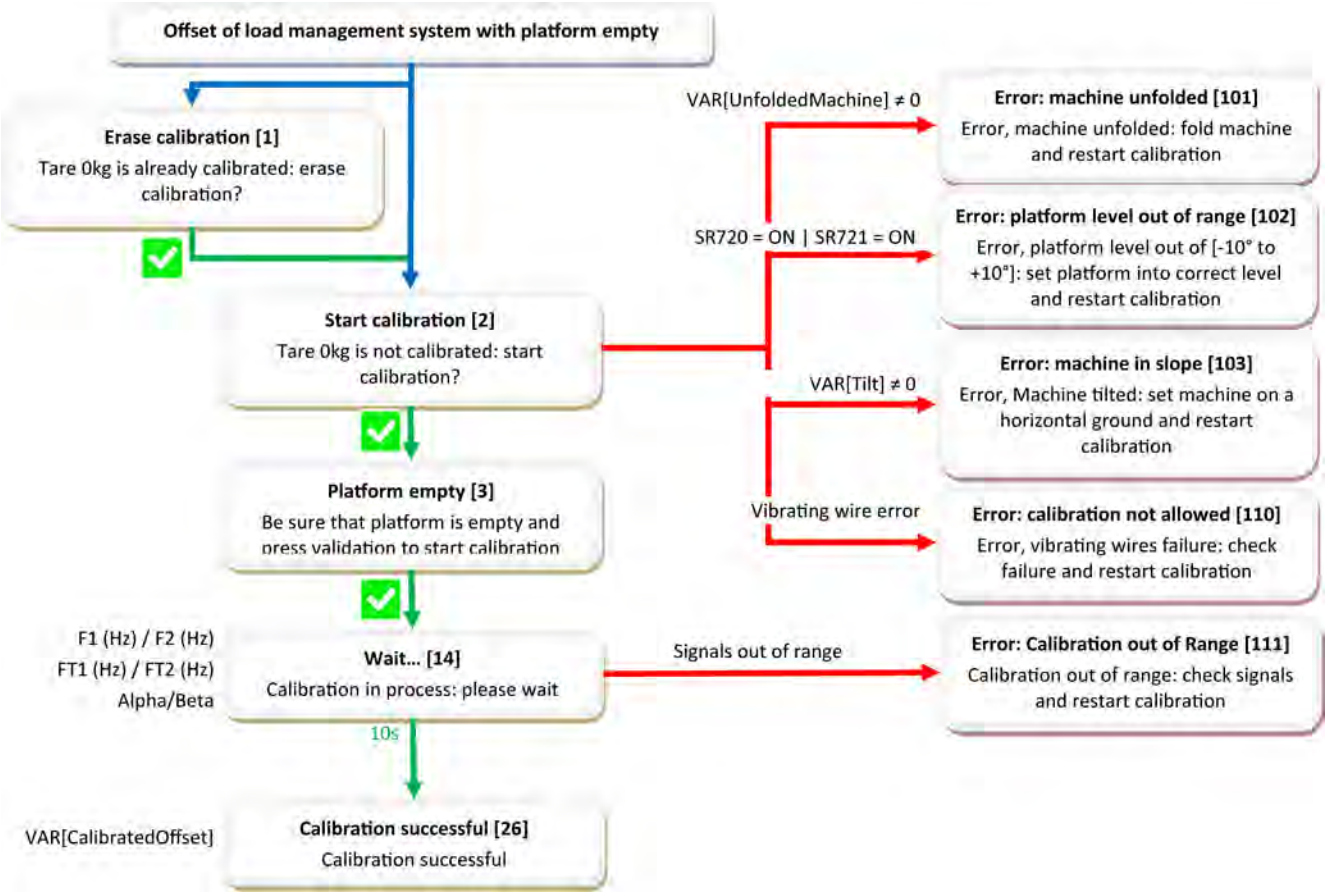
- Depending on the calibration you will do, select the code level 2 or 3 in ACCESS CODE : Main menu > Access code(Level 2 or 3)
- In the main menu select : Main menu > Machine settings > Calibration
- Then select the calibration you will do RESET 0KG (calibration of the offset) or RESET 250KG (calibration of the gain with fixed weight of 250 kg / 551 lbs) or 75 kg / 165 lbs (calibration of the gain with adjustable weight between 300 kg / 662 lbs and 75 kg / 165 lbs)

5.4 - RESET OF THE ZERO (EMPTY CAGE) VALUE

Before any calibration procedure, make sure to remove from the basket / platform all options weighing more than 15 kg / 33 lbs (Welding machine support, Basket mesh, ...).

For calibration with a fixed or adjustable weight, the load must integrate the weight of all basket options.

N.B.-:-ACCESS CODE LEVEL (2)

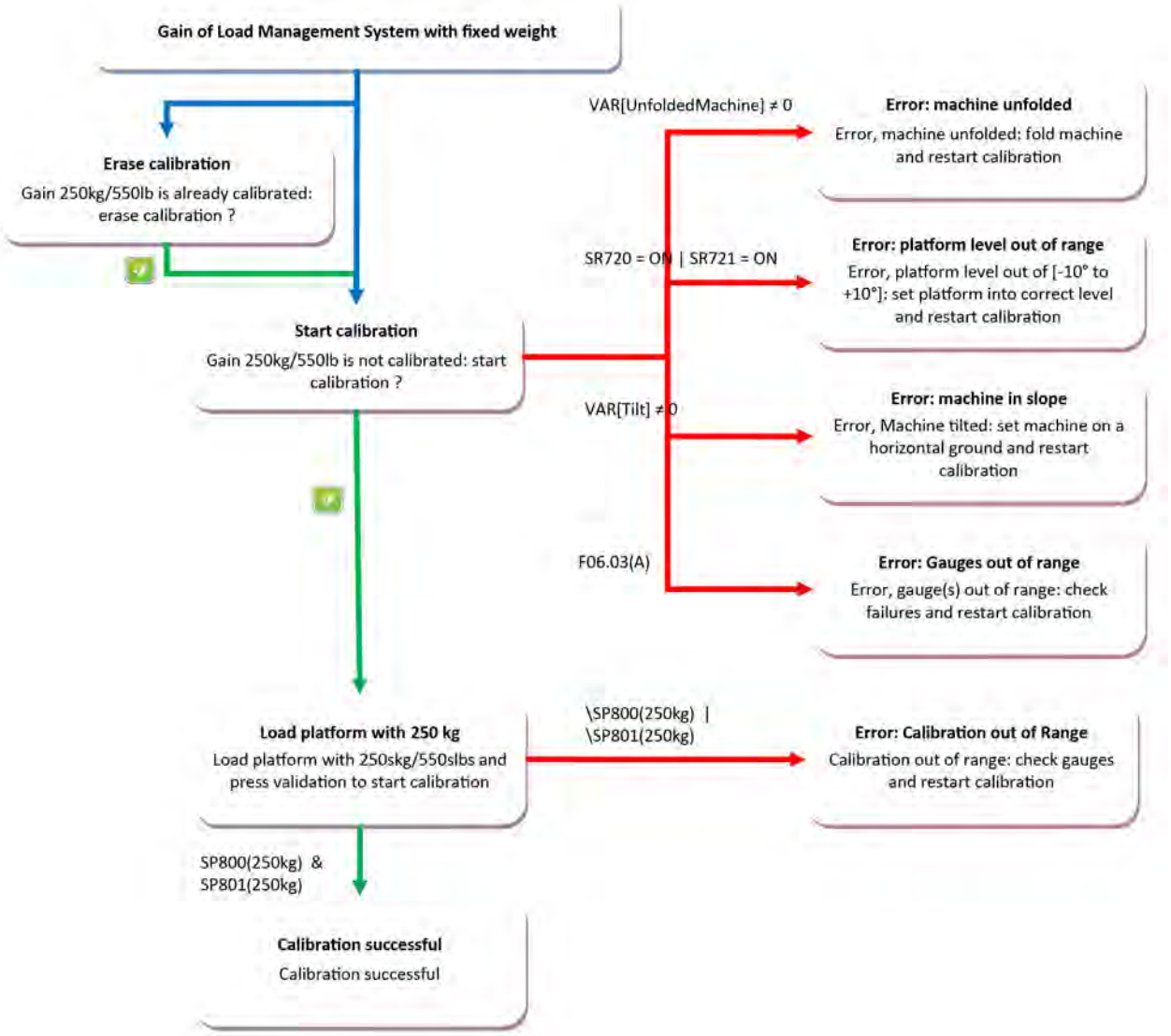


5.5 - CALIBRATION USING A FIXED KNOWN WEIGHT OF 250 KG (551 LBS)

Before any calibration procedure, make sure to remove from the basket / platform all options weighing more than 15 kg / 33 lbs (Welding machine support, Basket mesh, ...).

For calibration with a fixed or adjustable weight, the load must integrate the weight of all basket options.

N.B.-:-ACCESS CODE LEVEL (2)

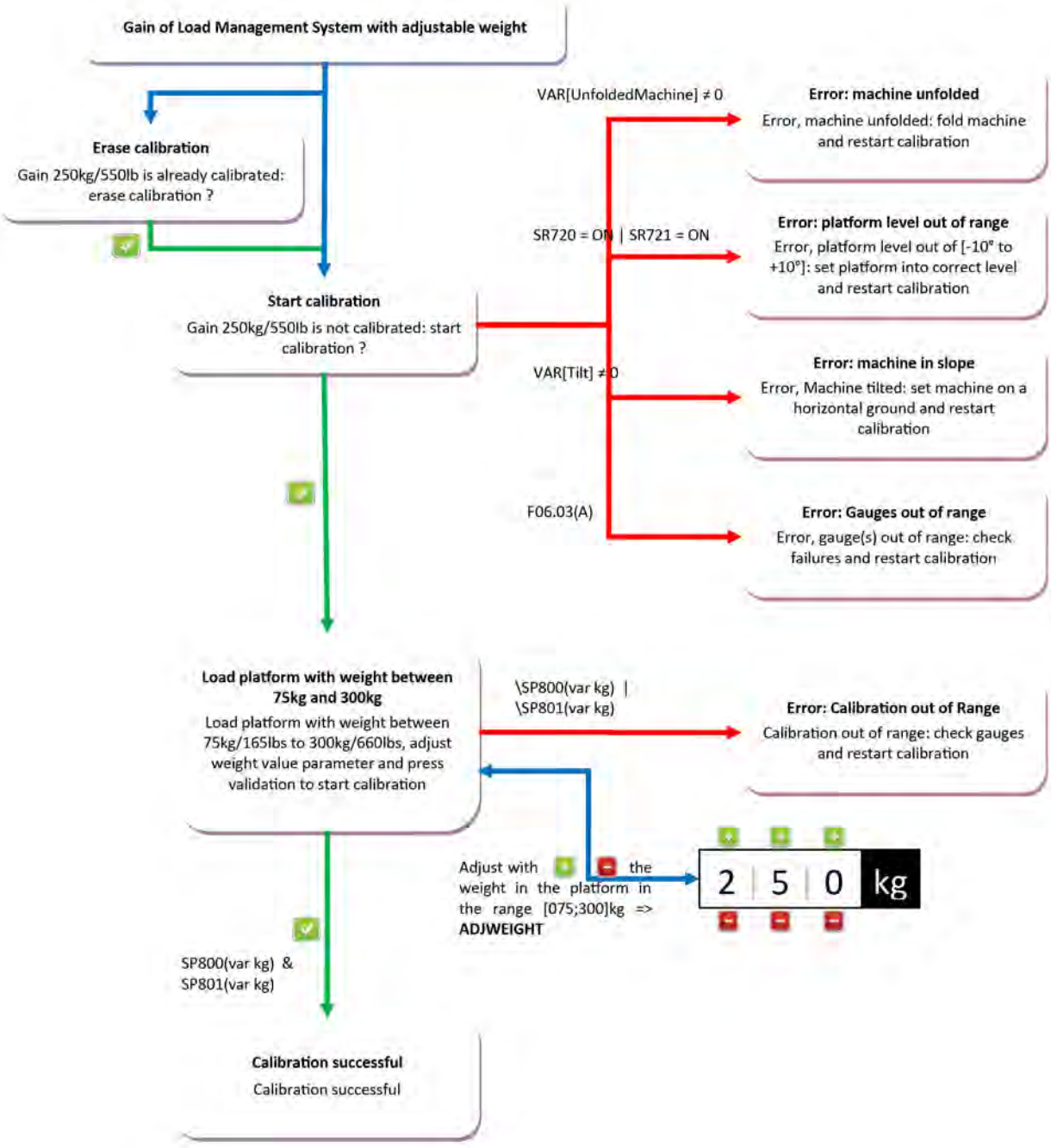


5.6 - CALIBRATION WITH A KNOWN WEIGHT OF ANY VALUE BETWEEN 75 KG (165 LBS) AND 300 KG (662 LBS)

Before any calibration procedure, make sure to remove from the basket / platform all options weighing more than 15 kg / 33 lbs (Welding machine support, Basket mesh, ...).

For calibration with a fixed or adjustable weight, the load must integrate the weight of all basket options.

N.B.-:-AVEC CODE D'ACCÈS NIVEAU 3 (CODE JOURNALIER)



5.7 - FAULT CODES LINKED TO THE OVERLOAD SYSTEM

Failures	Description
Load management system	
F06.01 **No Loading Cal** Calibrate	No overload calibration, do/redo overload calibration. Complete calibration.
F06.03 **Gauges out of Range** SP800/SP801	Gauges out of range (load management system activated). —> SP800 not in [1500; 20500] µA Check SP800 connections to ground, to U104 ECU analogue inputs
	Gauges out of range (load management system activated). —> SP801 not in [1500; 20500] µA Check SP801 connections to ground, to U104 ECU analogue inputs
F06.04 **Incoh Gauges** SP800/SP801	SP800 measured weight and SP801 measured weight are more than 50 kg far (and gauges are not out of range and gauges are calibrated) Check SP800 and SP801 connections to ground, to U104 ECU analog inputs Redo calibration
F06.05 **Low Power** Gauges supply	Low power for strain gauges is detected low : VbattB2 basket is under 8500mV Check gauges power supply
F06.09 **Negative load**	Negative load detected on SP800 gauge: measured load is below - 40kg and platform level angle is the range [-10 ; +10]° 1. Check the platform does not lie on an obstacle 2. Check weighing system (adjustment), check measured load when platform is empty 3. Check the integrity of the structure.
	Negative load detected on SP801 gauge: measured load is below - 40kg and platform level angle is the range [-10 ; +10]° 1. Check the platform does not lie on an obstacle 1. Check weighing system (adjustment), check measured load when platform is empty 1. Check the integrity of the structure.

6 - Checks

Set a known weight in the cage and check the value displayed in Activ'Screen :

- Main menu > Diagnosis > Machine status > Overload(Strain gauge) > Estimated weight

1 - You will need

	• Standard tool kit • Protective goggles • Gloves • Jack • Hoist • Torque wrench		• Place barriers around the perimeter of the work area

2 - Preliminary operation

For safety reasons, imperatively respect the following stages during the tests :

- To set up a beaconing of safety around the test area.
- Put the machine in stowed position.

The operations of disassembling if they exist should be carried out only on the installations completely disconnected and must be entrusted only to people having the necessary technical training.

Respect, in addition to the instructions appearing in the present instructions, the legal tendencies generally applicable for safety accident prevention.

All the precautions must be done in work before intervening on and near the machine.

After completion of work, all the covers and safety devices must be positioned back completely and operational.

3 - Technical specifications

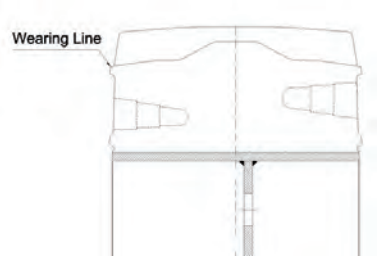
Component	Standard wheel
Reference number	"Solideal 850 x 340"
Type	Solid Tyre (Curred - on)
Wheel mass	180,3 kg +/- 3,6 kg (398 lbs +/- 8 lbs)
Size	850 mm +/- 4 mm (34 in/ 1 in)
Torque	320 Nm (236 lbs ft)

4 - Wheel and tires/tyres inspections

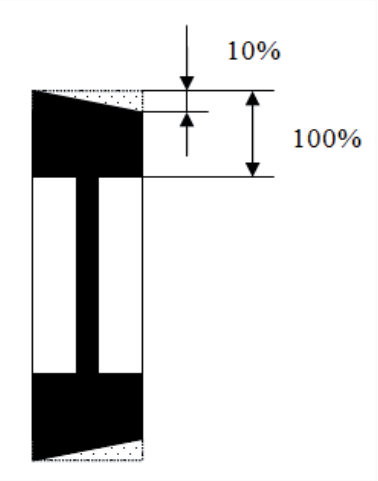
The tire and rim are bonded together, both must be replaced if either is damaged.

Wheels replacement must be made in the following cases :

- Deformation or cracks on the rim.
- De-bonding between the interface of the steel and the rubber.
- Uniform wear to the wearing line.



- Non-linear wearing of the tread profile (> 10%)



- 1 wheel stud is completely torn.
- 2 successive wheel studs are partially torn.
- 2 aperture holes are cut.

Tires and rims are critical components for the stability of the machine. For safety reasons :

- **Use only HAULOTTE® spare parts according to the technical characteristics of the machine. Refer to the spare parts catalog.**
- **Do not replace factory-installed tires with tires of different specifications or ply rating.**
- **Never replace a solid (rigid) (Solid Tyre) tire with a foam-filled or a pneumatic (air-filled) tire.**

5 - Wheel replacement

Procedure of replacement :

- Loosen the wheel nuts on the wheel to be removed.
- Raise the machine using a jack or a hoist.
- Remove the wheel nuts.
- Remove the wheel.
- Install the new wheel.
- Lower the machine to the ground.
- Tighten the wheel nuts to the recommended torque. Refer to MP0001 - Wheel tightening procedure.

Notes

1 - You will need

	• PPE (Personal Protective Equipment: glove, safety shoes, glasses, etc ...) • Standard tool kit • Spanner 36 mm • Strap (Capacity : 1 x 500 kg / 1100 lb - Length 3 m / 9 ft 10 in) • ORFS plug kit Part number HAULOTTE® : 2505001600 • Torque wrench : 320 Nm • 24 mm socket • Torque wrench : 190 Nm • Bridge crane or jack of adequate capacity to lift the machine • If use of a bridge crane Strap (Capacity : 2 x 3000 kg / 6615 lb - Length 4,80 m / 15 ft 9 in) : • Hydraulic oil • Collars COLSON • Grease • Wedges to lift the machine • if needed : Reducer oil - Typ Shell SPIRAX 80W90 or similar - Quantity 0,68 l / 0.18 gal		• Place barriers around the perimeter of the work area
	1 person		

Additional information :

- Hydraulic motor weight : Approx. 8 kg / 18 lb
- Reducer weight without the engine : Approx. 55 kg / 121 lb
- Wheel weight : Approx. 181 kg / 399 lb

2 - Level of knowledge required

The use of this card implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative, following the program for DIAG LEVEL II.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

Only an authorized and qualified technician can work on HAULOTTE® machines.

3 - Safety instructions

- The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.
- The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).
- Position the machine on a flat ground, stabilized and in a released environment.
- Mark out the work area.
- Cut the contact, to remove the key, open the battery cut if fitted.
- Place a "DO NOT USE" decal near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.
- Attention to the risks of burns, the hydraulic system works at high temperatures.
- The exhaust fumes of the engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. In a closed room, you must use a suitable system to evacuate the exhaust to the outside.

4 - Removal

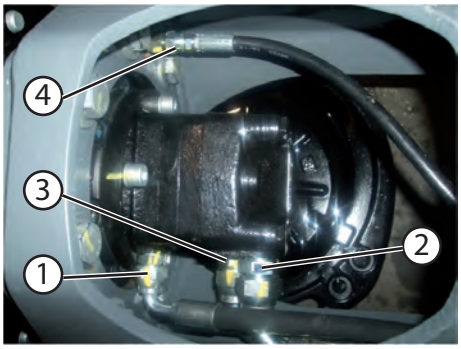
- Position the machine on a flat ground, stabilized and in a released environment.
- Switch off the ignition and remove the ignition key.
- Sling the machine with 2 straps.
- Lift the machine for unstick the wheels.
- Place the machine on resistant and stable wedges.

- Loosen the wheel nuts on the wheel to be removed.
- For safety, leave 2 nut.

- Sling wheel using a strap.
- Loosen the wheelnuts then remove the wheel.

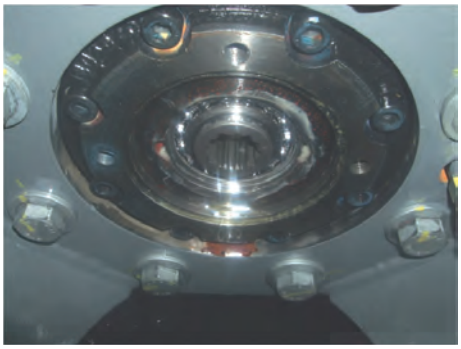
- Mark and disconnect the hoses from the hydraulic motor .
- Ensure to seal fitting to avoid risk of pollution.

1. Drain hose
2. Hose engine supply
3. Hose engine supply
4. Brake release hose

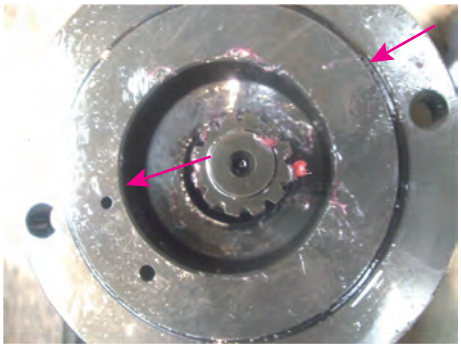


- To remove the hydraulic engine, remove the 4 screw BTR.
- To remove the complete reducer, hydraulic motor can remain in place.

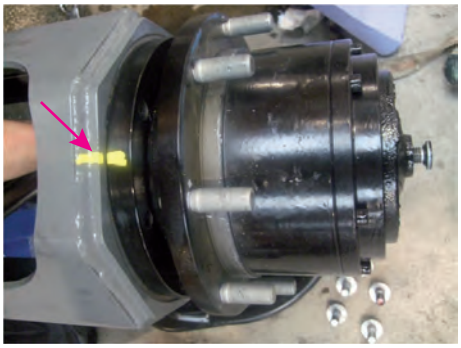
- Remove the engine



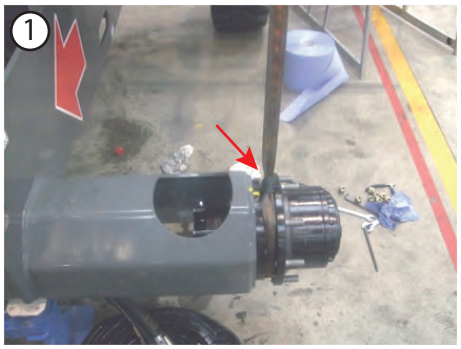
- Ensure the presence of seals. Stick the inner seal with grease to prevent it from dropping after removing the engine

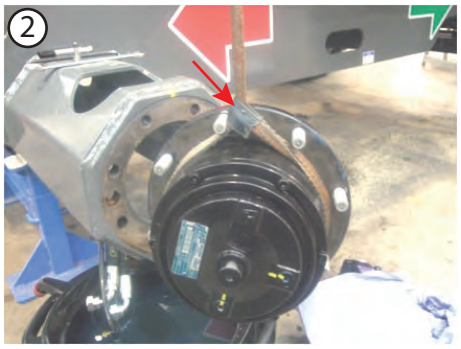


- To facilitate mounting, locate the position of the gear



- Sling the gear
  1. Sling with hydraulic motor
  2. Sling without hydraulic motor



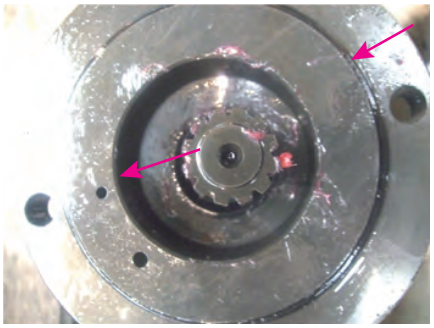


- Loosen 8 screws holding the gear onto the chassis

- Remove the gear system

5 - Reinstall

- Make a note of the serial number for gear.
- Remount in reverse order to removal
- Remember :
- Check state and presence of the seals on hydraulic motor.



- Grease on the frame the portion used for the centering of the gear.

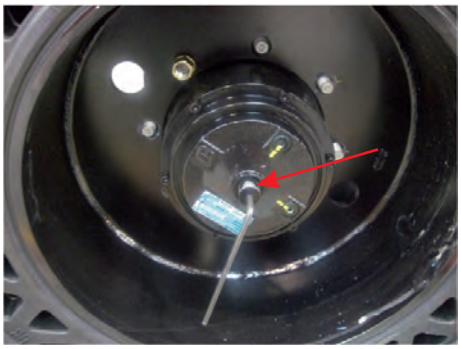
- Replace the 8 screws and washers and torque tighten to 190 Nm.

- Tighten the 8 wheel nuts to the torque of 320 Nm.
- Check for the presence of seal on connections.
- Maintain hoses so they do not turn when tightening fittings. Make sure to not twist the hoses.
- Ensure of the good hose path.

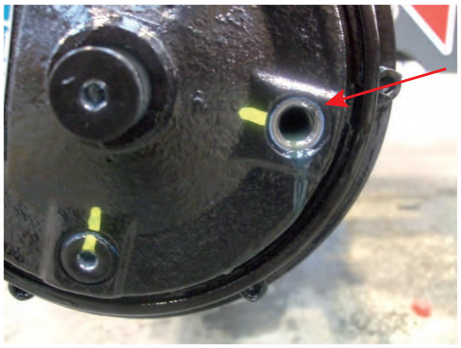
6 - Additional operations

Check the oil level :

- To manually unbrake gearbox, loosen approx. 7 turn the center screw to release the brake.



- Turn the wheel manually to one of the 2 plugs is horizontal.
- Open the cap.
- If the level is correct, oil should drain from the orifice.
- If missing, perform the filling (Typ Shel SPIRAX 80W90 Quantity 0,68 l)
- Tighten the central screw to reactivate the brake.
- If a hard point is found when tightening, rotate manually the wheel to align the gears.



- Lower the machine to the ground.
- Perform travel movements and check the stopping distances (1,7 m +/- 0,3 maximum in high speed).
- Top up the hydraulic oil if necessary.
- Wipe up any oil spills from the ground.

1 - You will need

	• PPE (Personal Protective Equipment: glove, safety shoes, glasses, etc ...) • Standard tool kit • ORFS plug kitPart number HAULOTTE® : 2505001600 • Strap (Capacity : 1 x 500 kg / 1103 lb - Length 2 m / 6 ft 7 in) • Grease • Pallets under the platform about 500 mm / 20 in • Normal threadlocker • Lifting and handling equipment(bridge crane, crane, etc) • Possibly use a ratchet strap to sling the output compensation cylinder • Normal threadlocker		• Place barriers around the perimeter of the work area
	1 person		

2 - Level of knowledge required

The use of this card implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative, following the program for DIAG LEVEL II.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

Only an authorized and qualified technician can work on HAULOTTE® machines.

3 - Safety instructions

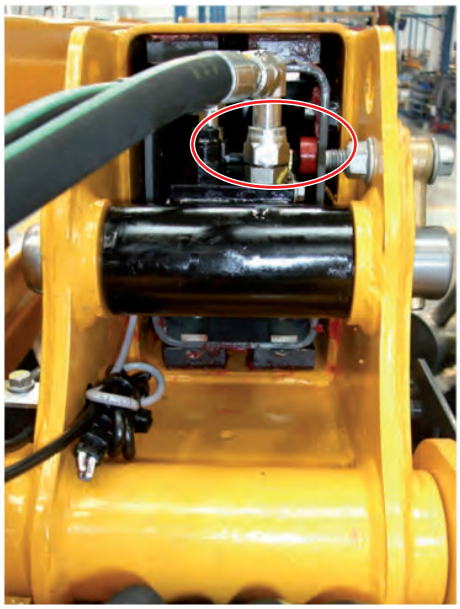
- The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.
- The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).
- Position the machine on a flat ground, stabilized and in a released environment.
- Mark out the work area.
- Cut the contact, to remove the key, open the battery cut if fitted.
- Place a "DO NOT USE" decal near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.
- Attention to the risks of burns, the hydraulic system works at high temperatures.
- The exhaust fumes of the engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. In a closed room, you must use a suitable system to evacuate the exhaust to the outside.

4 - Removal / Reinstall - Rear pads

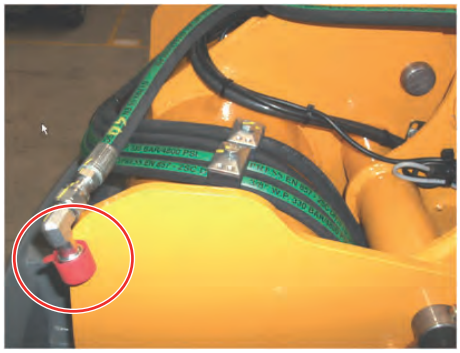
- Place the machine on firm, level ground.
- Stow the arm completely
- Completely retract the boom
- Place the platform on wedges with a height of approx. 500 mm.
- Position the jib so that the boom is horizontal when the platform against the wedges.

Upper pads :

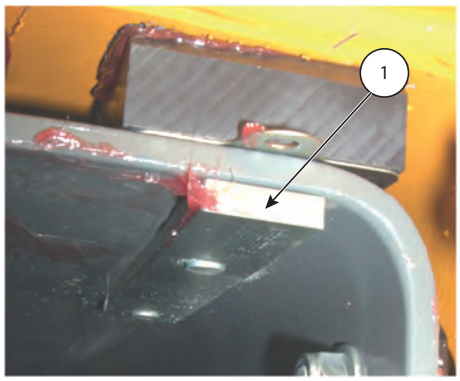
- Disconnect the hose on the right side telescope cylinder.



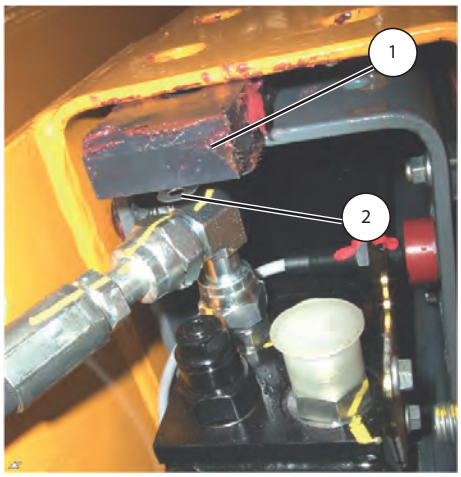
- Cap the hose and union.



- Unscrew the 4 screw holding the pads.
- Recover threaded barrettes (1).

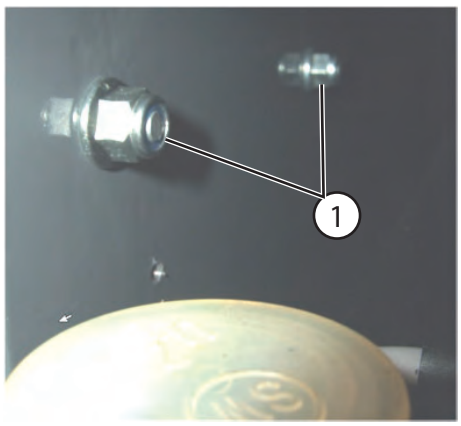


- Remove the pads (1) and wedges adjustment (2).
- Wedges coding.
- Put the wedges with new pads.



- To replace the side pads, remove the second hose.
- Cap the hose and union.

- Unscrew the screw holding the pads.
- Immobilise nuts inside the tube (1) with a key.

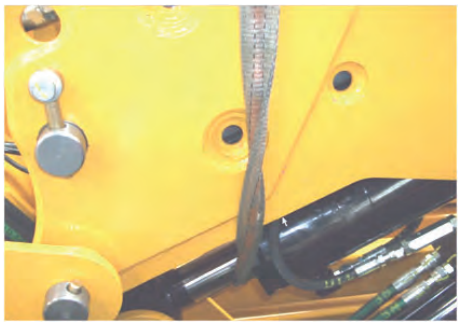


- Slide a screwdriver under the pads to extract more easily
- Repeat this operation for the 4 pads.

Lower pads :

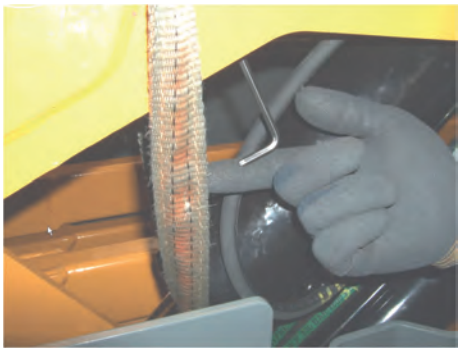
- Reconnect the hoses to the cylinder telescope (If you used plastic caps for capping unions and fittings).
- Raise the boom by around 26°.

- Sling the compensation cylinder with a lanyard for access inferiors pads.

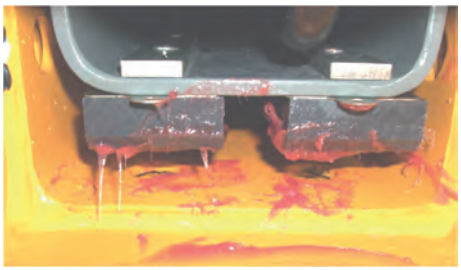


- Remove the locking pin.
- Remove the pin .

- Lower the cylinder.
- Unscrew the 4 screw holding the pads.



- Remove the pads and wedges adjustment .
- Recover threaded barrettes .
- Put the wedges with new pads.

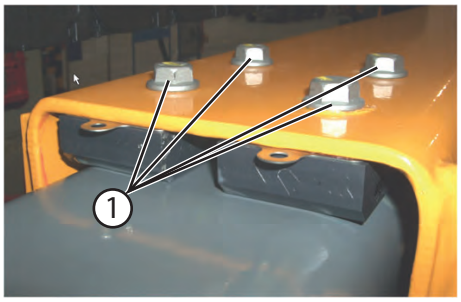


Reassemble in the reverse order of dismantling :

- Grease the pads.
- Position the wedges identical.
- The screws must be mounted with threadlocker.
- Install the lower pads.
- Install thecompensation cylinder pin.
- Insert the locking pin axis.
- Lower the boom.
- Place the platform on the wedges.
- Install the side pads (Apply a liberal coat of grease to the pads so that they stick to the tube and facilitate the mounting).
- Install the upper pads.

4.1 - REMOVAL / REINSTALL - FRONT PADS

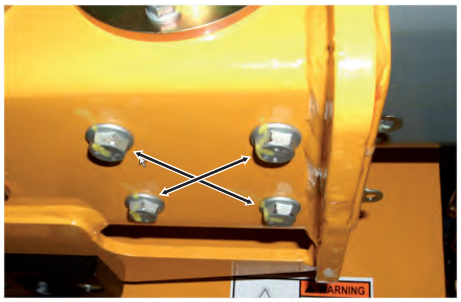
- Place the machine on firm, level ground.
- Stow the arm completely
- Stow the machine completely.
- Completely retract the boom
- Unscrew the 4 screw (1) holding the upper pads.
- Pull forwards the pads and wedges.



- Place the platform on wedges with a height of approx. 500 mm.

- Support the platform, in order to raise the telescope tube and release the lower pads.

- Unscrew the 4 screw holding the lower pads.
- Pull forwards the pads and wedges. .



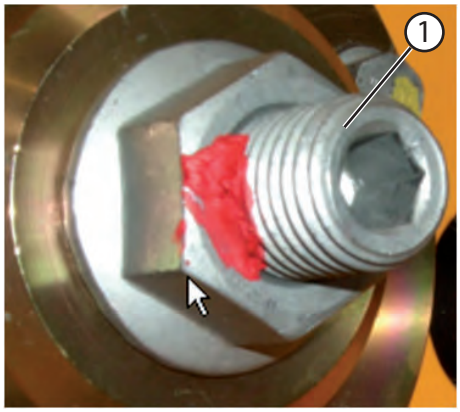
Lower pads :
- Coat the pads in grease before re-installing.
- Put the wedges with new pads.

Upper pads :
- Coat the pads in grease before re-installing.
- Put the wedges with new pads.
- Lift the jib so that it doesn't be supported.

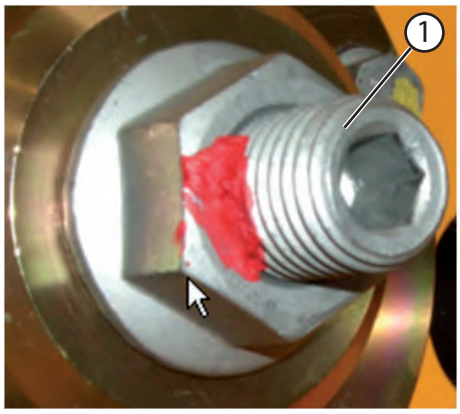
Side pads :
- Remove the 8 pads holders (4 per side).

- Insert new pads in the supports.
- Ensure the presence of the screw which prevent the rotation of the pads.
- Tighten the screw in the orifice (1).

- Loosen the adjustment screw (1).



- Grease the pads.
- Insert pads in the supports.
- Re-install the- 8 supports.
- Support the pads on the telescope by means of the screws (1).
- Perform symmetric adjustment (left / right) so that the tube of the telescope is centered in the tube of boom.
- When the adjustment is correct, tighten all lock nuts.



4.2 - ADDITIONAL OPERATIONS

- Wipe up any oil spills from the ground.
- Carry out a few telescoping movements.
- Ensure that there is no jerk, jamming.
- Check that there is no leak of oil at the removing connections.
- Top up the hydraulic oil if necessary.

Notes

1 - You will need

	• PPE (Personal Protective Equipment: glove, safety shoes, glasses, etc ...) • Standard tool kit • ORFS plug kitPart number HAULOTTE® : 2505001600 • Strap (Capacity : 1 x 500 kg / 1103 lb - Length 2 m / 6 ft 7 in) • Grease • Collars COLSON • Lifting and handling equipment(bridge crane, crane, etc) • Chocks (Length 115 mm / 5 in - Width 100 mm / 4 in - Height 75 mm / 3 in) • Axis Ø 20 mm / 1 in - Length 2 m / 6 ft 7 in • Circlips pliers • Pry bar • Axis Ø 20 mm / 1 in - Length 30 cm / 12 in • Hydraulic oil		• Place barriers around the perimeter of the work area
1 person + 1 person ; to remove and replace the cylinder	 		

Additional information :

- Telescoping cylinder weight : Approx. 33 kg / 73 lb

2 - Level of knowledge required

The use of this card implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative, following the program for DIAG LEVEL II.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

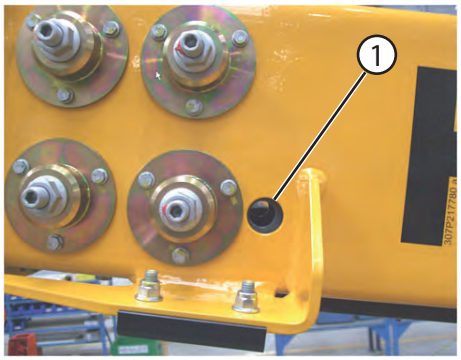
Only an authorized and qualified technician can work on HAULOTTE® machines.

3 - Safety instructions

- The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.
- The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).
- Position the machine on a flat ground, stabilized and in a released environment.
- Mark out the work area.
- Cut the contact, to remove the key, open the battery cut if fitted.
- Place a "DO NOT USE" decal near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.
- Attention to the risks of burns, the hydraulic system works at high temperatures.
- The exhaust fumes of the engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. In a closed room, you must use a suitable system to evacuate the exhaust to the outside.

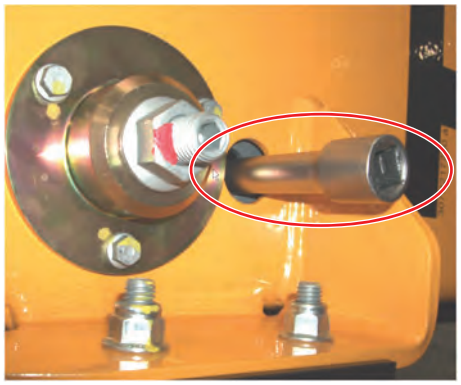
4 - Removal

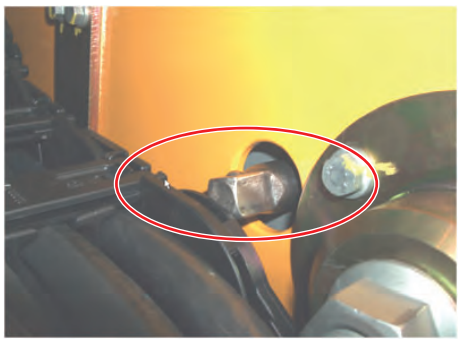
- Place the machine on flat and firm ground.
- Stow the arm completely.
- Stow the machine completely.
- Extend the telescope to its maximum.
- Lift the boom above the arm.
- Insert a pin (1) to lock the tubes.



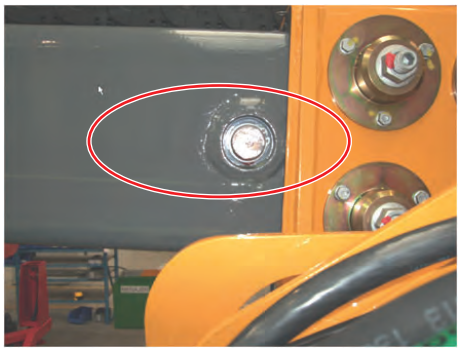
- Ensure that the pin extends beyond the other side.

Do not operate the telescope when the lock pin in place.





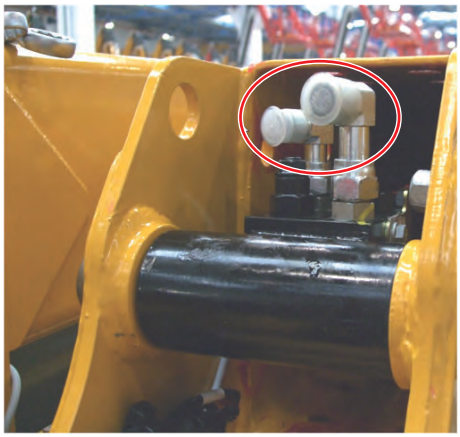
- Remove the circlips.
- Remove the pin connecting the telescope cylinder rod on the telescope tube.



- Remove the pin .

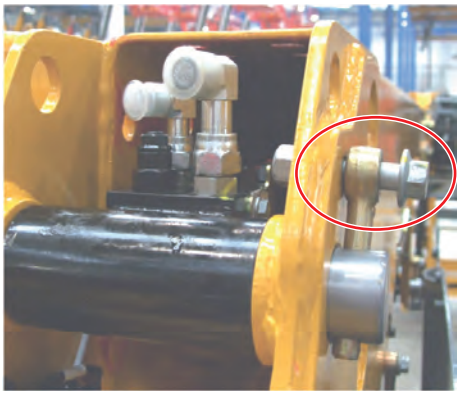
- Lowering the boom to return to a horizontal position.

- Ensure to mark, and plug the hoses and coupling connectors.
- Disconnect the hydraulic hoses.



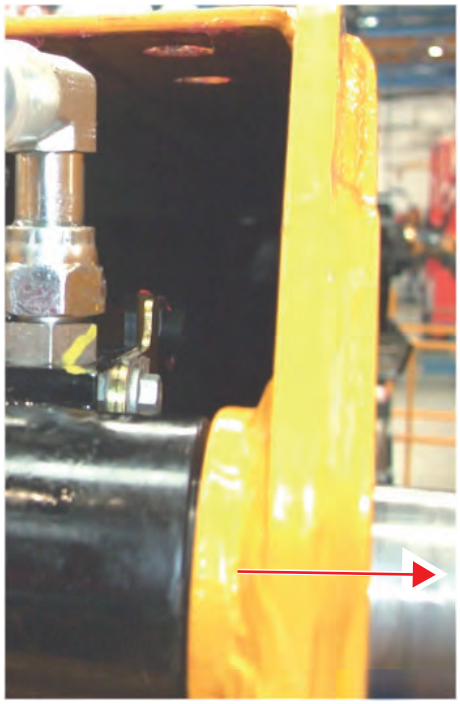
- Disconnect sensor ILS (HA16JRT) orthe 2 sensors ILS (HA16RTJO / HA16RTJ PRO).

- Remove the fastening screw from locking pin.
- Remove the locking pin.



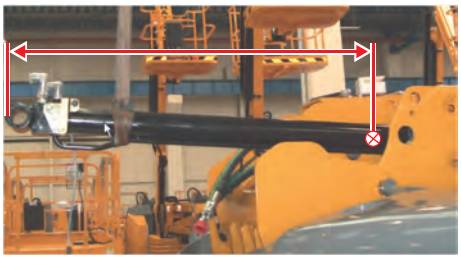
- Sling cylinder using a strap.
- Support the cylinder with bridge crane.

- Remove the pin .



- Using the bridge crane, remove the cylinder by pulling back.
- Lift the cylinder so that it doesn't come into contact with the clamps that hold the hoses.

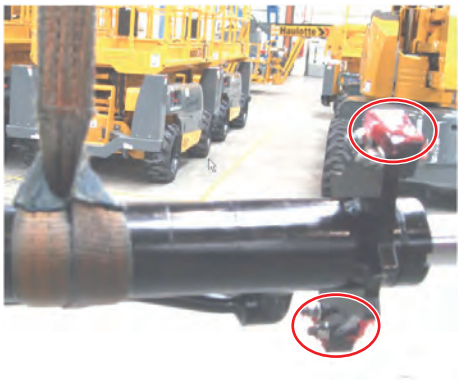
- Do not fully extend the cylinder.
- Re-install the cylinder.
- Slide the strap at the center of gravity (Approx. 1410 mm / 4 ft 8 in from the bottom end side.).



- Fully extend the cylinder.

5 - Reinstall

- Grease the pads.
- Install the front pads.



- Install the support with the sensor(s) ILS (If cylinder replacement).

- Re-build the cylinder inside the boom (Pull the pin out fully and spindle aligned).

- The lower front pad comes into abutment against the tube of the telescope.
- Positioning a wedge as far as possible under the cylinder for overbalance.
- Press the rear of the cylinder for to tilt, push simultaneously.
- Remove the wedge from the pads are entered into the tube of the telescope.
- Grease the pin before reassembly.
- Install the locking pin and the fastening screw.

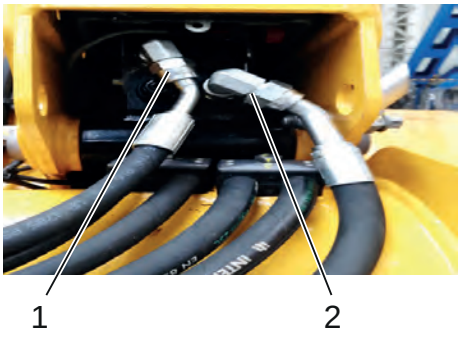
- Refit the hoses as illustrated using the hoses without elbows.

N.B.-:-ENSURE THE PRESENCE OF SEAL ON THE FITTINGS.

Refit the hoses as illustrated using the hoses with elbows at 45° :

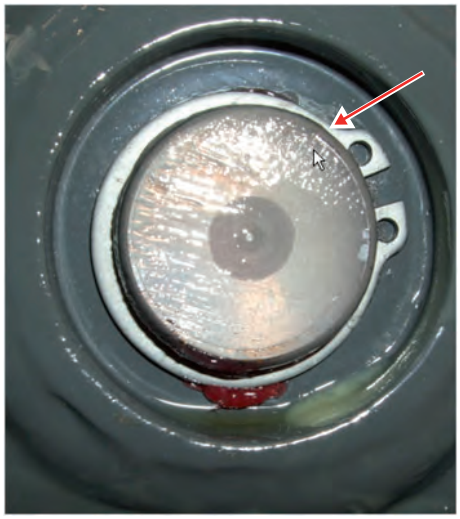
- Tighten the hose 5a (1) to 25 N.m.
- Tighten the hose 4a (2) to 45 N.m.

N.B.-:-ENSURE THE PRESENCE OF SEAL ON THE FITTINGS.

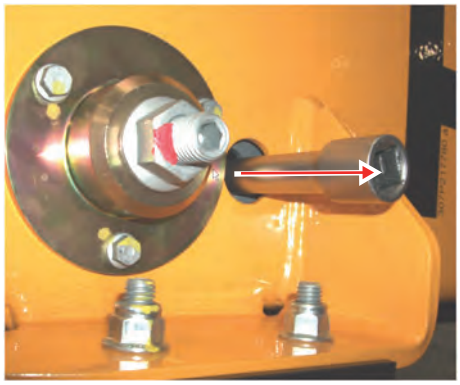


- Connect the sensor or sensors ILS.
- Fasten the bundle with a collar on the attachment provided point.

- Grease the pin before reassembly.
- Install the rod side fastening pin on the tube of telescope.
- Use a pry bar to align the height of cylinder.
- Re-install the circlip and ensure that it's correctly seated in the groove.



- Remove the pin connecting the tube of telescope on the boom tube.



6 - Additional operations

- Wipe up any oil spills from the ground.
- Carry out a few telescoping movements.
- Check that there is no leak at the connections.
- Check the oil level and top up if necessary.
- Check the sensor or sensors ILS using the console.

In the event the cylinder was replaced perform a static test. If necessary, the machine must be approved by a recognized organization.

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

2 - Pressure adjustment

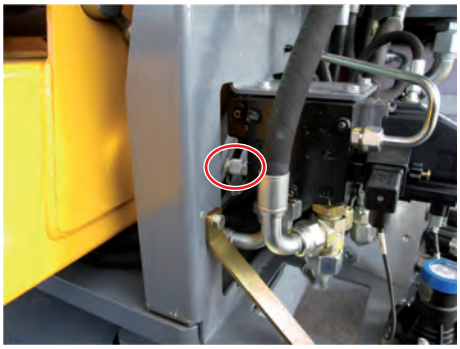
To allow checking operation, refer to the following table about originally pressure adjustment

If the values measured by test are not equal to the following :

- Do not use the machine.
- Setting updating is needed.

Description	In Bar	In PSI
General	240 +/- 5	3481 +/-72
Pressure LS)	22 +/- 5	319 +/- 72
Emergency pump	160 +/- 2	2320 +/- 29
Boom raise	240 +/- 5	3481 +/- 72
Descent boom	130 +/- 5	1885 +/- 72
Booms raising	240 +/- 5	3481 +/- 72
Arm lowers	240 +/- 5	3481 +/- 72
Telescoping boom extension	240 +/- 5	3481 +/- 72
Telescoping boom retraction	240 +/- 5	3481 +/- 72
Turret slewing	120 +/- 5	1740 +/- 72
Jib lifting	210 +/- 5	3046 +/- 72
Jib lowering	240 +/- 5	3481 +/- 72
Rotation basket	100 +/- 5	1450 +/- 72
High-speed drive	240 +/- 5	3481 +/- 72
Drive FWS - REV	320 +/- 5	4641 +/- 72

3 - Pressure plug location



1 - You will need

	• PPE (Personal Protective Equipment: glove, safety shoes, glasses, etc ...) • Standard tool kit • Reducer oil - Typ Shell SPIRAX 80W90 or similar - Quantity 0,68 l / 0.18 gal • Oil collection pan		• Place barriers around the perimeter of the work area • Use an oil collection pan to avoid polluting the environment
	1 person		

2 - Level of knowledge required

The use of this card implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative, following the program for DIAG LEVEL II.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

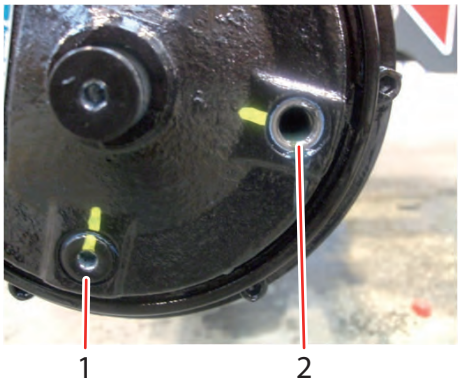
Only an authorized and qualified technician can work on HAULOTTE® machines.

3 - Safety instructions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Mark out the work area.**
- **Cut the contact, to remove the key, open the battery cut if fitted.**
- **Place a "DO NOT USE" decal near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The exhaust fumes of the engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. In a closed room, you must use a suitable system to evacuate the exhaust to the outside.**

4 - Additional operations

- Turn the wheel until plug (1) is directed downwards.
- Position an oil drain pan under the drain plug so as not to pollute the environment.
- Open the cap.
- The oil flows through the orifice.
- Replace the cap in place.
- Loosen the filling cap (2).
- Fill the reducer; the oil level must be level with the plug (Typ Shel SPIRAX 80W90 Quantity 0,68 l).
- Replace the cap in place.
- Wipe up any oil spills from the ground.



1 - You will need

	• The tracker with its cable. • A clamp to strip the wires. • A clamp to crimp the wires.		• Place barriers around the perimeter of the work area
	1 person		

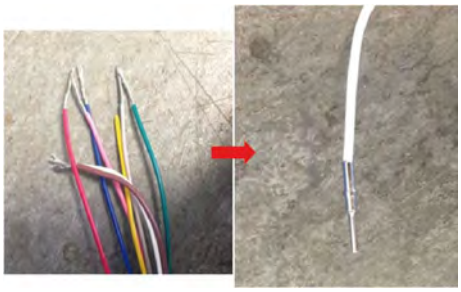
2 - Procedure

Step 1 :

- Disconnect the plug 2.
- Remove the caps on the plug.

Step 2 :

- Pick up the pins in the plastic bag.
- Strip the wires of the tracker.
- Crimp the wires with the pins with a crimping clamp.



Step 3 :

- Take the wedgelock off the plug.
- Thread the wires in the positions regarding the information.

C1	Universal connector
Pin 1	+ permanent battery
Pin 2	GND (0 V)
Pin 3	+ battery voltage
Pin 4	• Machine with engine : Engine ON information. • Electrical machine : Movement and driving information.
Pin 5	Power ON information
Pin 6	
Pin 7	Movement information (Flashing light option activation)
Pin 8	Driving information
Pin 9	CAN 1 H
Pin 10	CAN 1 L
Pin 11	CAN 2 H
Pin 12	CAN 2 L

N.B.-:-REFER TO THE INSTRUCTIONS PROVIDED WITH THE TRACKER FOR THE WIRES CORRESPONDENCE. DEPENDING OF THE TYPE OF UNIT, A RESISTANCE (200 OHMS, 1 W) MUST BE INTEGRATED BETWEEN SIGNAL AND GROUND.

Step 4 :

- Put the wedgelock back on the plug to fix the pins.

Step 5 :

- Reconnect the plugs.
- Mount the tracker.
- The tracking device is operational.

1 - Warning

- The use of this form implies that its user has been trained on this type of equipment.
- It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.
- Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...
- The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.
- Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.
- Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.
- ONLY use insulated tools when working on or near batteries or electrical connections.
- Do not produce sparks or flames or smoke near the battery.

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

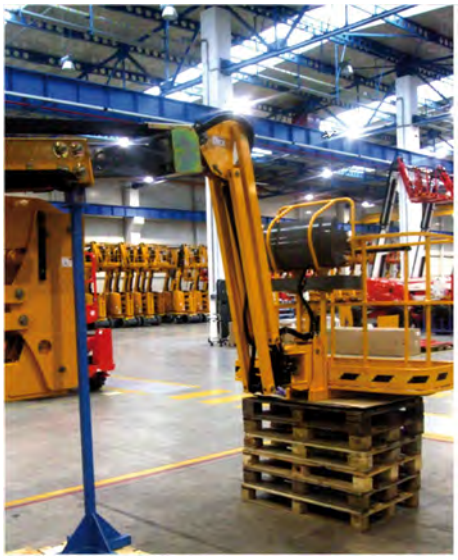
3 - You will need

	• Standard tool kit • Protective goggles • Gloves • EPI (Personal protective equipment) • Collars COLSON • Grease for pins • ORFS plug kit : 2505001600 • 1 hoisting strap(s) for 500 kg / 1,100 lbs at a length of 2 m / 6 ft 7 in • Lifting and handling equipment(bridge crane, crane, etc) • Pry bar • Pin diameter 20 mm / 0,8 in, length 300 mm / 12 in • Hydraulic oil • A tray to collect the oil when disassembling the fittings		• Place barriers around the perimeter of the work area
Major component masses	• Output jib compensation cylinder : 24 kg / 53 lbs		1 person

4 - Removal

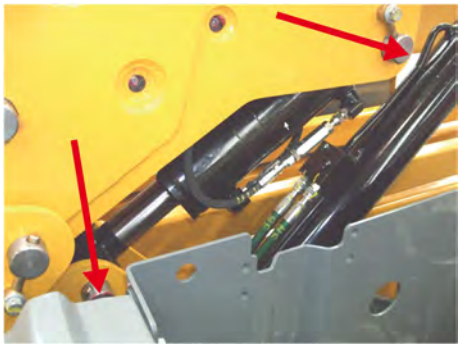
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

- The machine must be fully stowed (arm, boom, jib, telescope) with the turntable aligned.
- Raise the boom by around 30 °.
- Make a stable pallet stack about 700 mm / 28 in tall.
- Put the platform on the pallets by using the jib function.



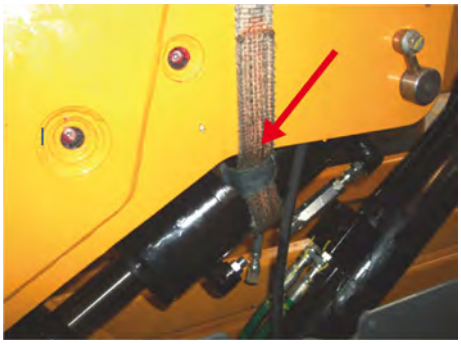
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Twist the engine casing then lock it to access the shafts of the output compensation cylinder.

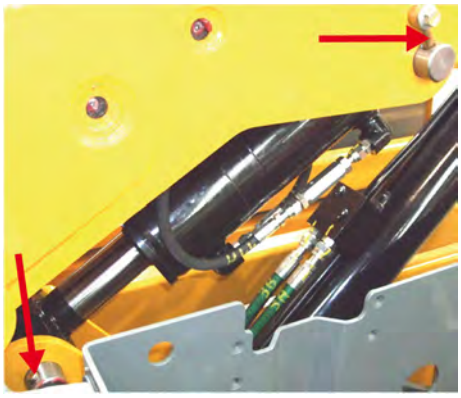


- Relieve the pressure between the output compensation cylinder and the compensation receiver cylinder. That prevents the shaft of the output compensation cylinder from coming out while removing the shaft-side pin.
- Carefully loosen the hoses that go to the compensation receiver cylinder.
- As soon as a trickle of oil appears, let it flow out.
- Once there is no more residual pressure, locate and disconnect the hoses and plug the connectors.

- Attach the cylinder to the bridge crane with the hoisting strap.
- Apply a small amount of tension on the bridge crane.

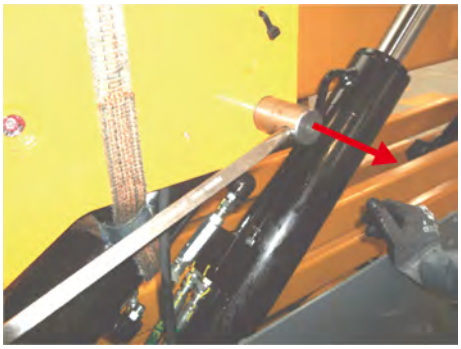


- Loosen the screws that hold the locking pins.
- Remove the pins.



- Remove the shaft-side pin.

- Using a pinching bar on the pin hole, pull the pin and remove it.



- Guide the cylinder to remove it.

5 - Re-installation

- If you are installing a new cylinder, note the traceability number.
- Perform the operations in the reverse order of dismantling.
- Grease the pins, the seals, and the bored holes.
- Remember to refit the pin stop screws.
- Check that the seals are on the connections before reconnecting the hoses.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). This will avoid the hoses twisting when they are connected to the rigid tubes.

During reinstallation, pay attention to the hoses and cables.

6 - Additional operations

- Clean off any residual oil or grease.
- Clean the work area.
- Check that there is no leak of oil at the removing connections.
- Purge air from actuator :
- From the low control panel, operate the platform leveling to bleed the circuit.
- Top up the hydraulic oil if necessary (machine in stowed position).
- Perform a static test by putting 290kg / 639 lbs on the platform.
- Machine unfolded, 15 mn after checking the performance of its parts :
- Boom lifting cylinder
- Boom telescopic cylinder
- Input jib leveling cylinder
- Jib cylinder

In compliance with the country's laws, have the machine approved by an accredited organization.

1 - Warning

- Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.
- The use of this form implies that its user has been trained on this type of equipment.
- It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.
- Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...
- The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.
- Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.
- Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.
- ONLY use insulated tools when working on or near batteries or electrical connections.
- Do not produce sparks or flames or smoke near the battery.

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

3 - You will need

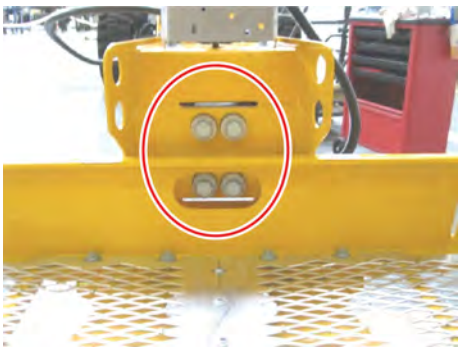
	• Standard tool kit. • Protective goggles. • EPI (Personal protective equipment). • Torque wrenches for torque of 70 Nm / 140 Nm / 215 Nm. • 24 mm / 1 in socket. • Short 24 mm / 1 in socket. • M16 x 1,5 bushing. • Circlips pliers. • Palettes for placement under the platform (about 700 mm / 28 in) • Load cell : 4000311980 - Quantity : 1. • Screws M16 x 70-38 P1.50 cl8.8 : 2700101170 - Quantity : 8.		• Place barriers around the perimeter of the work area
	1 person		

4 - Removal

- With the arm and boom folded and the telescope retracted, support the platform on pallets. Wedges under the platform of 700 mm / 28 in.

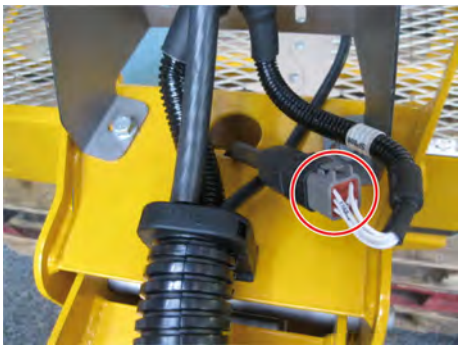
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

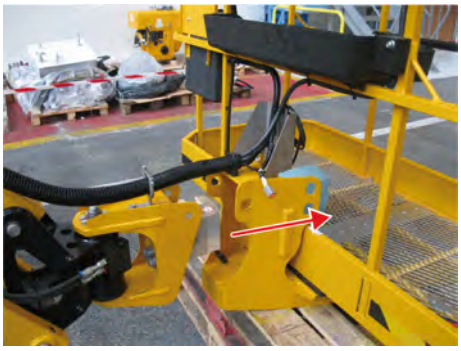
- Loosen the 4 screws connecting the platform support to the gauge.



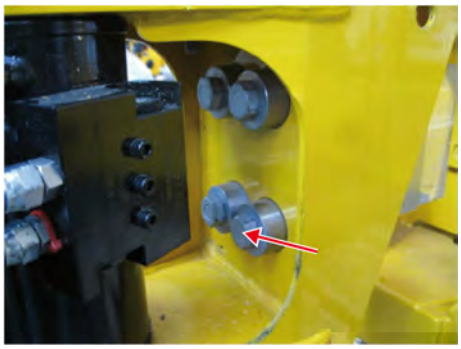
- Remove the circlip and withdraw the pin linking the link piece to the platform support.

- Disconnect the stress gauge plug.
- Pull slightly on the platform assembly to free access to the stress gauge.



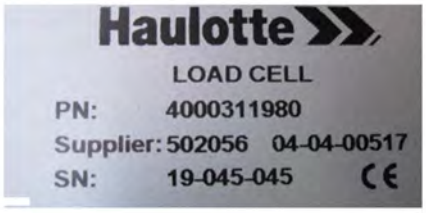


- Loosen the 4 screws that hold the strain gage onto the connecting element.
- Remove the strain gage.

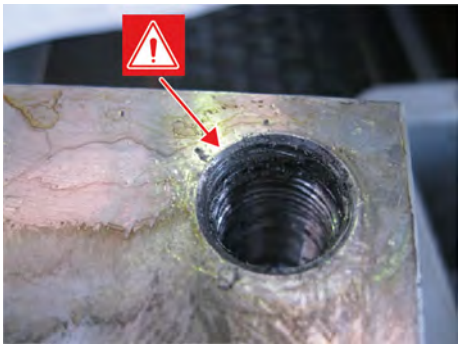


5 - Re-installation

- If the cell has been replaced, note the traceability number.

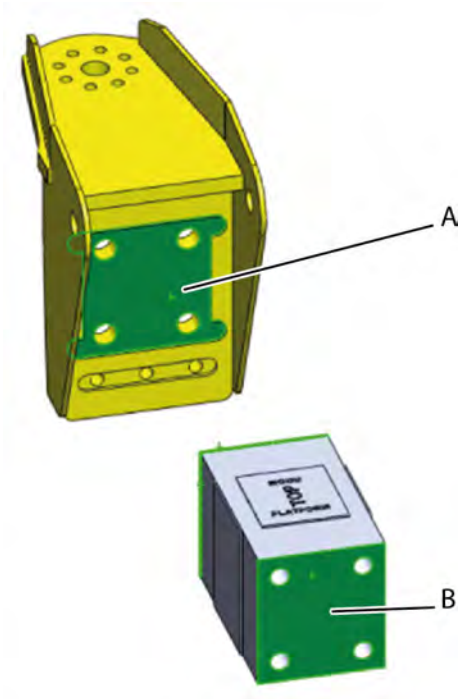


- **If the screws are replaced, fit the M16 x 1,5 bushing (extra thickness linked to the screw treatment). If this is not done, the tapping in the load cell will be damaged.**



Precautions on the surfaces in contact with the stress gauge :

- A : The surfaces in contact with load cell must not be painted. The load cell must not be in contact with the machined side or with the paint.
- B : Ensure that the load cell has no marks (impacts or scratches) on the surface in contact or the grooves on the 2 sides.



- Reassemble in the reverse order of dismantling.
- Apply the following torques :
- 70 Nm
- 140 Nm
- 215 Nm

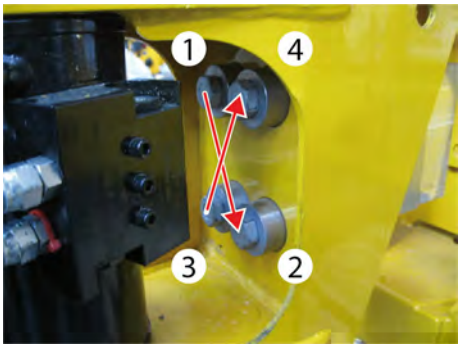
N.B.-:-ENSURE THE SPACER WASHERS ARE CORRECTLY POSITIONED ON THE PLATFORM SIDE. THEY MUST BE CENTRED IN THE COUNTERBORES.

- Put the label with TOP at the top and check that there are no foreign bodies (even small ones) between the cell and the supports.

- Tighten the fastening screws successively 3 times with a torque wrench.

Tightening recommendations :

- No lubrication on these screws.
- Tighten the screws crosswise.
- Tighten to the indicated final torque in 3 phases :
- Tighten to a third of the torque (impact wrench authorised without exceeding one third of the torque).
- Tighten to 2 of the torque with a torque wrench.
- Tighten to nominal torque using a torque wrench.
- If tightened too much and not in a crosswise fashion, the weight indicator will be damaged and will give incorrect results.
- Tighten the screws in the order 1, 2, 3, 4 (See photo opposite).
- Proceed in the same way on the 2 sides.



- **Remember to re-install the pin connecting the link piece to the platform bracket.**
- **Fit the washer and circlip (circlip to be changed if stretched when removing).**

When re-installing the cell on the link piece, ensure the cell is fitted the right way round (A label indicates the top). Place the label marked TOP at the top. Check there are no foreign bodies (even small) between the cell and the brackets.

6 - Additional operations

- Calibrate the load cell. MS0031 - Overload system.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

In compliance with the country's laws, have the machine approved by an accredited organization.

1 - Warning

- Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.
- The use of this form implies that its user has been trained on this type of equipment.
- It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.
- Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...
- The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.
- Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.
- Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.
- ONLY use insulated tools when working on or near batteries or electrical connections.
- Do not produce sparks or flames or smoke near the battery.

2 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

3 - You will need

	• Standard tool kit. • Protective goggles. • "DO NOT OPERATE" tag • EPI (Personal protective equipment). • Grease for pins. • Shim height 370 mm / 1 ft 25 in for arm calibration. • Shim height approximately 800 mm / 2 ft 75 in for platform and/or jack stand calibration, height approximately 2230 mm / 7 ft 4 in. • ORFS plug kit : 2505001600 • A 500 kg / 1,100 lbs lifting strap with a length of 2 m / 6 ft 7 in. • Lifting and handling equipment(bridge crane, crane, etc) • Pry bar. • Pin diameter 20 mm / 0,8 in, length 300 mm / 12 in to extract the pins. • Hydraulic oil. • Oil collection pan		• Place barriers around the perimeter of the work area
	1 person		

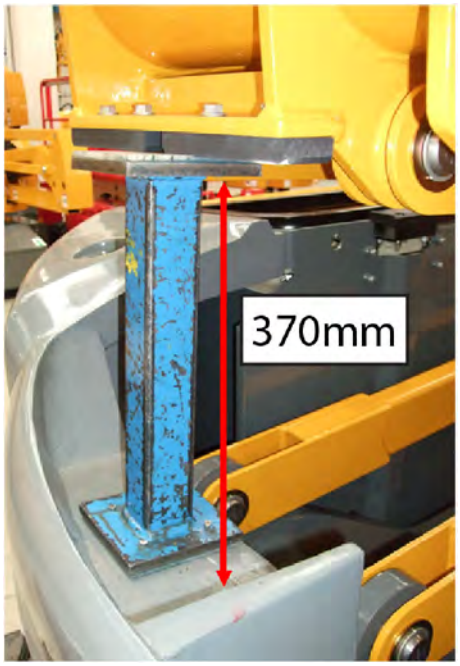
• Height boom cylinder (Approximately 40 kg / 88 lbs).

4 - Removal

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

- With the boom in a horizontal position and the telescope stowed, support the platform with a stable wedge.
- Remove the engine side cover.
- Twist the engine casing then lock it.
- Raise the arm to release the cylinder above the plate on the engine side or the bonnet, if mounted.

- For safety reasons, make a shim of approximately 370 mm / 1 ft 2 in to support the arm at the counterweight.



- Raise the boom. Swinging vertically, lower the boom to support the cage on a stable and resistant calibration (height of the calibration to be provided, approximately 800 mm / 2 ft 75 in).
- If you have a sufficiently resistant jack stand, you can also perform a calibration under the boom as well as the cage calibration (jack stand height approximately 2230 mm / 7 ft 4 in).

- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

N.B.-:-USE AN OIL COLLECTION PAN TO AVOID POLLUTING THE ENVIRONMENT.

- Mark, disconnect and stub hoses that feed the boom cylinder.
- Plug the unions.

Be careful not to lose the seals on the unions.

- Attach the cylinder to the bridge crane with the hoisting strap.
- Apply a small amount of tension on the bridge crane.
- Take out the screw that holds the locking pin(Shaft-side pin).
- Remove the pin .
- Remove the shaft-side pin

- Lower the bridge crane gently so that the cylinder remains horizontal.

- Take out the screw that holds the locking pin(Bottom-side pin).
- Remove the pin .
- Remove the bottom-side pin

- Remove the cylinder.

5 - Re-installation

- If you are installing a new cylinder, note the traceability number.
- Perform the operations in the reverse order of dismantling.
- Grease the pins, the cylinder seals, and the boom bore holes.

Remember to refit the axle locking pins and the immobilisation screws.

- Check for seals on the fittings.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). The hoses must not be twisted.

6 - Additional operations

- Clean off any residual oil or grease.
- From the lower control box, raise up and down boom up to purge the cylinder.
- Check that there is no leak of oil at the removing connections.
- Top up the hydraulic oil if necessary.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

In compliance with the country's laws, have the machine approved by an accredited organization.

Notes

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

	• Standard tool kit. • Protective goggles. • EPI (Personal protective equipment). • Grease for pins. • ORFS plug kit available from spare parts ref 2505001600. • A 500 kg / 1,100 lbs lifting strap with a length of 2 m / 6 ft 7 in. • A bridge or handling device . • Pry bar. • Pin diameter 20 mm / 0,8 in, length 300 mm / 12 in to extract the pins. • Height boom cylinder (Approximately 67 kg / 148 lbs). • Hydraulic oil. • A tray to collect the oil when disassembling the fittings.		• Place barriers around the perimeter of the work area
	1 person		

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

3 - Preliminary operation

- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

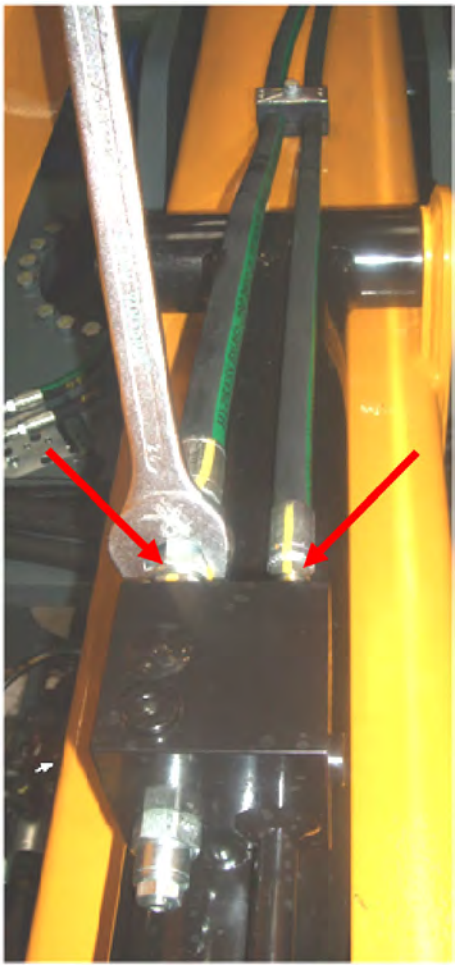
4 - Removal

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Telescope retracted ; Arm fully stowed.
- Raise the boom so as to be able to extract the pin on the shaft side of the arm cylinder.

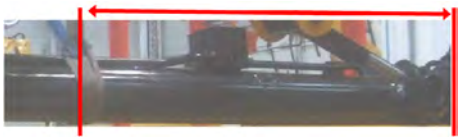
- Slide the cylinder and tighten the strap slightly.

- Take out the screw that holds the locking pin (18 mm / 0,70 in and 16 mm / 0,62 in wrenches) on the shaft side.
- Remove the dowel and extract the pin on the shaft side.
- Lower the cylinder and set it on a block.

- Locate, disconnect and plug the hoses that supply the arm cylinder (Wrench No. 22 mm / 0,72 in and 24 mm / 0,79 in).
- Seal the flexible fittings and unions on the cylinder.



- The cylinder's centre of gravity in this position is 800 mm / 2 ft 75 in from the end on the bottom.
- Move the strap to get this value.



- Take out the screw that holds the locking pin on the bottom(Wrench No. 22 mm / 0,72 in and 24 mm / 0,79 in).
- Remove the dowel and extract the pin on the bottom side.
- Extract the cylinder and pass it between the upper tie rod and upper casing of the arm.

5 - Re-installation

- If you are installing a new cylinder, note the traceability number.
- Remount in reverse order to removal.
- Grease the pins, the cylinder seals, and the boom bore holes.

Remember to refit the axle locking pins and the immobilisation screws.

- Check for seals on the fittings.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). The hoses must not be twisted.

6 - Additional operations

- Clean off any residual oil or grease.
- Using the ground control box, raise then lower the arm the maximum amounts in order to flush out the cylinder.
- Check that there is no leak of oil at the removing connections.
- Top up the hydraulic oil if necessary.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

In compliance with the country's laws, have the machine approved by an accredited organization.

Notes

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

	• Standard tool kit. • EPI (Personal protective equipment). • Circlips pliers • Grease for pins. • ORFS plug kit available from spare parts ref 2505001600. • Pry bar. • Pin diameter 20 mm / 0,8 in, length 300 mm / 12 in to extract the pins. • Weight of the receiver compensation cylinder (Approx. 20 kg / 44 lbs). • Hydraulic oil. • A tray to collect the oil when disassembling the fittings. • Blocks to fit the cage, allow for approximately 900 mm / 2 ft 11 in or use a vehicle lift or forklift, if available.		• Place barriers around the perimeter of the work area
	1 person		
Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.			

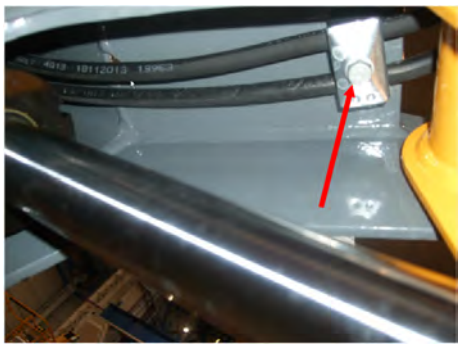
3 - Preliminary operation

- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - Removal

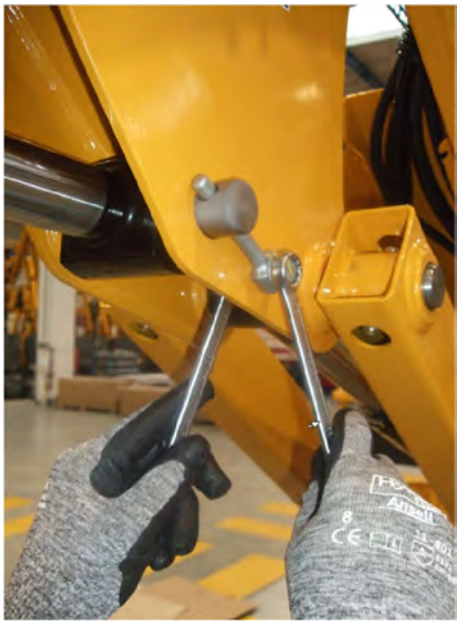
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Telescope retracted ; Arm stowed ; Boom lowered.
- Lift the jib and make a stable and resistant chock under the cage.
- Height of the chock under the cage is approximately 900 mm / 2 ft 11 in.
- Then lower the job so that the cage is supported on the chock.

- Make a mark on the hoses feeding the input compensation cylinder.
- This is to mark their positions on the STAUFF collar that holds them to the telescope.
- Remove the screw holding the STAUFF collar (2 Wrench No. 13 mm / 0.51 in).

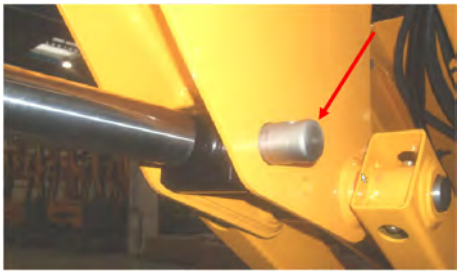


- Put a shim under the cylinder: width 80 mm / 3.15 in, height 30 mm / 1.18 in.

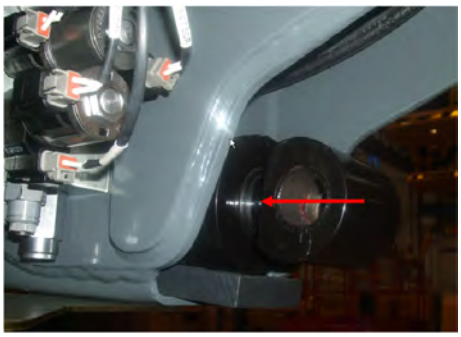
- Take out the screw that holds the locking pin on the shaft side (2 Wrench No. 15 mm / 0.6 in).



- Remove the locking pin and extract the axle.



- From the ground control box, retract the cylinder rod.



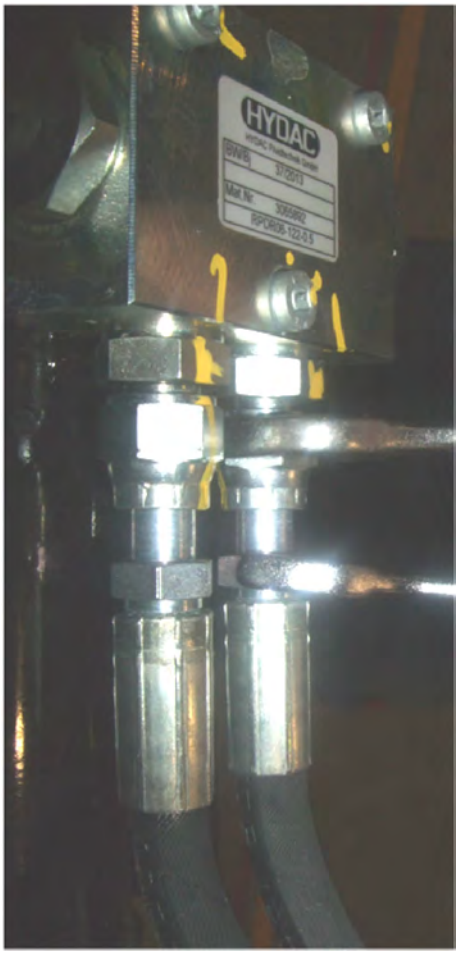
- Take off the circlips and extract the rod-side pin.

- Remove the cylinder and align it with the rod side on the connecting part.
- This holds the cylinder to disconnect the hoses.
- Set a pan under the cylinder.

- Mark the hoses before disassembly (Wrench No. 17 mm / 0.7 in and 15 mm / 0.6 in)

Warning: residual pressure between the output cylinder and input cylinder (EPI adapted glove + Glasses). Gently loosen the fittings. As soon as the oil begins to flow, stop the release and let the pressure drop.

- Then finish the release and close the hose and union connections.



5 - Re-installation

- If you are installing a new cylinder, note the traceability number.
- If the valve on the cylinder has been replaced,fit the screws with medium threadlocker. Tighten the 3 fastening screws for the valve to a torque of 8 Nm.
- Remount in reverse order to removal.
- Grease the pins, the cylinder seals, and the boom bore holes.

Remember to refit the axle locking pins and the immobilisation screws. + Replace the circlips if they have been discarded during disassembly.

- Check for seals on the fittings.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). The hoses must not be twisted.

6 - Additional operations

- Clean off any residual oil or grease.
- From the lower position, manoeuvre the compensation from stop to stop to drain the compensation cylinder. Perform two or three full manoeuvres.
- Put the cage in a horizontal position, lift and lower the boom to its maximum and check that the cage remains horizontal.
- Check that there is no leak of oil at the removing connections.
- Top up the hydraulic oil if necessary.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

In compliance with the country's laws, have the machine approved by an accredited organization.

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

	• Standard tool kit. • EPI (Personal protective equipment). • A bridge or handling device . • Collars COLSON. • 2 hoisting strap(s) for 500 kg / 1102 lbs at a length of 2 m / 6 ft 7 in. • Weight of platform alone around.		• Place barriers around the perimeter of the work area
	1 person		

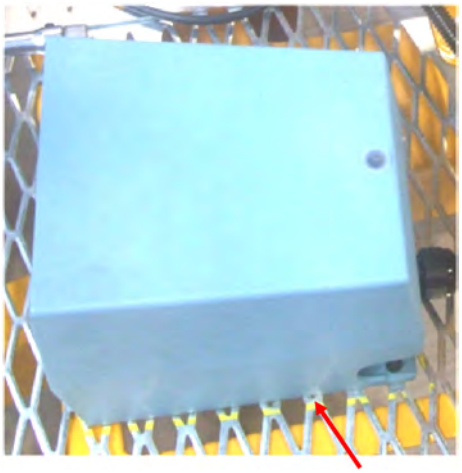
Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

3 - Preliminary operation

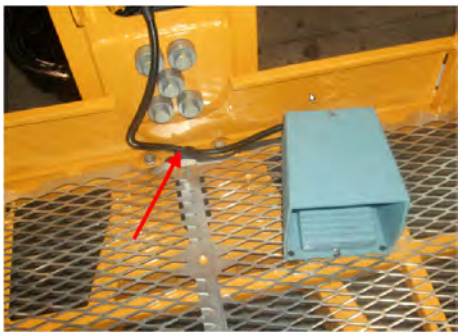
- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - Removal

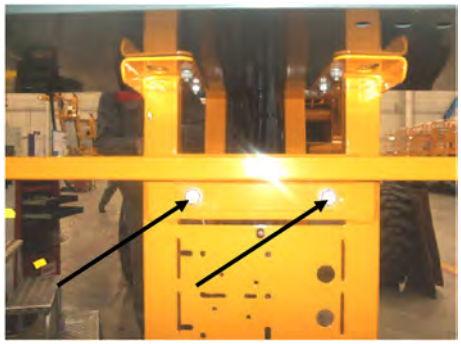
- Place the machine on flat and firm ground.
- Telescope retracted ; Arm stowed ; Boom lowered.
- Locate the position of the Foot Switch on the floor (mark the position of it on the floor).
- Remove the three screws that hold the pedal to the floor (2 13 mm / 0.5 in wrenches).

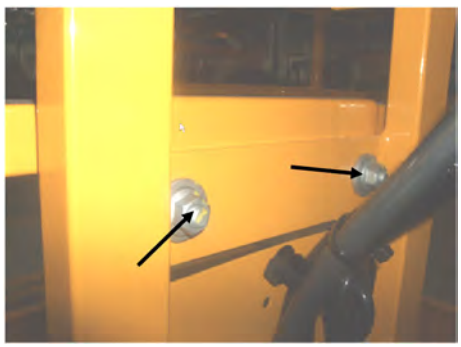


- Cut the COLSON clamp that holds the cable that feeds the pedal.
- Put the pedal on the outside the platform.

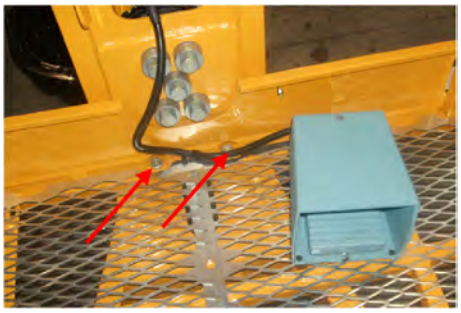


- Unscrew the two screws that connect the platform to the platform mount (2 13 mm / 0.5 in wrenches).
- These screws are mounted with flat washers and nuts.





- Remove the 2 bottom screws that connect the cage to the mount (use a 15 mm / 0.6 in socket and 15 mm / 0.6 in flat wrench).



- Sling the platform using two straps and tie it to the crane.

- Unscrew the two screws that connect the platform to the platform mount (Ratchet + Extension with 15 mm / 0.6 in socket + Spanner 15 mm / 0.6 in).

- Remove the platform.

- Mount once the platform is removed.

5 - Re-installation

- Remount in reverse order to removal. Insert all screws. Start by locking the bottom 4 screws and end with the 2 below the control box.
- If you are replacing the platform floor, tighten all screws to the torque of 22 Nm.

6 - Additional operations

- Clean off any residual oil or grease.

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

	• Standard tool kit. • EPI (Personal protective equipment). • Circlips pliers. • 36 mm / 1.4 in flat wrench for counterweight fastening screws. • Pin diameter 20 mm / 0.8 in, length 300 mm / 12 in to extract the pins. • ORFS plug kit : 2505001600. • 4 hoisting strap(s) for 2000 kg / 4409 lbs at a length of 3000 mm / 9 ft 10 in. • 2 ratcheting straps that support 5000 kg / 11023 lbs at a length of 5500 mm / 18 ft 0.5 in. • 1 lifting strap with 500 kg / 1102 lbs capacity and 3000 mm / 9 ft 10 in in length to attach the boom cylinder. • A bridge or handling device . • Weight of the arm assembly to be removed of around 1000 kg / 2205 lbs. • 2 lifting rings to be affixed in M24 to fasten the counterweight. • Total weight of the counterweight with the additional counterweight (principal 1365 kg / 3009 lbs + additional 100 kg / 220 lbs) for HA16RTJPRO/ HA16RTJO = 1465 kg / 3230 lbs. • Weight of counterweight HA16RTJ = 1365 kg / 3009 lbs. • Pin with a maximum diameter of 36 mm / 1.42 in and minimum length of 800 mm / 2 ft 7 in to fit the straps on the connecting part of the arm. • A 320 Nm torque wrench with 36 mm / 1.42 in socket for tightening the counterweight fastening bolts. • 290 kg / 639 lbs load for static test. • Shims for making a 750 mm / 2 ft 5 in wedge between the upper and lower arm casing. • Drip pan for draining the fuel tank (Tank capacity 62 litres). • Drip tray for draining the hydraulic tank of there is no plug (Tank capacity 76 litres).		• Place barriers around the perimeter of the work area
	2 persons		

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

3 - Preliminary operation

- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - Removal

- If using the Activ' Lighting System option, disconnect the plug from the twilight sensor and spotlight.

- Remove the boom/jib/box assembly MS0172 - Remove - Replace boom assembly.
- Arm stowed (Without it resting on the counterweight).
- Remove the counterweight to be able to access the hinge pin of the lower arm casing.

Remove the counterweight :

- Take off the plastic caps that protect the threads on the counterweight.
- Screw the 2 M24 lifting rings into the counterweight.

- Secure the counterweights using the rings with 2 2000 kg / 4409 lbs straps, 3000 mm / 9 ft 10 in long, and carefully tension the bridge.

- Open and lock the engine compartment.
- Remove the 4 screws (18 mm / 0.71 in wrench) that holds the plate (1) to the counterweight.

- Open the cover on the fuel tank and remove the screw (16 mm / 0.63 in wrench) holding the side plate to the counterweight.

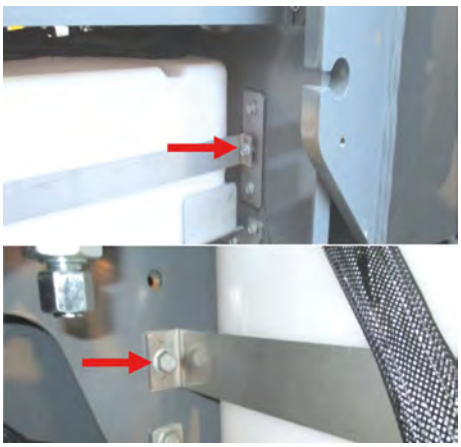
- Start by removing the lower fastening screw from the counterweight (Spanner 36 mm / 1.42 in).

- Then move on to the engine side. Remove the 2 other screws (36 mm / 1.42 in flat wrench) holding the counterweight on the turntable.

Check the tension of the bridge and its alignment.

- Remove the counterweight and set it aside, ensuring that it is stable, and delineate the area around it.

- Remove the fuel tank in order to access the hinge pin of the lower casing of the arm.
- If the tank is full (62 litres capacity), drain it to facilitate disassembly.
- Unscrew the 2 the fastening strap screws on the fuel tank.

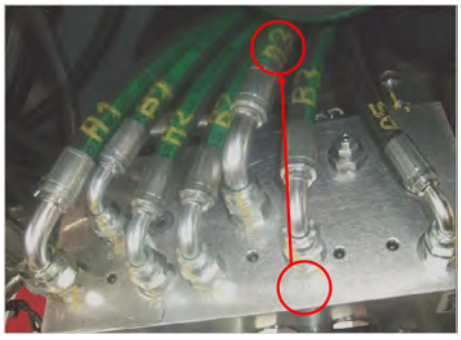


- Disconnect the mini indicator connector from the fuel tank (SL300).
- Mark and disconnect the fuel hoses, seal the hoses and holes on the tank.

Removing the fuel tank :

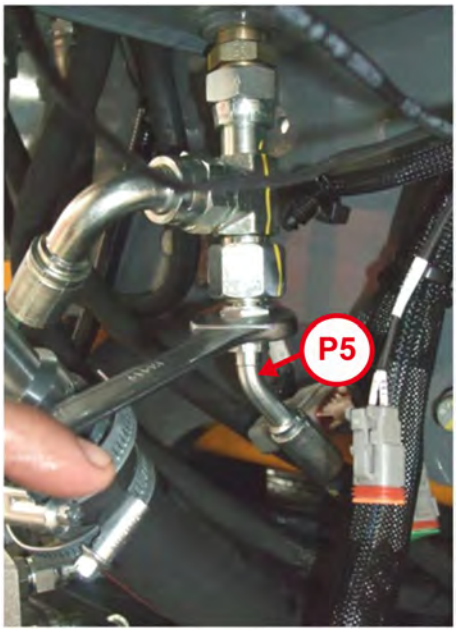
- Disconnect the CN06-2 connector in the hydraulic unit/fuel tank area.

- Mark the hoses on the main hydraulic unit. On the hoses, note their connection points to the unit.
- A1 and B1 arm cylinder feed, A2 and B2 boom cylinder feed.
- A3 and B3 telescope cylinder feed and A5 on/off unit feed on boom.
- Disconnect the hoses (17 mm / 0.67 in, 22 mm / 0.87 in and 24 mm / 0.95 in flat wrenches) and seal the connections on the hoses and on the unit.



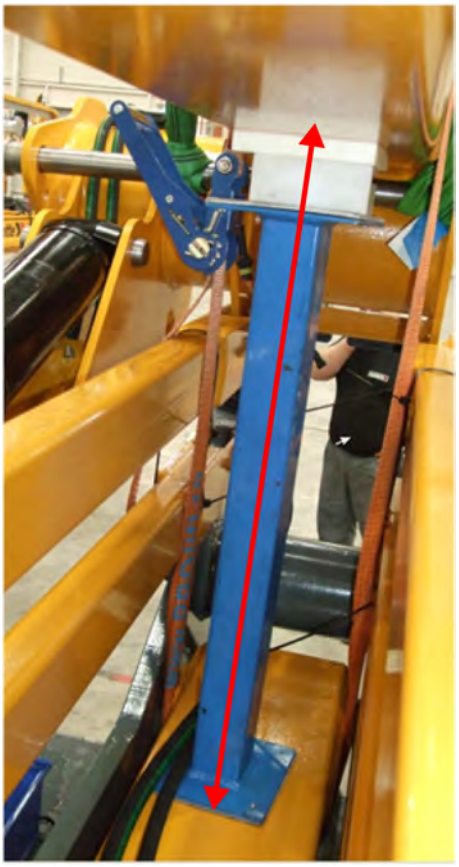
- Next mark the return hose on the tank of the on/off unit installed on the boom.
- Before disconnecting it, ensure that there is a ORFS plug in place to seal the tank side.
- If there is no plug, drain the hydraulic tank (Reservoir capacity 76 litres).
- If draining, remove the drain plug from the hydraulic tank (8 BTR wrench).

- Disconnect the hose marked P5 (22 mm / 0.87 in flat wrench) and seal it.



- Return all of the hoses, CN06-2 electric cable and 220 V power feed wire on the back of the turntable to the lower arm casing entry.
- Put them into the lower arm to facilitate removal of the arm assembly.

- Put a shim (approximately 750 mm / 2 ft 6 in) between the lower arm and upper arm (to be adjusted depending on the value measured).



- Strap the upper and lower unit using two 5000 Kg / 11023 lbs ratchet straps, mark 1, and 5500 mm / 18 ft 1 in long.
- Make the straps as tight as possible.

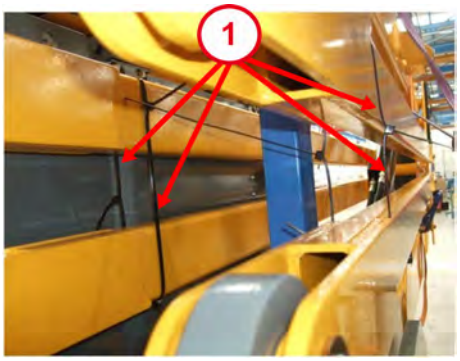
- Attach the boom cylinder to the upper unit using a strap.

- Use a pin with a diameter of 36 mm / 1.42 in and minimum length of 800 mm / 2 ft 7 in to attach the connecting part on the counterweight side.
- Position the 2 lifting straps with a 2000 kg / 4409 lbs capacity and 3000 mm / 9 ft 10 in in length (each strap).

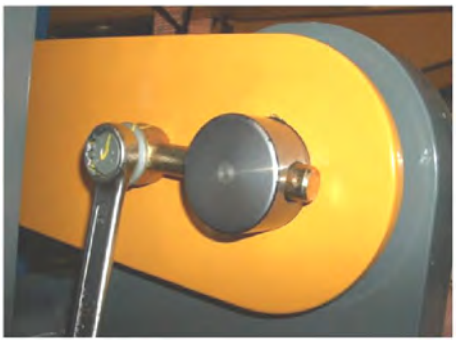
- Secure the front connecting part with 2 straps with a 2000 kg / 4409 lbs lifting capacity, 3000 mm / 9 ft 10 in long (each strap).

- Align the bridge and tension the straps.

- Fasten the upper and lower tie rods on each side to hold the lower tie rods in place when the pins are removed.
- Use 2 wide COLSON collars (1) for each side.



- Remove the 2 pins that connect the lower tie rods to the turntable. Remove the circlips.
- Loosen the screws that hold the locking pins (Wrench No. 16 mm / 0.6 in).



- Extract the pins from the lower tie rods.

- For safety, put a shim between the arm lower casing and the turret.

- Remove the screw holding the locking pin (Wrench No. 16 mm / 0.63 in).
- Remove the pin that is connecting the lower arm casing to the turntable.
- Remove it by pulling it out from the fuel tank side.

- The arm assembly is no longer secured to the turret. Lift the assembly.
- Place the assembly on a flat surface while ensuring the assembly's stability.

5 - Re-installation

- Remount in reverse order to removal.
- Grease the pins, the seals, and the bored holes.

- **Make sure to install the locking pin screws and circlips (change them if they became damaged during disassembly).**
- **Tighten the 3 counterweight supports to the torque ratio of 320 Nm.**

- Check for seals on the fittings.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). The hoses must not be twisted.
- Make sure the hoses follow their correct paths and the harnesses are under the arm casing.

6 - Additional operations

- Clean off any residual oil or grease.
- Verify the hydraulic oil level.
- Replace the fuel is the fuel tank has been drained.

Using the ground control box and after reassembling the boom assembly, perform all the arm and boom motions :

- Check the articulation of the hoses ;
- Check the articulation of the wire harnesses ;
- Using the console, check the status change of the senses ILS ;
- Check for any oil leaks.

- Test all of the functions from the ground station and platform station.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

Notes

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

	• Standard tool kit. • EPI (Personal protective equipment). • Circlips pliers. • Pin diameter 20 mm / 0.8 in, length 300 mm / 12 in to extract the pins. • ORFS plug kit : 2505001600. • 1 hoisting strap(s) for 500 kg / 1102 lbs at a length of 2000 mm / 6 ft 7 in. • 2 hoisting strap(s) for 2000 kg / 4409 lbs at a length of 3600 mm / 11 ft 10 in. • 2 hoisting strap(s) for 3000 kg / 6614 lbs at a length of 4800 mm / 15 ft 9 in. • A bridge or handling device . • 2 WLL 4-3/4T lyre shackles. • 290 kg / 639 lbs load for static test. • Shim height approximately 900 mm / 2 ft 11 in for platform and/or jack stand calibration, height approximately 2234 mm / 7 ft 4 in. • Pan for collecting hydraulic oil. • Pan for collecting hydraulic oil. • Hydraulic oil. • Grease for pins and rings. • Weight of boom/jib/platform assembly (approx. 1000 kg / 2205 lbs).		• Place barriers around the perimeter of the work area
	2 persons		

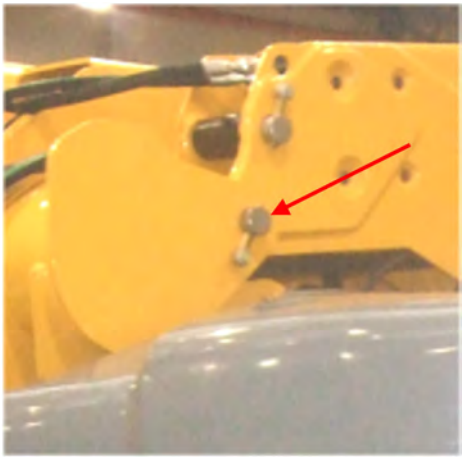
Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

3 - Preliminary operation

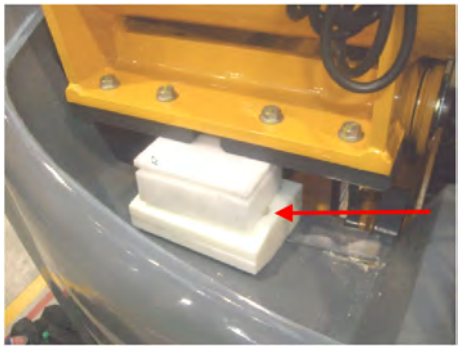
- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - Removal

- Place the machine on flat and firm ground.
- Telescope retracted ; Engine cover removed.
- Raise the arm so that the pin connecting the boom to the connecting part is clear of the counterweight.

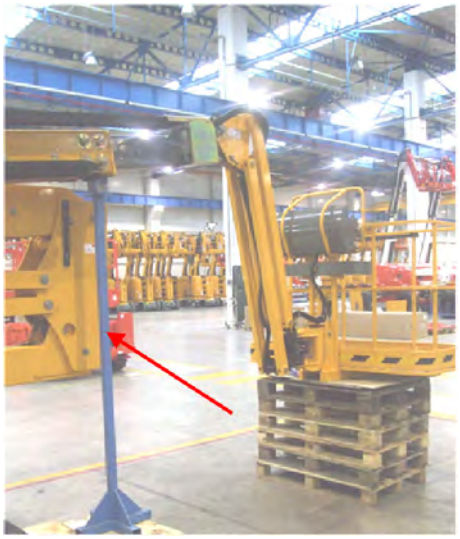


- Insert a shim between the arm and the counterweight.
- Set the arm on top, ensuring that the pin of the boom is always above the counterweight.



- Make a wedging, solid and stable under the basket about 900 mm / 2 ft 11 in.
- The boom is slightly raised so that the pin on the bottom of the output compensation cylinder is above the plate on the engine side.
- Jib is vertical.
- Place the platform on the wedges.

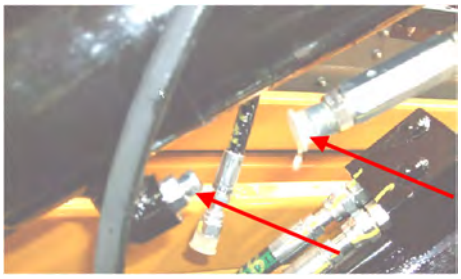
- If you have a sufficiently resistant jack stand, you can also perform a calibration under the boom as well as the cage calibration (jack stand height approximately 2234 mm / 7 ft 4 in).
- Be careful to position the stand so that it does not slip.



- Cut off the engine and remove the keys from the ignition.

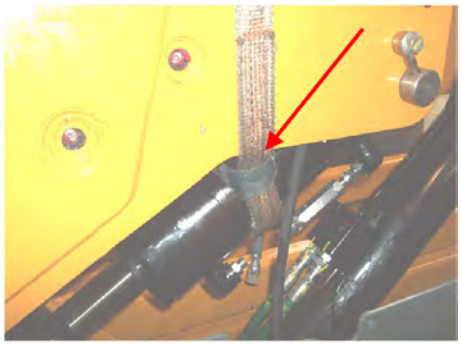
- Mark and disconnect the hoses from the output compensation cylinder (17 mm / 0.7 in wrenchesand 15 mm / 0.6 in).

Release the fittings slowly and let the pressure rise before fully releasing them (Put in place an oil drip pan).

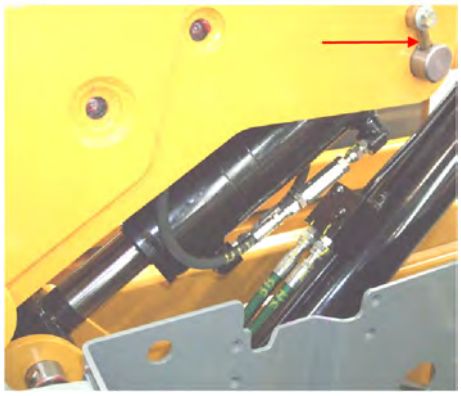


- Seal the hose and cylinder connections.

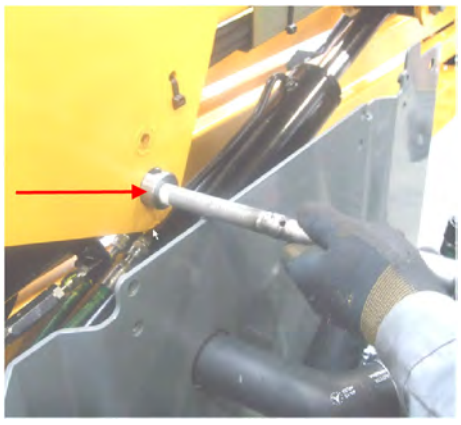
- Lash the output compensation cylinder with the lifting strap (Length 2 m / 6 ft 7 in ; Capacity 500 kg / 1102 lbs).
- Lightly tension the strap with the bridge.



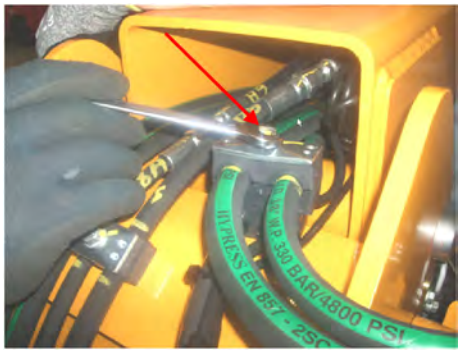
- Remove the screw holding the locking pin (Spanner 16 mm / 0.6 in and 18 mm / 0.7 in).
- Remove the pin.



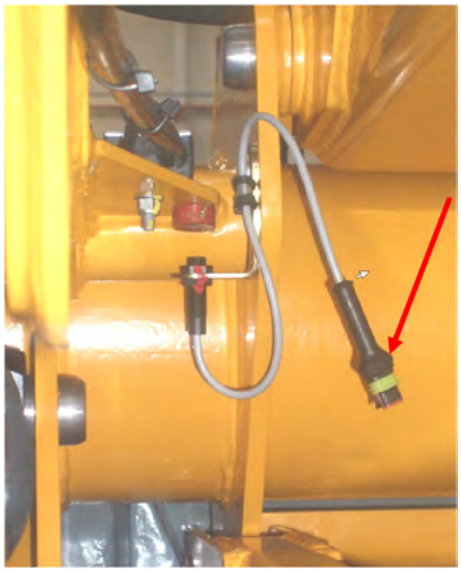
- Extract the pin on the back side.
- Let the cylinder rest on the boom cylinder.



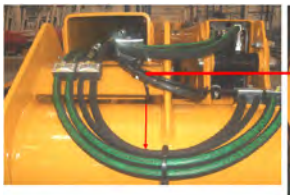
- Using a felt pen, mark the location of the hoses that supply the telescope cylinder and electrical harnesses on the STAUFF collar.
- This will enable them to be correctly repositioned when re-installing.
- Then remove the fastening screw from the STAUFF collar (13 mm / 0.5 in flat wrench and pipe wrench).



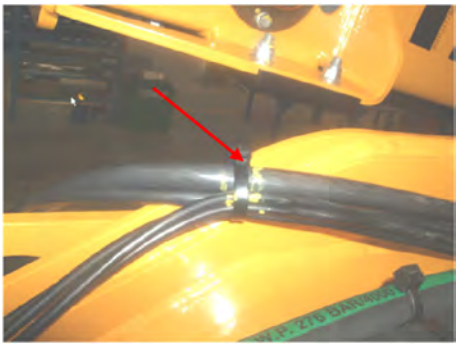
- Disconnect the plug from the boom ILS sensor (SQ520).

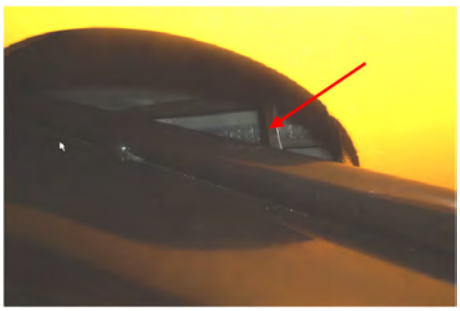


- Bring the other side of the boom ILS sensor bundle to the rear.
- Cut the collars in the link piece.



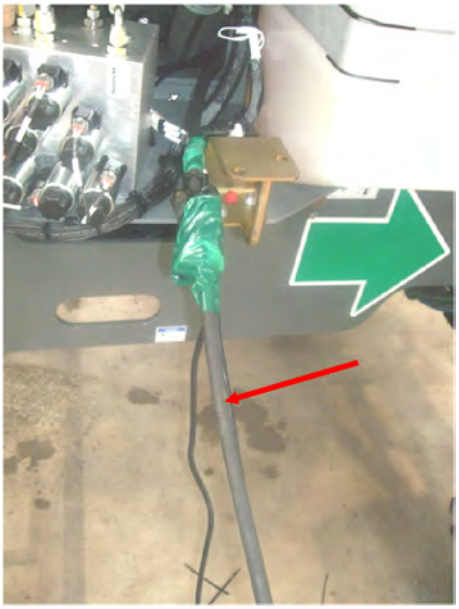
- At the front of the arm connecting part, cut the COLSON collars holding the bundles.
- Also cut the COLSON collars holding these bundles in the upper casing above the arm cylinder attached with hoses.





- On the turret, to the left of the fuel tank, mark and disconnect the CN06 1 and CN06 2 plugs.

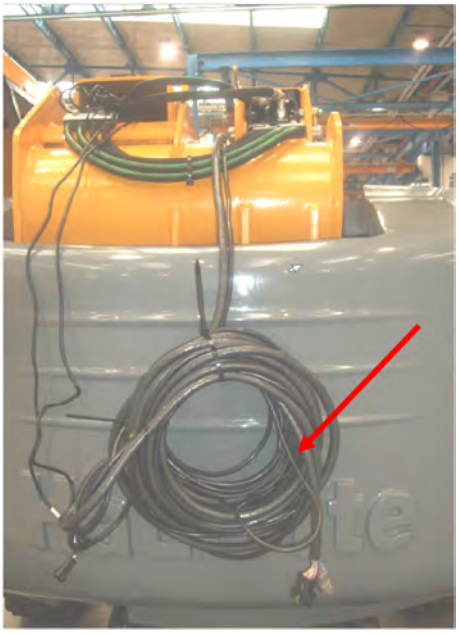
- Attach the bundle and 220V cable to a thread or electric cable with a minimum length of 15 m / 49 ft 3 in.
- This will enable you to remove the bundles in the arm compartments during reassembly.



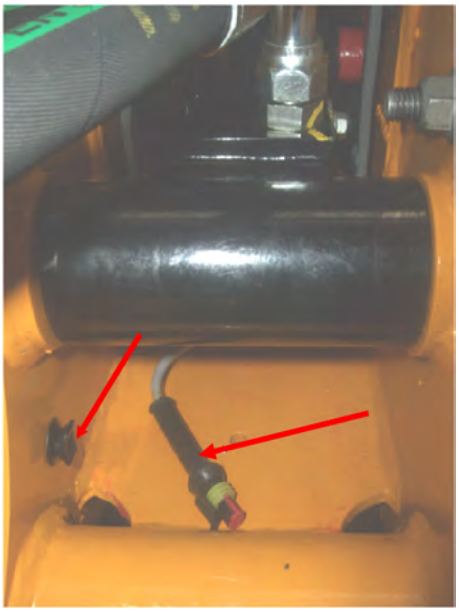
- Pull the bundles behind the lower compartment of the arm.

- Then pull the bundles on the front of the lower arm compartment.

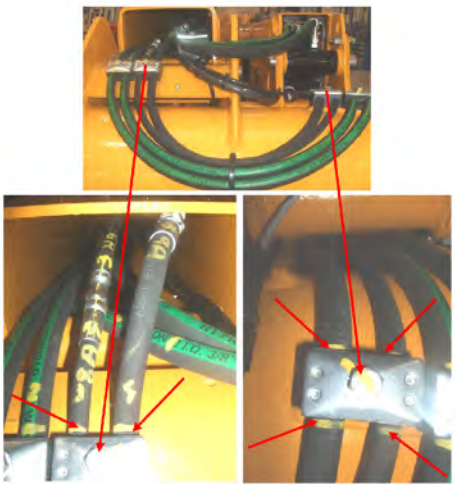
- Return the bundles behind the boom.
- Fasten them with COLSON collars.
- Leave the guide string in the arm compartment.



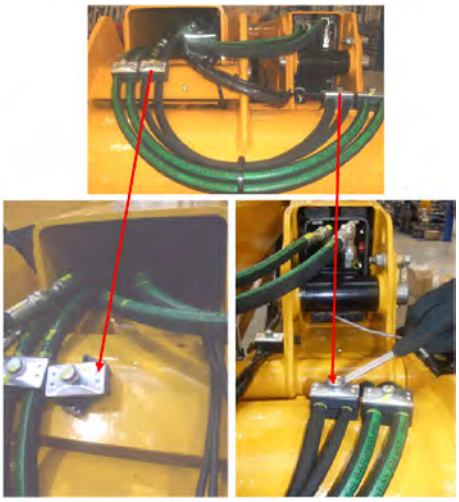
- Disconnect the ILS sensor from the telescope (SQ330) and cut the COLSON collar holding the bundle.
- Return the ILS sensor bundle with the rest of the bundles.



- Mark the location of the hoses on the STAUFF collars.
- These hoses feed the on/off unit on the boom.



- Remove the fastening screws from the STAUFF collars (Spanner 13 mm / 0.5 in ; 13 mm / 0.5 in pipe wrench).



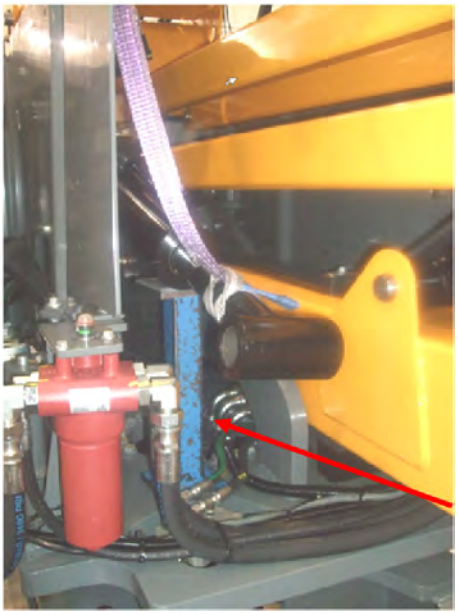
- Disconnect the hoses that feed the on/off unit on the boom at the connections (Spanner 22 mm / 0.9 in, 19 mm / 0.75 in, 18 mm / 0.71 in and 17 mm / 0.67 in).
- Seal the hoses after disassembly.

- Locate and disconnect the telescope cylinder supply hoses.
- Seal the hoses and connections on the cylinder.

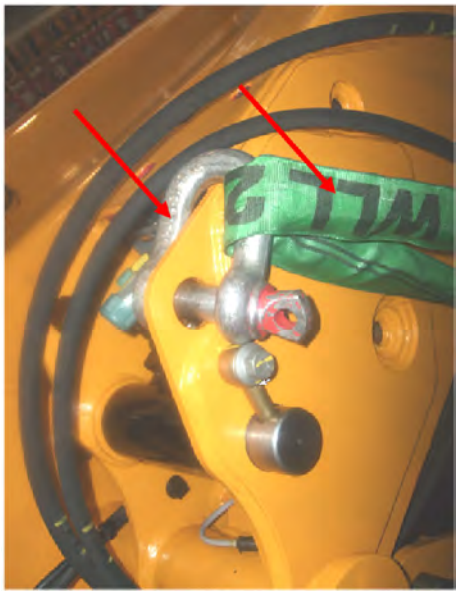
- **Ensure that the boom is fully secured. Chock under the cage and/ or boom.**

- Lash the boom cylinder with the 500 kg / 1102 lbs strap, 2000 mm / 6 ft 7 in long, and remove the screw holding the locking pin on the shaft side (18 mm / 0.7 in wrenches and 16 mm / 0.6 in).
- Remove the dowel and extract the pin on the shaft side.

- Position the boom cylinder on the chock in the turret and release the bridge to fasten the entire boom to the jib and cage.

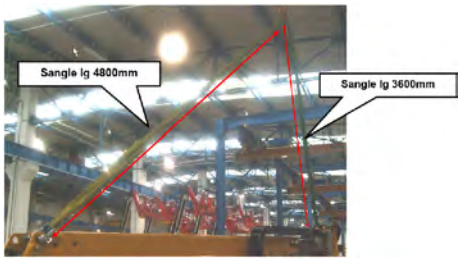


- Lash the boom: to the rear, affix the shackle and the strap with a capacity of 3000 kg / 6614 lbs and length of 4800 mm / 15 ft 9 in.



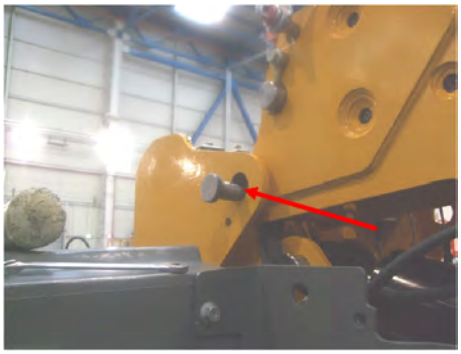
- Lash the boom to the front by passing the strap between the telescope and the connecting part.
- Use the strap with a capacity of 2000 kg / 4409 lbs and length of 3600 mm / 11 ft 10 in.

- Align the bridge and tension the straps.



- Remove the screw holding the locking pin and boom hinge on the turret (Spanner 16 mm / 0.6 in; 18 mm / 0.7 in).

- Extract the pin, adjusting the tension of the bridge to find the position where the pin can be removed more easily.



- Remove the boom and set it on strong and stable supports.
- Then delineate the area.

N.B.-:-IF HEIGHT OR STRAP LENGTH CONSTRAINTS PREVENT YOU FROM MAKING A SLING AS DESCRIBED ABOVE. IF YOU ARE NOT SURE, YOU CAN LASH THE BOOM TO HAVE A CORRECT CENTRE OF GRAVITY, USE A BRIDGE CRANE OR A FORKLIFT TO REMOVE THE ASSEMBLY. EXAMPLE OF SECURE FORKLIFT AND WITHOUT FORKLIFT, IF SLINGING OF THE CENTRE OF GRAVITY IS NOT CORRECT.

5 - Re-installation

- Remount in reverse order to removal.
- Grease the pins, the seals, and the bored holes.

- **Remember to refit the pin stop screws.**

- Check for seals on the fittings.
- Hold the hoses to ensure that they don't turn while tightening the connections (risk of seal damage). The hoses must not be twisted.
- Make sure the hoses follow their correct paths and the harnesses are under the arm casing.

6 - Additional operations

- Clean off any residual oil or grease.
- Verify the hydraulic oil level.

  Using the ground control box and after reassembling the boom assembly, perform all the arm and boom motions :

  - Check the articulation of the hoses ;
  - Check the articulation of the wire harnesses ;
  - Using the console, check the status change of the senses ILS ;
  - Check for any oil leaks.

- Test all of the functions from the ground station and platform station.
- Perform a static test by putting 290 kg / 639 lbs on the platform. Machine unfolded, 15 mn after checking the performance of its parts :
- Lift Arm hydraulic cylinder.
- Boom lifting cylinder.
- Telescoping cylinder.
- Input jib leveling cylinder.
- Jib cylinder.

1 - You will need

	• Standard tool kit • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

2 - Technical specifications

Type	12 V DC, Group 34/78
Quantity	1
Cold cranking ampere	800 A

3 - Starter battery inspection

Proper battery condition is essential to good engine performance and operational safety :

1. Put on protective clothing and eye wear.
2. Check that the battery is secure.
3. Check for damaged batteries, battery cables or connections.
4. Check battery terminals for oxidation.
5. Check battery terminals for cleanliness and tightness

N.B.-:-TURN THE ENGINE TRAY TO ACCESS THE BATTERY MORE EASILY. THE BATTERY TERMINALS WERE DEPORTED IN FRONT OF THE ENGINE TRAY (REP B+ AND B-).

HA16RTJ - HA16RTJ O - HA16RTJ PRO - HA46RTJ O - HA46RTJ PRO

3.1 - ACCESS TO THE BATTERY

- Open the engine cover.
- Remove screw (1) that is blocking the engine compartment.
- Pull then swivel the engine compartment.
- Lock the engine compartment using the locking lever .

Remove the starter battery :

- Disconnect the terminal from the negative terminal (-) then from the positive terminal (+).
- Torque tightening of terminals 40 Nm (32 lbs.ft) .

Notes

1 - Warning

- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

2 - You will need

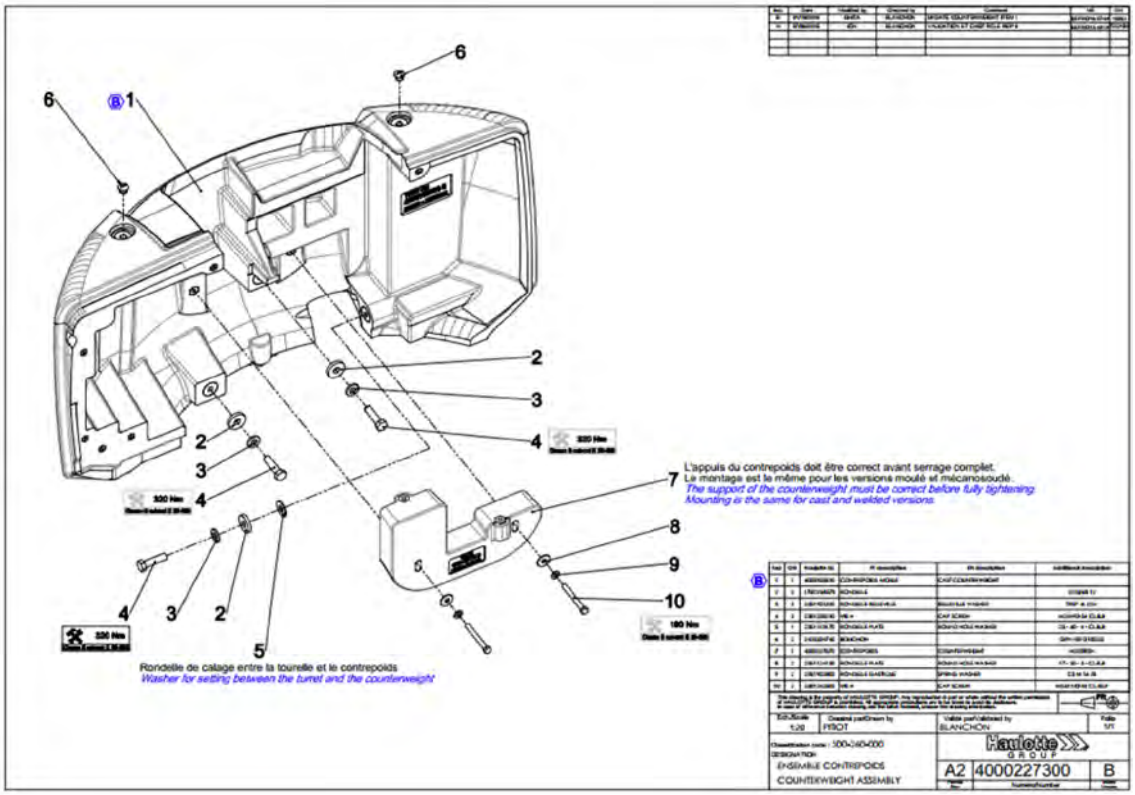
	• Standard tool kit. • EPI (Personal protective equipment). • Circlips pliers. • 36 mm / 1.4 in flat wrench for counterweight fastening screws. • 2 hoisting strap(s) for 2000 kg / 4409 lbs at a length of 3000 mm / 9 ft 10 in. • A bridge or handling device . • 2 lifting rings to be affixed in M24 to fasten the counterweight. • Total weight of the counterweight with the additional counterweight (principal 1365 kg / 3009 lbs + additional 100 kg / 220 lbs) for HA16RTJPRO/HA16RTJO = 1465 kg / 3230 lbs. • Weight of counterweight HA16RTJ = 1365 kg / 3009 lbs. • A 320 Nm torque wrench with 36 mm / 1.42 in socket for tightening the counterweight fastening bolts. • Grease for lubricating the threadings in M24 • For information, the fastening screws of the additional counterweights present on HA16RTJPRO and HA16RTJO must have a tightening torque of 190 Nm.		• Place barriers around the perimeter of the work area
	1 person		

Exclusively use tools and auxiliary average adapted. Always wear necessary safety clothing.

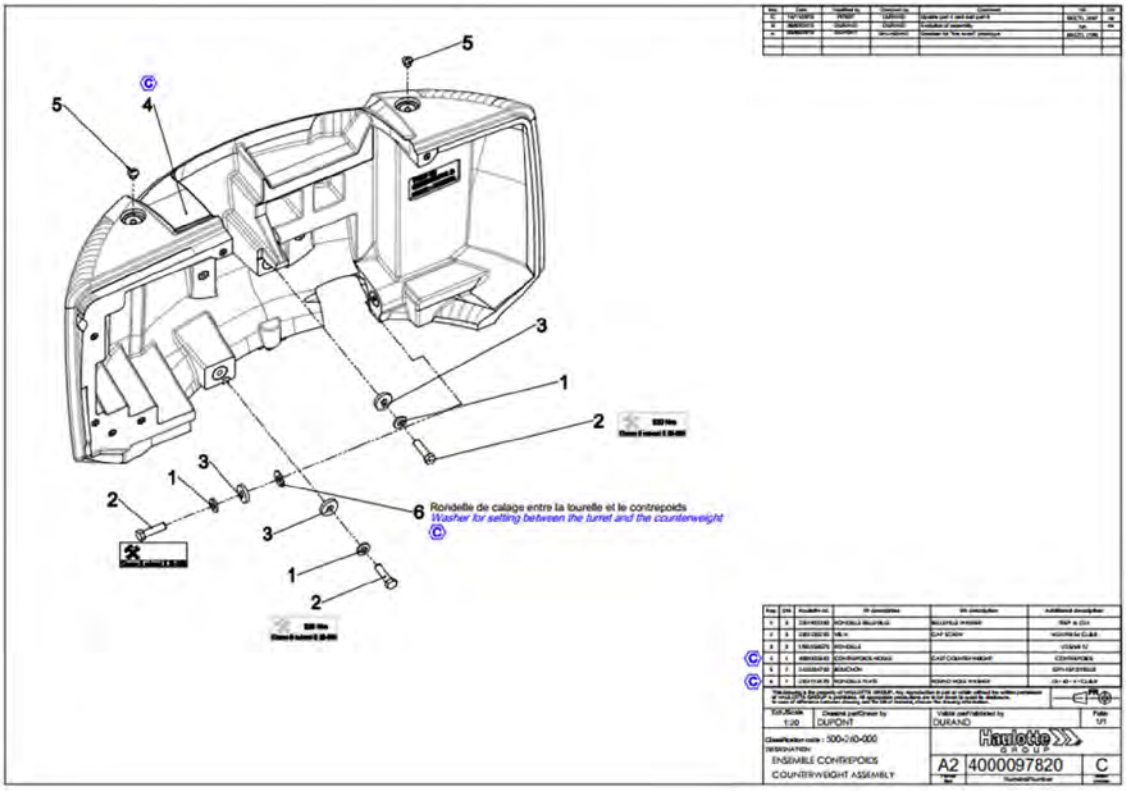
3 - Preliminary operation

- The technician should take all steps to protect themselves or others against all risks of injury connected with this operation.
- The worker must make sure to have the EPI (Personal Protective Equipment) suited to the work and to the environment's specific conditions in which the equipment is located (see safety information specific to the work site.
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Mark out the work area.
- Switch off the ignition and remove the ignition key.
- Put a "DO NOT USE" decal near the start/stop button to inform personnel that work is currently in progress on the equipment.
- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- Engine exhaust gases contain harmful products of combustion. Always start and run the engine in a well-ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - HA16RTJPRO/HA16RTJO counterweight general arrangement plan



5 - HA16RTJ counterweight general arrangement plan



6 - Removal

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Machine completely folded, except the arm, slightly raised so that it is not supported on the counterweight.
- Switch off the ignition and remove the ignition key.

- If using the Activ' Lighting System option, disconnect the plug from the twilight sensor and spotlight.

Remove the counterweight :

- Take off the plastic caps that protect the threads on the counterweight.
- Screw the 2 M24 lifting rings into the counterweight.

- Secure the counterweights using the rings with 2 2000 kg / 4409 lbs straps, 3000 mm / 9 ft 10 in long, and carefully tension the bridge.

- Open and lock the engine compartment.
- Remove the 4 screws (18 mm / 0.71 in wrench) that holds the plate (1) to the counterweight.

- Open the cover on the fuel tank and remove the screw (16 mm / 0.63 in wrench) holding the side plate to the counterweight.

- Start by removing the lower fastening screw from the counterweight (Spanner 36 mm / 1.42 in).

- Then move on to the engine side. Remove the 2 other screws (36 mm / 1.42 in flat wrench) holding the counterweight on the turntable.

Check the tension of the bridge and its alignment.

- Remove the counterweight and set it aside, ensuring that it is stable, and delineate the area around it.

7 - Re-installation

- Remount in reverse order to removal.

- **Tighten the 3 counterweight supports to the torque ratio of 320 Nm.**

- Lubricate the inside of the threadings in M24 and replace the plastic plugs.
- If the Activ' Lighting System option is used, connect the plug of the twilight sensor and spotlight.

8 - Additional operations

- Clean the counterweight.

1 - Links to engine manufacturer manuals - Fuel-powered machines

For online reference and to download engine maintenance manuals for HAULOTTE® machines, go to :

https://www.e-technical-information.com :

- Username : Haulotte-Manuals
- Password : manuals

2 - KUBOTA

V1505 – D1105 E3 Engine :

- In french : Manuel d'atelier 9Y111-00543
- In english : Workshop manual 9Y111-00126

V1505 – D1105 E4 Engine :

- In french : Manuel d'atelier 9Y111-14251
- In english : Workshop manual 9Y111-07841

D1803 CRTE5 - STAGE V Engine :

- In french : Manuel de l'opérateur 1J783-8915-7FRA
- In english : Operator's manual 1J783-8915-7ENG
- In french : Manuel d'atelier 9Y311-00022
- In english : Workshop manual 9Y311-00032

V2403 CR Engine :

- In french : Manuel d'atelier 9Y111-10985
- In english : Workshop manual 9Y111-07825

V2403M Engine :

- In french : Manuel d'atelier 9Y111-02584
- In english : Workshop manual 9Y111-02574

V2607 CR E4 Engine :

- In french : Manuel d'atelier 9Y111-11034
- In english : Workshop manual 9Y111-06744

V2607 MT E3 Engine :

- In french : Manuel d'atelier 9Y111-01726
- In english : Workshop manual 9Y111-01036

WG1605 Engine :
- In french : Manuel atelier moteur réf 4000208650
- In english : Workshop manual engine ref 4000208650

WG2503 Engine :
- In french : Manuel d'atelier 9Y111-10902
- In english : Workshop manual 9Y111-09142

WG3800 Engine :
- In french : Manuel d'atelier 9Y111-13101
- In english : Workshop manual 9Y111-13091

WG972 Engine :
- In french : Manuel d'atelier 9Y111-03190
- In english : Workshop manual 9Y111-03180

3 - PERKINS

403-J17 Engine :
- In english : Operator's manual PERKINS engine type 403-J17

1104D Engine :
- In french : Manuel de l'opérateur Moteur PERKINS 1104D-44T
- In english : Operator's manual PERKINS engine type 1104D-44T

4 - DEUTZ

TCD 2,9 L4 Engine :
- In french : Manuel de l'opérateur 03124630_10_2013
- In english : Operator's manual 03124628 en

5 - KOHLER

KDI 3404 TCR Engine :
- In french : ED0053030060 UM_KDI_3404TCR_REV_00_FR_HD
- In english : ED0053030050 UM_KDI_3404TCR_REV_00_EN_HD

KDI 1903 TC - STAGE V Engine :
- In english : ED0053029490_UM_KDI_1903_2504TCR_REV_19_1_EN
- In french : ED0053029710_UM_KDI_1903_2504TCR_REV_19_1_FR

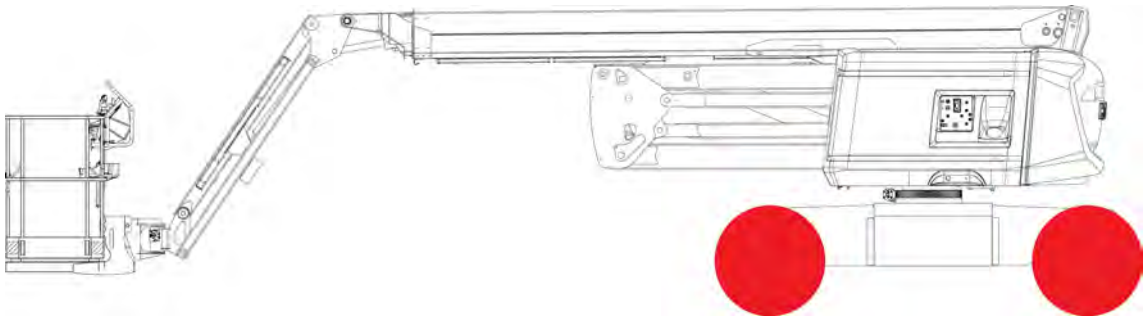
6 - YANMAR

Range Extender P6000 :
- In english : Yanmar Operation Manual EN0016

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Torque wrench		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

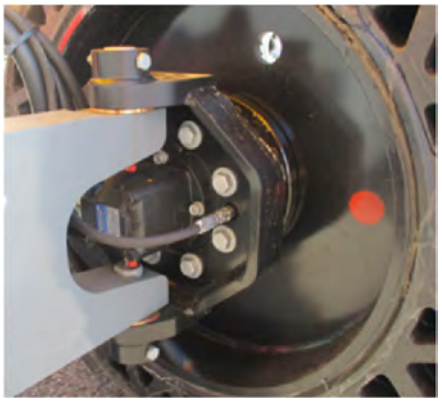
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

Wheel / Reduction gear :

- Check the tightening torque of the 8 studs : 320 N.m (236 lbf.ft).

Chassis or wheel steering pivot / Reduction gear :

- Check the tightening torque of the 8 studs : 190 N.m (140 lbf.ft).



7 - Additional operations

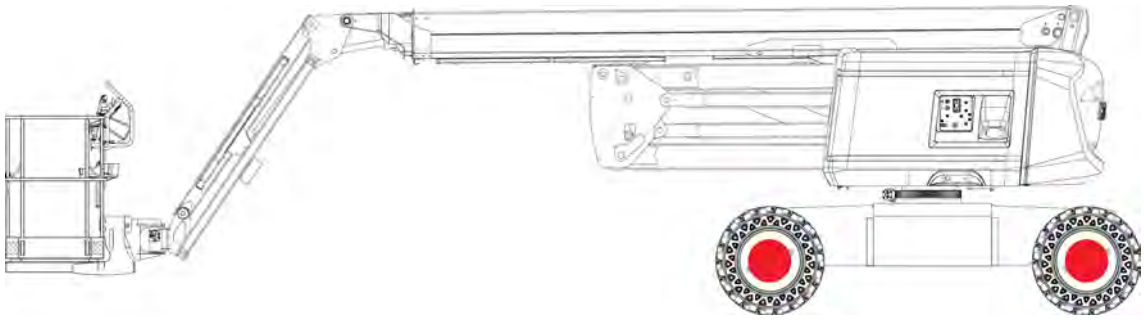
- Clean the work area.

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Jack 2000 kg(4409 lb) • Chocks 4 m(13 ft2 in) • 1 syringe for oil filling • Oil collection pan		• Place barriers around the perimeter of the work area
	1 person		

6 - Consumables

Consumable	HAULOTTE® code	Packaging
Gear box oil SAE 80W90	4000530610	Can : 1 l(0.22 gal US)
Gear box oil SAE 80W90	2420801370	Can : 20 l(5.3 gal US)
Gear box oil SAE 80W90	2420801380	Barrel : 209 l(55.2 gal US)

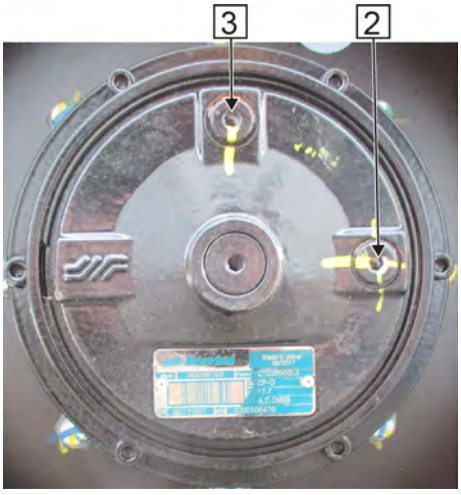
7 - Procedure

7.1 - YOU HAVE A MEANS OF LIFTING THE MACHINE

- Lift the machine with the jack to raise the wheel off the ground.
- Place wedges under the chassis and lower the jack slowly.

- Disconnect the gear system :
- Loosen the central screw by approximately 7 turns (1).

- Manually turn the wheel to position the filler cap to the top of the vertical axis (3).
- Open the caps (2,3) :
- If the level is correct, oil should drain from the orifice (2).
- If not, add oil via the cap (3) using the syringe until oil flows through the hole (2).
- Re-tighten the central screw, close the caps and wipe any oil that has spilled on the floor.



7.2 - YOU DO NOT HAVE THE MEANS TO LIFT THE MACHINE

- Rotate the wheel, moving it slowly to place a filler cap at the top of the vertical axis (1).
- Open the caps (1, 2) :
- If the level is correct, oil should drain from the orifice (2).
- If not, add oil via the cap (1) using the syringe until oil flows through the hole (2).
- Close the caps and wipe up any oil that has spilled on the floor.

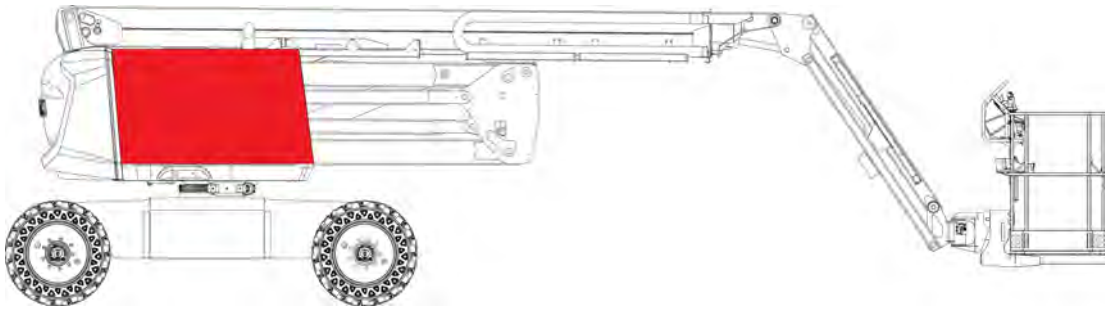
8 - Additional operations

- Clean any oil traces.
- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.
- The use of this form implies that its user has been trained on this type of equipment.
- It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.
- Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...
- The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.
- Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

- Beware of the risk of burns; the hydraulic system operates at high temperatures.
- The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.
- The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.
- Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.
- ONLY use insulated tools when working on or near batteries or electrical connections.
- Do not produce sparks or flames or smoke near the battery.
- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.
- Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.
- Contact with engine oil can damage your skin.
- Wear gloves and goggles to protect yourself from fluid splashes.
- If you come in contact with engine oil, wash it off immediately.

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

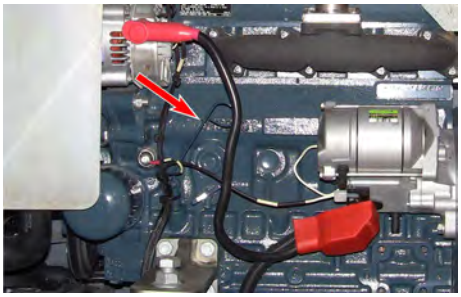
5 - You will need

	• "DO NOT OPERATE" tag • Rags Engine oil should be MIL-L-2104C or should have the properties of grades CD from the API classification : • Above 25°C : SAE30 or SAE10W-30 / SAE15W-40. • From -10°C to 25°C : SAE10W-30 or SAE15W-40. • Below -10°C : SAE10W-30. • When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil		Place barriers around the perimeter of the work area
	1 person		

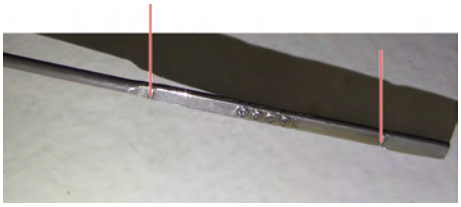
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.

- Withdraw the oil dipstick.
- Wipe the dipstick on a clean, non-fluffy rag.
- Take the oil level gauge out again, and check the oil level.



- Check that the oil level is between the indicated minimum and maximum levels.



- Top up the oil level, if necessary. After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.

7 - Additional operations

- Clean the work area.

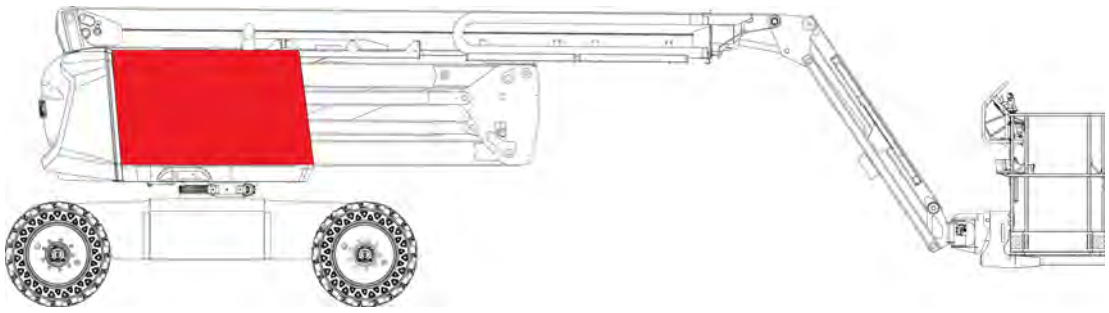
Procedure for checking the level of engine oil - Perkins 403J-17 engine

MP0003I

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**
- **The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.**
- **Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.**
- **Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.**
- **Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.**
- **Contact with engine oil can damage your skin.**
- **If you come in contact with engine oil, wash it off immediately.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Rags • Standard tool kit		• Place barriers around the perimeter of the work area
	1 person		

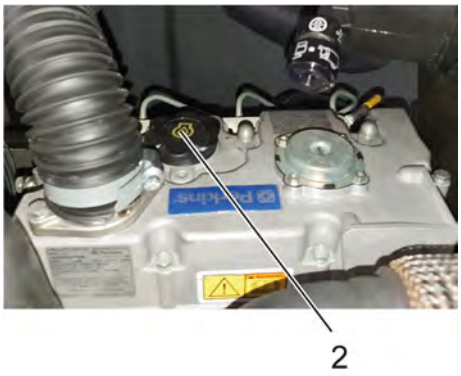
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Check the engine oil level before starting or more than 5 minutes after stopping the engine.
- Remove the oil level gauge, wipe it clean and reinstall it (1).

- Remove the gauge again :
- If the oil level is between the marks (MIN.) and (MAX.), the oil level is correct.

- If the oil level is lower than the minimum mark (MIN.) :
- Remove the oil filling cap (2) and top up with new oil until it reaches the correct level.
- After adding oil, wait more than 5 minutes and check the oil level again.
- If the level is still below the limit, repeat the operation.



7 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**
- **The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.**
- **Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.**
- **Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.**
- **Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.**
- **Contact with engine oil can damage your skin.**
- **If you come in contact with engine oil, wash it off immediately.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

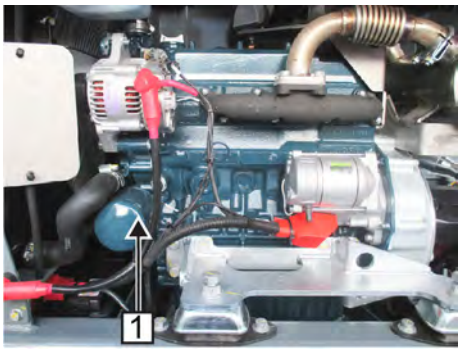
	• Change the oil and filter after the first 50 h hours of operation then every 200 h hours using the standard oil pan • "DO NOT OPERATE" tag • Standard tool kit • Oil filter wrench • Rags • Engine oil filter - 4000007250 • Container		Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Remove the oil filter (1) using a filter wrench.
- Apply a layer of clean oil to the seal of the new cartridge.
- Tighen the new cartridge by hand until it comes into contact, then tighten through 3/4 of a turn using the wrench.

N.B.-:-AFTER REPLACING THE CARTRIDGE, THE OIL LEVEL FALLS SLIGHTLY. REMEMBER TO CHECK THE LEVEL.



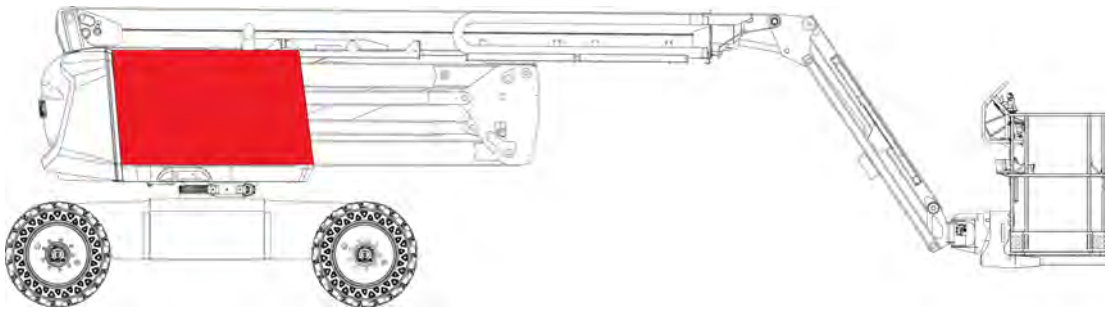
6 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**
- **The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.**
- **Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.**
- **Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.**
- **Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.**
- **Contact with engine oil can damage your skin.**
- **If you come in contact with engine oil, wash it off immediately.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

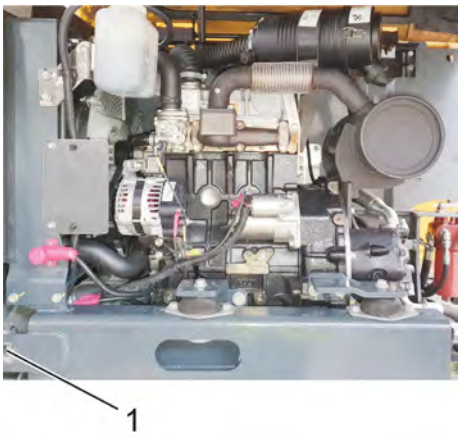
5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Oil filter wrench • Rags • Engine oil filter - 2324003020 • Container		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

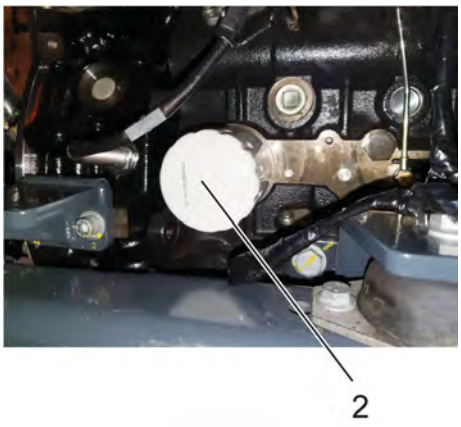
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- The oil cartridge is at the rear of the engine. To access it, swivel the engine by removing the screw (1).



- Remove the oil filter (2) using a filter wrench.
- Apply a layer of clean oil to the seal of the new cartridge.
- Tighen the new cartridge by hand until it comes into contact, then tighten through 3/4 of a turn using the wrench.

N.B.-:-DO NOT FILL THE OIL FILTERS WITH OIL BEFORE INSTALLING THEM. THIS OIL WOULD NOT BE FILTERED AND COULD BE CONTAMINATED. CONTAMINATED OIL CAN CAUSE ACCELERATED WEAR TO ENGINE COMPONENTS OR ENGINE DAMAGE.



7 - Additional operations

- Clean the work area.

Notes

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O - HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

• Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

• The use of this form implies that its user has been trained on this type of equipment.

• It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.

• Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...

• The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.

• Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

• Beware of the risk of burns; the hydraulic system operates at high temperatures.

• The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.

• The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

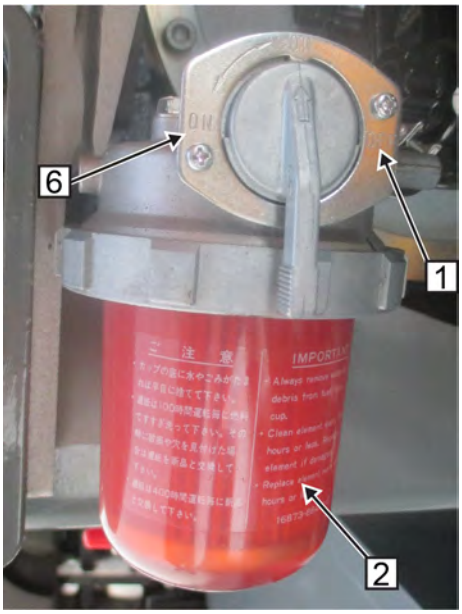
	• Diesel filter cartridge - 4000079430 • Seals - 4000210630 - 4000079450 • "DO NOT OPERATE" tag • Standard tool kit • Filter wrench • Container • Oil collection pan		Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

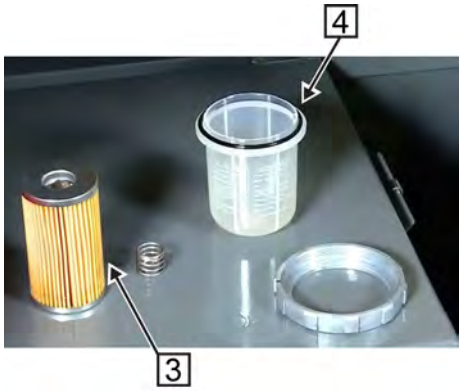
Dis-assembly :

- Set the handle of the separator to "OFF" (1).
- Loosen and remove the container (2) using a filter wrench.
- Remove the cartridge from the diesel filter (3).



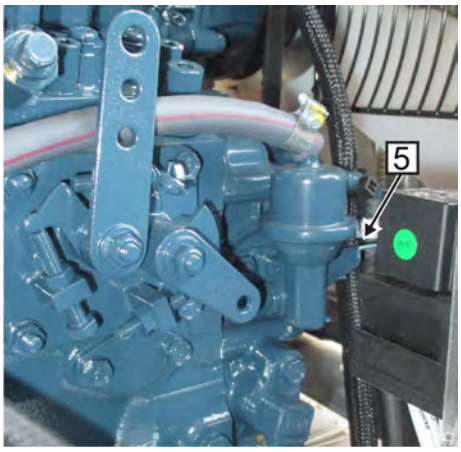
Assembly :

- Clean the inside of the diesel filter jar (2).
- Replace the seal of the container (4) and reassemble in the reverse order to disassembly.
- Apply a thin layer of fuel to the surface of the seal of the container (4).
- Tighten the container by hand then lock with the filter wrench.
- Open the fuel valve (1), setting it to "ON", and reboot the system using the button behind the engine (5).
- Release the air by loosening the screw, then re-tightening it (6).



Disconnecting the engine start sensor to reboot the pump is recommended.

- Switch on the engine for a few moments and check that there are no fuel leaks in the filter.



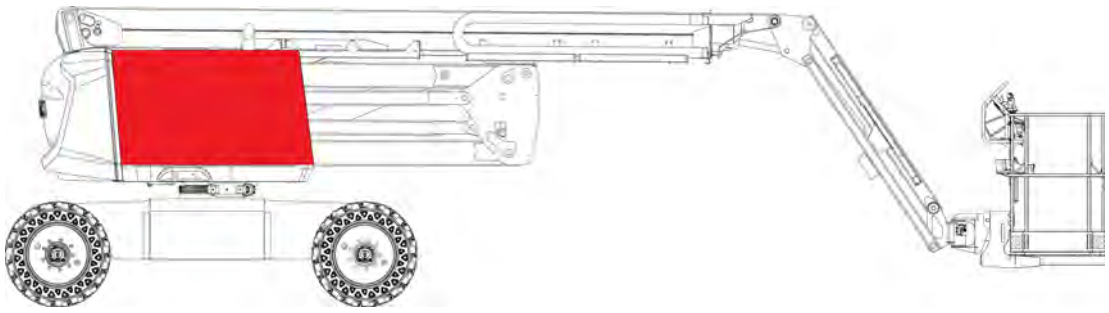
6 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**
- **The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

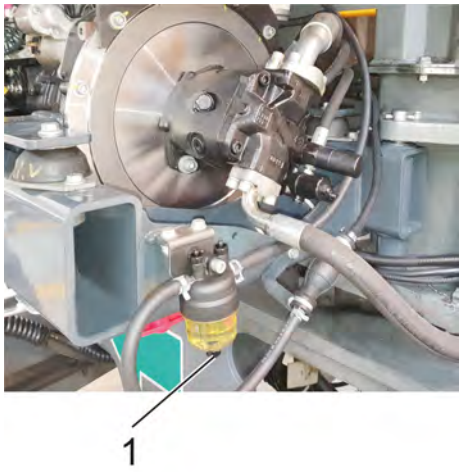
	• Diesel prefilter cartridge - 4001206140 • Diesel filter cartridge - 4001205910 • "DO NOT OPERATE" tag • Standard tool kit • Filter wrench • Container • Oil collection pan		Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

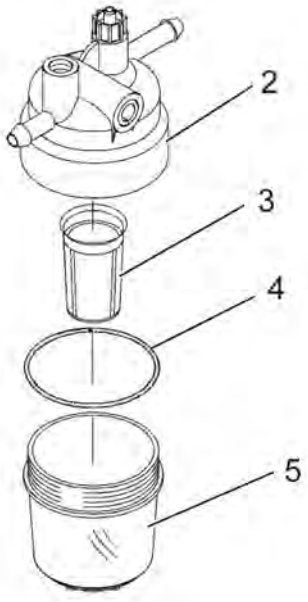
6.1 - PRE-FILTERED WITH DIESEL (PRIMARY)

- Turn the fuel supply valve (if equipped) to the OFF position before performing this maintenance.
- Open the drain tap (1) and allow the fuel to drain into a recipient.
- Wipe up any spilled fuel.
- Clean the outside of the fuel filter assembly .



Dis-assembly :

- Remove the filter bowl (5) from the fuel filter base (2).
- Remove the O-ring seal (4).
- Remove the filter element (3) from the fuel filter base (2).
- Clean the filter bowl (5).

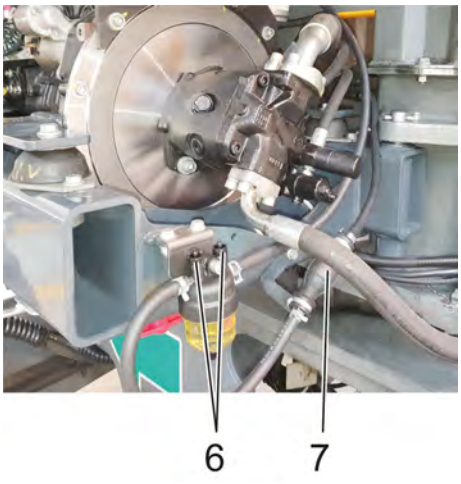


Assembly :

- Replace the seal of the container (4) and reassemble in the reverse order to disassembly.
- Apply a thin layer of fuel to the surface of the seal of the container.
- Do NOT fill the bowl with fuel before the assembly is installed.
- Fit the filter bowl (5) on the upper part of the filter head (2).
- Tighten the filter bowl (5) by hand.

Use the following procedure to prime the fuel system :

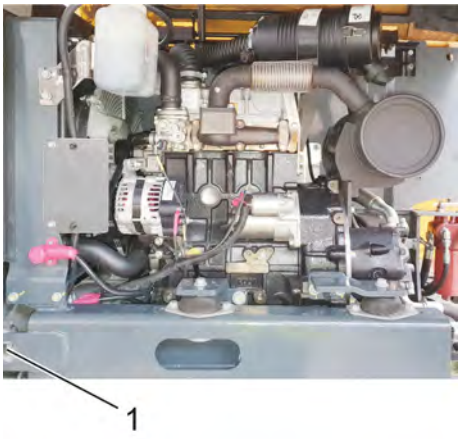
- Ensure that fuel valve for the fuel filter that has an element is in the ON position.
- Loosen the purge screw (6).
- Operate the hand priming pump (7) until fuel free from air comes from the vent screw (6).
- Refit and tighten the purge screw.



N.B.-:-THE SECONDARY FUEL FILTER MUST BE REPLACED AT THE SAME TIME AS THE PRIMARY FUEL FILTER.

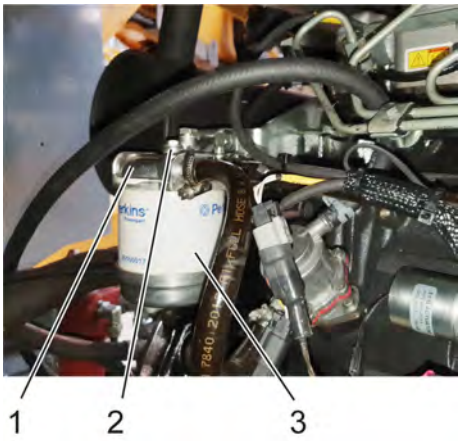
6.2 - DIESEL FILTER (SECONDARY)

- Pivot the motor tank by unscrewing the screw (1).



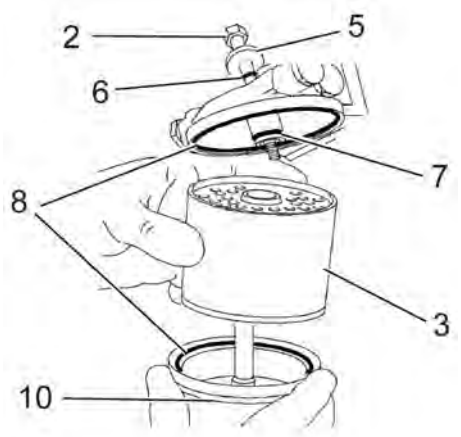
Dis-assembly :

- Close the fuel supply valve.
- Clean the outside of the fuel filter assembly (1).
- Remove setscrew (2).
- Remove the cartridge from the diesel filter (3). Allow the liquid to flow into the receptacle.



Assembly :

- Replace the seals (8, 7).
- Install a new cartridge (3).
- Close the casing again (10).
- Place washer (5) and new seal (6) on setscrew (2).
- Fasten the assembly to the fuel filter base with setscrew (2)



- Release the air by loosening the screw, then re-tightening it (11).

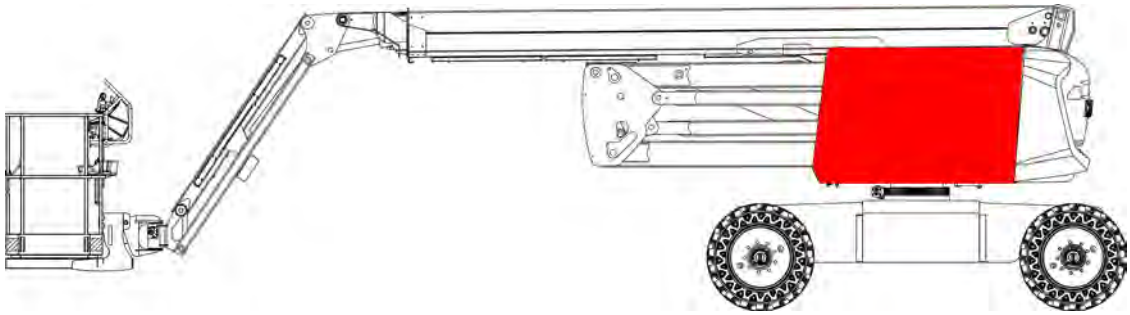
7 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

5 - You will need

	• Filter replacement every year or every 1000 h • Hydraulic oil filter - 2427002910 • Hydraulic filter cartridge - 2427002910 • "DO NOT OPERATE" tag • Standard tool kit • Vacuum pump • Rags • Container • Collection tray 1 l(0.22 gal US)		Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Place a container under the filter.
- Unlock the filter container using a wrench then unscrew by hand.

- Change the cartridge inside the container.
- Re-tighten the container by hand then tighten using a wrench to finish.
- Wipe away any run-off and check that the system has no leaks.
- Perform the operation when it is at room temperature.

7 - Additional operations

- Clean the work area.

Notes

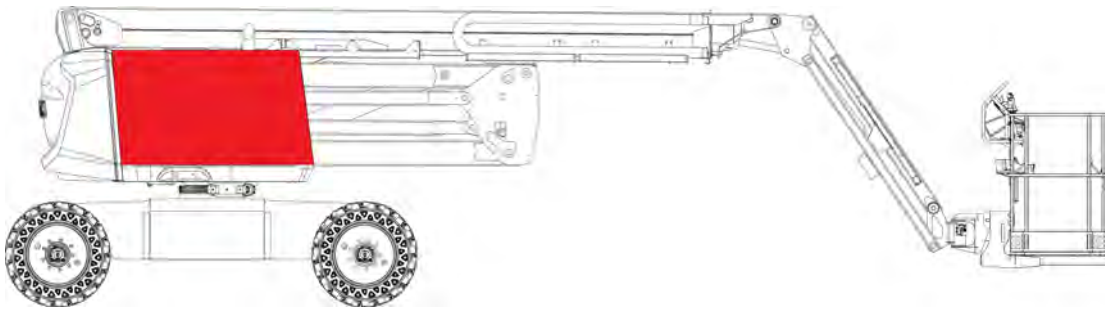
Procedure for checking engine belt tension - Kubota - V1505 / V2403 engine

MP0007B

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Concerned area



3 - Warning

• Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

• The use of this form implies that its user has been trained on this type of equipment.

• It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.

• Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...

• The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.

• Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

• Beware of the risk of burns; the hydraulic system operates at high temperatures.

• The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.

• The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

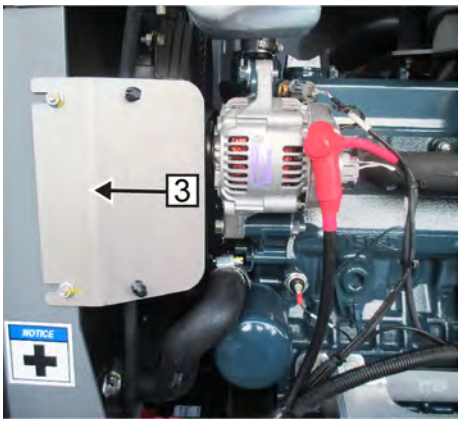
	• "DO NOT OPERATE" tag • Tools for checking belt tension • Standard tool kit • Lever		Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

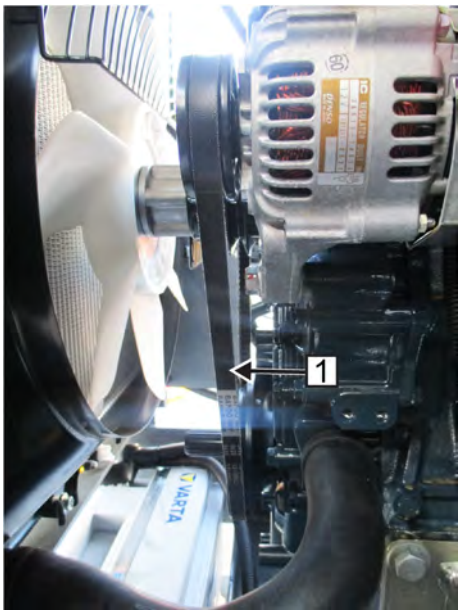
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Do not start the engine and disconnect the battery.

- Remove the protective cover if there is not sufficient access (3).



- Press halfway between the fan drive pulley and the alternator pulley with a force of 98 N (10 kg) to measure the deflection(1).
- The value measured must be between 7 mm and 9 mm.
- If the value is within this range, the tension is correct.



- If the value is not within this range :
- Loosen the fastening screw of the alternator (2).
- Adjust its position.

7 - Additional operations

- Clean the work area.

Notes

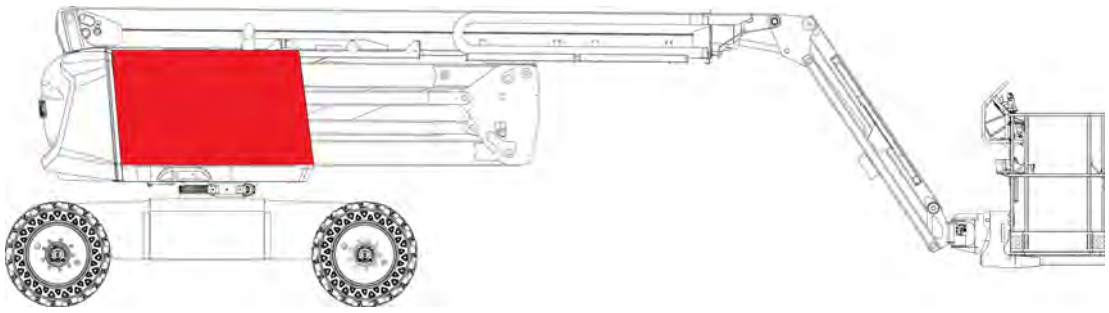
Procedure for checking engine belt tension - Perkins 403J-17 engine

MP0007G

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**
- **The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

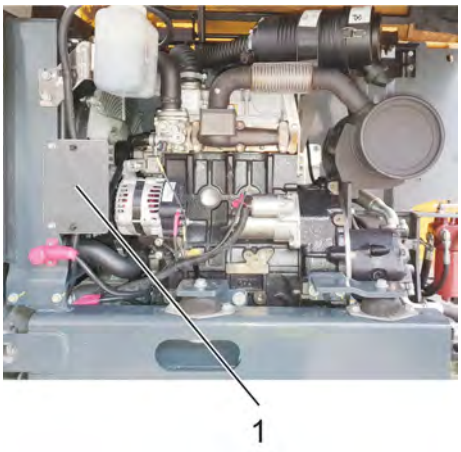
	• "DO NOT OPERATE" tag • Tools for checking belt tension • Standard tool kit • Lever		Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

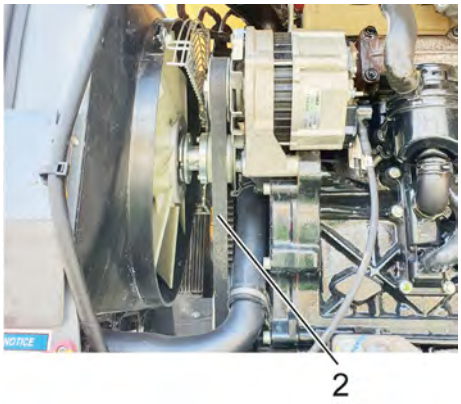
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Do not start the engine and disconnect the battery.

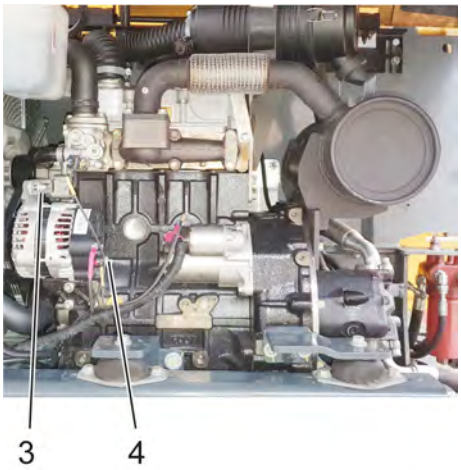
- Remove the protective cover if there is not sufficient access (1).
- Place a tension measurement instrument in the centre of the part between the alternator pulley and the engine pulley.



- The correct tension of a new belt is 489 N (110 lb).
- The correct tension should be between 267 N (60 lb) and 356 N (80 lb).



- If the value is not within this range :
- Unscrew the alternator fastening screws (3, 4).
- Adjust its position.
- Tighten the alternator fastening screws again.
- Tighten all bolts and nuts to a torque of 25 Nm (221 lb).



7 - Additional operations

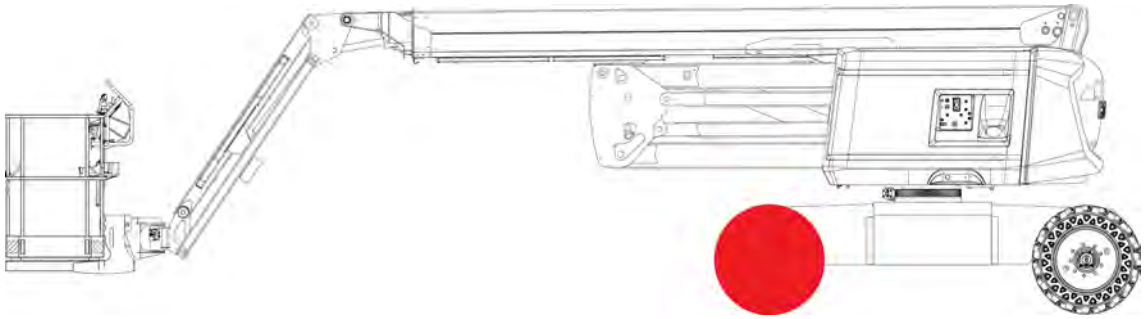
- Clean the work area.

Notes

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	150 mm / 5.9 in support that can support the weight of the machine		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

The front axles will oscillate when the boom is in transport position (i.e. when the boom is less than 15° above horizontal and not extended beyond 30cm (12in) on the machine and drive is selected.

- Ensure the axles are extended and the boom is fully retracted, lowered, and centered betweeen the rear wheels prior to beginning lockout cylinder test.
- Place a ramp 15 cm (6 in) high in front of the front right wheel.

.

- From platform control box, start engine.
- Place the drive control lever to the forward position and carefully drive machine up ascension ramp until left front wheels is on top of block.

- Carefully extend the boom just enough to get it out of the transport position.

- With boom in this position, place drive control lever to reverse and carefully drive machine off of block and ramp.
- Have an assistant check to see that left front or right rear wheel remains elevated in position off of the ground.

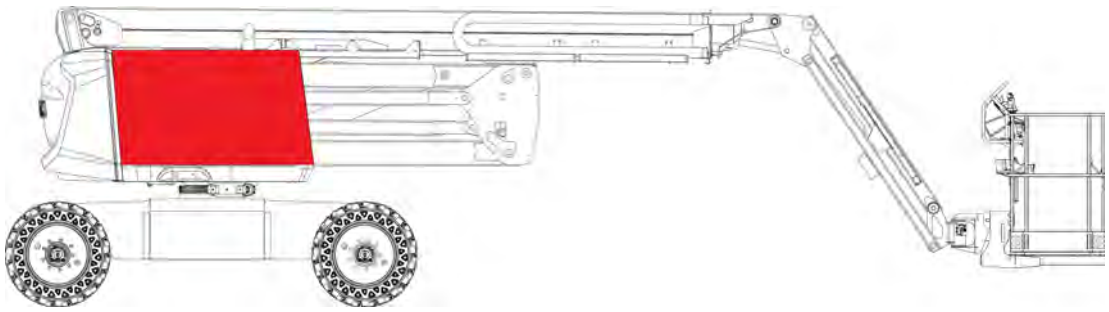
- Carefully return the boom to the transport position. When boom reaches the transport position, carefully activate drive to release cylinders. To lockout cylinders should release and allow the wheel to rest on ground. This operation must be realized with extremes precautions by standing strongly on the platform by the contact with the ground.

- Repeat the procedure for the right oscillation cylinder checking to see that the right front or left rear wheel remains elevated in position off of the ground.
- If lockout cylinders do not function properly, have qualified personnel correct the malfunction prior to any further operation.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

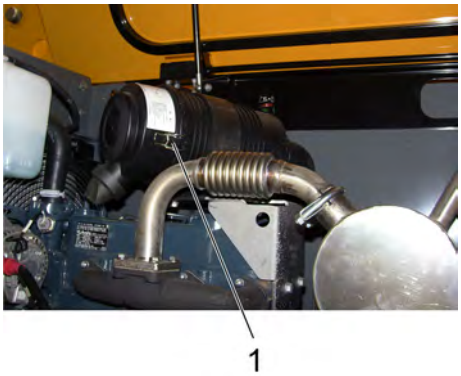
5 - You will need

	• Primary cartridge – 4000211710 • Secondary cartridge – 4000211720		Place barriers around the perimeter of the work area
	1 person		

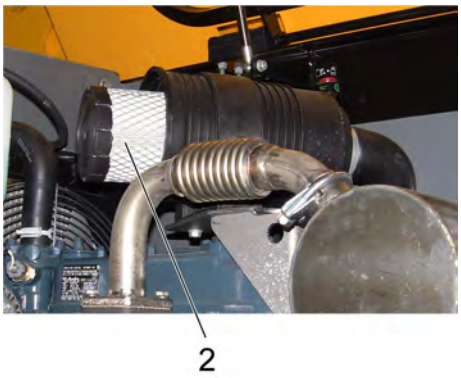
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Pull the pins (1) to remove the cover.

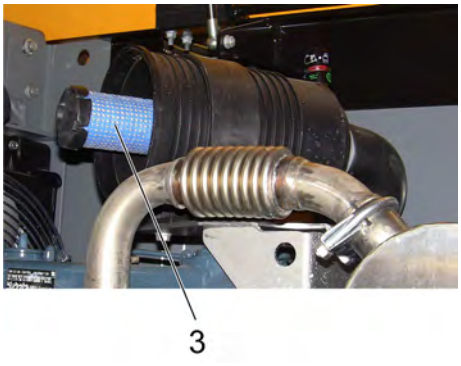


- Remove the main element (2) and secondary element (3).



- Replace with new cartridges.
- Close the cover using the pins (1).

Do not use oil.



Changing the air filter cartridges :

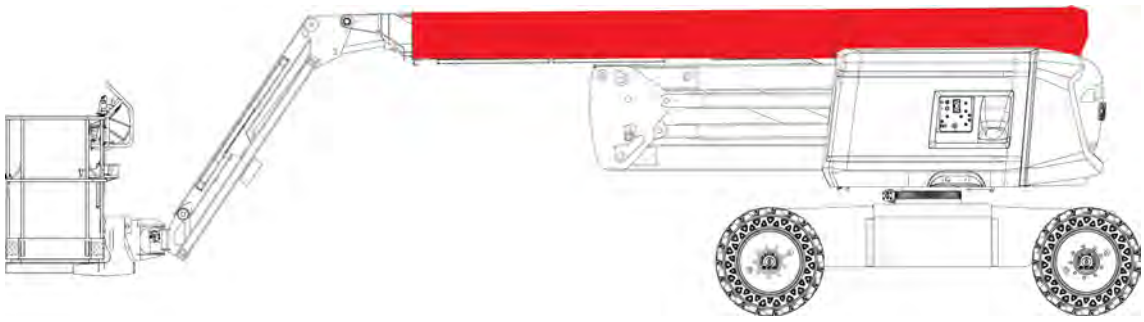
- Marking (2) : Primary cartridge.
- Marking (3) : Secondary cartridge.
- Reassemble in the reverse order of dismantling.

Do not use oil.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Grease • Wear pads kit - KITPATINHA16RTJ		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

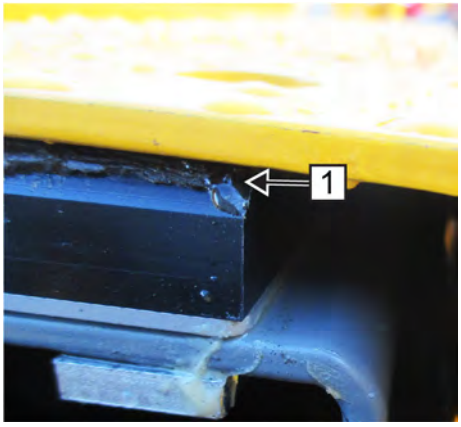
• Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).

Front pads :

• Telescope of the boom slightly.
• Check the wear on the 4 upper and lower pads.
• If the chamfers (1) are visible on the pads, the pad is compliant.
• If the chamfers are not visible on the pads, replace the pads.

Rear pads :

• Retract the telescoping boom.
• Check the wear on the 4 upper and lower pads.
• If the chamfers (1) are visible on the pads, the pad is compliant.
• If the chamfers are not visible on the pads, replace the pads.



1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • - 2505003830 Hydraulic oil • Rags		• Place barriers around the perimeter of the work area
	1 person		

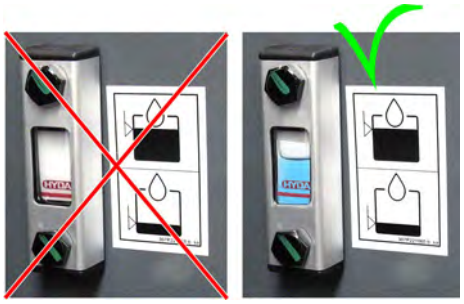
5 - Consumable

Consumable	HAULOTTE® code	Packaging
Standard oil HV46	4000530620	Can : 5 l(1,3 gal US)
Standard oil HV46	2420801320	20 l(5.3 gal US) bucket
Standard oil HV46	2420801310	Barrel : 209 l(55.2 gal US)
Oil - Winter option	2505002640	Barrel : 209 l(55.2 gal US)
Organic oil	2820304310	Barrel : 209 l(55.2 gal US)

6 - Procedure

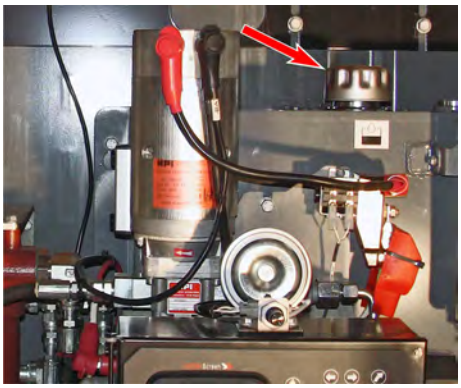
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered. Jib is in transportation position and telescope is retracted.

- Check the filling level of the hydraulic tank.
- The oil level should be between the minimum and maximum levels.



- Open the hydraulic tank cap to refill the oil level.

N.B.-:-DO NOT FILL TO THE MAXIMUM LEVEL , AS THE OIL COULD LEAK OUT.



7 - Additional operations

- Clean the work area.

Notes

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

	• "DO NOT OPERATE" tag • Standard tool kit • Vacuum pump • Funnel with a pipe of around 1 m / 3 ft 28 in • 140 l / 37 gal canister for hydraulic oil collection • Oil collection pan • Rags • Hand pump • 76 L / 20 gals tank		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumable

Consumable	HAULOTTE® code	Packaging
Standard oil HV46	4000530620	Can : 5 l(1,3 gal US)
Standard oil HV46	2420801320	20 l(5.3 gal US) bucket
Standard oil HV46	2420801310	Barrel : 209 l(55.2 gal US)
Oil - Winter option	2505002640	Barrel : 209 l(55.2 gal US)
Organic oil	2820304310	Barrel : 209 l(55.2 gal US)

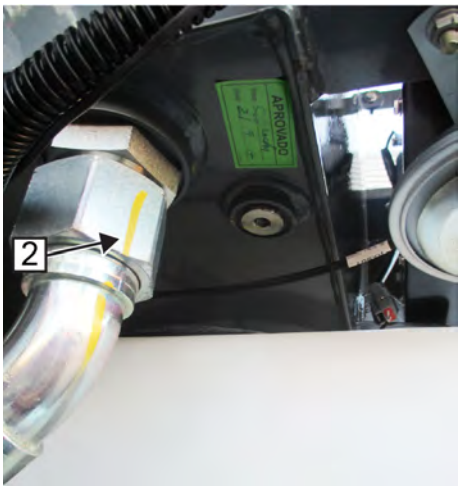
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered. Jib is in transportation position and telescope is retracted.

- Place a recipient under the hydraulic oil tank (1).

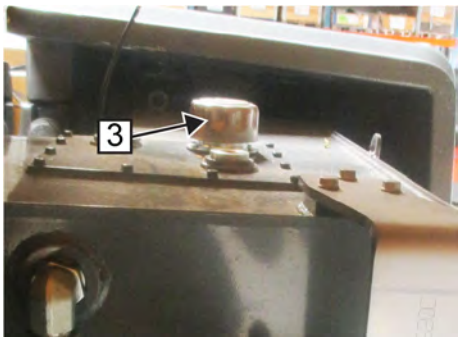
  Place a vacuum pump on the tank to reduce oil leaks during this operation.

- Remove the drain plug (2) under the tank and allow the oil to fully drain out.



N.B.-:-REMOVE THE FILLING CAP TO FACILITATE DRAINING (3).

- Tighten the drain plug (2).



- Fill the tank with new oil.

N.B.-:-DO NOT FILL TO THE MAXIMUM LEVEL , AS THE OIL COULD LEAK OUT.

- Run several cycles with the machine and ensure that the oil is between the minimum and maximum level.

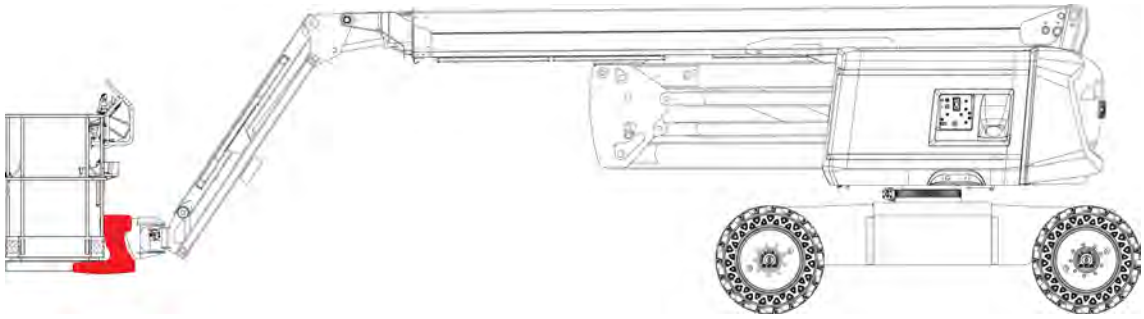
7 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• "DO NOT OPERATE" tag • Standard tool kit • Torque wrench • Torque multiplier		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

Check the tightness of the jib-side load cell :

- Single load machine : Torque wrench for 215 Nm. Short 24 mm socket.
- Dual load machine : Torque wrench for 370 Nm. Short 30 mm socket.

N.B.-:-CHECK THE SCREWS IN LINE A TIGHTENING CROSSWISE ORDER.

Check the tightness of the platform-side load cell :

- Single load machine : Torque wrench for 215 Nm. 24 mm pin with extension.
- Dual load machine : Torque wrench for 370 Nm. 30 mm pin with extension.

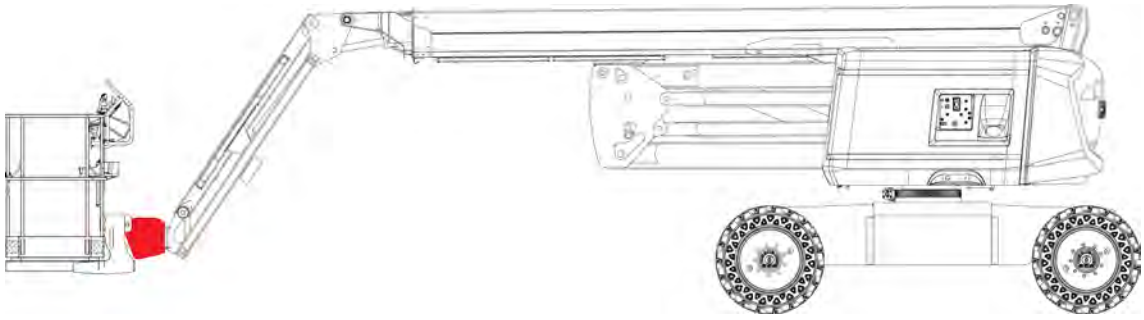
N.B.-:-CHECK THE SCREWS IN LINE A TIGHTENING CROSSWISE ORDER.

MP0016

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• "DO NOT OPERATE" tag • Standard tool kit • Torque wrench • Torque multiplier		• Place barriers around the perimeter of the work area
	1 person		

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

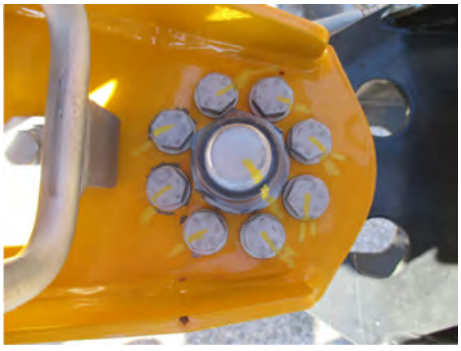
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Check the torque of the rotatory cylinder central nut is at 800 Nm (590lbf.ft)

N.B.-:-USE A SPANNER AND A TORQUE SPANNER FOR TIGHTENING.

- Visually inspect the 8 screws on the rotary cylinder

N.B.-:-DO NOT TIGHTEN USING A TORQUE WRENCH AS THE SCREWS ARE TIGHTENED WITH THREADLOCKER.

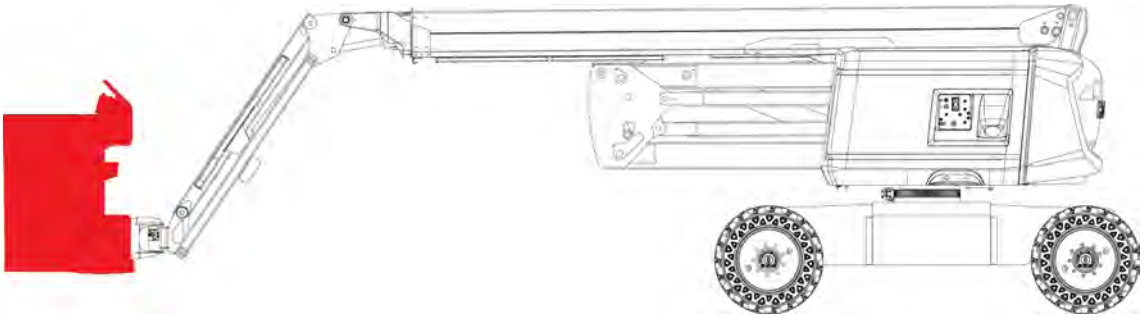


Notes

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

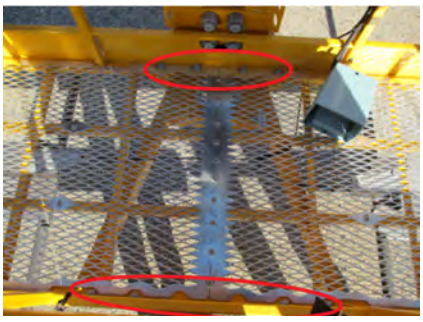
5 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit		• Place barriers around the perimeter of the work area
	1 person		

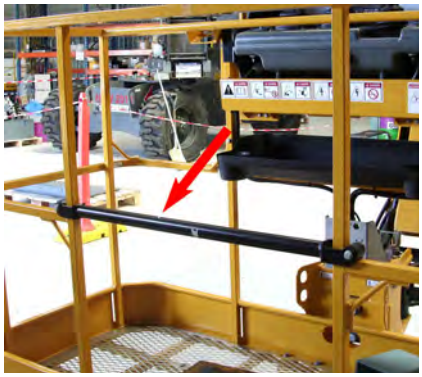
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.
- Check the platform floor is mounted.

- Check the tightening torque of the 8 screws between the platform and the platform mount 44 Nm.



- Check the platform access rail or gate.



Notes

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Standard tool kit • Magnetic piston comparator		• Place barriers around the perimeter of the work area
	1 person		

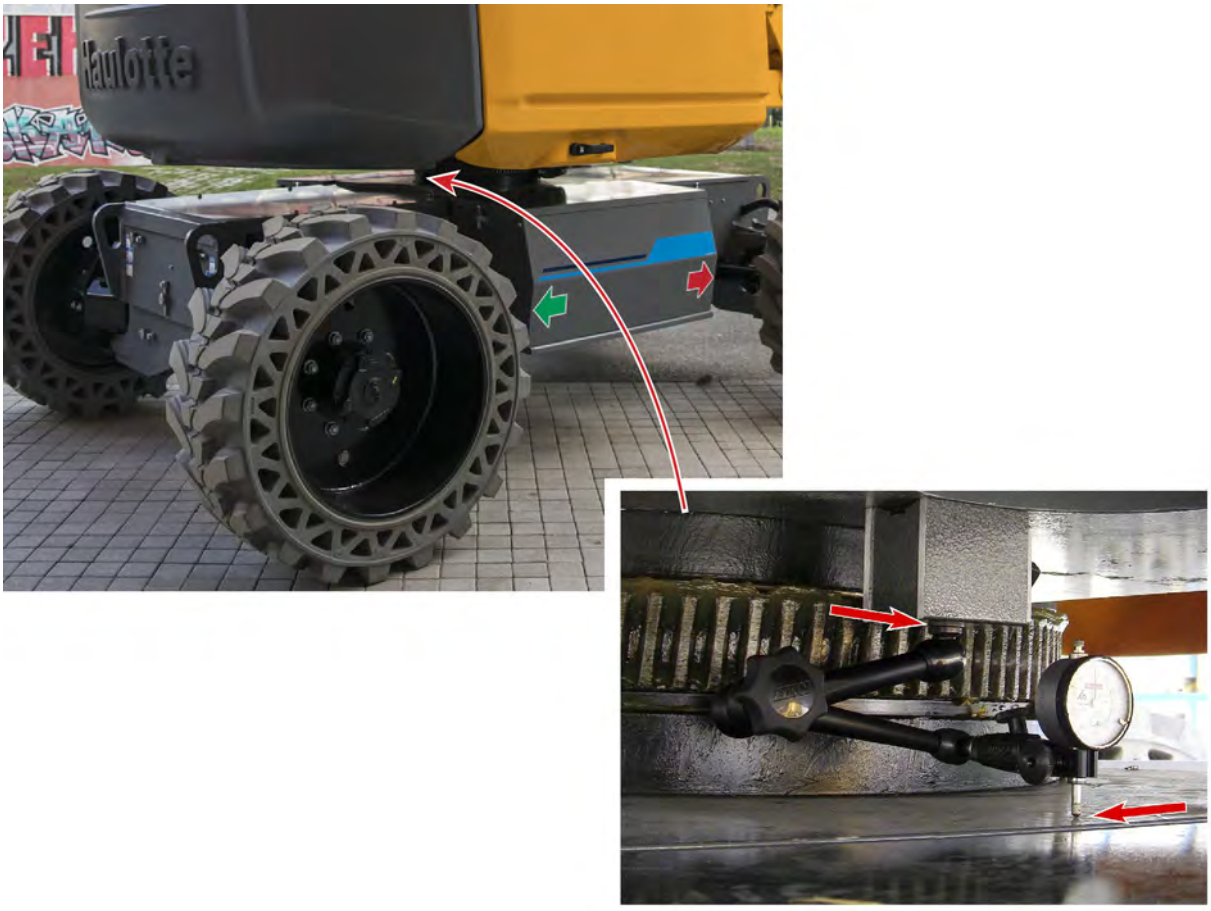
5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).

Put the machine into the following configuration :

- No load in the platform.
- Boom raised as far as possible.
- Telescope retracted.
- Jib lifted as far as possible.
- Boom aligned.

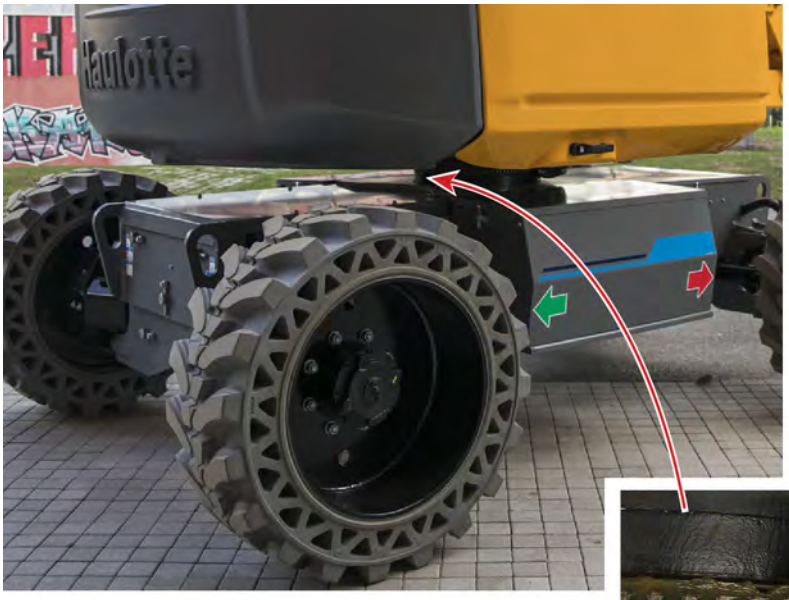
- Fix the magnetic comparator between the chassis and turntable (100mm from the bearing aligned with the boom).
- Using the magnetic comparator, read the clearance (J1) between the chassis and the turntable.

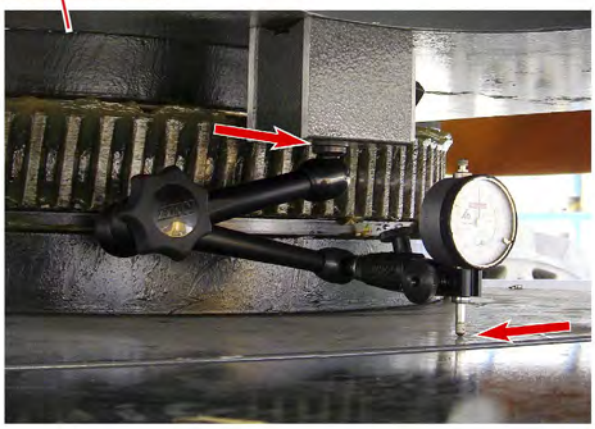


Put the machine into the following configuration :

- Lower the arm to the lowest point.
- Jib platform assembly :
- Extend the telescope as far as possible.
- Boom aligned.

- Using the magnetic comparator, read the clearance (J2) between the chassis and the turntable.





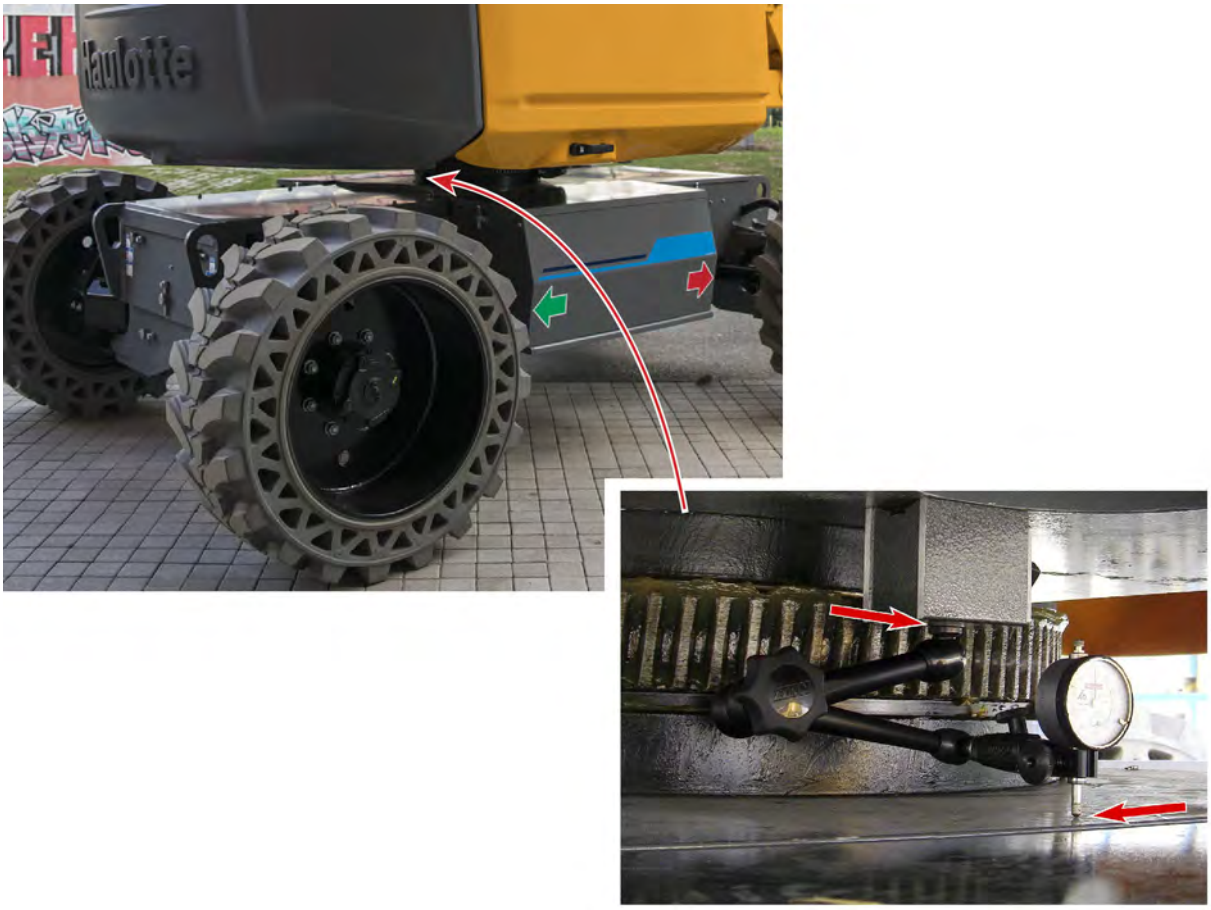
The clearance between (J1) and (J2) must be less than 2 mm :

- **If the clearance is greater than this, check that the tightness of the slew ring. Refer to MP0019 - Serrage au couple de la couronne d'orientation.**
- **After checking the tightness, if the value remains greater than 2 mm, replace the slew ring**

Put the machine into the following configuration :

- No load in the platform.
- Boom raised as far as possible.
- Telescope retracted.
- Jib lifted as far as possible.
- Turret at 90°.

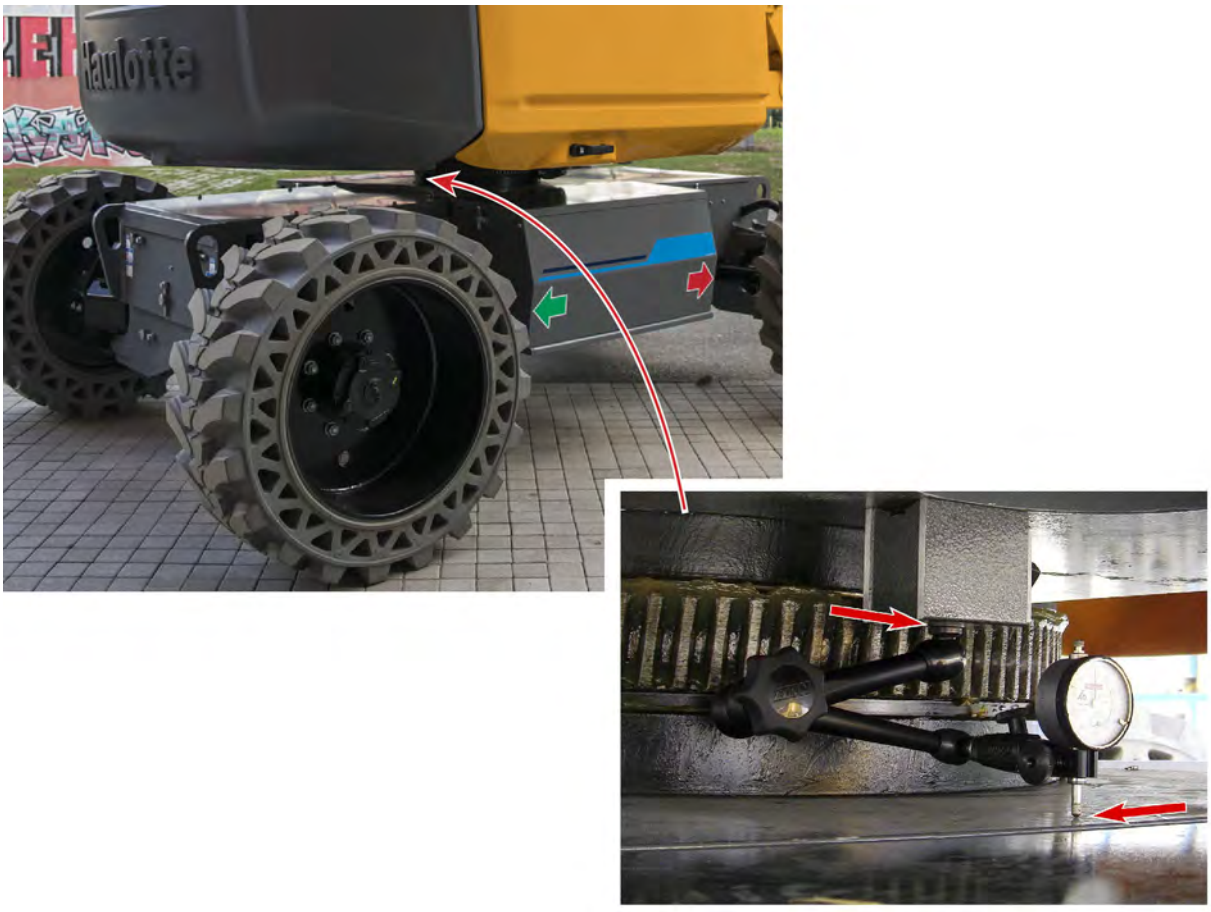
- Using the magnetic comparator, read the clearance (J3) between the chassis and the turntable.



Put the machine into the following configuration :

- Lower the arm to the lowest point.
- Jib platform assembly :
- Extend the telescope as far as possible.
- Turret at 90°.

- Using the magnetic comparator, read the clearance (J4) between the chassis and the turntable.



The clearance between (J3) and (J4) must be less than 2 mm :

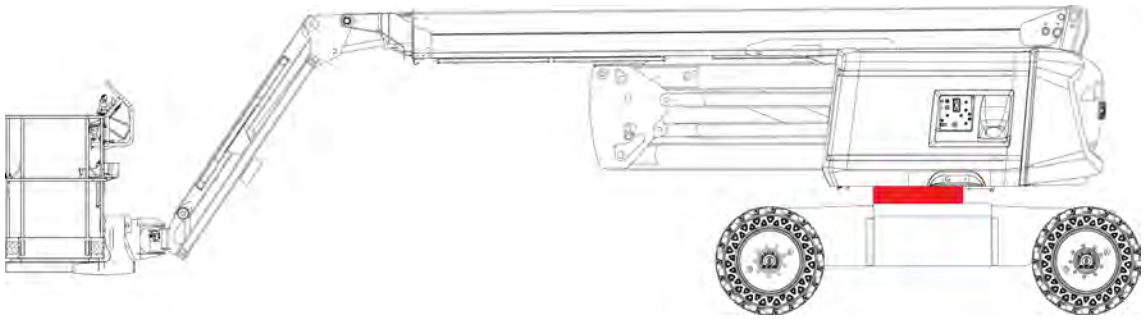
- **If the clearance is greater than this, check that the tightness of the slew ring. Refer to MP0019 - Serrage au couple de la couronne d'orientation.**
- **After checking the tightness, if the value remains greater than 2 mm, replace the slew ring**

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Concerned area



3 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

4 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

5 - You will need

	• Voltage absence tester • "DO NOT OPERATE" tag • Handling equipment • Standard tool kit • Hose clamps • Torque wrench		• Place barriers around the perimeter of the work area
	1 person		

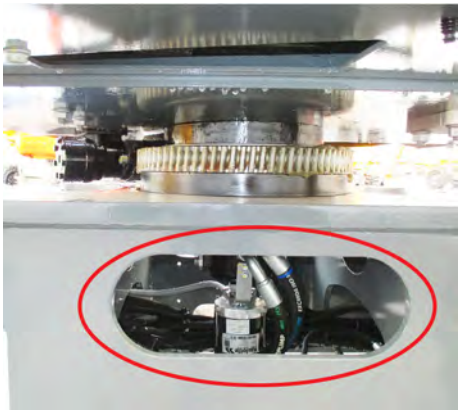
6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines). Mark out the work area
- Lift the arm to access the ring's screw.
- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

Tightening the chassis / Slew ring :

- Check the tightening torque on the 18 screws: 215 N.m (159 ft.lbf).

  These screws can be accessed by opening the side of the chassis.

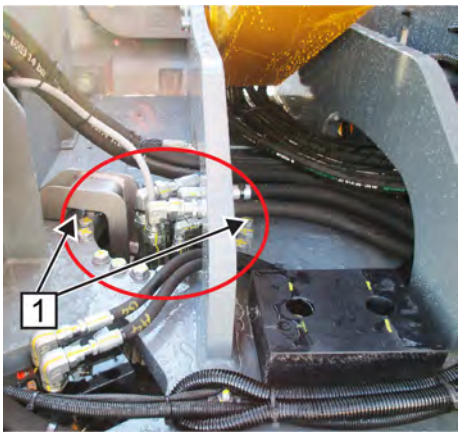


Tightening the turntable / Slew ring :

- Check the tightening torque on the 18 screws: 215 N.m (159 ft.lbf).

  Lift the boom to access the screws.

  For the non-accessible screws (1) under the support and under the hoses, check the tightening using a flat spanner.



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

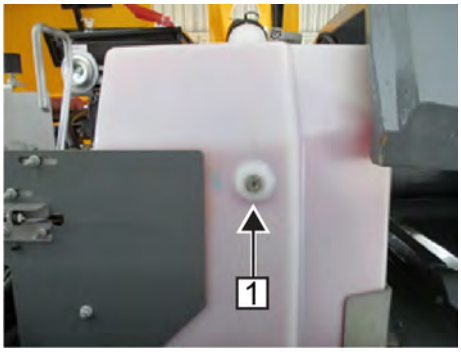
	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Provide a container sufficient for the contents of the tank • Rags		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

- Switch off the ignition and remove the ignition key.
- Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.

- Place a container under the diesel fuel tank.
- Unscrew the drain plug from the diesel fuel tank (1).
- Allow the fuel to completely drain.
- Then rinse with clean diesel.



- Once drained, screw the drain plug back on (At 15 N.m).
- Fill the tank back up with fuel.

6 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

• Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

• The use of this form implies that its user has been trained on this type of equipment.

• It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.

• Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...

• The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.

• Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

• Beware of the risk of burns; the hydraulic system operates at high temperatures.

• The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.

• The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In a closed room, ensure the exhaust gases are evacuated to the outside.

• Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.

• ONLY use insulated tools when working on or near batteries or electrical connections.

• Do not produce sparks or flames or smoke near the battery.

• Do not stop the engine suddenly, stop it after about 5 minutes of unloaded idling.

• Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).

• Do not remove the radiator cap while coolant is hot. Slightly loosen the cap when stationary, before completely removing it

• If overheating occurs, steam may spout from the radiator or emergency tank. This could result in severe burns.

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • 1 tube of around 1 m (3 ft 28 in) • Collection tray 10 l(2.6 gal US) • Coolant - Can 25 l (6.6 gal US) - 4000564860		• Place barriers around the perimeter of the work area
	1 person		

N.B.-:-THE WAY COOLING WATER AND ANTIFREEZE ARE MIXED VARIES DEPENDING ON THE PRODUCT MANUFACTURER. IT MUST FUNDAMENTALLY BE IN LINE WITH STANDARD SAE J1034. FOR MORE DETAILS, SEE SAE J814C.

Anti-freeze :

- Antifreeze volume in % : 50
- Solidification point : -37
- Boiling point : 108° C

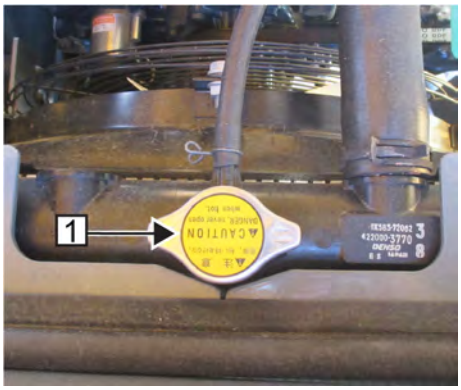
5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Restrict access to the area (restricted access sign).

- Stop the engine and leave the coolant to reach room temperature.
- Pivot the engine compartment.

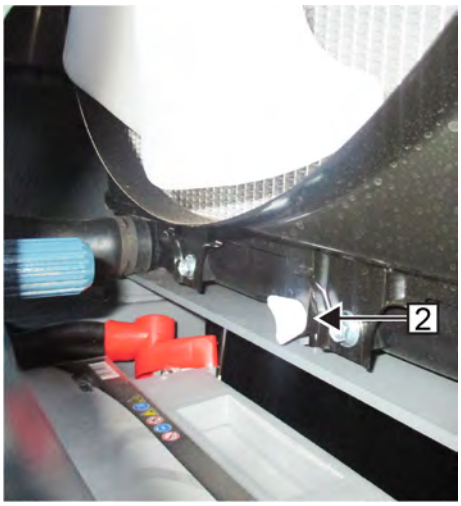
- Remove the plug from the radiator (1) in order to fully drain the coolant liquid.

N.B.-:-GENTLY UNSCREW THE RADIATOR PLUG TO RELEASE THE PRESSURE.



- Position the collection tray. Open the drain valve (2).

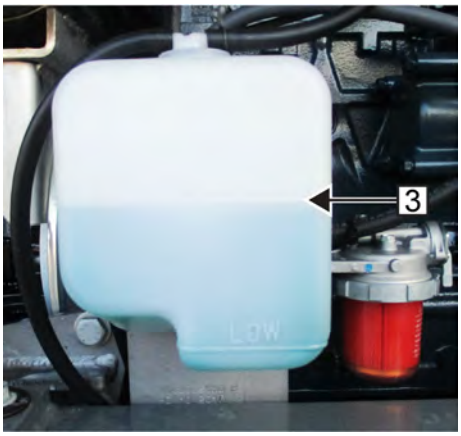
N.B.-:-IT IS ADVISABLE TO PLACE A PIPE BETWEEN THE DRAIN VALVE AND THE COLLECTION TRAY.



- Remove the expansion bottle and empty it.
- Once all of the coolant liquid is drained, close the drain valve again.

- Fill with liquid through the radiator cap (1) and into the expansion tank up to the maximum mark (3).
- Start the engine and leave it to turn over for a few minutes.
- Stop the engine and leave the coolant to reach room temperature.
- Check the coolant liquid level in the radiator and expansion tank (3).

N.B.-:-WHEN MIXING ANTI-FREEZE AND WATER, ENSURE THAT THE PROPORTION OF ANTI-FREEZE IS 50%.



6 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **Do not stop the engine suddenly, stop it after about 5 minutes of unloaded idling.**
- **Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).**
- **Do not remove the radiator cap while coolant is hot. Slightly loosen the cap when stationary, before completely removing it**
- **If overheating occurs, steam may spout from the radiator or emergency tank. This could result in severe burns.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • 1 tube of around 1 m (3 ft 28 in) • Collection tray 10 l(2.6 gal US) • Coolant - Can 25 l (6.6 gal US) - 4000564860		• Place barriers around the perimeter of the work area
	1 person		

N.B.-:-THE ENGINE FITTED IN YOUR HAULOTTE® MACHINE MUST OPERATE WITH A 1:1 SOLUTION OF WATER AND GLYCOL. THIS CONCENTRATION ALLOWS THE NOX REDUCTION SYSTEM TO OPERATE CORRECTLY IN ENVIRONMENTS WHERE THE TEMPERATURES ARE HIGH.

Coolant service life

Coolant type	Service life [1]. [2].
Recommended : Extended Life Coolant	Every 6000 hours of operation (or every 3 years)
Commercial heavy-duty antifreeze that meets ASTM D6210	Every 3000 hours of operation (or every 2 years)
Water and commercial SCA inhibitor	Every 3000 hours of operation (or once a year)

1. Use the interval that occurs first
2. The cooling system must also be flushed out at this time

Anti-freeze :

- Antifreeze volume in % : 50
- Solidification point : -37
- Boiling point : 108° C

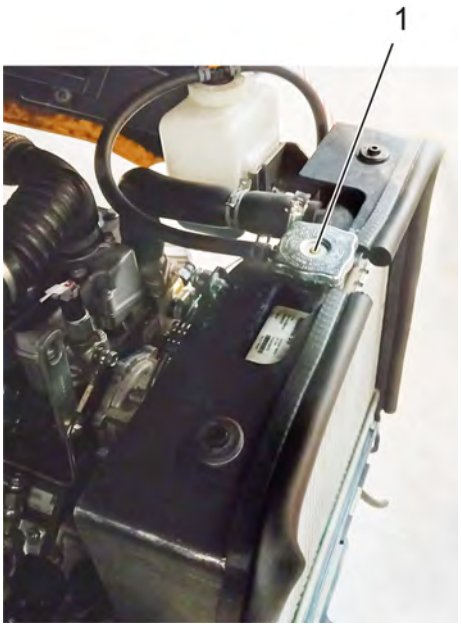
5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Stop the engine and leave the coolant to reach room temperature.
- Pivot the engine compartment.

- Remove the plug from the radiator (1) in order to fully drain the coolant liquid.

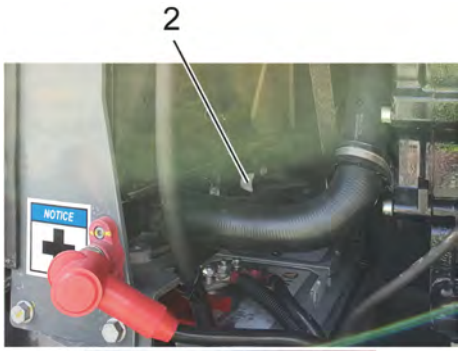
N.B.-:-GENTLY UNSCREW THE RADIATOR PLUG TO RELEASE THE PRESSURE.



- Position the collection tray.
- Open the drain plug at the bottom of the radiator (2) and the drain plug on the engine (3).

N.B.-:-IT IS ADVISABLE TO PLACE A PIPE BETWEEN THE DRAIN VALVE AND THE COLLECTION TRAY.

- Remove the expansion bottle and empty it.
- Once all of the coolant liquid is drained, close the drain valve again - (2) and (3).



- Fill with liquid through the radiator cap (1) and into the expansion tank up to the maximum mark (4).
- Start the engine and leave it to turn over for a few minutes.
- Stop the engine and leave the coolant to reach room temperature.
- Check the coolant liquid level in the radiator and expansion tank (4).

N.B.-:-WHEN MIXING ANTI-FREEZE AND WATER, ENSURE THAT THE PROPORTION OF ANTI-FREEZE IS 50%.

6 - Additional operations

- Clean the work area.

1 - Concerned machines

- HA20 LE - HA20 LE PRO - HA61 LE - HA61 LE PRO
- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT21RT O - HT21RT O SW - HT61RT O HT21RT PRO - HT21RT PRO SW - HT61RT PRO HT23RTJ O - HT23RTJ O SW - HT67RTJ O - HT23RTJ PRO - HT23RTJ PRO SW - HT67RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

• Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

• The use of this form implies that its user has been trained on this type of equipment.

• It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.

• Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...

• The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.

• Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

• Do not wear any metal jewellery (rings, watches, chains, etc.) when working on the batteries.

• ONLY use insulated tools when working on or near batteries or electrical connections.

• Do not produce sparks or flames or smoke near the battery.

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

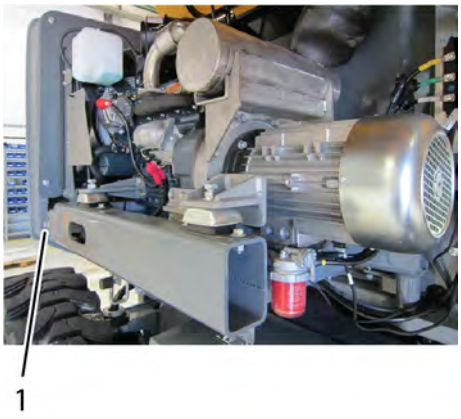
4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit		• Place barriers around the perimeter of the work area
	1 person		

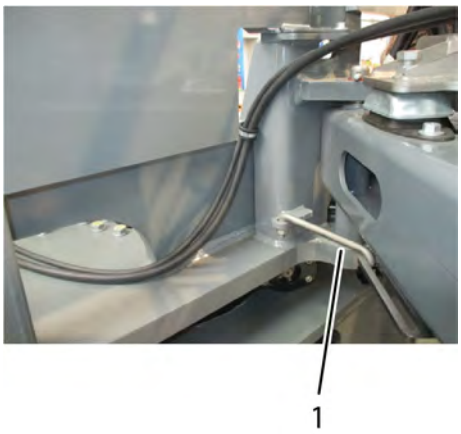
5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

- Open the engine cover.
- Remove screw (1) that is blocking the engine compartment.



- Pull then swivel the engine compartment.
- Lock the engine compartment using the locking lever (1).



- Check battery terminals for oxidation.
- Check terminals for oxidation.
- Check battery terminals for cleanliness and tightness.
- Check that the battery is secure.

- Carry out the operations in the reverse order.

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).

- Check the presence and the position of the rings.
- Check the absence of heavy abrasion, wear or oxidation of the rings.
- Check the absence of deformations, cracks or breakage of the rings.

Criteria of replacement : Replace as soon as the anomaly indicated above appears.

- Check the condition of the pins.

  N.B.-:-IN CASE OF DOUBT : CHECK THE ABSENCE OF RADIAL GAP > 0,5 MM (19690 IN) ON THE PINS.

- Check the absence of shaving in periphery of the pins.

  Criteria of replacement : Replace as soon as the anomaly indicated above appears.

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O - HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

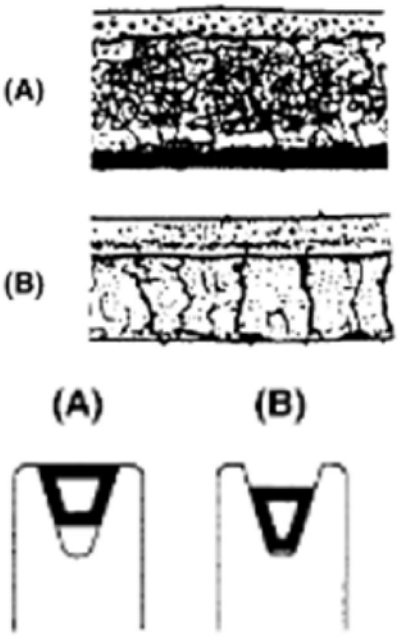
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Do not start the engine and disconnect the battery.

- Check the degree of wear on the fan belt.
- Check the subsidence of the belt in the pulley groove :

  (A) Proper.

  (B) Wear.
- Replace it/them if necessary.



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

• Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.

• The use of this form implies that its user has been trained on this type of equipment.

• It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.

• Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...

• The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.

• Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.

• Beware of the risk of burns; the hydraulic system operates at high temperatures.

• The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

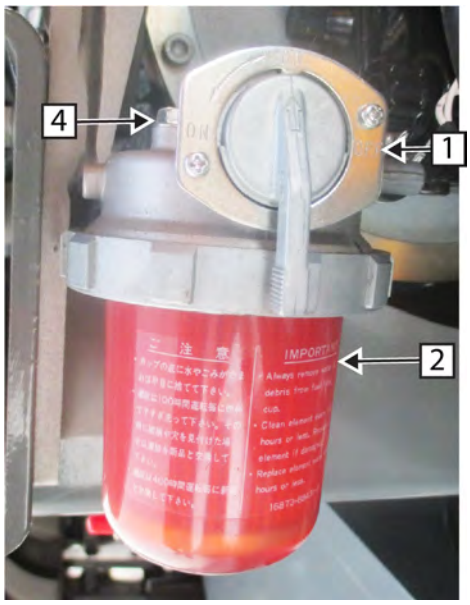
4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Filter wrench		• Place barriers around the perimeter of the work area
	1 person		

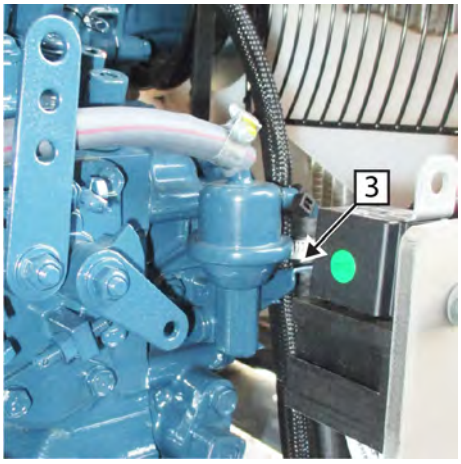
5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Check whether the water and dirt contained in the fuel has been decanted into the water separator.
- If there are no impurities in the water: no action to be taken.
- If there are impurities or water in the bottom of the container :
- Set the handle of the separator to "OFF" (1).
- Loosen and remove the container (2) using a filter wrench ; Clean with diesel.
- Clean the filtering part with diesel.
- Replace the filtering element with diesel protected from dust.



- Re-tighten the container (2) then reboot the system using the button at the back of the engine (3).
- Release the air by loosening the screw, then re-tightening it (4).



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before beginning any work and never search for oil leaks using your hands.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

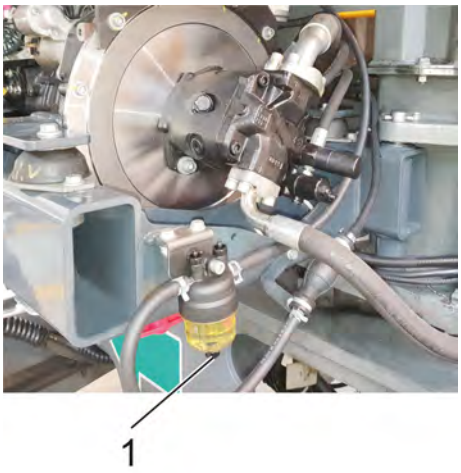
	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Filter wrench		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

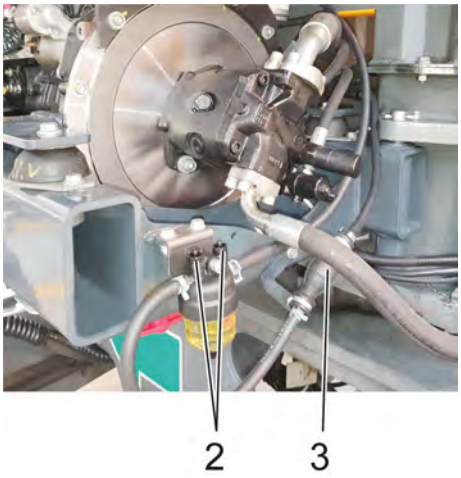
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Turn the fuel supply valve (if equipped) to the OFF position before performing this maintenance.
- Open the drain tap (1) and allow the fuel to drain into a recipient.
- When clean fuel flows out of the water separator, close the drain valve (1).
- Tighten the drain valve by hand only.
- Wipe up any spilled fuel.
- Clean the outside of the fuel filter assembly .

N.B.-:-DISPOSE OF THE DRAINED LIQUID PROPERLY.



- Finally, fanning the air.
- Operate the hand priming pump (2) until fuel free from air comes from the vent screw (3).



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Grease pump		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

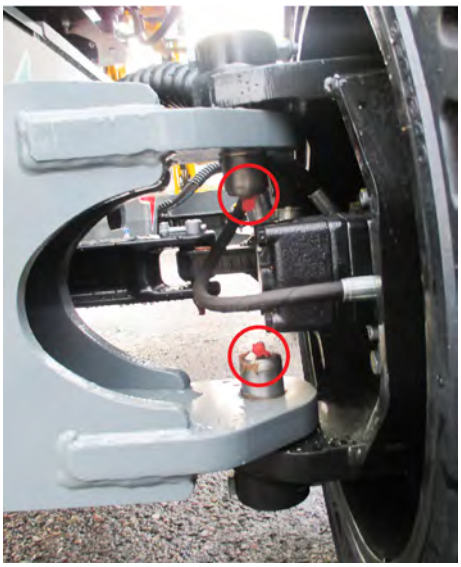
Consumable	HAULOTTE® code	Packaging
Lead-free grease	2820304330	Aerosol : 0,4 l(0.1 gal US)
Lead-free grease	2820304340	Can : 5 l(1.3 gal US)

6 - Procedure

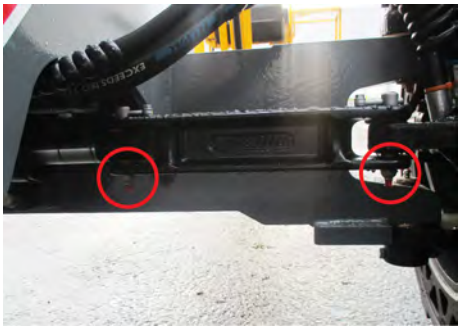
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

On each of the steering wheels :

- Place the grease pump on each of the two greasers located between the steering pivot and the chassis.
- There is enough grease when you can see grease running from the axle.



- Place the grease pump on the two greasers located on the tie rod.
- There is enough grease when you can see grease running from the axle.



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Brush		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumable

Consumable	HAULOTTE® code	Packaging
Teflon grease aerosol	2326005410	Aerosol : 0,4 l(0.1 gal US)

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Fully extend the boom.
- Clean the greased surfaces.
- Apply the Teflon grease to the boom using a spray or brush.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

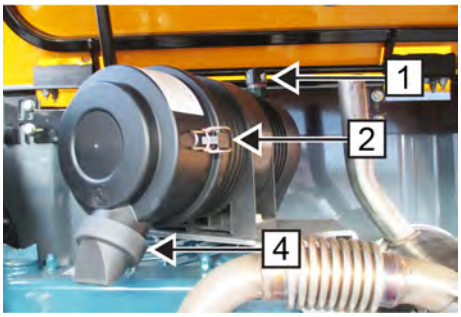
	• Personal protective equipment • Standard tool kit • Air compressor		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumable

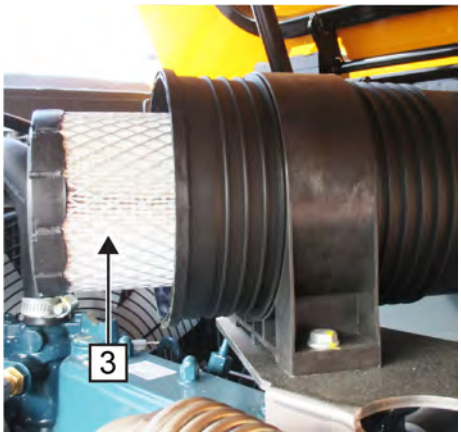
Reference	Part number HAULOTTE®
Primary air filter cartridge	4000044230
Secondary air filter cartridge	4000044240

6 - Procedure

- Turn on the engine.
- Check the clogging indicator (1).
- If the LED is green, the filter does not need to be changed.
- If the LED turns red :
- Remove the drain valve, let the particles escape then refit it (4).
- Pull out the pins (2) and remove the cap.

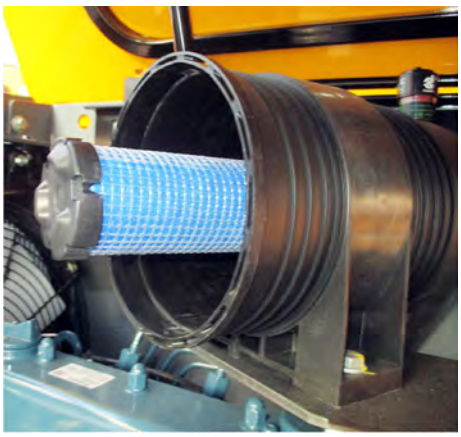


- Remove the main element (3).
- Blow the inside of the main element (3) with clean and dry compressed air. Pressure of compressed air must be under 205 kPa (2,1 kgf/cm 2,30 psi).
- Refit the main element (3). Close the cover using the pins (2).



Do not use oil.

Do not touch the secondary element unless it has to be replaced.



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

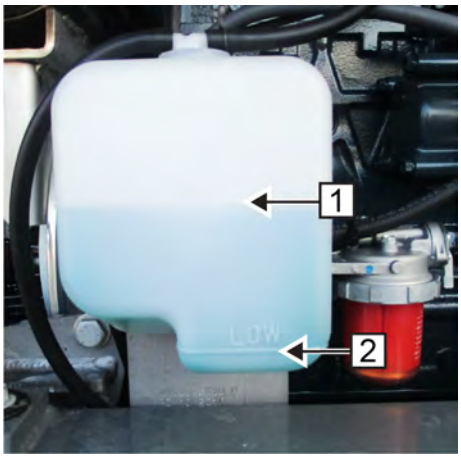
	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Coolant -37°, Can 25 l (6.6 gal US) - 4000564860		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Before unscrewing the cooling system filler cap, shut off the engine and wait for the parts of the cooling system to cool down. Then slowly unscrew the cooling system filler cap to release the pressure :

- Check that the cooling liquid sits between the maximum (1) and minimum (2) levels of the expansion vessel.
- If the cooling liquid level is too low, find out why this is the case.



Case 1 :

Evaporation has lowered the cooling liquid level: top up with clean fresh water only.

Case 2 :

A leak has lowered the cooling liquid level: top up with a cooling liquid with the same brand and reference number using the recommended mixing ratio (clean fresh water and L.L.C.).

If it is not possible to identify the brand of coolant, drain it and add a new coolant mixture.

1 - Concerned machines

- HA16 RTJ - HA16 RTJO - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

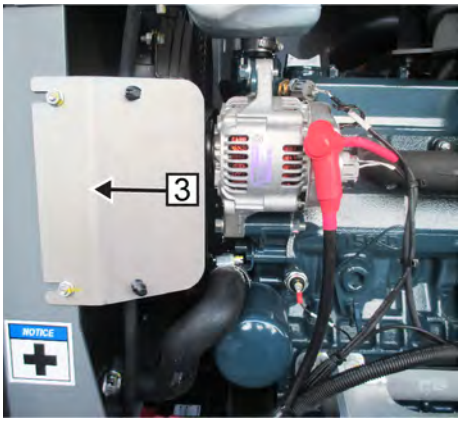
4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Kubota V1505 engine : Belt 4000210820 / 4000007270 • Kubota V2403 engine : Belt 4000353520 • Kubota D1803 CRTE5 engine : Belt 4000501180 • Kohler KDI 1903 engine : Belt 4001064000		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

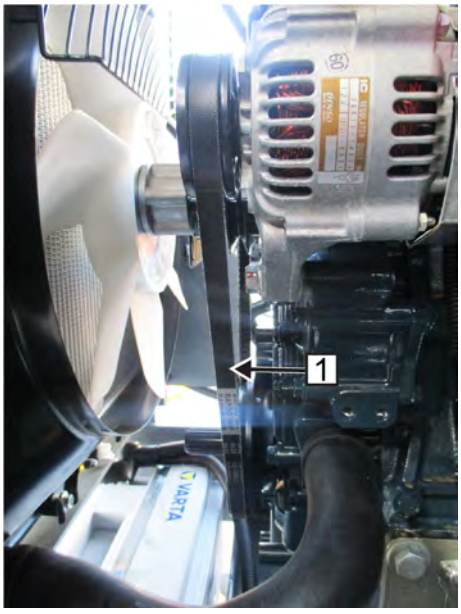
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Do not start the engine and disconnect the battery.



- Remove the protective cover if there is not sufficient access (3).

- Loosen the alternator using the screw (2).



- Remove the fan belt (1).
- Replace the belt with a new one.
- Refit the alternator.
- Check the belt deflection to tighten it correctly : Refer to MP0007 - Procédure contrôle tension courroie moteur

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJO - HA16 RTJ PRO - HA46 RTJO - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

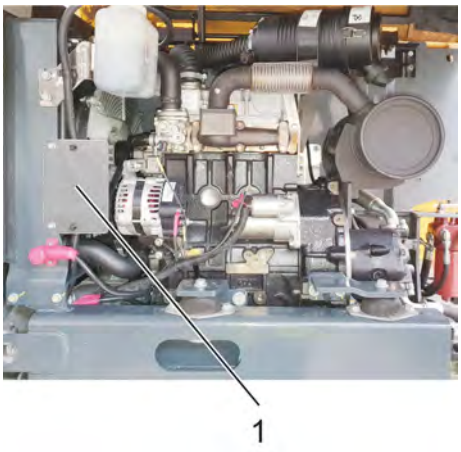
	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Belt 4001205710		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

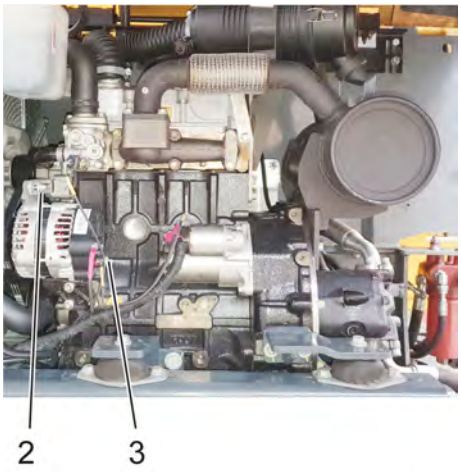
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

Do not start the engine and disconnect the battery.

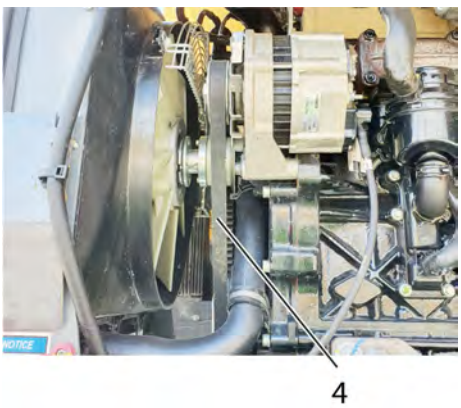
- Remove the protective cover if there is not sufficient access (1).



- Loosen adjusting bolt (2) and mounting bolt and nut (3).
- Push the alternator towards the engine.



- Remove the fan belt (4).
- Replace the belt with a new one.
- Refit the alternator.
- Check the belt deflection to tighten it correctly : Refer to MP0007 - Procédure contrôle tension courroie moteur
- Tighten all bolts and nuts to a torque of 25 N.m (221 lb).



1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O - HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT26 RT O - HT26 RT O SW - HT28 RTJ O - HT28 RTJ O SW - HT28 RTJ PRO - HT28 RTJ PRO SW - HT80 RT O - HT85 RTJ O - HT85 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Oil collection pan		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Consumable	HAULOTTE® code	Packaging
Engine oil - 15W40	4000530600	Can : 5 l(1.3 gal US)
Engine oil - 15W40	2420801360	20 l(5.3 gal US) bucket
Engine oil - 15W40	2820305720	Barrel : 20 l(5.3 gal US)

Capacity - Engine oil :

- Kubota - D1803 CRTE5 engine
- 7 l (1.8 gal US)
- Kubota - V1505 engine
- 6,7 l (1.7 gal US)
- Kubota - V2403 engine
- 9,5 l (2.5 gal US)

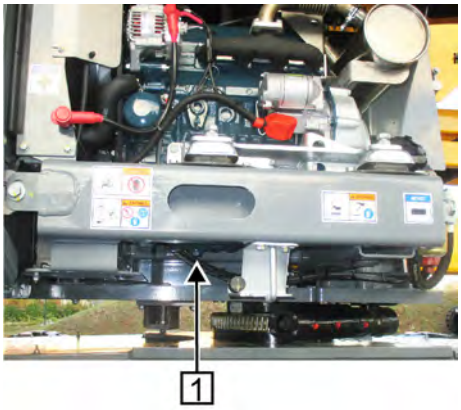
6 - Procedure

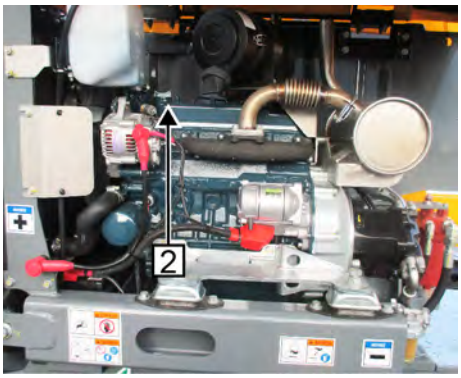
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Start the engine and leave it to turn over for a few minutes.

Shut off the engine before draining the engine oil.

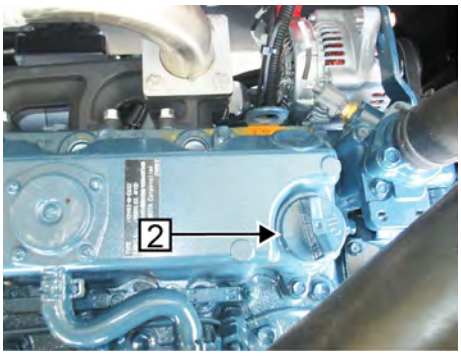
- Place a container under the engine.
- Remove the drain plug (1) under the engine and leave the oil to drain out completely.
- Refit and tighten the drain out (1).

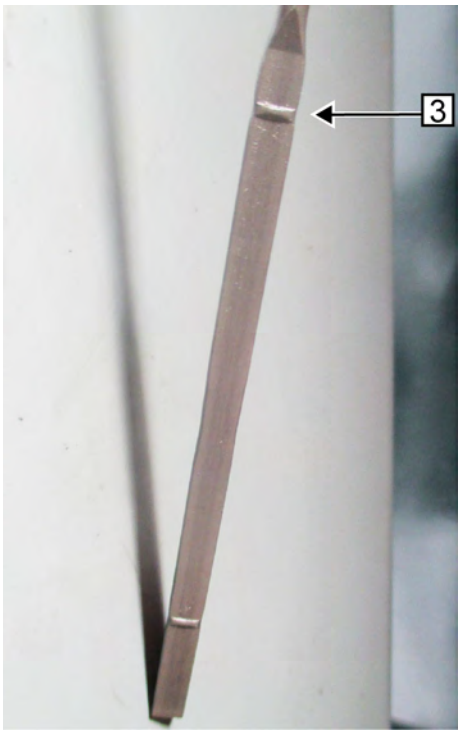




- Open the cap (2) and fill the engine with new oil until it reaches the upper mark of the gauge (3).

Do not touch the hot parts of the engine.





1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Oil collection pan		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Consumable	HAULOTTE® code	Packaging
Engine oil - 15W40	4000530600	Can : 5 l(1.3 gal US)
Engine oil - 15W40	2420801360	20 l(5.3 gal US) bucket
Engine oil - 15W40	2820305720	Barrel : 20 l(5.3 gal US)

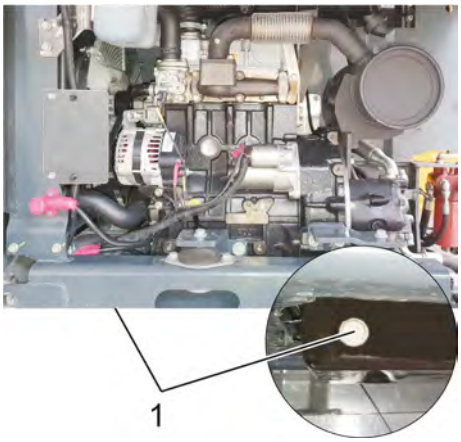
Capacity - Engine oil :

- Perkins - 403J-17 engine
- 6 l (1.6 gal US)

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Start the engine and leave it to turn over for a few minutes.

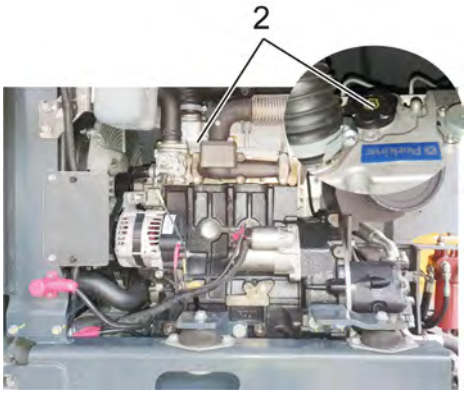


Shut off the engine before draining the engine oil.

- Place a container under the engine.
- Remove the drain plug (1) under the engine and leave the oil to drain out completely.
- Refit and tighten the drain out (1).
- Tighten to a torque of 34 N.m (25 lbf.ft).

N.B.-:-REPLACE THE JOINT(S).

- Open the cap (2) and fill the engine with new oil until it reaches the upper mark of the gauge (MAX).



Do not touch the hot parts of the engine.

DO NOT fill above the sight gauge (MAX).

Notes

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT21 RT O - HT21 RT O SW - HT61 RT O - HT21 RT PRO - HT21 RT PRO SW - HT61 RT PRO - HT23 RTJ O - HT23 RTJ O SW - HT67 RTJ O HT23 RTJ PRO - HT23 RTJ PRO SW - HT67 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Grease pump		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Consumable	HAULOTTE® code	Packaging
Lead-free grease	2820304330	Aerosol : 0,4 l(0.1 gal US)
Lead-free grease	2820304340	Can : 5 l(1.3 gal US)

6 - Procedure

- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Place the grease pump on the greasers located under the basket rotation cylinder pin.
- There is enough grease when you can see grease running from the axle.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Jack 20 000 kg(44 090 lb) • Chocks 4 m(13 ft2 in) • Filling syringe • Collection tray 1,5 l(0.40 gal US)		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumable

Consumable	HAULOTTE® code	Quantity	Packaging
Gear box oil SAE 80W90	4000530610	0,68 l(0.18 gal US) by reducer	Can : 1 l(0.22 gal US)
Gear box oil SAE 80W90	2420801370	0,68 l(0.18 gal US) by reducer	Can : 20 l(5.3 gal US)
Gear box oil SAE 80W90	2420801380	0,68 l(0.18 gal US) by reducer	Barrel : 209 l(55.2 gal US)

6 - Procedure

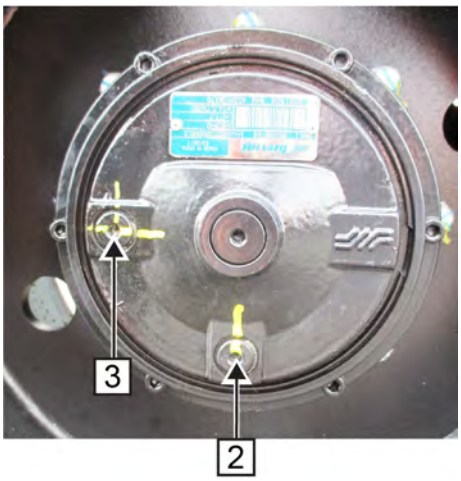
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

You have a means of lifting the machine :

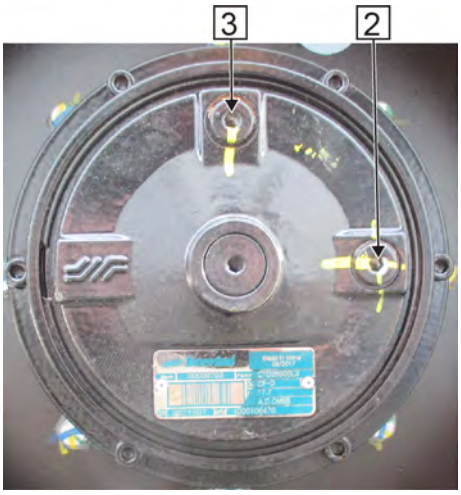
- Lift the machine with the jack to raise the wheel off the ground.
- Place wedges under the chassis and lower the jack slowly.

- Disconnect the gear system :
- Loosen the central screw by approximately 7 turns (1).

- Manually turn the wheel to place the drain plug to the bottom of the vertical axis (2) and the other horizontal (3).
- Position the oil collection tray under the plug (2).
- Open the caps (2, 3).
- Allow the liquid to drain completely ; To make the flow easier, the oil should still be hot.

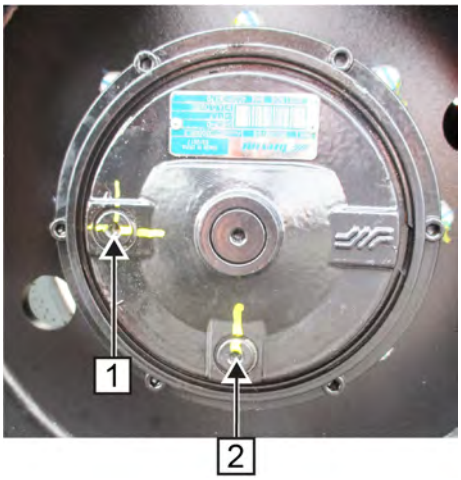


- Manually turn the wheel to position the filler cap to the top of the vertical axis (3).
- Add the oil via the hole (3) using a syringe until the oil flows from the hole (2).
- Quantity: 0,68 l (0.18 gal US).
- Re-tighten the central screw, close the caps and wipe any oil that has spilled on the floor.



You do not have the means to lift the machine :

- Turn the wheel slowly to place a drain plug to the bottom of the vertical axis (2) and the other horizontal (1).
- Position the oil collection tray under the plug (2).
- Open the caps (1, 2).
- Allow the liquid to drain completely ; To make the flow easier, the oil should still be hot.



- Rotate the wheel, moving it slowly to place a filler cap at the top of the vertical axis (1).
- Add the oil via the hole (1) using a syringe until the oil flows from the hole (2).
- Quantity: 0,68 l (0.18 gal US).
- Close the caps and wipe up any oil that has spilled on the floor.

1 - Concerned machines

- HA16 RTJ - HA16 RTJ O - HA16 RTJ PRO - HA46 RTJ O - HA46 RTJ PRO
- HA20 RTJ - HA20 RTJ O - HA20 RTJ PRO - HA61 RTJ O - HA61 RTJ PRO
- HA26 RTJ O - HA26 RTJ O SW - HA26 RTJ PRO - HA26 RTJ PRO SW - HA80 RTJ O - HA80 RTJ PRO
- HT16 RTJ O - HT16 RTJ PRO - HT46 RTJ O - HT46 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
- **The use of this form implies that its user has been trained on this type of equipment.**
- **It is important that the person working on the machine is familiar with all of the safety information contained in the user manual.**
- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
- **The user must have all the permits/authorizations required to work (fire permit, etc.) and comply with the specific safety instructions at the intervention site.**
- **Only risks linked specifically to activities relating to the disassembly and assembly of the machine HAULOTTE® are described in this sheet.**

- **Beware of the risk of burns; the hydraulic system operates at high temperatures.**

3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Grease pump • Brush		• Place barriers around the perimeter of the work area
	1 person		

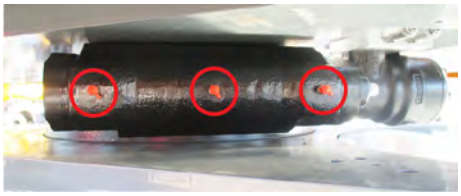
5 - Consumable

Consumable	HAULOTTE® code	Packaging
Lead-free grease	2820304330	Aerosol : 0,4 l(0.1 gal US)
Lead-free grease	2820304340	Can : 5 l(1.3 gal US)
Extreme-pressure lithium grease	2820304320	Aerosol : 0,4 l(0.1 gal US)

6 - Procedure

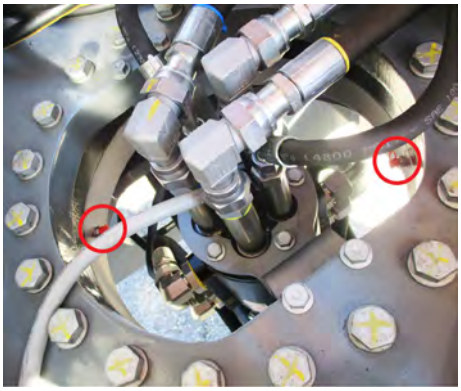
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.

- Place the grease pump on each of the 3 greasers located on the worm screw system :
- Lead-free grease.



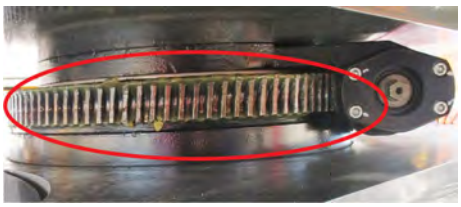
- Place the grease pump on each of the 2 greasers located inside the slew ring :
- Lead-free grease.

Lift the arm in order to access the 2 greasers.



- Grease the slew ring using a brush :
- Extreme-pressure lithium grease.

In order to grease the slew ring well, pivot the turntable several times to access all of the teeth.



E - Trouble shooting and diagram

1 - Trouble shooting

1.1 - RECOMMENDATIONS

If a malfunction occurs, check the following points :

- There is sufficient fuel.
- Sufficient engine oil.
- Sufficient hydraulic oil in the tank.
- Batteries are charging.
- Control box E-stop push-buttons are pulled out.
- The control box selector key is set to platform or ground control box.
- Control box relays are engaged.
- Fuse status.
- Ground control box solenoid valve status.

If the malfunction persists, consult the troubleshooting table to identify the problem.

IF you cannot identify the problem, contact HAULOTTE Services®.

1.2 - DESCRIPTION

The FAILURES function describes the requirements relative to failures : monitoring, information recording, information reading.

1.3 - REQUIREMENTS

Requirements	Definition
FAIL_xx_001	An ACTIVE failure (A) signals that the failure is stive active
FAIL_xx_002	A DETECTED failure (D) signals the cause of the failure has been valid one at least power on, but is inactive
FAIL_xx_003	A code CODE is linked to failures which have several causes of activation to identify the one of activation (if many conditions are active the code are added)
FAIL_xx_004	At power on, the failure log and failure counter are not changed for a failure which was already active at power off
FAIL_xx_005	The failure log and failure counter are changed for a failure which internal code is changed

N.B.-:- VAR[ACTIVEFAILURE] = 1 IF ONE OR MORE OF THE FOLLOWING FAILURES ARE IN ACTIVE STATE

E - Trouble shooting and diagram

1.4 - FAILURES LIST

With Activ'screen, it is possible to visualize the defects in "FAILURES".

- For any type A (ACTIVE) failure code, it will appear on display in lower control and the warning light will flicker on upper controls (see below).
- For any type D (DETECTED) failure code, it will also appear on display in lower control and the warning light will flicker on upper controls. In order to reset this failure which has been detected and no more active, it will be necessary to fold the machine until full stowed position, and then switch OFF then ON again the main power.
- For any type N failure code, it means that this alarm will never appear on display.

The notification of failures on the lights and displays of the machine is managed in the following way :

- the failure is notified only if it is active
- the failure is notified if it has been detected after the power on, even if it is not active anymore
- the failure is notified if it has been detected after the power on, even if it is not active anymore

Explanation on the column C of the table of failures :

- An internal code (column C) with 5 digits, visible only on the console, allows specifying the trigger conditions of the failure.
- Each trigger condition is associated with a single code number (16 possible single codes in decimal format corresponding to a single bit in binary format) :

Individual code		
Decimal	**Binary**	**Bit**
1	0000000000000001	0
2	0000000000000010	1
4	0000000000000100	2
8	0000000000001000	3
16	0000000000010000	4
32	0000000000100000	5
64	0000000001000000	6
128	0000000010000000	7
256	0000000100000000	8
512	0000001000000000	9
1024	0000010000000000	10
2048	0000100000000000	11
4096	0001000000000000	12
8192	0010000000000000	13
16384	0100000000000000	14
32768	1000000000000000	15

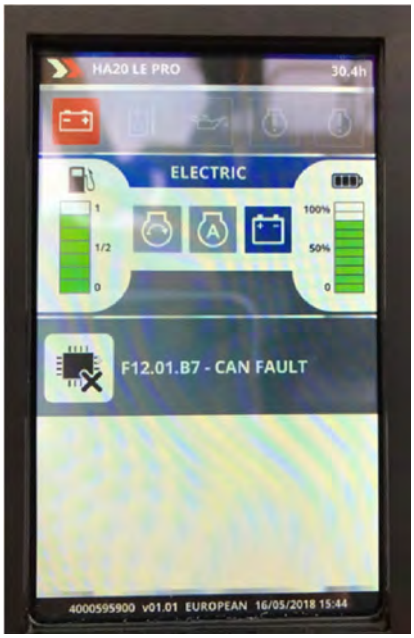
E - Trouble shooting and diagram

If several conditions are active at the same time, single codes are added to form the resulting code displayed.

For example, if the conditions of single code 1 and 2 are active, the resulting code posted will be 3 (1 +2 = 3 into decimal or 0000000000000011 in binary format).

On newest models, the binary code appears directly on screen. In case of multiple failures, the binary codes will scroll on screen (B2, B7, ...).

Example :



FAILURES	N	Dec	Bit	Description
F12.01 CAN Fault Check wires	A	1	b0	CAN network failure detected with turret B2 ECU (U100) Machine switched OFF, with multimeter, check the resistance between 1001 (CAN high) and 1002 (CAN low) is nearly 60 ohms (if 0ohm or 120ohm: failure, check "res term" connection for all ECUs) Check ECU supplies line Check address connections for each B2 ECU (CN106.18/CN106.19/CN106.20)
		2	b1	CAN network failure detected with keyboard switches ECU (U107)
		4	b2	CAN network failure detected with onboard screen ECU (U101)
		8	b3	CAN failure detected with drive front left inverter
		16	b4	CAN failure detected with drive front right inverter
		32	b5	CAN failure detected with drive rear left inverter
		64	b6	CAN failure detected with drive rear right inverter
		128	b7	CAN failure detected with pump inverter
		256	b8	CAN failure detected with generator inverter
		512	b9	CAN failure detected with Battery Management System
		1024	b10	CAN failure detected with CAT I Screen
		2048	b11	CAN failure detected with Charger

E - Trouble shooting and diagram

Definition
Machine failures are checked only if power is ON for more than 3s : • D3s(VAR[PowerOn]=1)
The notification (N) of failures on the lights and displays of the machine is managed in the following way (See Lights and Buzzers function) : • A: the failure is notified only if it is active • B: the failure is notified if it has been detected after the power on, even if it is not active anymore • C: the failure is never notified (it is visible only with the console) In all cases, active and detected failures are always visible with the console.
An internal code (column C) with 5 digits, visible only on the console, allows specifying the trigger conditions of the failure. Each trigger condition is associated with a single code number (16 possible single codes in decimal format corresponding to a single bit in binary format). If several conditions are active at the same time, single codes are added to form the resulting code displayed. For example, if the conditions of single code 1 and 2 are active, the resulting code posted will be 3 (1+2 = 3 into decimal or 0000000000000011 in binary format).
Failures related to slave ECU outputs (F04 for upper movements electrovalves) require the following conditions to be triggered : • A failure due to an open circuit OC can appear or disappear only if the output is inactive • A failure due to a short circuit (SC) to GND or VBAT can appear or disappear only if the output is active
Failures related to master ECU PWM HSD outputs (F02 for contactors, F03 for relays and F04 for electrovalves) require the following conditions to be triggered : • A failure due to an open circuit (OC) or short circuit to VBAT(SC+) or power supply error (PSE) can appear or disappear if the output is active or inactive • A failure due to an over current to GROUND(SC-) or a low current (LC) can appear or disappear only if the output is active
Failures related to master ECU DIGITAL HSD outputs (F02 for contactors, F03 for relays and F04 for electrovalves) require the following conditions to be triggered : • A failure due to an open circuit (OC) or short circuit to VBAT(SC+) can appear or disappear if the output is inactive • A failure due to an over current to GROUND(SC-) or a low current (LC) can appear or disappear only if the output is active • A failure due to a power supply error (PSE) can appear or disappear if the output is active or inactive
Failures related to master ECU DIGITAL LSD outputs (F02 for contactors, F03 for relays and F04 for electrovalves) require the following conditions to be triggered : • A failure due to an open circuit (OC) or over current to GROUND(SC-) can appear or disappear if the output is inactive • A failure due to a short circuit to VBAT(SC+) can appear or disappear only if the output is active
Failures related to master ECU DIGITAL PVG outputs (F02 for contactors, F03 for relays and F04 for electrovalves) require the following conditions to be triggered : • A failure due to a short circuit to VBAT(SC+) can appear or disappear only if the output is active • A failure due to an over current to GROUND(SC-) can appear or disappear if the output is active • A failure due to a power supply error (PSE) can appear or disappear if the output is active or inactive
A failure active at power off does not increment the counter or the log if it is still active at the next power up.
The counter of an active failure is incremented when its internal code changes and the failure is again recorded into the log with the new code.

1.4.1 - List of failures per category

Failures	N	Dec	Bit	Description
Contactors				
F02.02 Emergency Pump KM120	D			• Digital output's failure : Emergency pump relay --> KM120 • Check relay • Check connection to ground • Check connection to U106 ECU
F02.04 Power Contactor KMP	D			• Incoherence between the emergency stop status and the presence of voltage on power line--> SB801=0 & (12VD1>8.00V | 12VD2>8.00V | 12VD3>8.00V | 12VD4>8.00V | 12VD5>8.00V | 12VF1>8.00V | 12VF2>8.00V | 12VF3>8.00V | 12VF4>8.00V) • Check emergency stop • Check relay KMP • Check fuses • Check wiring
F02.05 Heating Relay KM160	D			• Digital output's failure : Preheating relay--> KM160=FAIL & CFG [Engine]=TierIII • Check relay • Check connection to ground • Check connection to U106 ECU

Failures	N	Dec	Bit	Description
Relays				
F03.06 Horn Relay KA9	D			• Digital output's failure : Horn relay--> KA9=FAIL • Check relay • Check connection to ground • Check connection to U106 ECU
F03.08 Start Relay KA4	D			• Digital output's failure : Starter relay--> KA4=FAIL • Check relay • Check connection to ground • Check connection to U106 ECU
F03.09 Supply/ KeySwitch Rel KA3	D			• Digital output's failure : Engine supply relay--> KA3=FAIL • Check relay • Check connection to ground • Check connection to U106 ECU
F03.10 Throttle Relay KM300	D	1	b0	• Digital output's failure : Throttle relay, pull wire (available with mechanical engine only)--> KM300=FAIL • Check relay • Check connection to ground • Check connection to U106 ECU
		2	b1	• Digital output's failure : Throttle, hold wire (available with mechanical engine only)--> YA300=FAIL • Check relay • Check connection to ground • Check connection to U106 ECU
F03.11 Generator Relay KA2	D			• Digital output's failure : Generator relay failure while generator on (And failure is not low current)--> KA2=FAIL& SETP[Generator]=ON • Check relay • Check connection to ground • Check connection to U106 ECU
F03.13 Gasoline/LPG selector Relay KA140	D			• Digital output's failure : Gasoline/LPG selector relay--> KA140=FAIL& CFG[Engine]= TierIII Dual Fuel • Check relay • Check connection to ground • Check connection to U106 ECU

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Electrovalves				
• For each failure, check the internal code. For failures about digital electro valves controlled by the U104 ECU (platform slave ECU) : The detected failures are "open circuit" or "short circuit", check the harness between the ECU and the hydraulic block controlling the movement, check the valves. For failures about proportional or digital electro valves controlled by U106 ECU (turret master ECU) : • The detected failures are open circuit (OC), short-circuit to VBAT (SC+) , short-circuit to GROUND (SC-), low current (LC) and power supply error (PSE) • First check the type of failure by reading the status of the output in the menu "INPUTS-OUTPUTS => DIGITAL OUTPUTS / ANALOGUE OUTPUTS". If OC/SC+/SC-/LC : • check harness, check there is no misconnection between signal and ground supply or power supply. If PSE : • Check the supplies are well connected : 12VD1 (1B.18), 12VD2 (2A.08), 12VD3 (2B.02), 12VD4 (3A.01), 12VF1 (1B.32), 12VF2 (2A.07), 12VF4 (3A.07). For steering (movement and mode), drive (speed), differential lock, brake releasing and oscillating axle electro valves : • Check the connections through the revolving joint.				
F04.01 Steering YV900/YV150L/ YV150R	D	1	b0	Proportional output's failure : Steering movement (with or without movement)--> YV900=FAIL
		2	b1	Digital output's failure : Left steering movement (with or without movement)--> YV150L=FAIL
		4	b2	Digital output's failure : Right steering movement (with or without movement)--> YV150R=FAIL
F04.02 Compensation YV900/YV720U/ UV720D	D	1	b0	Proportional output's failure : Basket level movement (with or without movement)--> YV900=FAIL
		2	b1	Digital output's failure : Platform level raise movement (with or without movement)--> YV720U=FAIL
		4	b2	Digital output's failure : Platform level descent movement (with or without movement)--> YV720D=FAIL
F04.03 Turret rotation YV250/YV250L/ YV250R	D	1	b0	Proportional output's failure : Turntable rotate movement (with or without movement)--> YV250=FAIL
		2	b1	Digital output's failure : Turntable rotate left movement (with or without movement)--> YV250L=FAIL
		4	b2	Digital output's failure : Turntable rotate right movement (with or without movement)--> YV250R=FAIL
F04.04 Arm YV420/YV420U/ YV420D	D	1	b0	Proportional output's failure : Arm movement (with or without movement)--> YV420=FAIL
		2	b1	Digital output's failure : Arm lifting movement (with or without movement)--> YV420U=FAIL
		4	b2	Digital output's failure : Arm lowering movement (with or without movement)--> YV420D=FAIL
F04.05 Boom YV520/YV520U/ YV520D	D	1	b0	Proportional output's failure : Boom movement (with or without movement)--> YV520 : Boom lifting proportional electrovalve failure
		2	b1	Digital output's failure : Boom lifting movement (with or without movement)--> YV520U=FAIL
		4	b2	Digital output's failure : Boom lowering movement (with or without movement)--> YV520D=FAIL
F04.06 Telescope YV530/YV530O/ YV530I	D	1	b0	Proportional output's failure : Telescope movement (with or without movement)--> YV530=FAIL
		2	b1	Digital output's failure : Telescope extension movement (with or without movement)--> YV530O=FAIL
		4	b2	Digital output's failure : Telescope retraction movement (with or without movement)--> YV530I=FAIL

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F04.07 Jib YV900/YV620U/ YV620D	D	1	b0	Proportional output's failure : Jib movement (with or without movement)--> YV900 :Jib lifting proportional electrovalve
		2	b1	Digital output's failure : Jib lifting movement (with or without movement)--> YV620U: Jib raise digital electrovalve failure
		4	b2	Digital output's failure : Jib lowering movement (with or without movement)--> YV620D: Jib raise digital electrovalve failure
F04.08 Cage Rotation YV900/YV750L/ YV750R	D	1	b0	Proportional output's failure : Platform rotation movement (with or without movement)--> YV900=FAIL
		2	b1	Digital output's failure : Platform rotation left movement (with or without movement)--> YV750L: Cage rotation left digital electrovalve failure
		4	b2	Digital output's failure : Platform rotation right movement (with or without movement)--> YV750R : Cage rotation right digital electrovalve failure
F04.10 Drive YV160/YV160S/ YV160FA	D	1	b0	• Proportional output's failure : Drive movement while driving--> YV160=FAIL. • YV160 is supplied powered via the YV160S output from U106 ECU during 2 s (once) at startup and when drive is running. Otherwise YV160 is not supplied and then seen as failing. • Check YV160 : Connection to ground (pin3), and to U106 ECU (pin1), to YV160S (pin4). • Check YV160S : Connection to YV160 electrovalve (pin4).
		2	b1	• Digital output supplying the PVG while driving is failing--> YV160S=FAIL. • YV160 is supplied powered via the YV160S output from U106 ECU during 2 s (once) at startup and when drive is running. Otherwise YV160 is not supplied and then seen as failing. • Check YV160 : Connection to ground (pin3), and to U106 ECU (pin1), to YV160S (pin2). • Check YV160S : Connection to YV160 electrovalve (pin2).
		4	b2	• Failure indicator for PVG is active--> YV160FA: : Failure indicator provided by PVG component, mechanical problem detected. • YV160 is supplied powered via the YV160S output from U106 ECU during 2 s (once) at startup and when drive is running. Otherwise YV160 is not supplied and then seen as failing.
F04.11 Principal movements Chk YV800	D	1		• Digital output's failure : LS valve (HSD)--> YV800=FAIL. • YV800 and YV800G are activated when drive, steering or movement(s) are running. Otherwise YV800 and YV800G are not connected and then seen as failing.
		2		• Digital output's failure : LS valve ground supply--> YV800G=FAIL. • YV800 and YV800G are activated when drive, steering or movement(s) are running. Otherwise YV800 and YV800G are not connected and then seen as failing.

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F04.20 Drive Speed YV112/YV111	D	1	b0	• Digital output's failure : Drive middle and high speed--> YV112=FAIL. • Check YV112/YV114 : Check valves, check connection between the two U106 ECU outputs (690 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		2	b1	• Digital output's failure : Drive middle and high speed--> YV113=FAIL. • Check YV113/YV115 : Check valves, check connection between the two U106 ECU outputs (687 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		4	b2	• Digital output's failure : Drive middle and high speed--> YV114=FAIL. • Check YV112/YV114 : Check valves, check connection between the two U106 ECU outputs (690 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		8	b3	• Digital output's failure : Drive middle and high speed--> YV115=FAIL. • Check YV113/YV115 : Check valves, check connection between the two U106 ECU outputs (687 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		16	b4	• Digital output's failure : Drive high speed--> YV110=FAIL • Check YV110/YV111 : Check valves, check connection between the two U106 ECU outputs (686 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		32	b5	• Digital output's failure : Drive high speed--> YV111=FAIL. • Check YV110/YV111 : Check valves, check connection between the two U106 ECU outputs (686 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
F04.21 Differential locking YV100	D			• Digital output's failure : Differential locking--> YV100=FAIL. • Check YV100 : Check valves, check connection between the two U106 ECU outputs (689 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
F04.33 Steering mode YV107/YV108	D	1	b0	• Digital output's failure : Steering mode with 4 wheels steering option activated--> YV107=FAIL & VAR[4WSEnable] . • Check YV107/YV108 : Check valves, check connection between the two U106 ECU outputs (621/622 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.
		2	b1	• Digital output's failure : Steering mode with 4 wheels steering option activated--> YV108=FAIL & VAR[4WSEnable] . • Check YV107/YV108 : Check valves, check connection between the two U106 ECU outputs (621/622 wire), check connection to electrical collector, check connection between electrical collector and electro valves, check connections to ground.

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F04.34 Front Axle Unlocking YV101	D	1	b0	• Digital output's failure : Oscillating axle unlocking with oscillating axle option--> YV101=FAIL & VAR[OscillatingAxleEnable]. • Check YV101 : Check connection to ground, check connection to U106 ECU digital output, check connection to electrical collector, check connection between electrical collector and electrovalve.
		2	b1	• Detection of incoherence between the state of control for oscillating axle and pressure in the oscillating axle control valve when drive control is above the third of maximum control : --> YV101=ON & D2000ms((WUI-SP109)<1500mV) & VAR[OscillatingAxleEnable]. • Check YV101 : Check connection to ground, check connection to U100 ECU digital output, check connection to electrical collector, check connection between electrical collector and electrovalve. • Check SP109 : Check connection to ground, check connection to U100 ECU digital input, check connection to electrical collector, check connection between electrical collector and electrovalve. • Check also minimum speed for both directions (when reaching the third of the joystick's stroke on front direction, drive must be effective "wheels are turning to front direction" / when reaching the third of the joystick's stroke on reverse direction, drive must be effective "wheels are turning to reverse direction").
		4	b2	• Detection of incoherence between the state of control for oscillating axle and pressure in the oscillating axle control valve : Control is OFF and detection of pressure--> YV101=OFF & D2000ms((WUI-SP109)>1100mV) & VAR[OscillatingAxleEnable]. • Check YV101Check connection to ground, check connection to U100 ECU digital output, check connection to electrical collector, check connection between electrical collector and electrovalve. • Check SP109 : Check connection to ground, check connection to U100 ECU digital input, check connection to electrical collector, check connection between electrical collector and electrovalve.
F04.35 Brake Releasing YV102/YV105	D	1	b0	• Digital output's failure : Brake releasing--> YV102=FAIL. • Check YV102 : Check connection to U106 ECU outputs (782 wire), check connection to electrical collector, check connection between electrical collector and electrovalve, check connections to ground.
		2	b1	• Digital output's failure : Brake releasing with 4 wheels steering option activated--> YV105=FAIL & VAR[4WSEnable]. • Check YV105 : With 4WS activated, check connection to U106 ECU outputs (783 wire), check connection to electrical collector, check connection between electrical collector and electrovalve, check connections to ground.

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Joysticks				
The following joysticks' failures are relevant if failure F08.05 is not active (failure of 5 V supplying signal). First check the 5 V supplying the joysticks, then the harness between ECU and joysticks				
F05.01 Drive Joystick SM902Y	D	1	b0	Drive joystick failure : Out of range [0.2.4.8] V --> SM902Y<0.20V and SM902Y>4.80V
		2	b1	Drive joystick failure : Analogue signal and out of neutral incoherence --> SM902F = 1 | SM902B = 1 & 2.45V<SM902Y<2.55V --> Or SM902F = 0 & SM902Y<2.00V --> Or SM902B = 0 & SM902Y>3.00V
F05.02 Arm Joystick SM901Y	D	1	b0	Arm joystick failure : Out of range [0.2.4.8] V --> SM901Y<0.20V and SM901Y>4.80V
		2	b1	Arm joystick failure : Analogue signal and out of neutral incoherence --> SM901N = 1 & 2.45V<SM901Y<2.55V --> Or SM900N=0 & (SM901Y<2.00V | SM901Y>3.00V)
F05.04 Boom Joystick SM900Y	D	1	b0	Boom joystick failure : Out of range [0.2.4.8] V --> SM900Y<0.20V | SM900Y>4.80V
		2	b1	Boom joystick failure : Analogue signal and out of neutral incoherence --> SM900N = 1 & 2.45V<SM900Y<2.55V & 2.45V<SM900X<2.55V --> Or SM900N=0 & (SM900Y<2.00V | SM900Y>3.00V) & (SM900X<2.00V | SM900X>3.00V)
F05.05 Turret Joystick SM900X	D	1	b0	Turret rotation joystick failure : Out of range [0.2.4.8] V --> SM900X<0.20V | SM900X>4.80V
		2	b1	Turret rotation joystick failure : Analogue signal and out of neutral incoherence --> SM900N = 1 & 2.45V<SM900Y<2.55V & 2.45V<SM900X<2.55V --> Or SM900N=0 & (SM900Y<2.00V | SM900Y>3.00V) & (SM900X<2.00V | SM900X>3.00V)
F05.11 Joystick neutral SM902Y	A			No detection of joystick's neutral position at machine's power-on --> SM902Y<2.3V | SM902Y>2.65V Release joystick / Check joystick
F05.12 Joystick neutral 2 SM901Y	A			No detection of joystick's neutral position at machine's power-on --> SM901Y<2.3V | SM901Y>2.65V Release joystick / Check joystick
F05.13 Joystick neutral 3 SM900X/Y	A			No detection of joystick's neutral position at machine's power-on --> SM900X<2.35V | SM900X>2.65V | SM900Y<2.35V | SM900Y>2.65V Release joystick / Check joystick

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Load management system				
F06.01 **No Loading Cal** Calibrate	A			No overload calibration, do/redo overload calibration CFG[LoadManagementSytem] = StrainGauges: [VAR[GaugesNotCalibrated]=1 VCFG[LoadManagementSytem] = VibratingWires: VAR[VibratingWiresNotCalibrated] = 1 Complete calibration
F06.03 **Gauges out of Range** SP800/SP801	D	1	b0	Gauges out of range (load management system activated)--> SP800 Not in [1500; 20500]µA VAR[GaugesOutOfRange]=1 Check SP800 connections to ground, to U104 ECU analogue inputs
		2	b1	Gauges out of range (load management system activated)--> SP801 Not in [1500; 20500]µA Check SP801 connections to ground, to U104 ECU analogue inputs
F06.04 **Incoh Gauges** SP800/SP801	D			SP800 measured weight and SP801 measured weight are more than 50kg far (and gauges are not out of range and gauges are calibrated) VAR[GaugesIncoherent]=1 Check SP800 and SP801 connections to ground, to U104 ECU analog inputs Redo calibration
F06.05 **Low Power** Gauges supply	D			Low power for strain gauges is detected low : VbattB2 basket is under 8500 V Check gauge's power supply

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F06.06 Weighing sensors[1]	CFG[LoadManagementSytem] = VibratingWires			
	A	1	b0	Overvoltage on sensor 1 Sensor and/or electronic card failure 1. Replace weighing unit
		2	b1	Overvoltage on sensor 2 Sensor and/or electronic card failure 1. Replace weighing unit
		4	b2	Low voltage on sensor 1 • Battery voltage too low • Electronic card failure 1. Check the battery voltage (minimum 8V) 2. Replace weighing unit
		8	b3	Low voltage on sensor 2 • Battery voltage too low • Electronic card failure 1. Check the battery voltage (minimum 8V) 2. Replace weighing unit
	D	16	b4	Sensor 1 : Loss of signal • Internal wiring failure • Sensor failure • Card failure 1. Replace weighing unit
		32	b5	Sensor 2 : Loss of signal • Internal wiring failure • Sensor failure • Card failure 1. Check the load in the basket 2. Check if the basket is bearing against something 3. Replace weighing unit
		64	b6	Sensor 1 : Out of range • Excessive mechanical stress • Sensor and/or unit failure • Sensor assembly 1. Check the load in the basket 2. Check if the basket is bearing against something 3. Replace weighing unit
		128	b7	Sensor 2 : Out of range • Excessive mechanical stress • Sensor and/or unit failure • Sensor assembly 1. Check the load in the basket 2. Check if the basket is bearing against something 3. Replace weighing unit

1. Failure masked during engine starting

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Load management system				
F06.06 Weighing sensors[1]	A	256	b8	Sensor 1 : Signal dispersion • Sensor mechanical slip 1. Check weighing system 2. Perform a new advanced calibration
		512	b9	Sensor 2 : Signal dispersion • Sensor mechanical slip 1. Check weighing system 2. Perform a new advanced calibration
	D	1024	b10	Sensor 1 displacement • Sensor disconnected of the unit 1. Check weighing system 2. Perform a new advanced calibration 3. Replace weighing unit
		2048	b11	Sensor 2 displacement • Sensor disconnected of the unit 1. Check weighing system 2. Perform a new advanced calibration 3. Replace weighing unit

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F06.07 Weighing sensors[2]	CFG[LoadManagementSytem] = VibratingWires			
	D	1	b0	Weighing system memory erroneous • Electronic card failure 1. Replace weighing unit
	N	2	b1	Dynamic correction out of service • Accelerometer failure Weighing active without this correction 1. Replace weighing unit
	D	4	b2	Information received from the weighing system not refreshed • CAN bus connection • Card failure 1. Check weighing system unit connection (CAN bus) 2. Check harness state 3. Replace weighing unit
	A	8	b3	Low temperature threshold reached • Ambient temperature too low • Temperature sensor failure 1. Return to proper temperature conditions 2. Replace weighing unit
		16	b4	High temperature threshold reached • Ambient temperature too high • Temperature sensor failure 1. Return to proper temperature conditions 2. Replace weighing unit
		32	b5	Temperature information incoherent • Temperature sensor failure 1. Replace weighing unit
	N	64	b6	-
		128	b7	-
	D	256	b8	Weighing system not responding • Bad battery supply • Electronic card failure 1. Check the battery 2. Check the wiring connection of the weighting system
F06.08 Strong overload	CFG[LoadManagementSytem] = VibratingWires			
	A			Strong overload detected 1. Check the load in the basket 2. Check the integrity of the structure Failure active for a load ? 700 Kgs

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F06.09 Negative load	A	1	b0	CFG[LoadManagementSytem] = StrainGauges | VibratingWires Negative load detected on SP800 gauge: measured load is below -40 kg and platform level angle is the range [-10;+10]° 1. Check the platform does not lie on an obstacle 2. Check weighing system (adjustment), check measured load when platform is empty 3. Check the integrity of the structure
		2	b1	CFG[LoadManagementSytem] = StrainGauges | VibratingWires Negative load detected on SP801 gauge: measured load is below -40 kg and platform level angle is the range [-10;+10]° 1. Check the platform does not lie on an obstacle 2. Check weighing system (adjustment), check measured load when platform is empty 3. Check the integrity of the structure

1. Failure masked during engine starting
2. Failure masked during engine starting

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Sensors				
F07.01 **Low Position** SQ900/SQ421/ SQ520	D	1	b0	Failure : Incoherence states between SQ900 and SQ421 sensor's value : --> SQ900=ON & SQ421=OFF Machine folded, check the state of the sensors : --> SQ900=ON & SQ421=ON Then unfold slowly the machine and check the next sensor's state is : --> SQ900=OFF & SQ421=ON Then unfold slowly the machine and check the next sensor's state is : --> SQ900=OFF & SQ421=OFF
		2	b1	Failure : Incoherence states between SQ900 and SQ520 sensor's value : --> SQ900=ON & SQ520=OFF Machine folded, check the state of the sensors : --> SQ900=ON & SQ520=ON Then unfold slowly the machine and check the next sensor's state is : --> SQ900=OFF & SQ520=ON Then unfold slowly the machine and check the next sensor's state is : --> SQ900=OFF & SQ520=OFF
F07.03 **Boom Angle** SQ520	D			Failure of voltage of SQ520 sensor, above [6.0V] : possibly short circuit to UBAT, or 5V_REF output supply voltage is failing. --> VAR[BoomSensorFailure]=1 Check SQ520 voltage value. Check short circuit between signal and 12 V or 5VREF and 12 V Check sensor's power supply is 5VREF.
F07.06 **Arm Angle** SQ421	D			Failure of voltage of SQ421 sensor, above [6.0V] : possibly short circuit to UBAT, or 5V_REF output supply voltage is failing. --> VAR[ArmSensorFailure]=1 Check SQ421 voltage value. Check short circuit between SQ421 and 12 V or 5VREF and 12 V. Check sensor's power supply is 5VREF.
F07.10 **Teles. Length** SQ530	D			Failure of voltage of SQ530 sensor, above [6.0V] : possibly short circuit to UBAT, or 5V_REF output supply voltage is failing. --> VAR[TelescopeSensorFailure]=1 Check SQ530 voltage value. Check short circuit between SQ530 and 12 V or 5VREF and 12 V. Check sensor's power supply is 5VREF.
F07.15 **Compensation pos.** SR721/SR720	D			Incoherence between basket tilt sensors : SR721/SR720. Check position sensors with basket tilt = 0°. SR721=OFF & SR720=0FF Check position sensors with basket tilt > 10°. SR721=ON & SR720=OFF Check position sensors with basket tilt <-10°. SR721=OFF & SR720=ON
F07.30 **Engine oil pressure** SP300	N	1	b0	Incoherence between engine pressure signal and engine state: engine is not running and SP300 in ON position (engine running) for engines V1505, E3B and Perkins TPD1812 Tier IV variable speed (mechanical or electronic governors) and KA3 relay is ON
		2	b1	Incoherence between engine pressure signal and engine state: engine is not running and engine oil pressure is below 200kPa for WG1605-GL engine

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F07.34 Front Axle Unlocking SP109	D	1	b0	Difference between supply voltage and SP109 sensor voltage is below 200 V : Open circuit detected. 1. Check connectors (sensor and ECU side) 2. Check harness 3. Check / replace sensor
		2	b1	Difference between supply voltage and SP109 sensor voltage is above 6000 V : Short circuit is detected. 1. Check / Plug connectors (sensor and ECU side) 2. Check / Plug harness 3. Check / replace sensor
F07.39 Fuel level sensor SL300	D	1	b0	Open circuit on fuel level sensor (only for analog fuel level sensor type) : Check fuel level sensor SL300 --> SL300 > 400 ohms & CONFIG[FuelLevelSensorType] = Analog
		2	b1	Short circuit to ground on fuel level sensor (only for analog fuel level sensor type) : Check fuel level sensor SL300 --> SL300 = 0 ohms & CONFIG[FuelLevelSensorType] = Analog
F07.40 Twilight sensor SN900	D	1	b0	Twilight sensor is out of range (Short circuit) --> SN900 > 4.8V
		2	b1	Twilight sensor is out of range (Open circuit) --> SN900 < 0.2V
F07.56 Engine Temperature sensor ST300_R	D	1		The temperature sensor it's monitored with 7.56 diagnosis. If the value of sensor (GET_ST300_R in software) is less than 750 ohms or bigger than 2000 ohms, the error will be qualified.

E - Trouble shooting and diagram

Failures	N	C		Description
Electric circuit-Power supply				
F08.04 **Calc. Input Supply** Chk U104/U106	D			Detected ECU voltage difference --> Difference between U106 (SPU) and U104 (basket B2) Check U100, U104 and U106 supply voltage Check fuses Check supply voltage coherence between all ECU (more than 2000 V far during the first 4 seconds after start)
F08.05 **Calc. Input Supply** U106 5V regul	D	1	b0	Failure on regulated 5 V output of U104 ECU (basket slave node B2) supplying the joysticks. --> 5 V output is measured out the range [4.5;5.5]V and 5 V output not failing Check fuses Check the harness (check short circuit to power supply, to ground supply, open circuit…)
		2	b1	Failure on regulated 5 V output of U104 ECU (basket slave node B2) supplying the joysticks. --> Detected failure on 5 V output Switch OFF/ON the machine, check the failure has gone (probable cause: internal failure of the ECU)
F08.08 **Unplugged connector** Connectors / Fuses	D	1	b0	Supplies' input detected as unplugged on connectors : Check the CN2.A connectors for U106 ECU : --> 12VD2<1.00V & 12VF2<1.00V
		2	b1	Supplies' input detected as unplugged on connectors : Check the CN2.B connectors for U106 ECU : --> 12VD3<1.00V & 12VF3<1.00V
		4	b2	Supplies' input detected as unplugged on connectors : Check the CN3.A connectors for U106 ECU : --> 12VD4<1.00V & 12VF4<1.00V
		8	b3	Supplies' input detected as unplugged on connectors : Check the CN3.B connectors for U106 ECU : --> 12VD5<1.00V & 12VD6<1.00V

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Engine				
F09.01 **Water temperature** Engine overheat	D	1		Engine overheat detected from ST300 handled by machine master ECU --> T2s(ST300 & T15s(VAR[Engine]=RUNNING))
		2		Engine overheat detected from ST300 handled by engine ECU (through DM1 CAN frame)
F09.02 **Oil pressure** Engine pressure	D	1		Engine oil pressure for engines V1505, E4B and Perkins TPD1812 Tier IV variable speed --> T6s(SP300 & T15s(VAR[Engine]=RUNNING))
		2		Engine oil pressure for engine WG1605-GL --> T6s(VAR[EngineOilPressure]<200kPa & T15s(VAR[Engine]=RUNNING))
F09.07 **Amber warning lamp** Check engine	D			Available with Tier III variable RPM electronic engine and Tier III dual fuel engine, warning lamp received from engine ECU : Check DIAGNOSTIC => FUNCTIONS => Engine T3 Var => Failure SPN
F09.08 **Red stop lamp** Check engine	D			Available with Tier III variable RPM electronic engine and Tier III dual fuel engine, stop lamp code received from engine ECU : Check DIAGNOSTIC => FUNCTIONS => Engine T3 Var => Failure SPN
F09.10 **D+** Engine alternator	D			Alternator not charging battery --> T2s(CTRL[Engine]=RUNNING & DPLUS=OFF Or alternator voltage greater than 6V while engine is OFF and supplied (On Kubota engine, if IG wire is cut or engine is not supplied => L_ALT is pulled to VBAT by resistor R10) --> T1s(CTRL[Engine]=STOP & KA3=1 & DPLUS > 6V

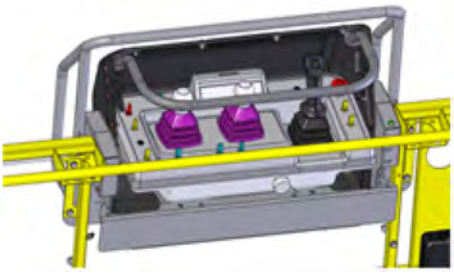
Failures	N	Dec	Bit	Description
Functions				
F10.17 **Lights**	A	1	b0	Short circuit detected on turret lights (HL910)
		2	b1	Short circuit detected on counter weight lights (EL906)
		4	b2	Short circuit detected on boom lights (EL907)
		8	b3	Short circuit detected on basket lights (KA10)

Failures	N	Dec	Bit	Description
Functions				
F11.06 **Buzzer** HA901	N			Digital output's failure : Lower control box buzzer --> HA901=FAIL Upper panel's buzzer is not tested (impedance off buzzer component is too low, seen as failing even if not failing)

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Internal faults				
F12.01 CAN Fault Check wires	A	1	b0	CAN network failure detected with turret B2 ECU (U100) Machine switched OFF, with multimeter, check the resistance between 1001 (CAN high) and 1002 (CAN low) is nearly 60 ? (if 0 ? or 120 ? : failure, check RES TERM connection for all ECUs) Check ECU supplies line Check address connections for each B2 ECU (CN106.18/CN106.19/CN106.20)
		2	b1	CAN network failure detected with keyboard switches ECU (U107)
		4	b2	CAN network failure detected with onboard screen ECU (U101)
F12.02 E2P Read/Write Error Change U106 ECU	D			Internal failure of SPU: access to EEPROM (read or write) Restart machine
F12.04 E2P Param Reset Check SETTINGS	D	1	b0	ID of software loaded into machine is different from the ID stored into EEPROM : All machine parameters have been reset and must then be set again (speeds, ramps, options, configs, access code level 2, failure counters and calibration data)
		2	b1	Detected changes in machine speeds and ramps
		4	b2	Detected changes in machine options
		8	b3	Detected changes in machine configuration
		16	b4	Detected changes in machine maintenances
		32	b5	Detected changes in machine daily logs
		64	b6	Detected changes in machine events counters
		128	b7	Detected changes in machine events logs

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
F12.05 **Machine not set** Check SETTINGS	D	1	b0	Machine's model is not set Set machine model (HA16RTJ/HA16RTJO/HA16RTJPRO)
		2	b1	Country not set Set country (USA/AUS/EUR/EAC/JPN/CAN /CHN)
		4	b2	Serial number not set Set machine serial number
		8	b3	Some speed or ramp parameters are not set Set all speed and ramp parameter
		16	b4	Some options are not set Set machine options (Buzzer, Flashing light, Fleet management, Activ' Shield Bar)
		32	b5	Some configurations are not set Set all machine's options (Engine)
		64	b6	Activ'Shield Bar option is active while Activ'Shield Bar system version is set to "Not mounted" Set the Activ'Shield Bar system configuration to the version conforming with the type of hardware on the machine V1 - Version : V2 - Version : 

E - Trouble shooting and diagram

Failures	N	Dec	Bit	Description
Switches				
F13.02 Platform switches Sw:2 dir active	D	1	b0	Detected failure on upper console switches : Two directions active at the same time for telescope switch --> SA531O=ON & SA531I=ON
		2	b1	Detected failure on upper console switches : Two directions active at the same time for jib switch --> SA621U=ON & SA621D=ON
		4	b2	Detected failure on upper console switches : Two directions active at the same time for platform rotation switch --> SA751U=ON & SA751D=ON
		8	b3	Detected failure on upper console switches : Two directions active at the same time for platform level switch --> SA721U=ON & SA721D=ON
		16	b4	Detected failure on upper console switches : Two directions active at the same time for steering rocker switch --> SM902L=ON & SM902R=ON
		32	b5	Detected failure on upper console switches : Two directions active at the same time for steering mode switch --> SA101C=ON & SA101S=ON
		64	b6	Detected failure on upper console switches : Two directions active at the same time for speed selector switch --> SA110H=ON & SA110L=ON
		128	b7	Detected failure on upper console switches : Two directions active at the same time for Activ Lighting System switch --> SA910A=ON & SA910M=ON
F13.10 Switches neutral Sw: Lower box	A	1	b0	Neutral detection failure at machine's power-on for lower console switches : Arm switch is active
		2	b1	Neutral detection failure at machine's power-on for lower console switches : Boom switch is active
		4	b2	Neutral detection failure at machine's power-on for lower console switches : Telescope switch is active
		8	b3	Neutral detection failure at machine's power-on for lower console switches : Turret rotation switch is active
		16	b4	Neutral detection failure at machine's power-on for lower console switches : Jib switch is active
		32	b5	Neutral detection failure at machine's power-on for lower console switches : Platform level switch is active
		64	b6	Neutral detection failure at machine's power-on for lower console switches : Engine start/ stop switch is active
		128	b7	Neutral detection failure at machine's power-on for lower console switches : Enable switch is active
		256	b8	Neutral detection failure at machine's power-on for lower console switches : Overriding switch is active (not checked if platform emergency switch is pushed)
		512	b9	Neutral detection failure at machine's power-on for lower console switches : Platform rotation switch is active (Not checked if platform emergency switch is pushed)
		1024	b10	Neutral detection failure at machine's power-on for lower console switches : Horn switch is active (Not checked if platform emergency switch is pushed)
		2048	b11	Neutral detection failure at machine's power-on for lower console switches : Beacon rotation switch is active (Not checked if platform emergency switch is pushed)
		4096	b12	Neutral detection failure at machine's power-on for lower console switches : Dual fuel selection switch is active (Not checked if platform emergency switch is pushed)

E - Trouble shooting and diagram

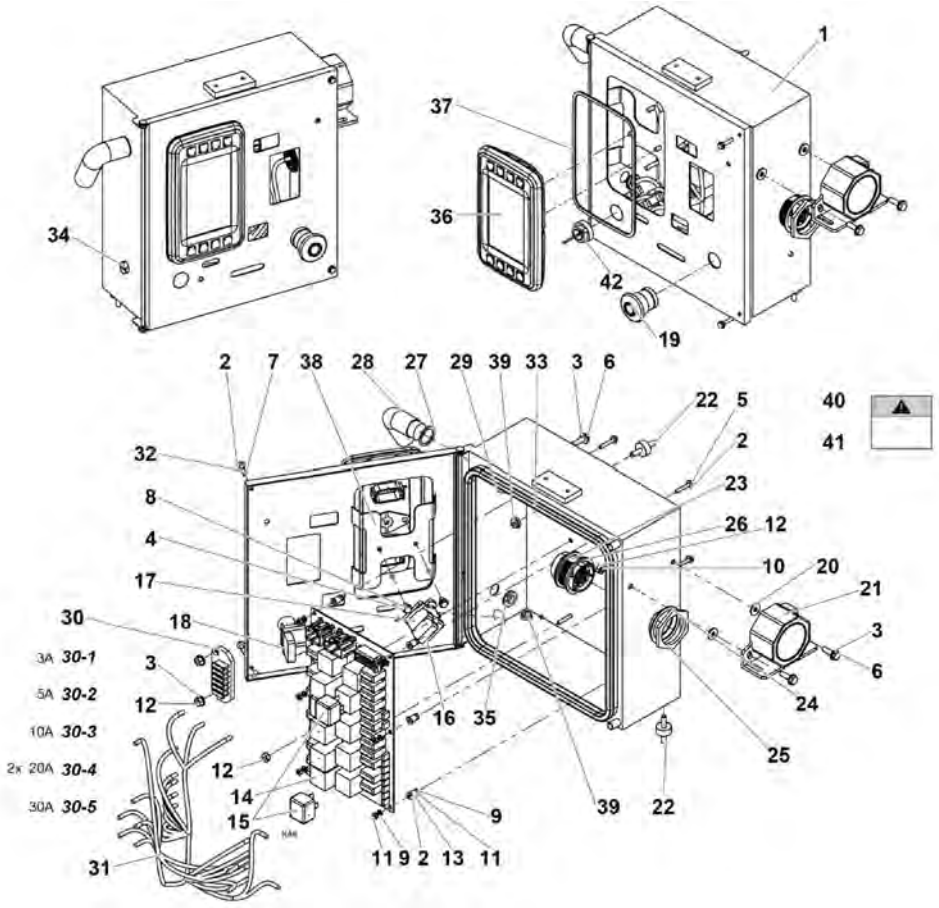
Failures	N	Dec	Bit	Description
F13.11 Switches neutral 2 Sw: Upper box	A	1	b0	Neutral detection failure at machine's power-on for upper console switches : Telescope switch is active
		2	b1	Neutral detection failure at machine's power-on for upper console switches : Jib switch is active
		4	b2	Neutral detection failure at machine's power-on for upper console switches : Platform rotation switch is active
		8	b3	Neutral detection failure at machine's power-on for upper console switches : Platform level switch is active
		16	b4	Neutral detection failure at machine's power-on for upper console switches : Steering rocker switch is active
		32	b5	Neutral detection failure at machine's power-on for upper console switches : Engine start/stop switch is active
		64	b6	Neutral detection failure at machine's power-on for upper console switches : Emergency pump switch is active
		128	b7	Neutral detection failure at machine's power-on for upper console switches : Horn switch is active
		256	b8	Neutral detection failure at machine's power-on for upper console switches : Differential lock switch is active
		512	b9	Neutral detection failure at machine's power-on for upper console switches : Foot Switch is active
		1024	b10	Neutral detection failure at machine's power-on for upper console switches : Activ Lighting System switch is active

Failures	N	Dec	Bit	Description
CAN J1939				
F15.06 CANBus Cycle Unit	D	1	b0	Timeout detected on J1939 CAN_HG
		2	b1	Timeout detected on J1939 CAN_2.0
		4	b2	Overrun of the transmit queue on J1939 CAN_HG
		8	b3	Overrun of the transmit queue on J1939 CAN_2.0

2 - Legend

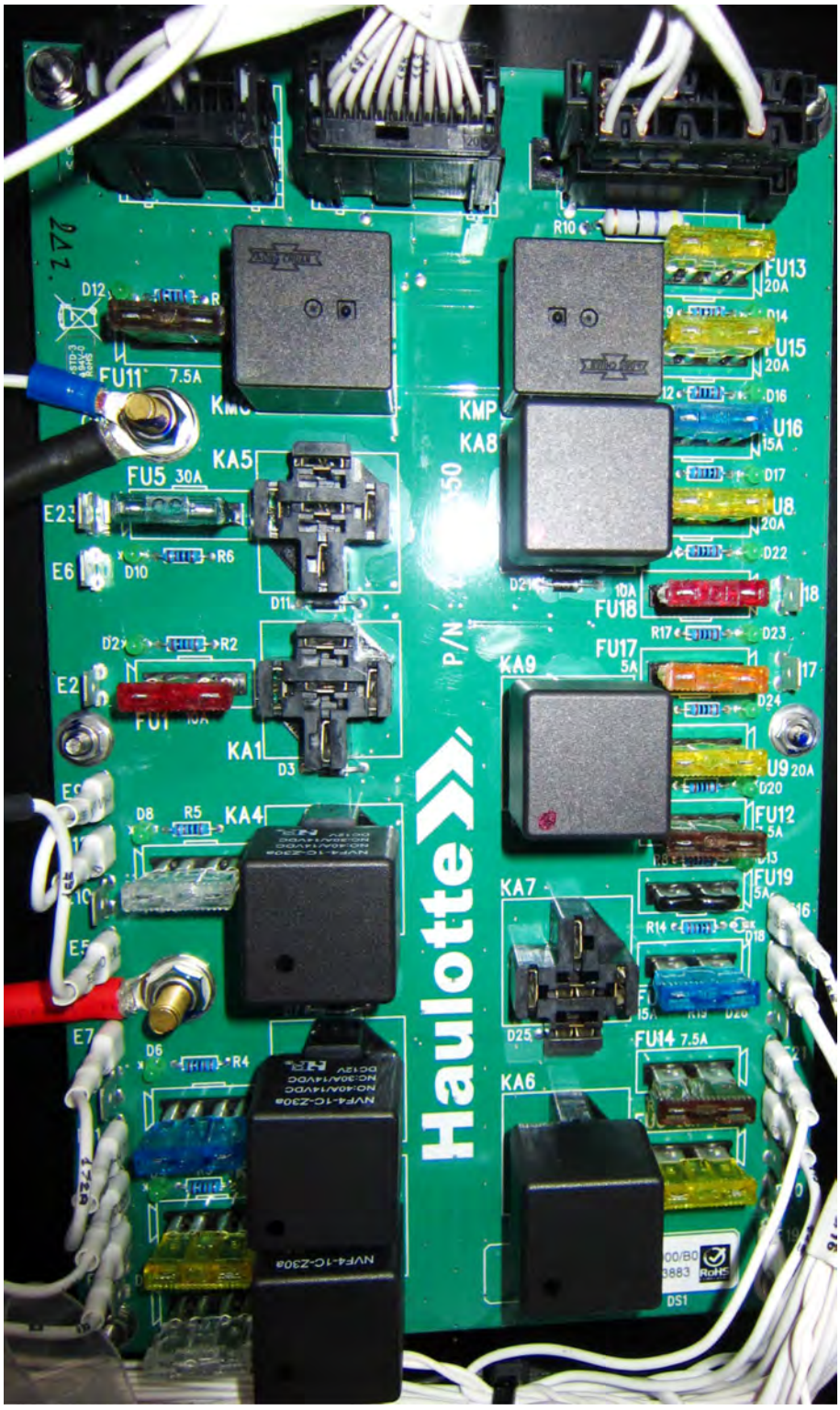
2.1 - PCB TURRET

Location on the machine

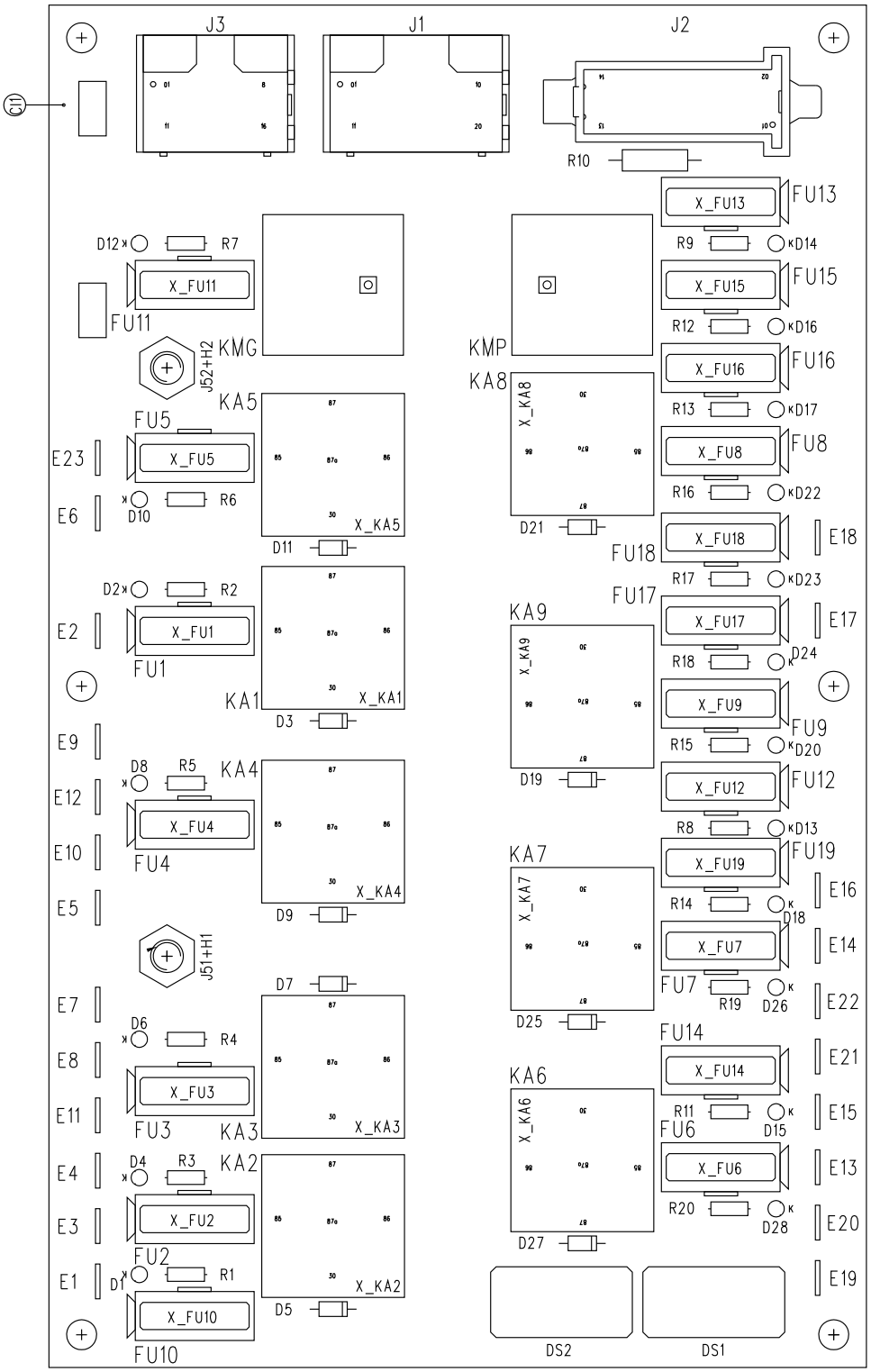


E - Trouble shooting and diagram

Location



E - Trouble shooting and diagram

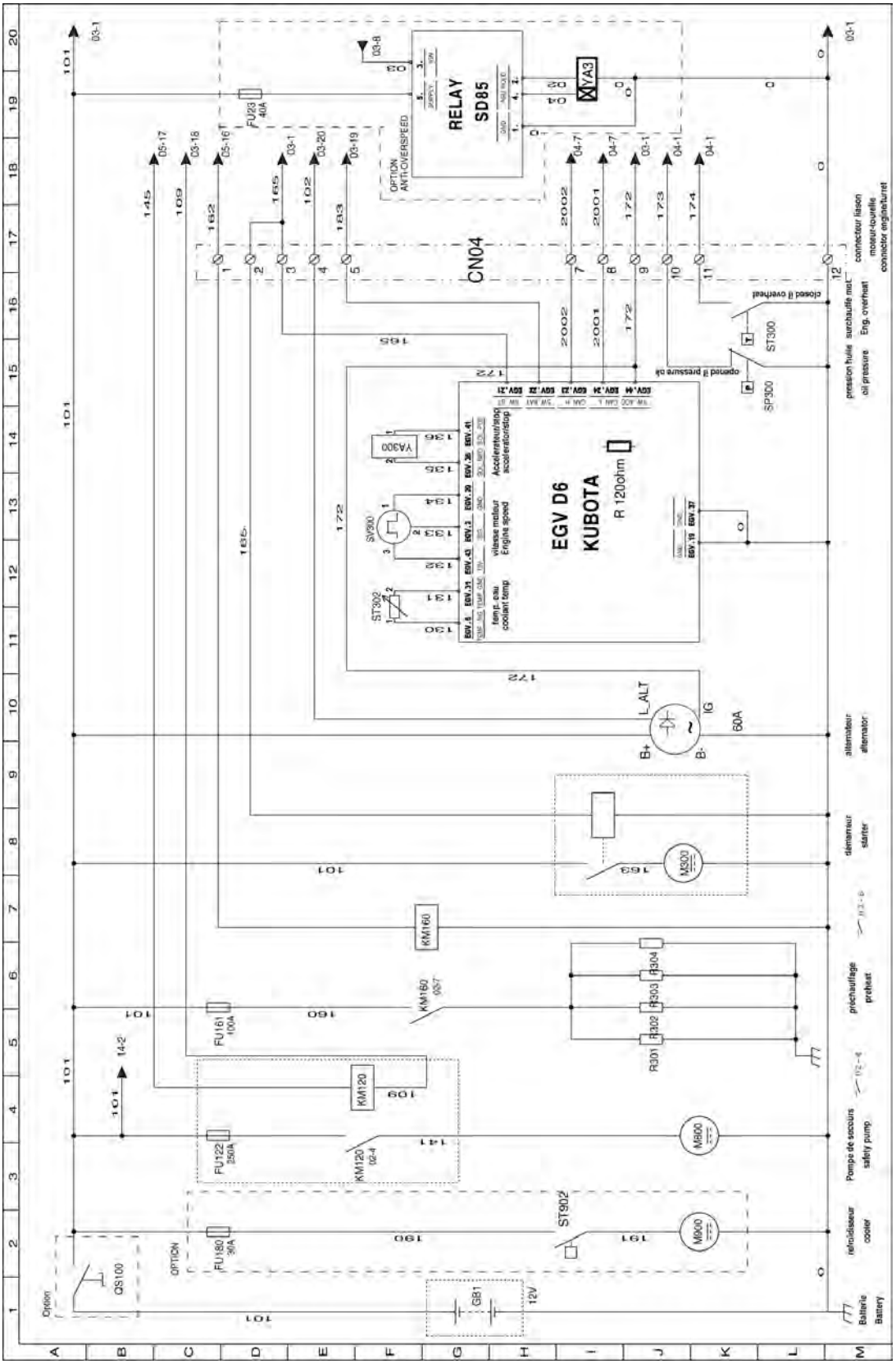


E - Trouble shooting and diagram

Marking	Description
FU1	Not used
FU2	Fuse - 20A - Generator
FU3	Engine shutdown / Acceleration - 15A -
FU4	Fuse - 25A - Starter
FU5	Fuse - 30A - General
FU6	Fuse - 20A - Options
FU7	Fuse - 15A - ECU
FU8	Fuse - 20A - Option
FU9	Fuse - 20A - Attachments
FU10	Not used
FU11	Fuse - 7.5A - + Permanent
FU12	Not used
FU13	Fuse - 20A - Power
FU14	Not used
FU15	Not used
FU16	Not used
FU17	Fuse - 5A -Selection ground / upper controls
FU18	Not used
FU19	Not used
FU23	Option overspeed relay - 40A -
FU34	Supply strain gauges -1A-
FU122	Emergency pump -250A-
FU161	Preheating -100A-
FU180	Cooler option -30A-
KA1	Not used
KA2	Relay - 1RT - 12V - Generator (192)
KA3	Engine shutdown / Acceleration (170)
KA5	Not used
KA4	Starter (169)
KA5	Not used
KA7	For engine start
KA9	Relay - 1RT - 12V - Horn (187)
KMG	Relay - 1T - 12V/70A - Main relay (142)
KMP	Relay - 1T - 12V/70A - Power (142)
SD85	Option overspeed relay
KM120	Emergency pump (145)
KM160	Pre-heating (162)
KM300	Starter motor (165)

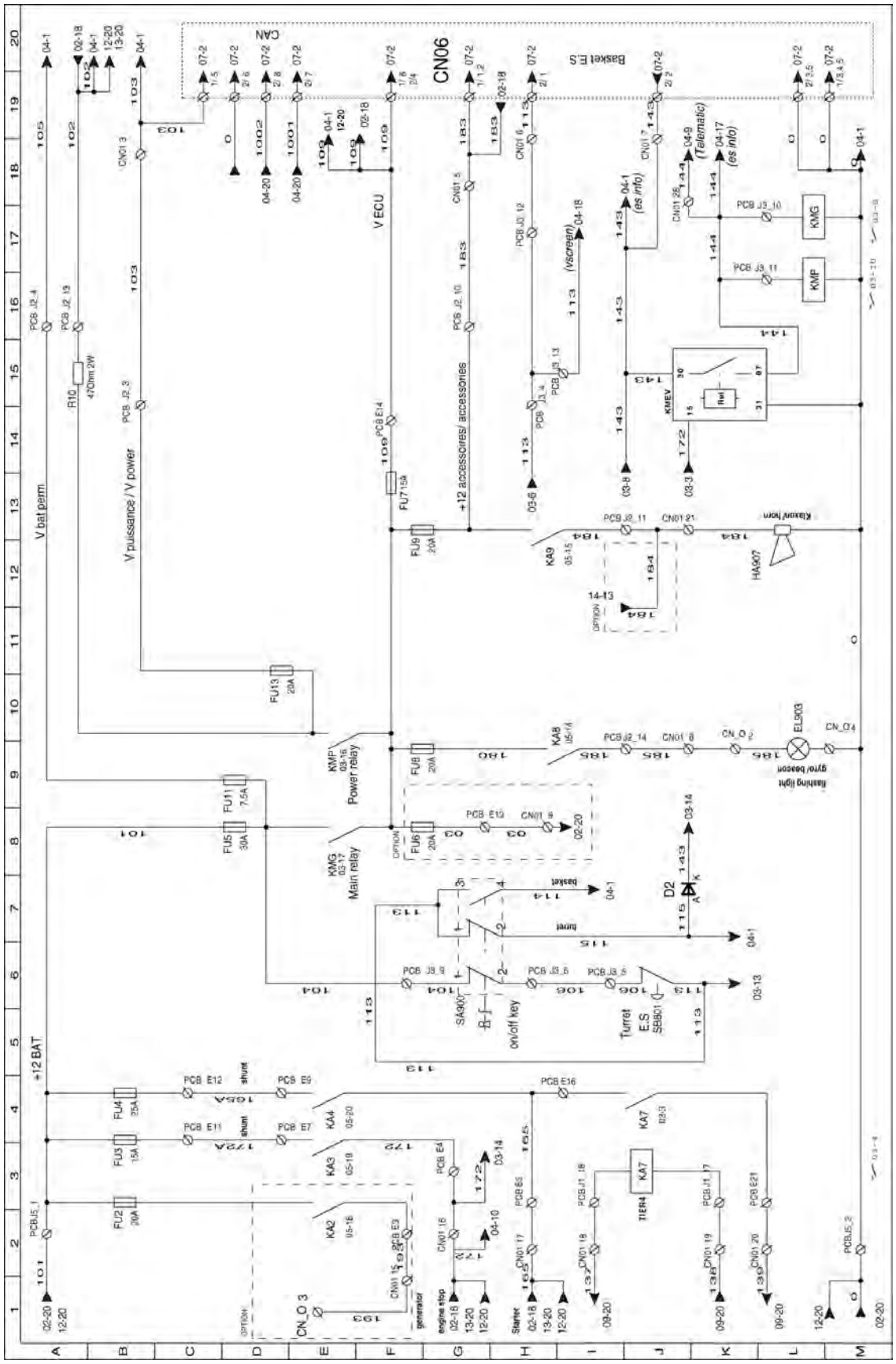
3 - Electric diagram

Engine part - Tier III - 4000419850J - folio 02

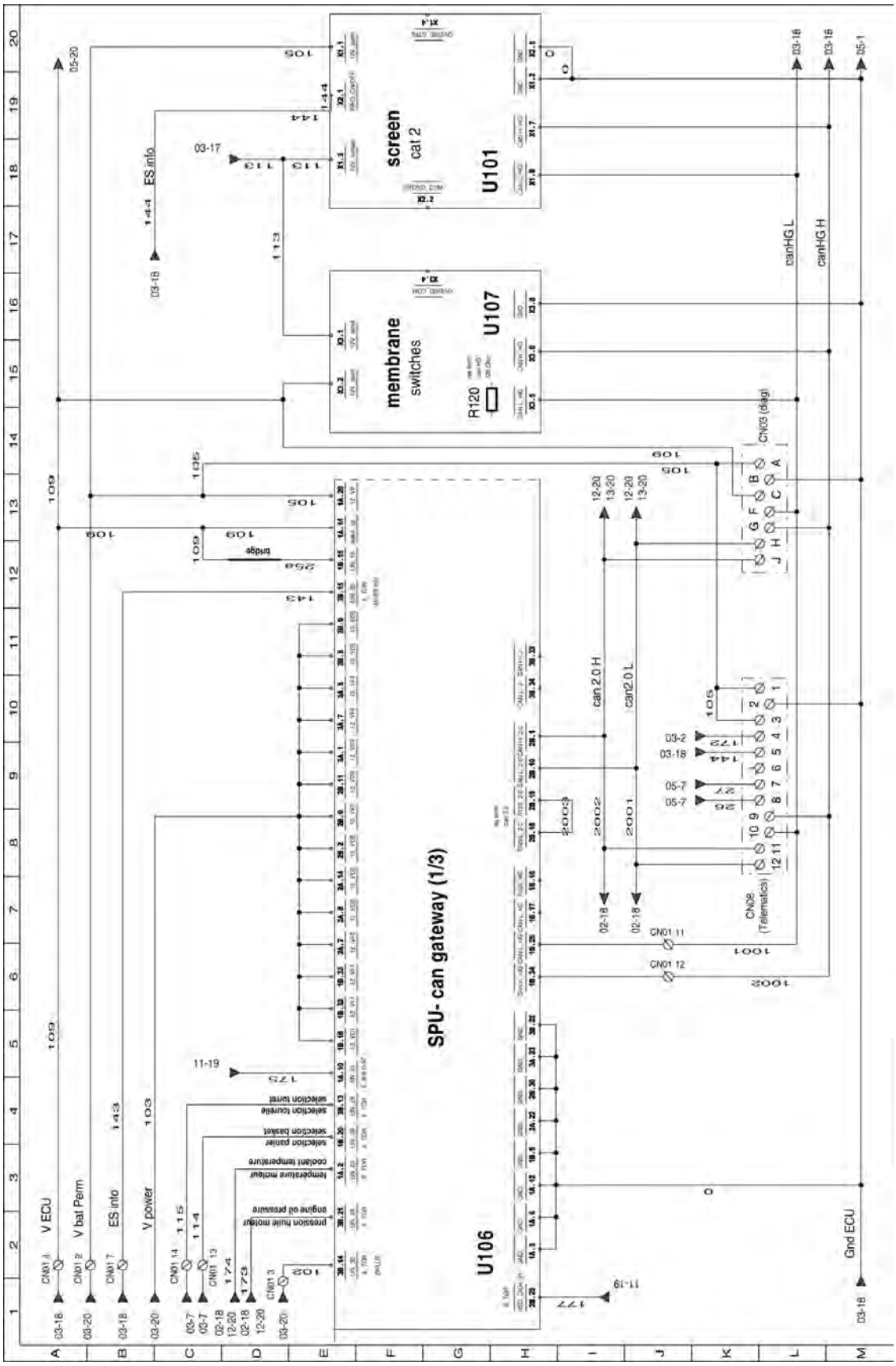


E - Trouble shooting and diagram

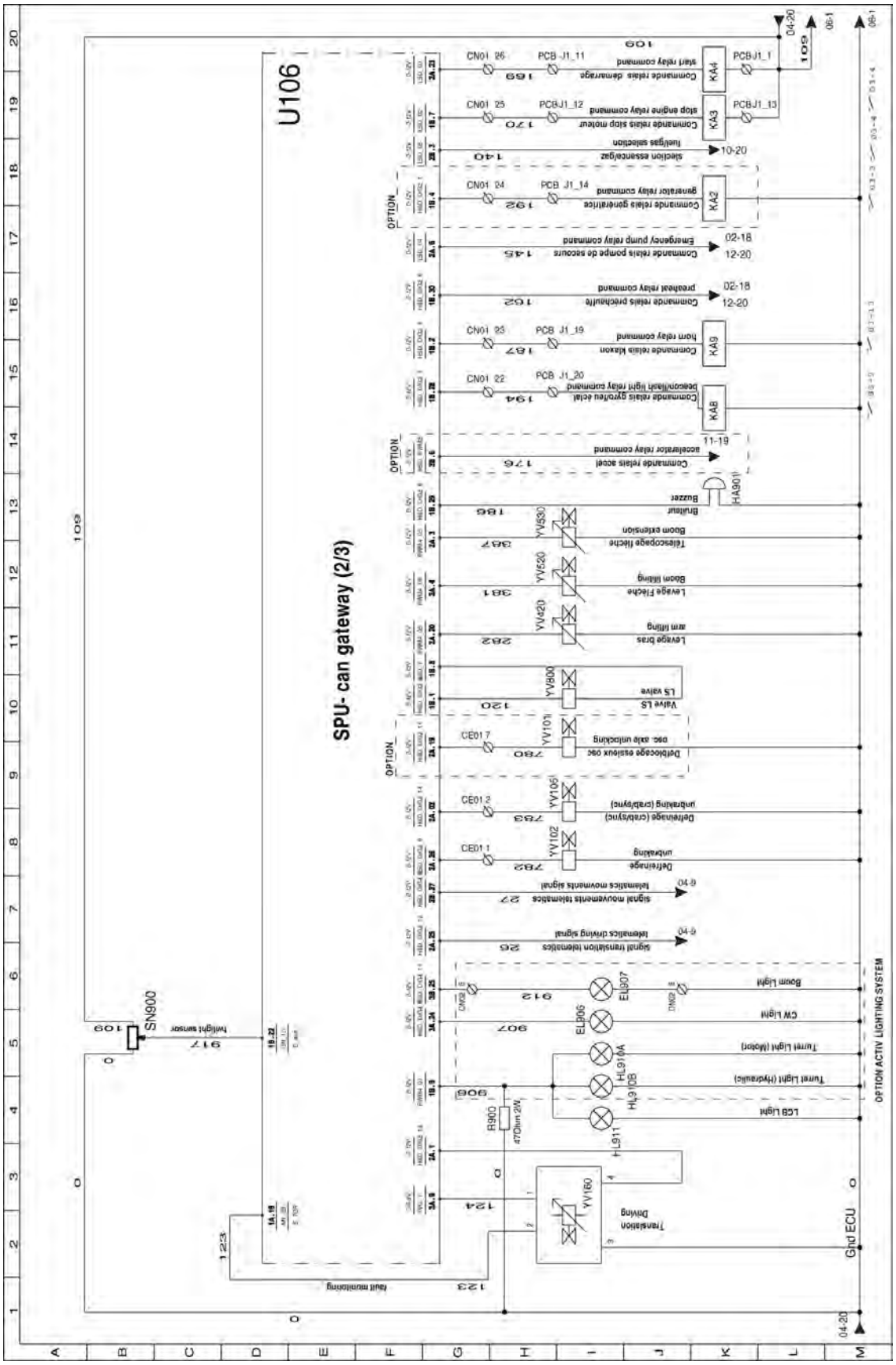
Turntable part - PCB - 4000419850J - folio 03



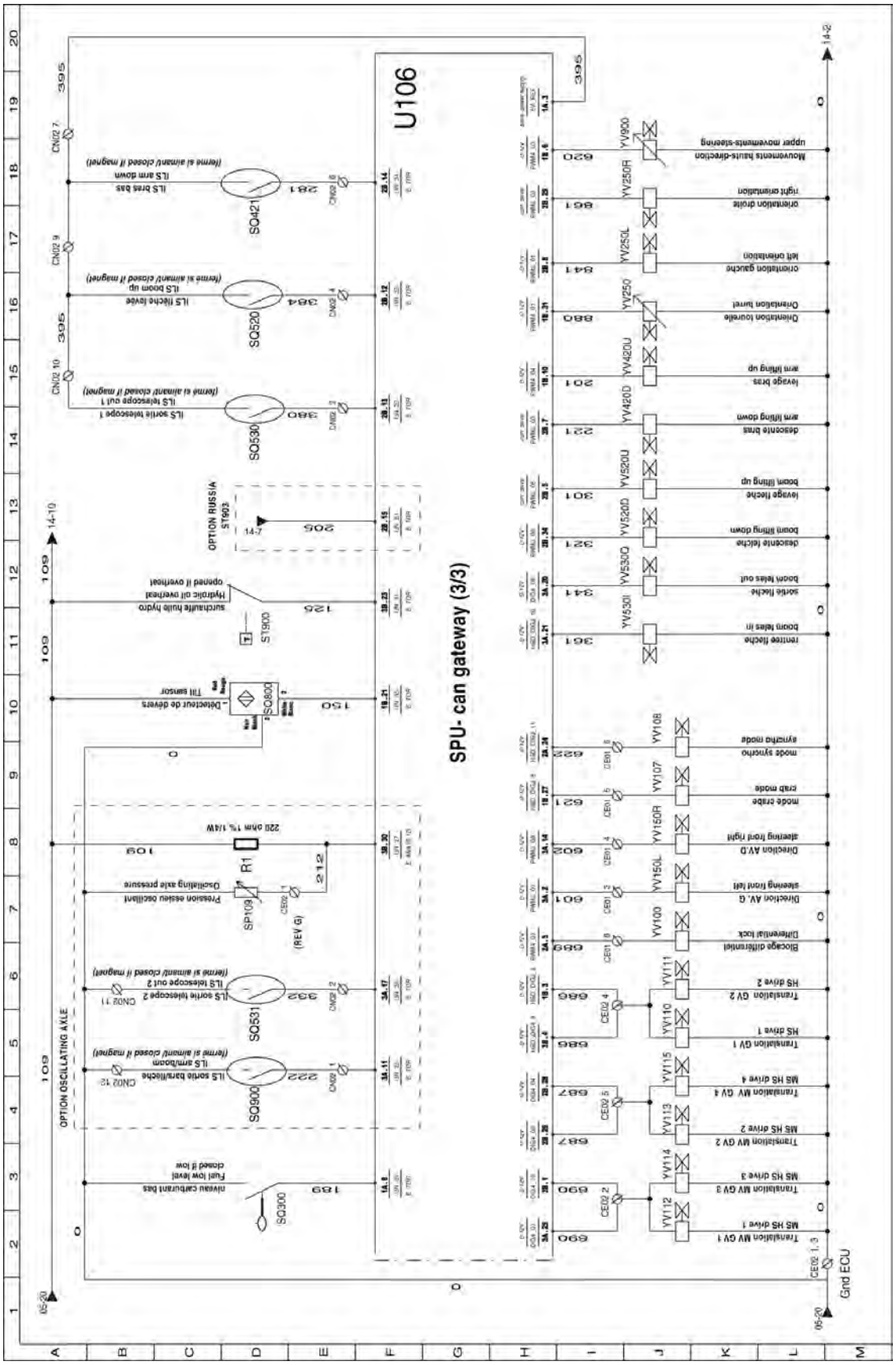
Turntable part - SPU 1/3 + CLUSTER - 4000419850J - folio 04



Turntable part - SPU 2/3 - 4000419850J - folio 05

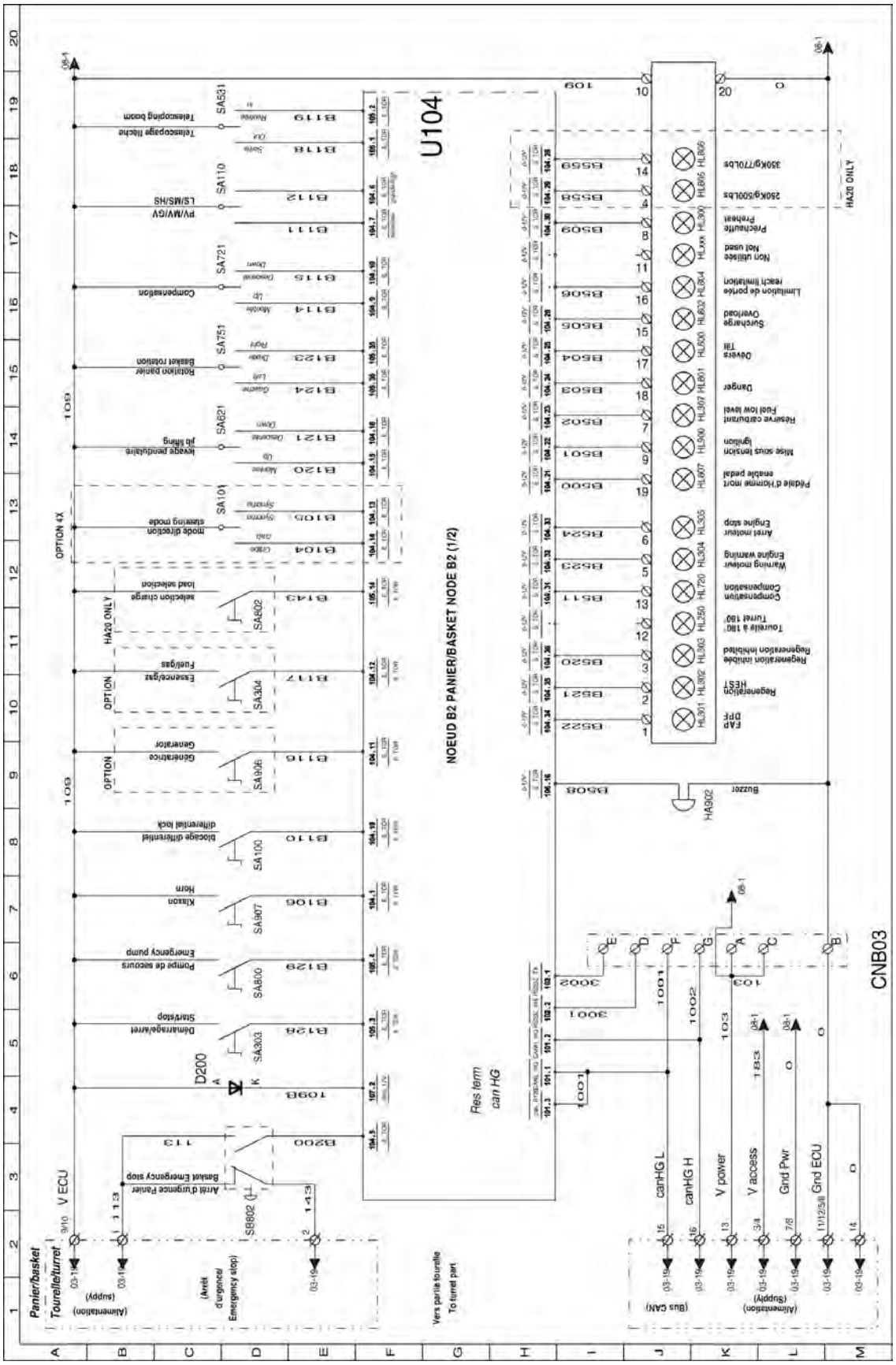


Turntable part - SPU 3/3 - 4000419850J - folio 06

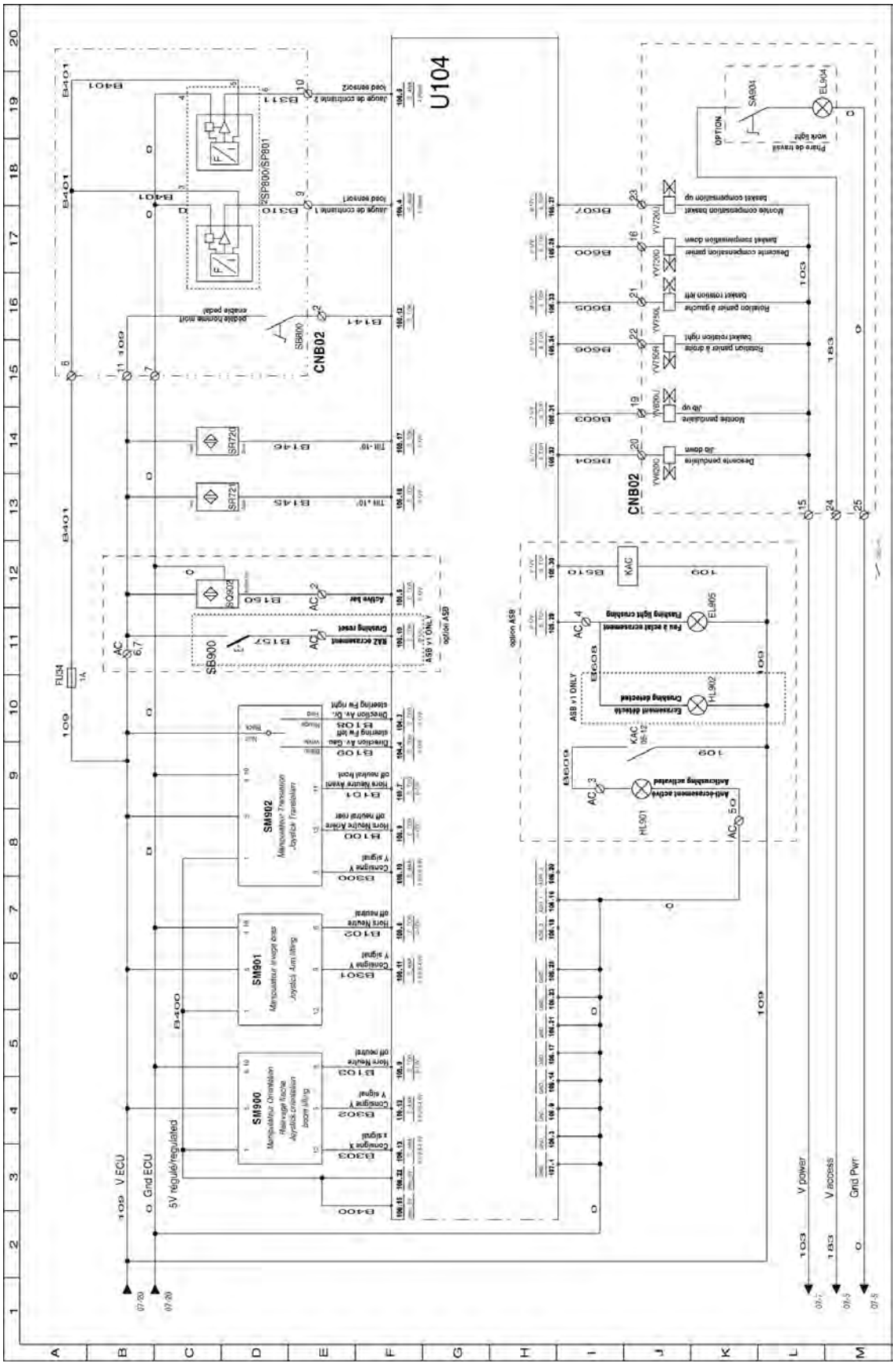


E - Trouble shooting and diagram

Cage part-Node B 1/2 - 4000419850J - folio 07

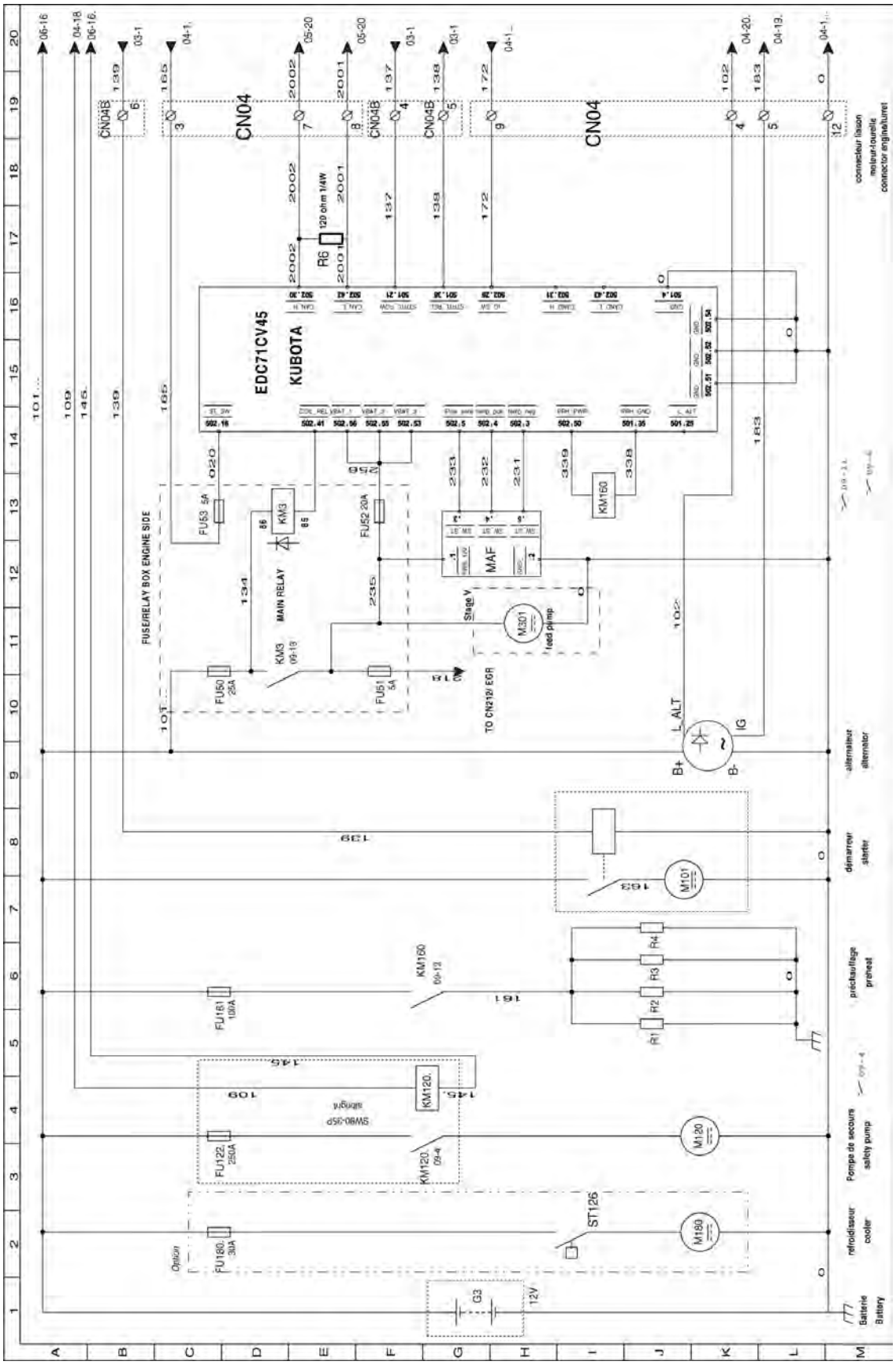


Cage part-Node B 2/2 - 4000419850J - folio 08



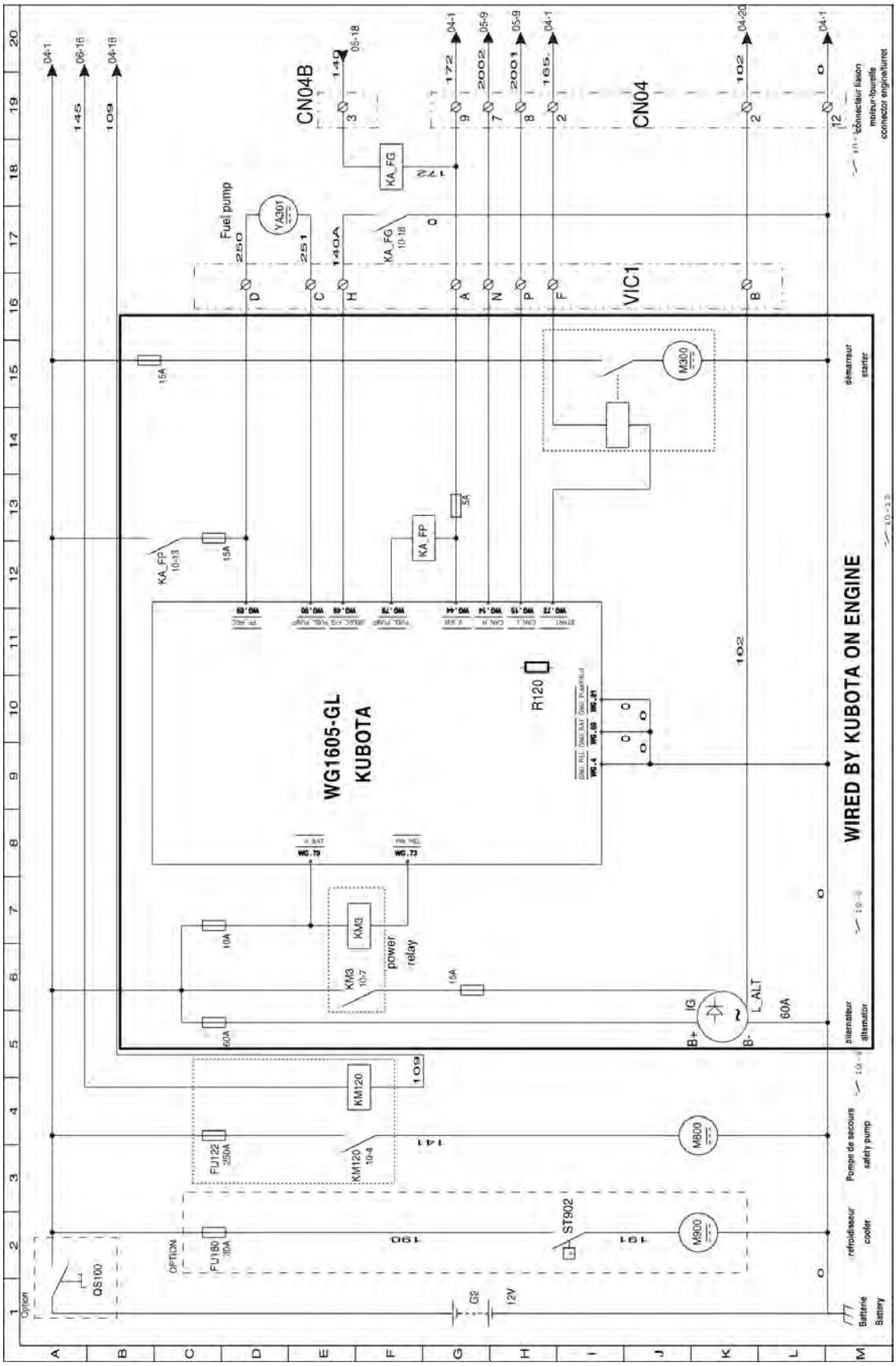
E - Trouble shooting and diagram

Engine part - Tier IV / Stage V Kubota - 4000419850J - folio 09



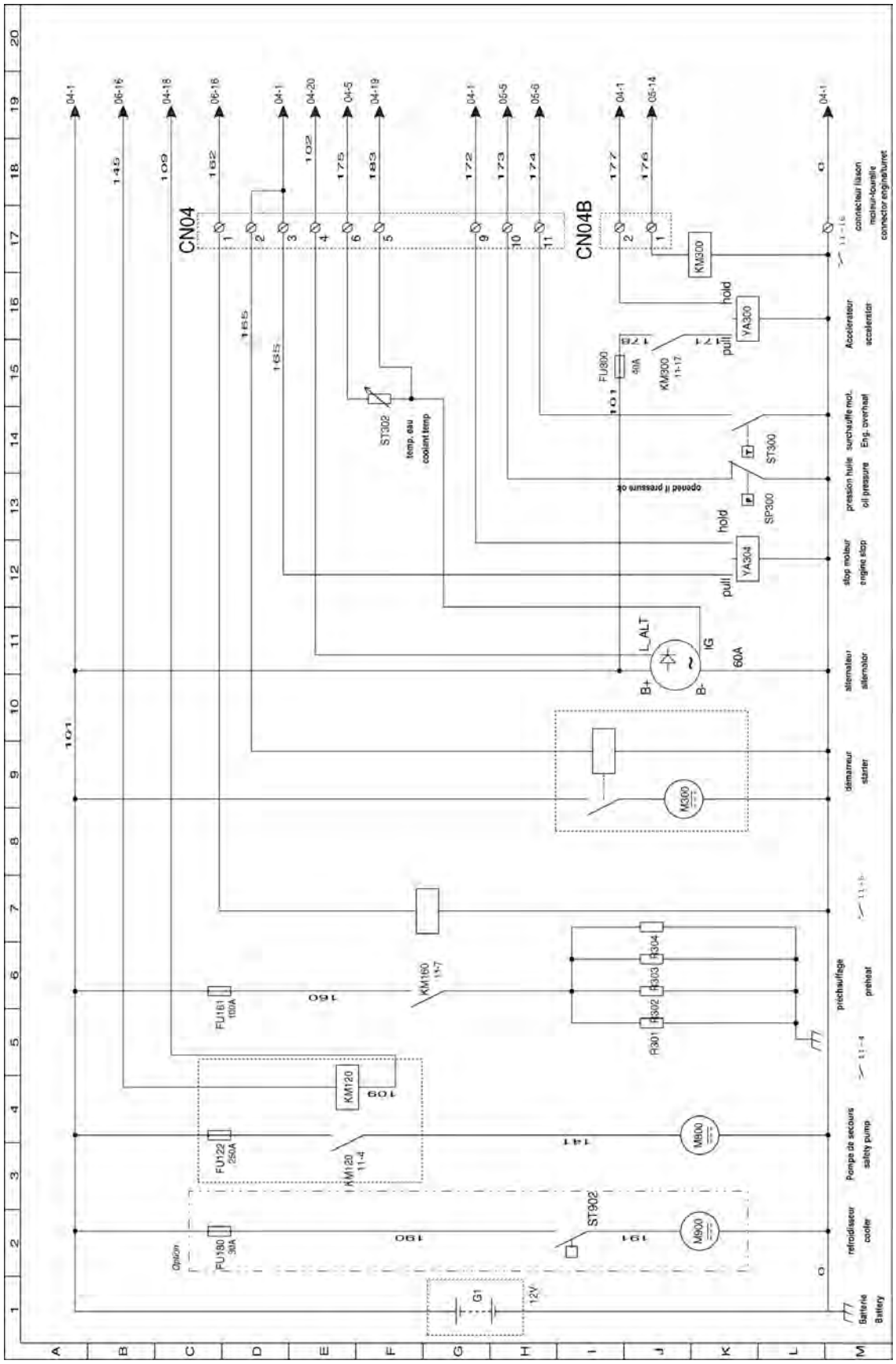
E - Trouble shooting and diagram

Engine part-Petrol/gas - 4000419850J - folio 10

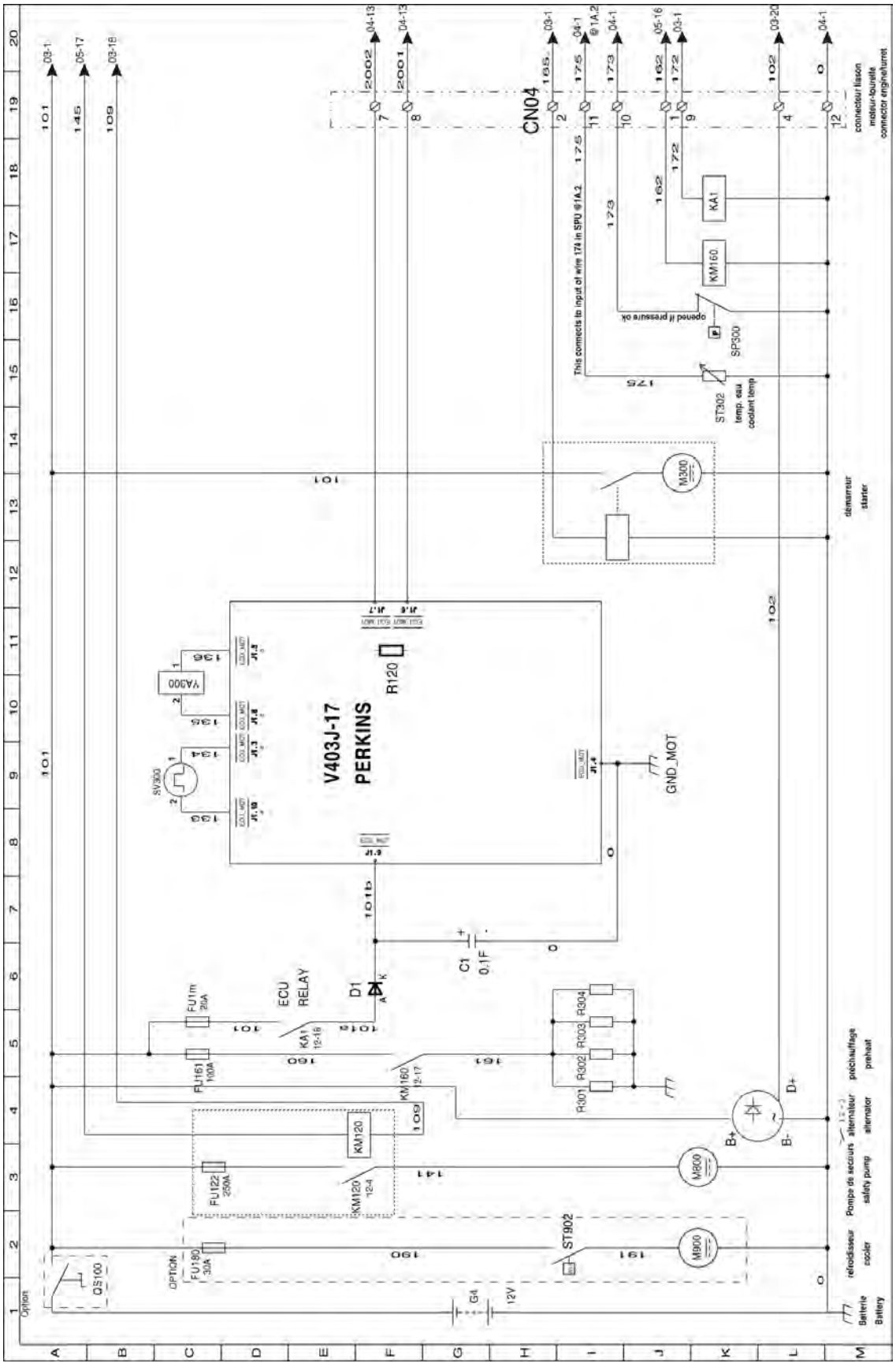


E - Trouble shooting and diagram

Engine part-ON/OFF Kubota - 4000419850J - folio 11

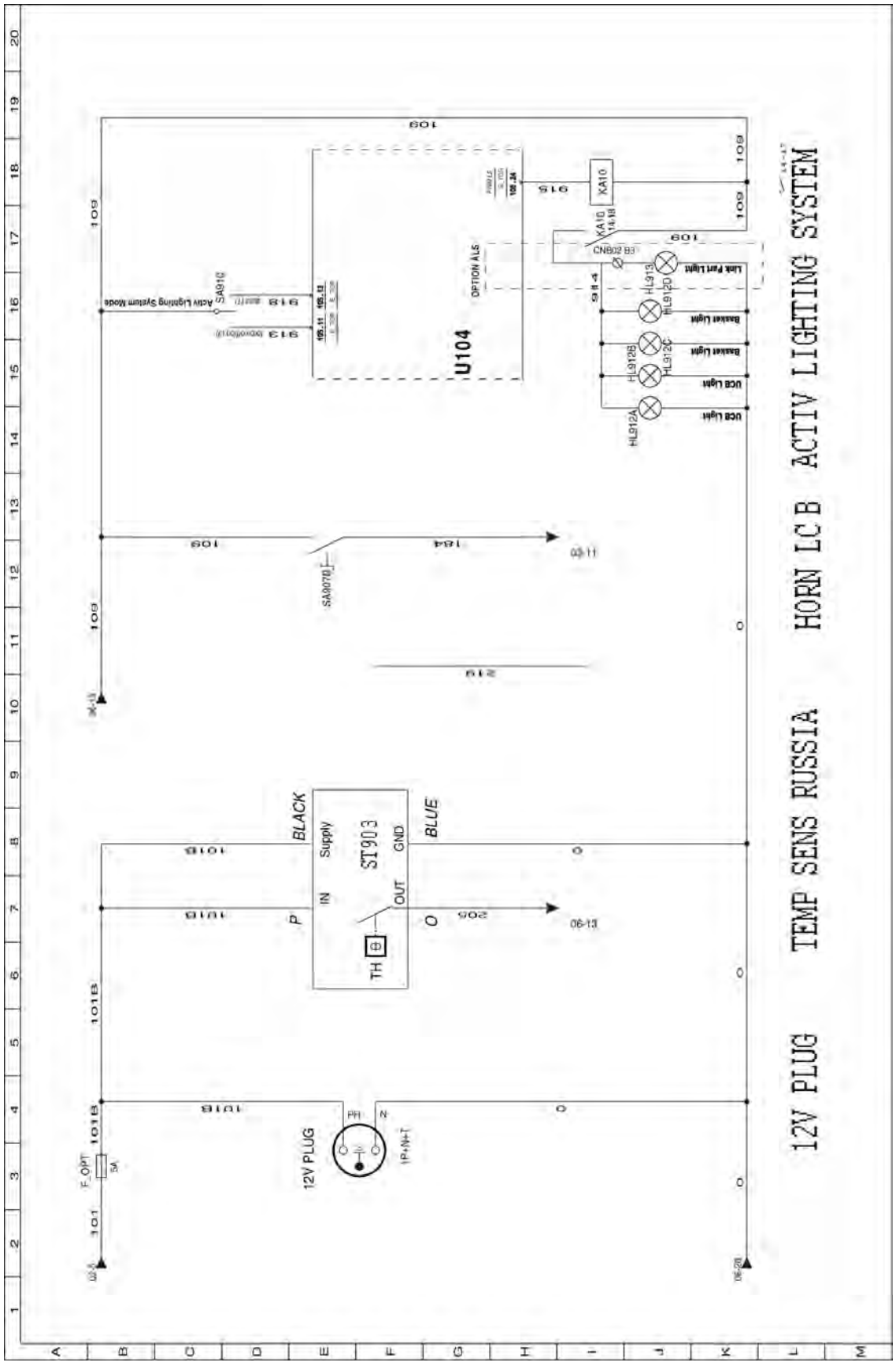


Engine part - TIER IV Final / Stage V - Perkins 403J-17 - 4000419850J - folio 12



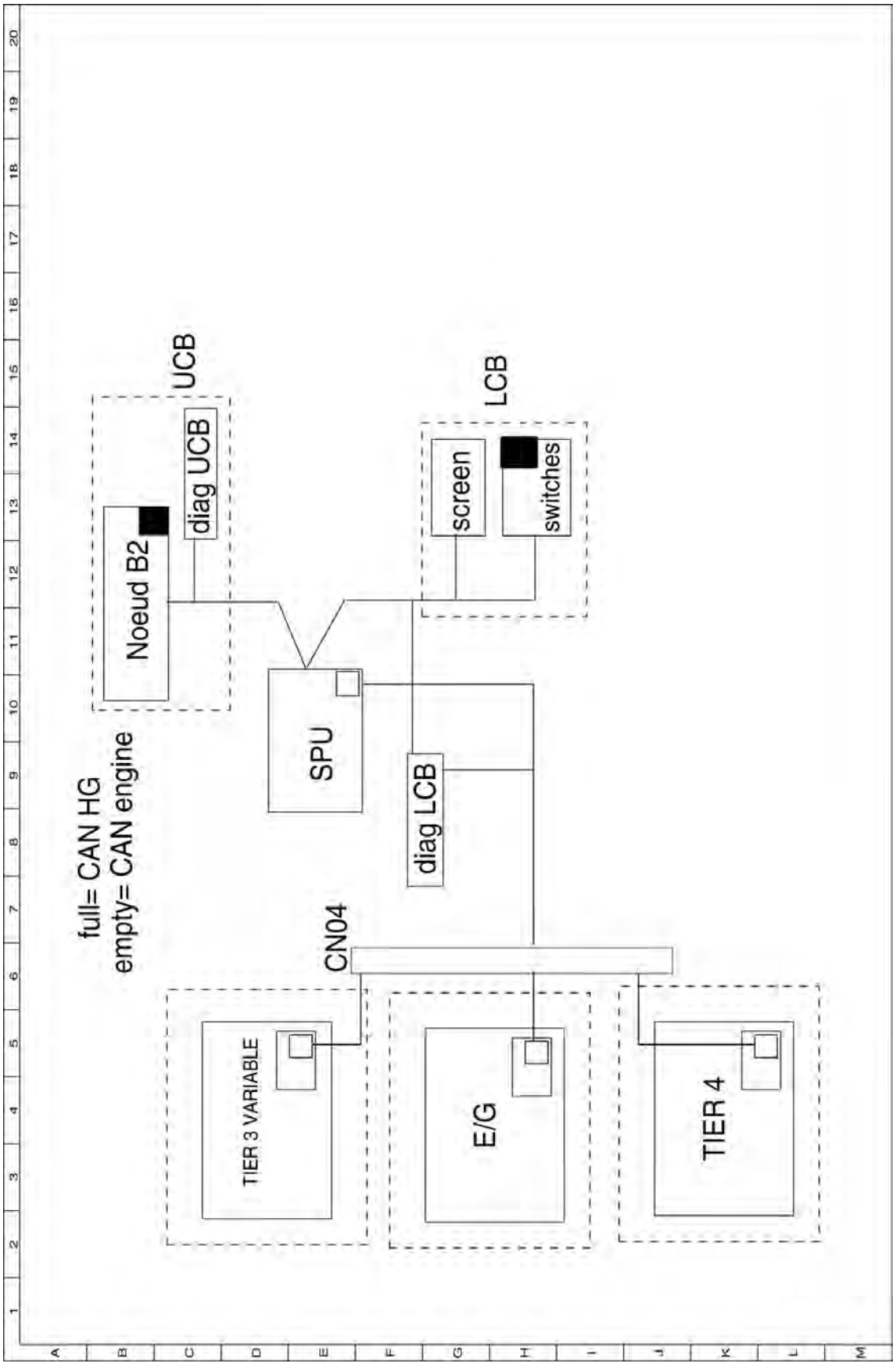
E - Trouble shooting and diagram

Option - 4000419850J - folio 14



E - Trouble shooting and diagram

System architecture - 4000419850J - folio 15

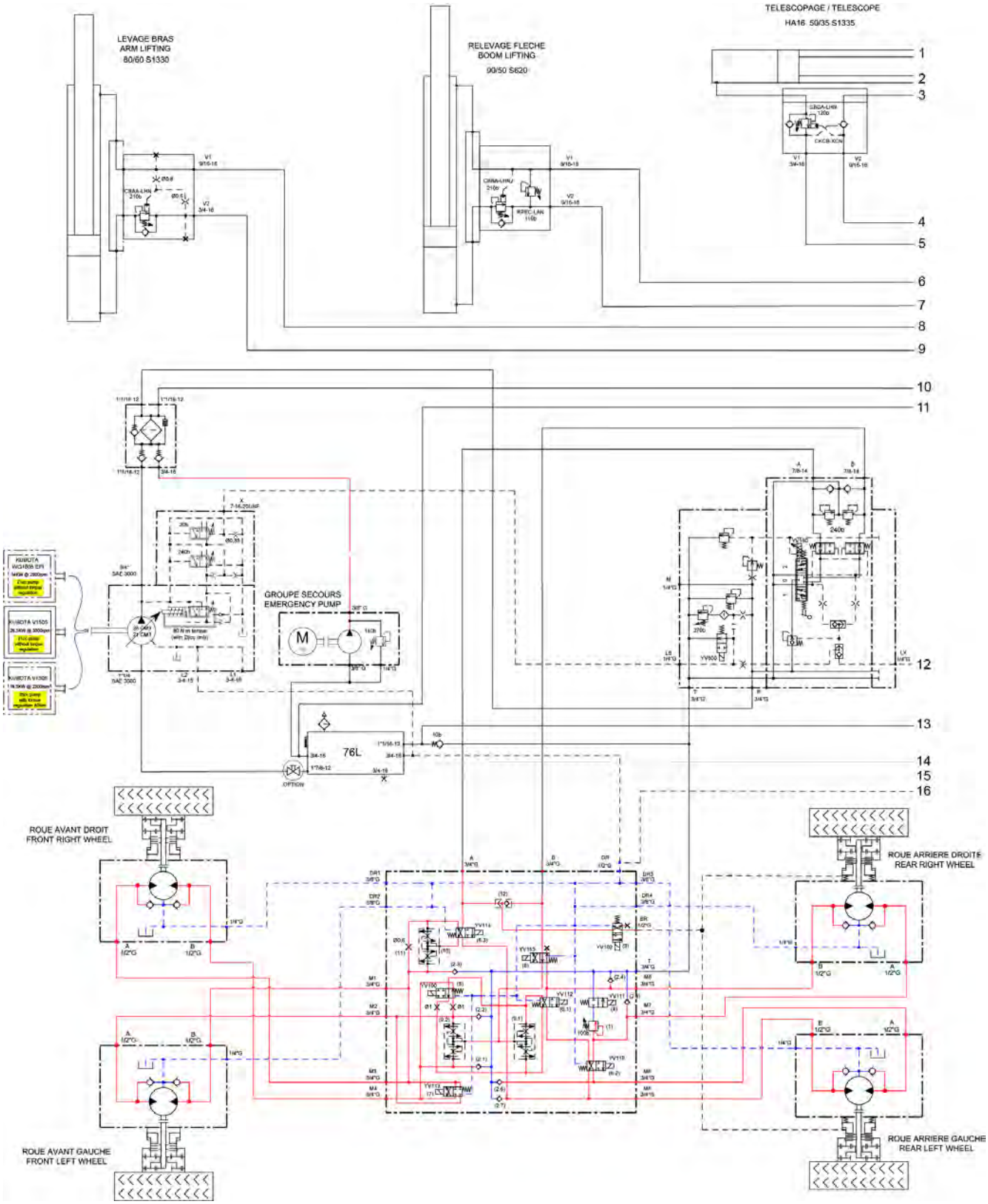


E - Trouble shooting and diagram

Notes

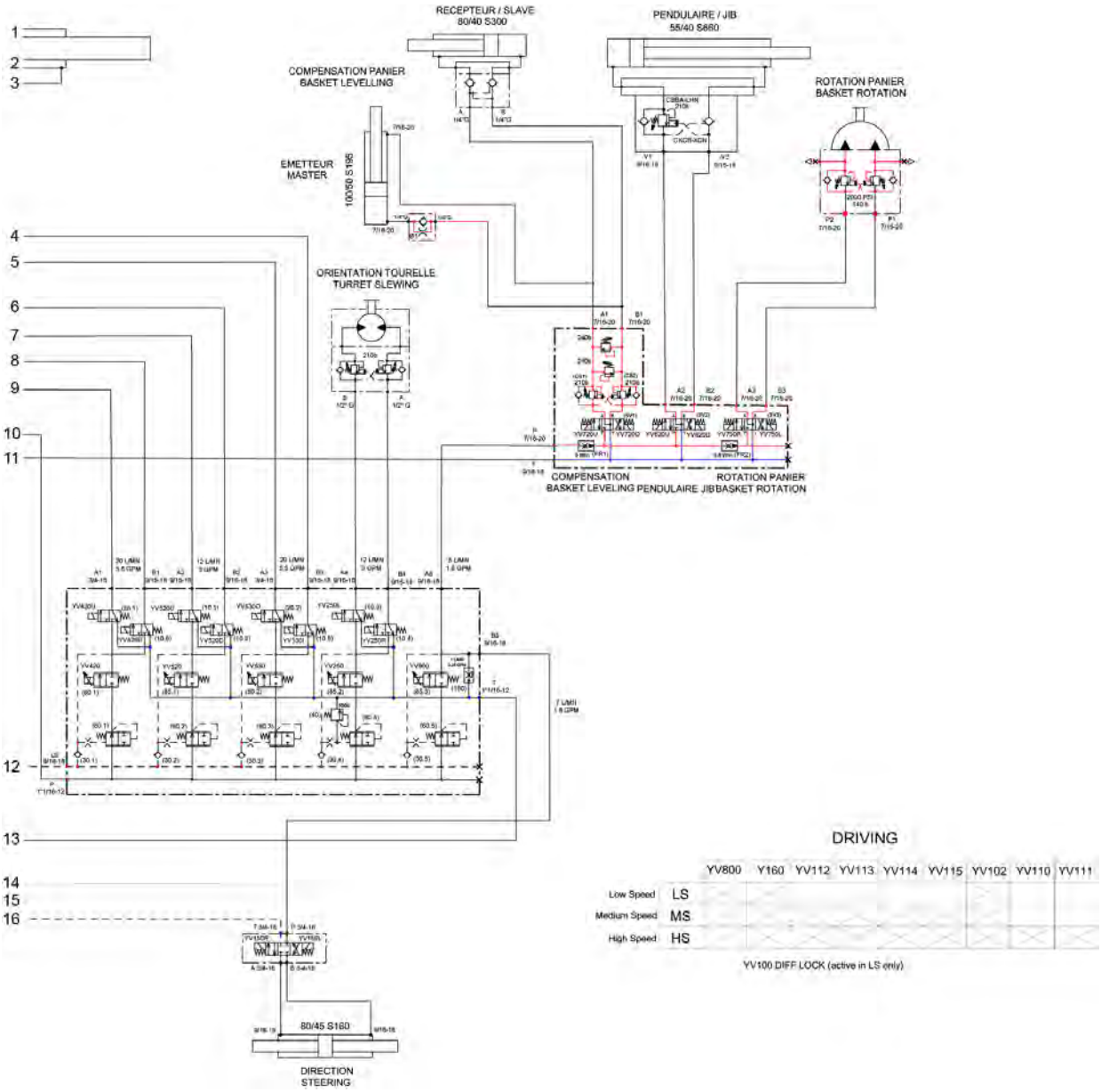
4 - Hydraulic diagram

HA16RTJ - 4000361790D - 1/2



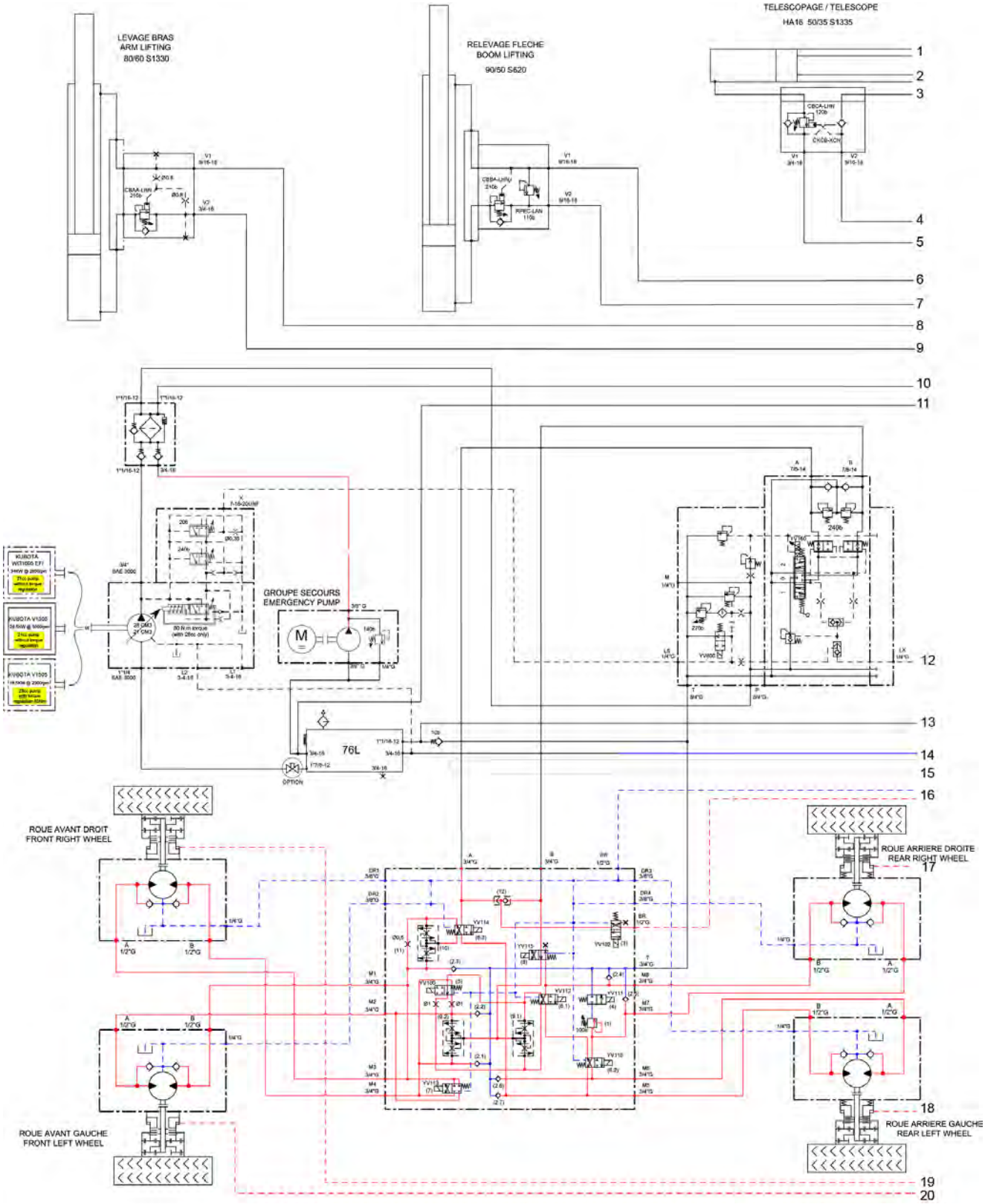
E - Trouble shooting and diagram

HA16RTJ - 4000361790D - 2/2



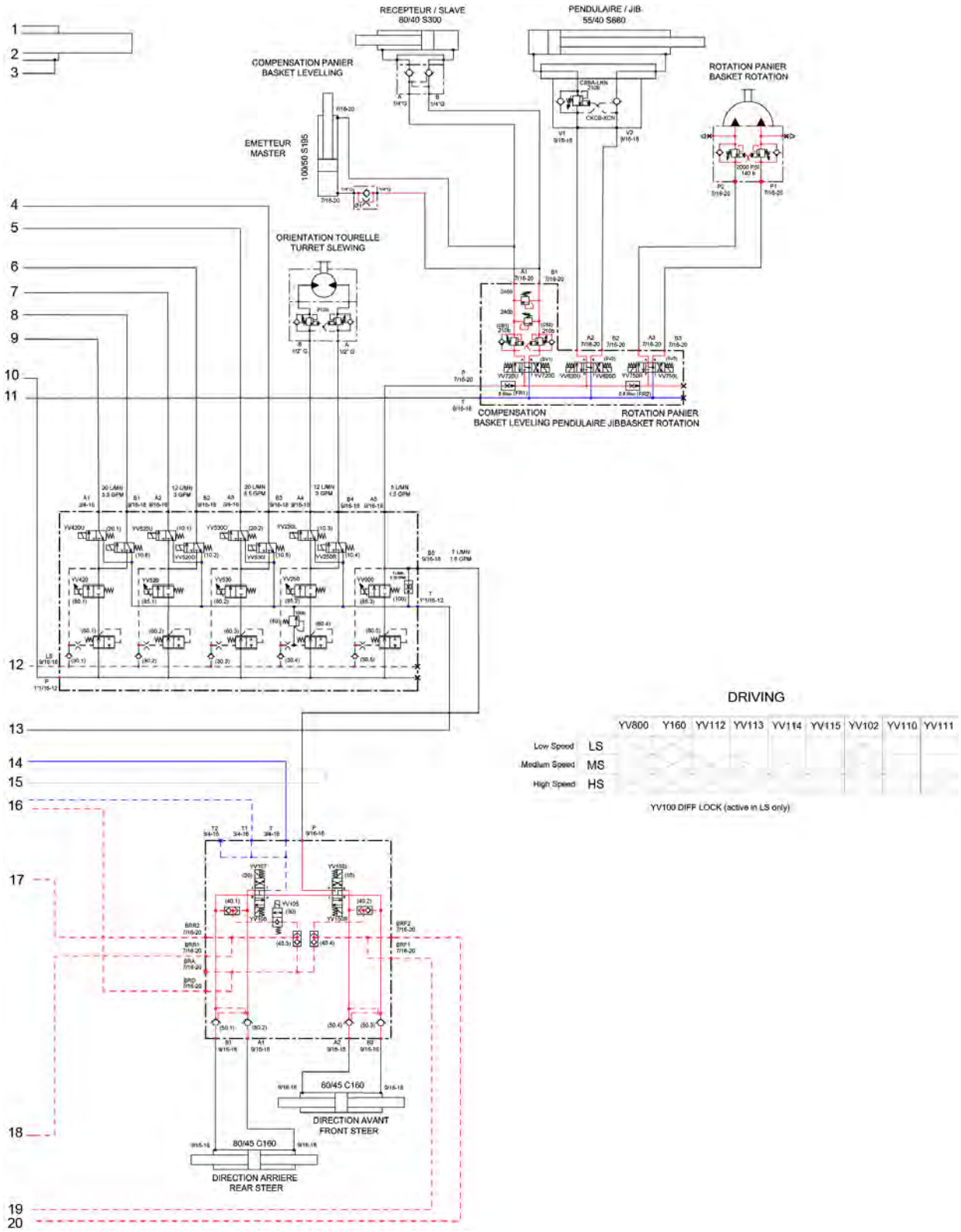
E - Trouble shooting and diagram

HA16RTJ 4WS - 4000361790D - 1/2



E - Trouble shooting and diagram

HA16RTJ 4WS - 4000361790D - 2/2



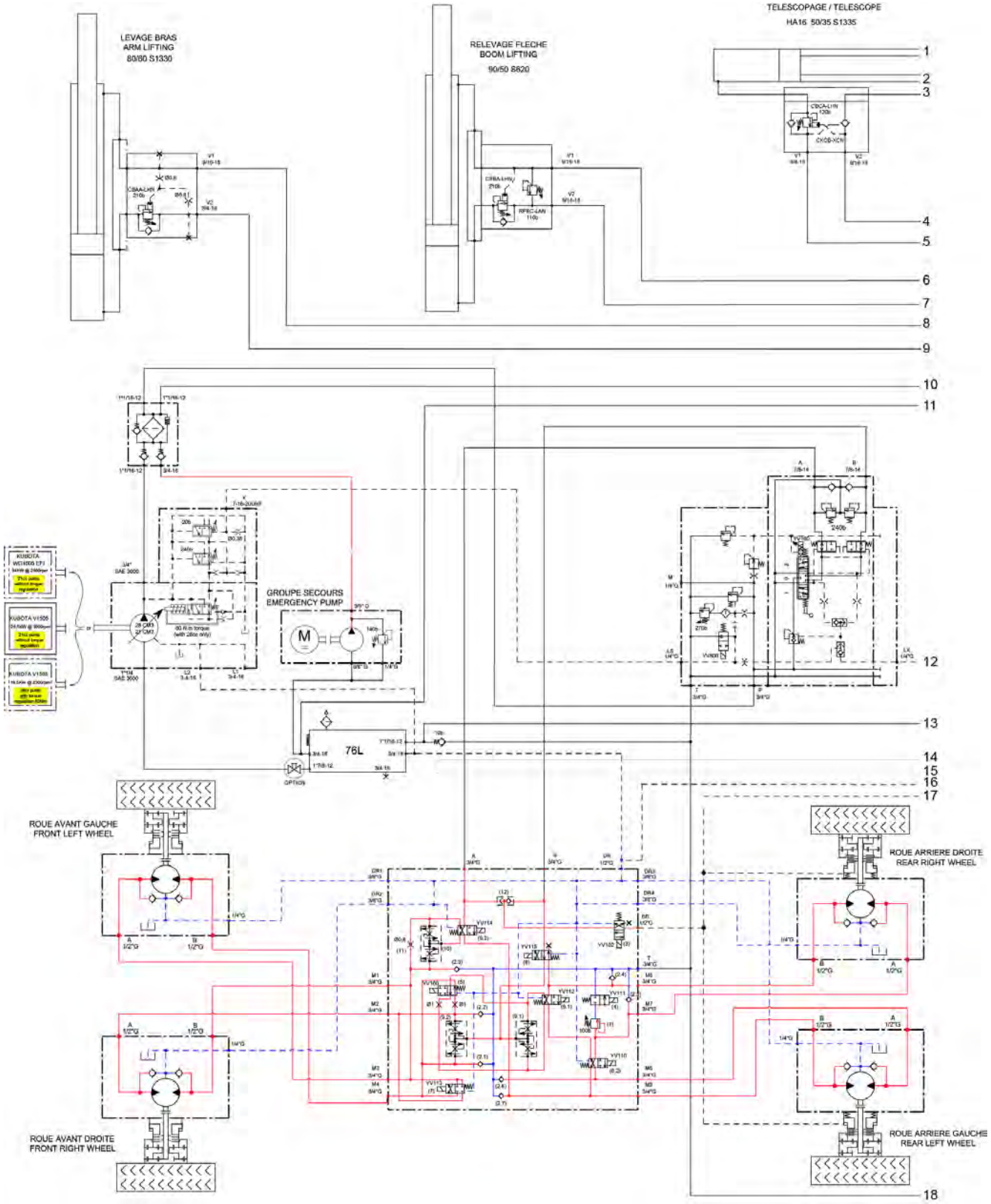
DRIVING

	YV800	Y160	YV112	YV113	YV114	YV115	YV102	YV110	YV111
Low Speed	LS								
Medium Speed	MS								
High Speed	HS								

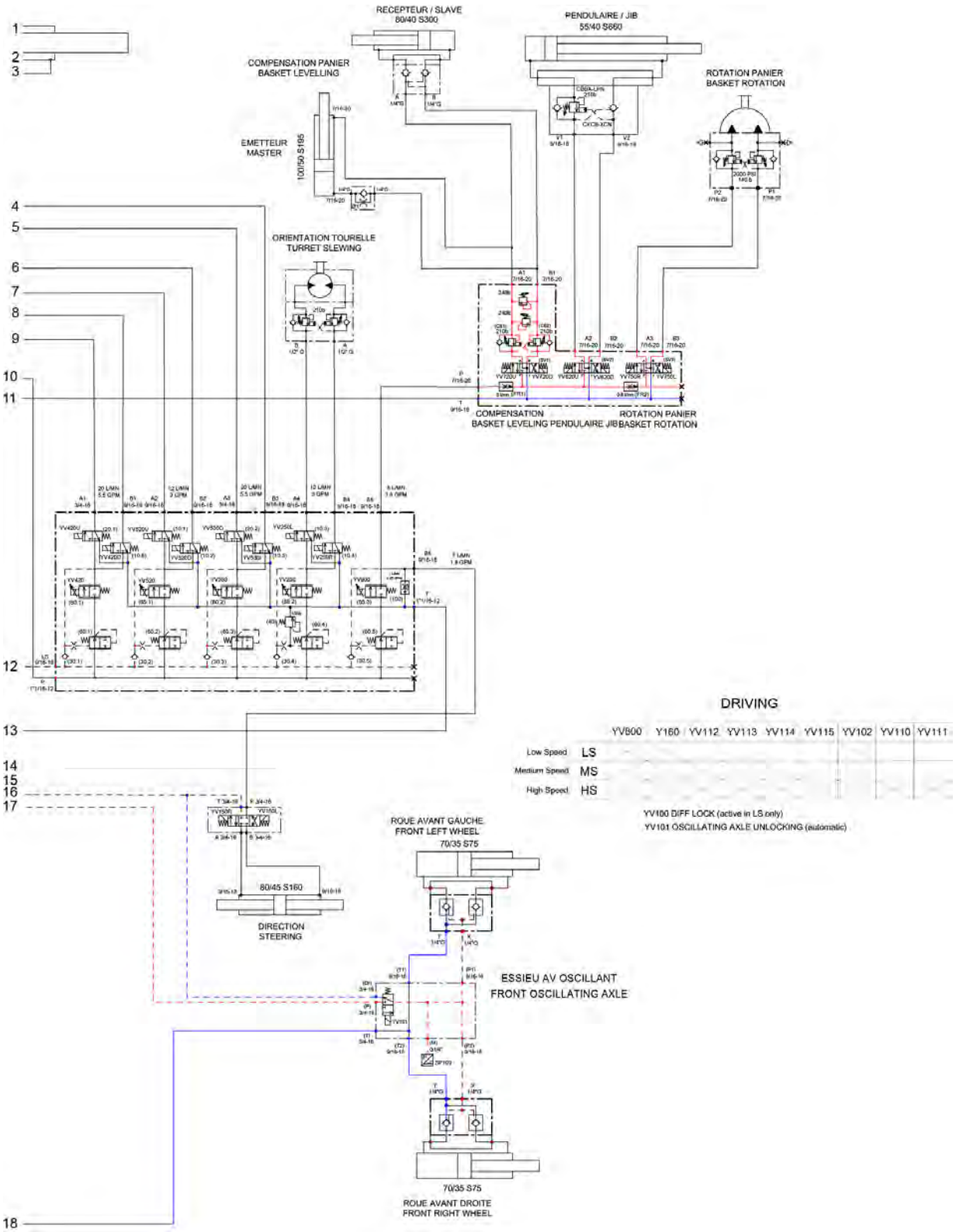
YV100 DIFF LOCK (active in LS only)

E - Trouble shooting and diagram

HA16RTJ O - 4000361790D - 1/2

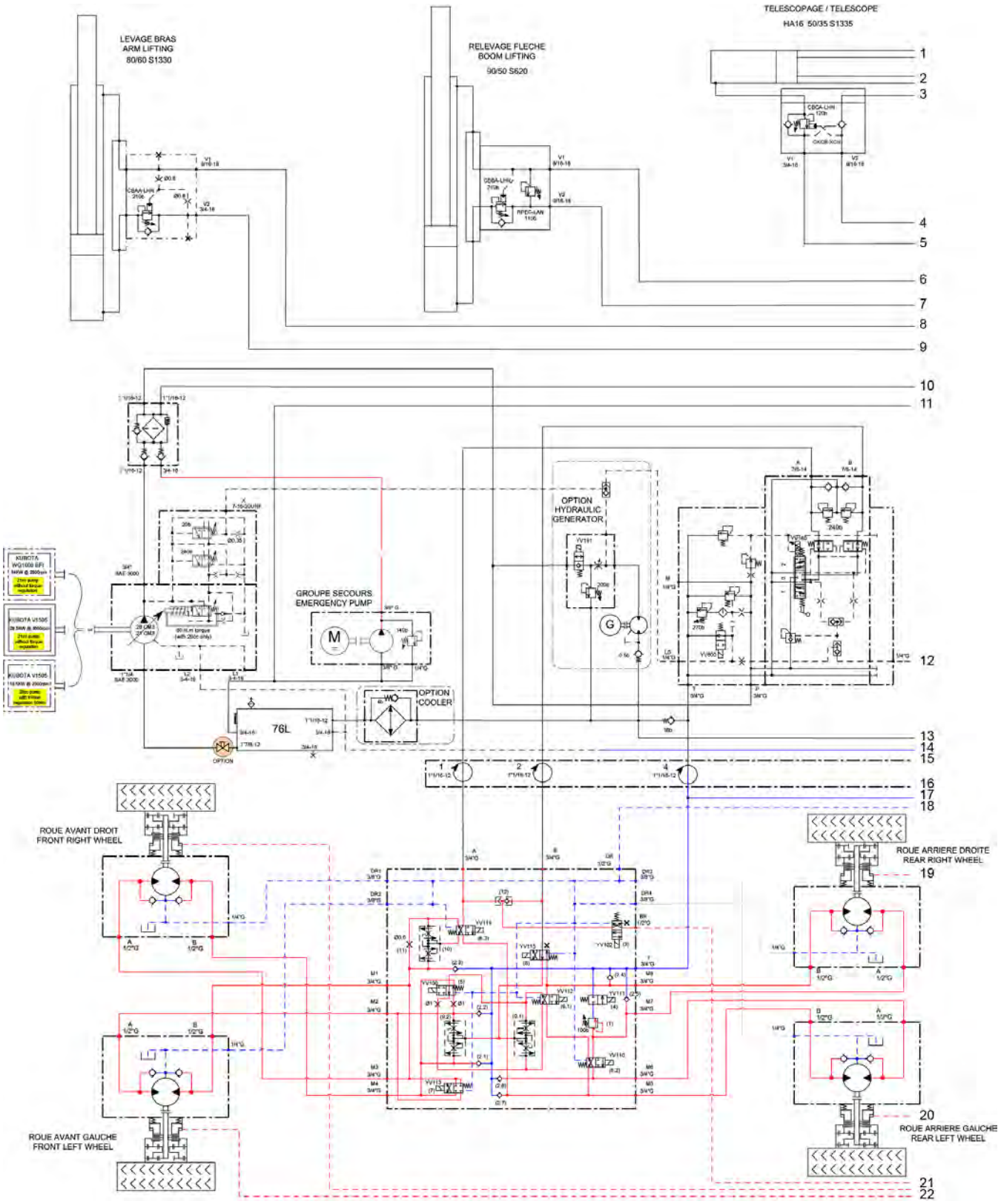


HA16RTJ O - 4000361790D - 2/2



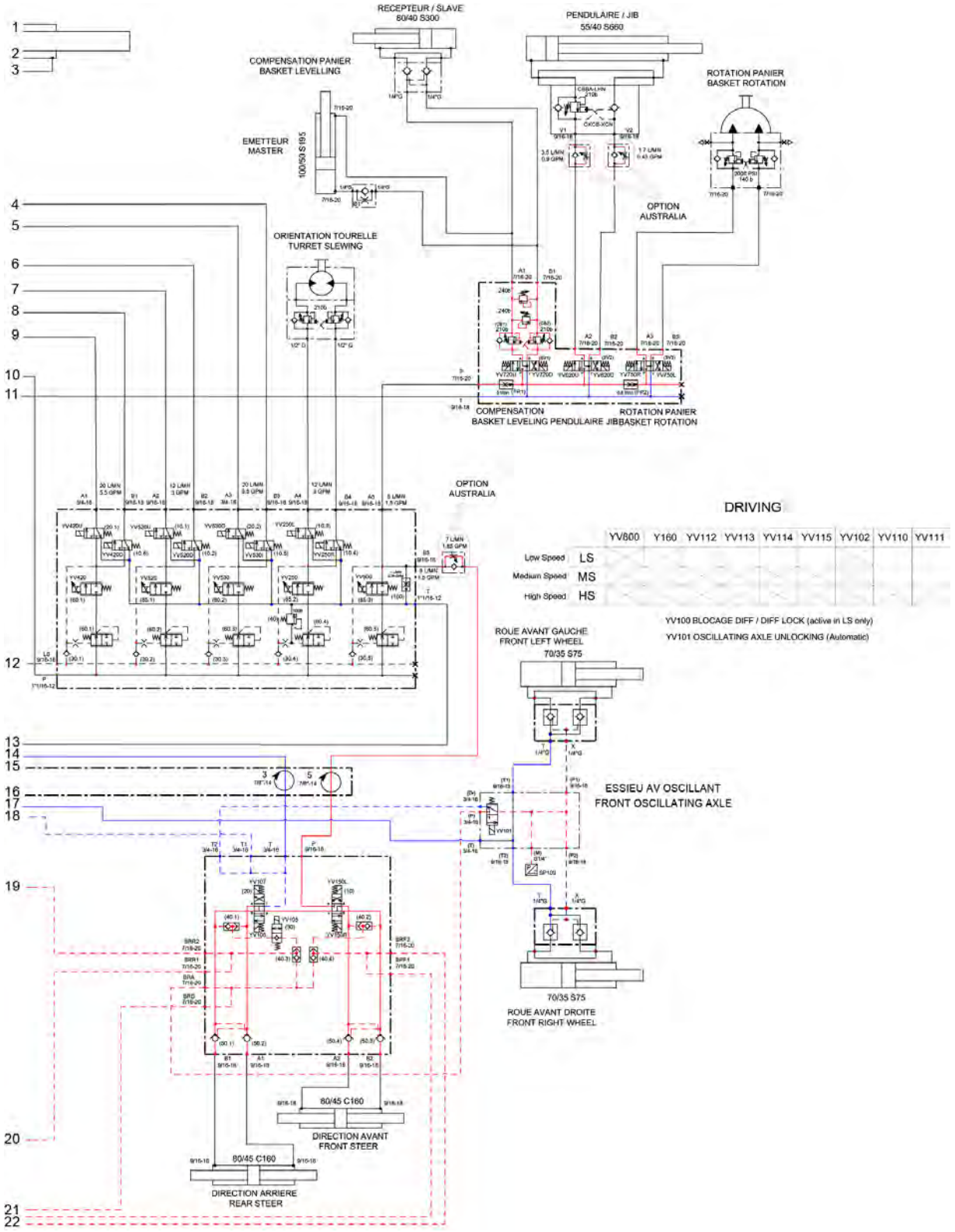
E - Trouble shooting and diagram

HA16RTJ PRO - 4000361790D - 1/2

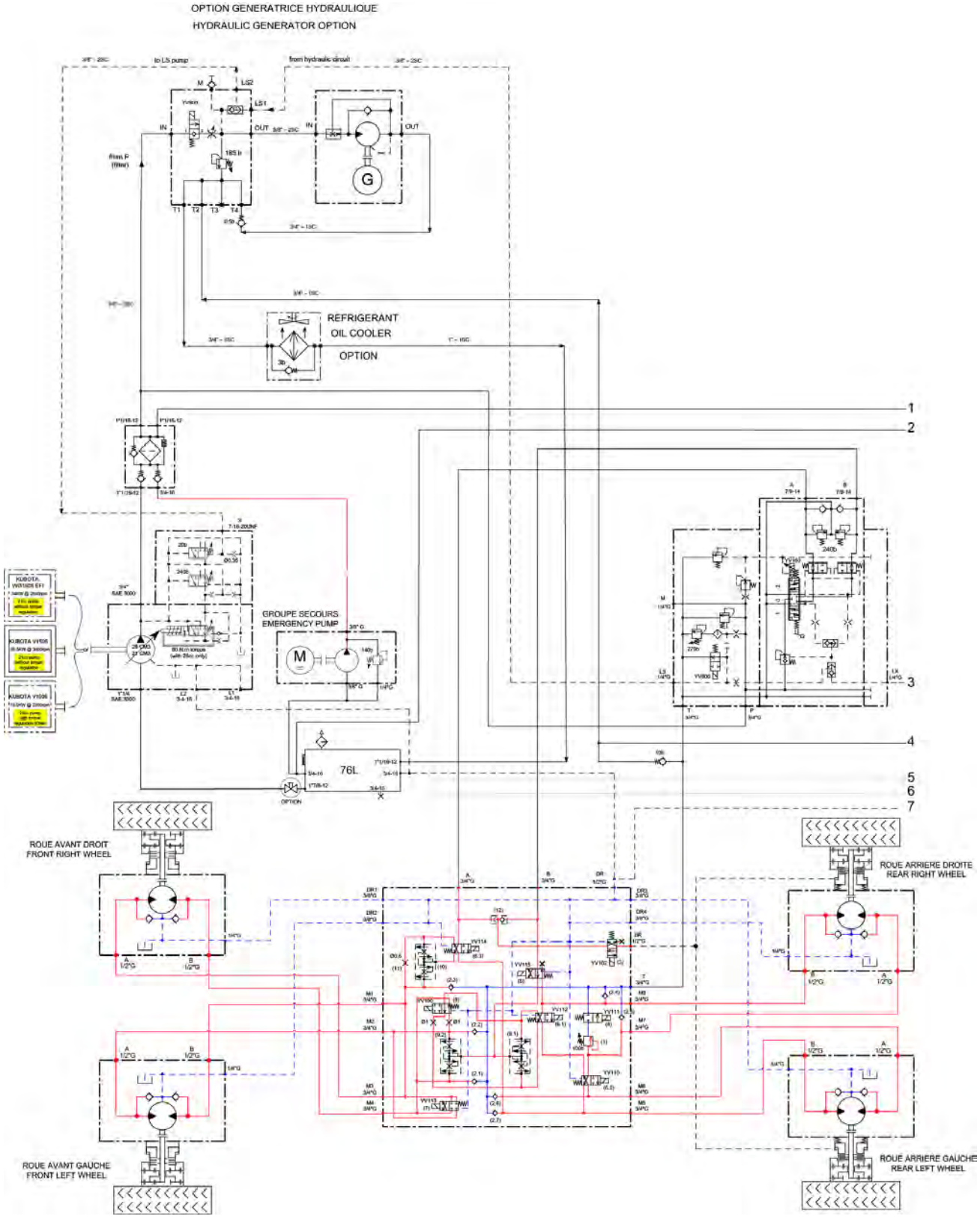


E - Trouble shooting and diagram

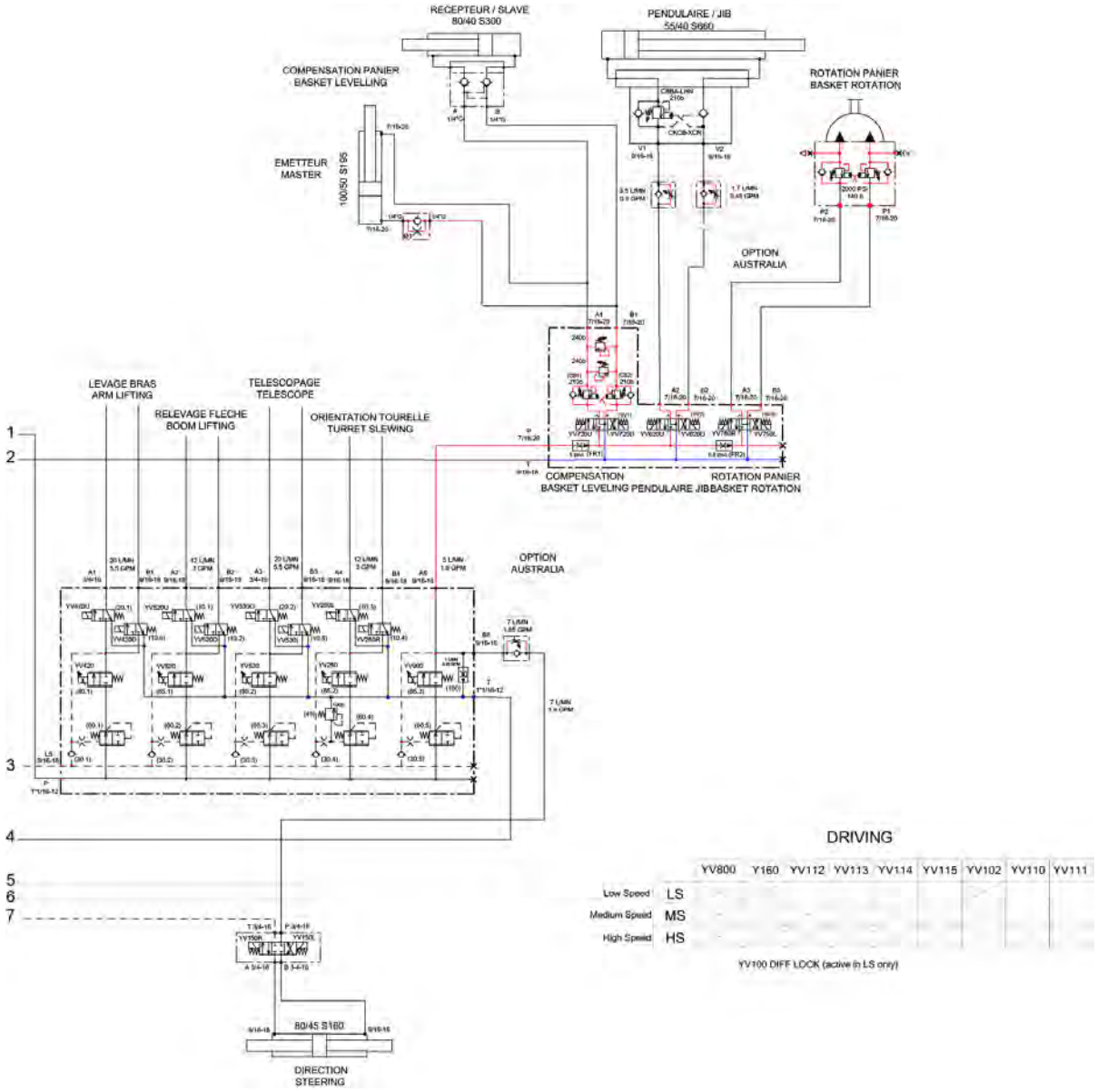
HA16RTJ PRO - 4000361790D - 2/2



HA16RTJ - 4000361790D - Hydraulic generator option - 1/2



HA16RTJ - 4000361790D - Hydraulic generator option - 2/2



Notes

F - Records

1 - Intervention register

The intervention register keeps a record of maintenance and repair work carried out inside or outside the maintenance programme.

N.B.-:-In the case of a HAULOTTE Services® intervention, the qualified technician must indicate the HAULOTTE Services® intervention number.

Date	Type of intervention	Number of hours	Intervenor	HAULOTTE Services® intervention number

F - Records

Date	Type of intervention	Number of hours	Intervenor	HAULOTTE Services® intervention number