HT43RTJ PRO - HT132RTJ PRO

MAINTENANCE BOOK

HT43RTJ PRO - HT132RTJ PRO

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CONTENTS

A

Preface - Foreword

B

Safety

C

Familiarization

D

Inspection and maintenance schedule

Machine sheet

CONTENTS

CONTENTS

E

Trouble shooting and diagram

F

Records

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.

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

Decals

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

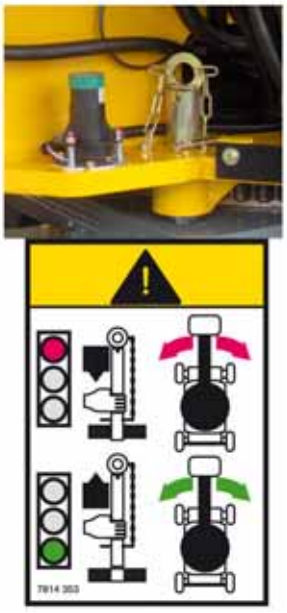
1.1 - MAINTENANCE IMPLEMENTATION

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

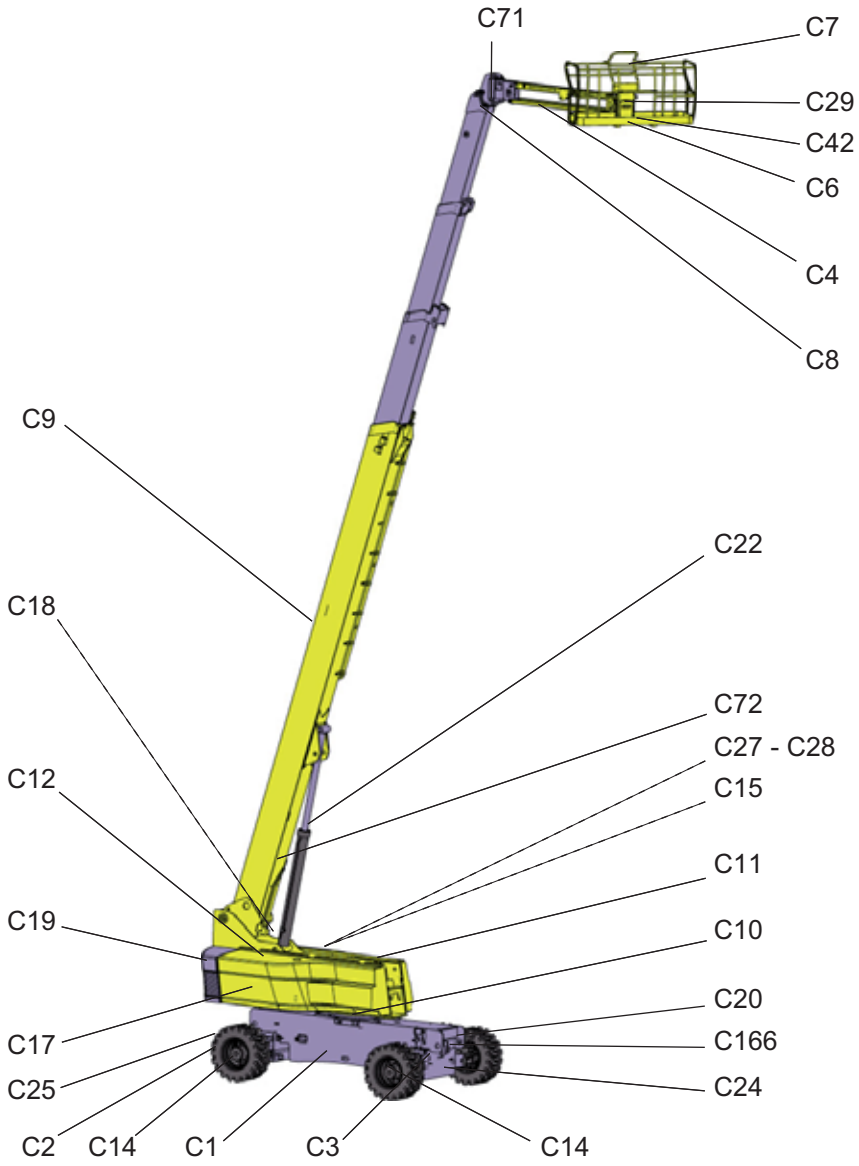
Notes

Notes

1 - Primary machine components

1.1 - LAYOUT

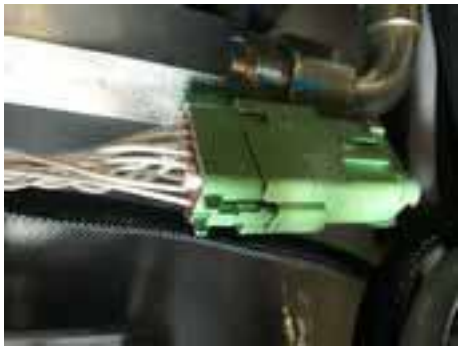
HT43RTJ PRO - HT132RTJ PRO



C - Familiarization

Marking	Description	Marking	Description
C1	Chassis	C18	Right counterweight
C2	Front driven steering axle	C19	Left counterweight
C3	Rear drive and/or steer wheel	C20	Tie-down (and/or lifting) points
C4	Jib	C22	Boom lift cylinder
C6	Platform	C24	Extendable fixed axle
C7	Platform control box	C25	Extendable swing axle
C8	Input jib leveling cylinder	C27	Ground control box + Universal plug
C9	Telescopic boom	C28	Tilt sensor
C10	Slew ring	C29	Platform rotation cylinder
C11	Turntable assembly	C42	Foot Switch
C12	Side cover	C71	Jib rotation cylinder
C14	Hydraulic drive motor and reducer	C72	Output jib compensation cylinder
C15	Right side compartment (hydraulic oil tank and fuel tank)	C166	Axle extension control box
C17	Left side compartment (engine, pump and starter battery)		

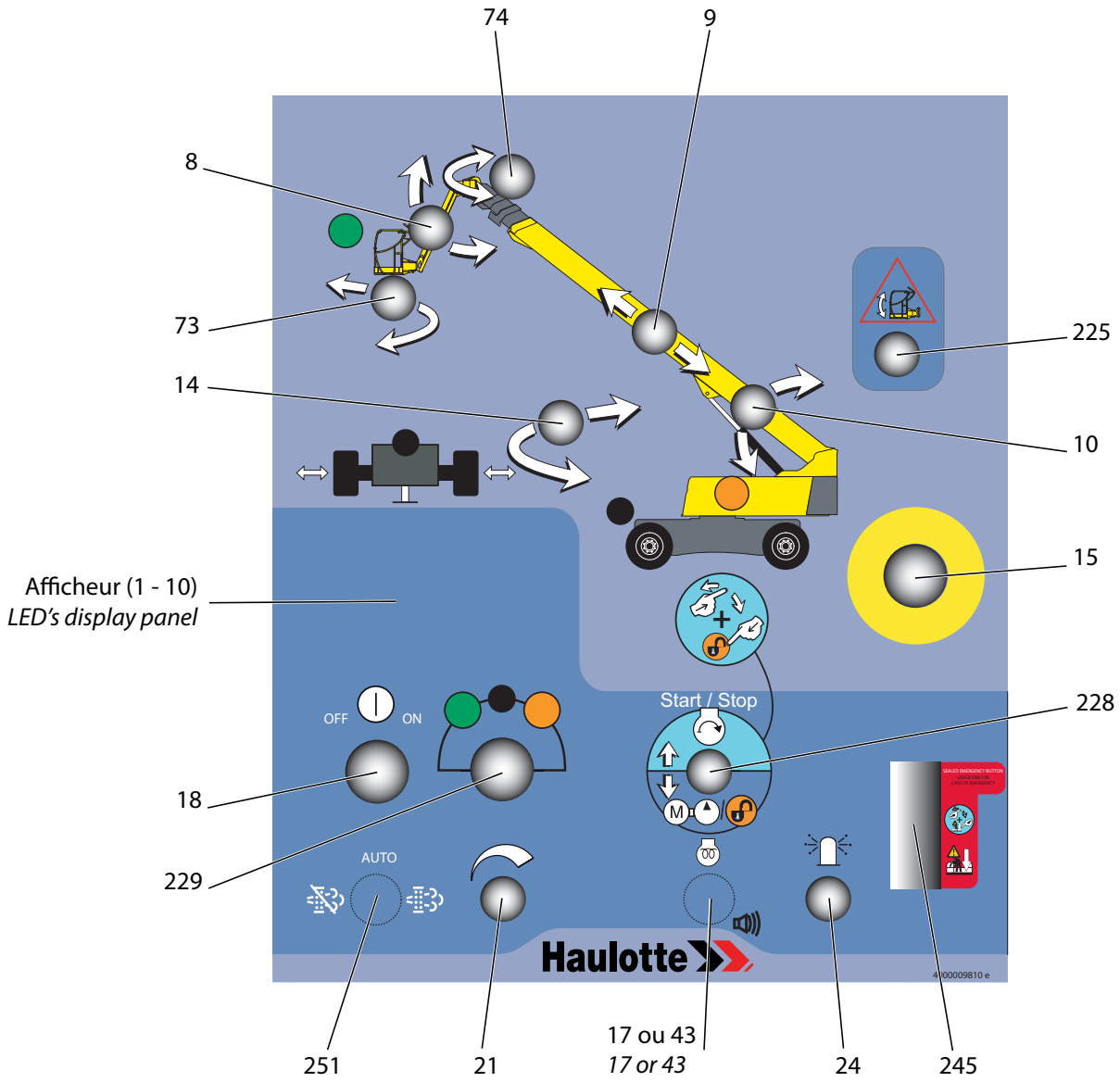
Universal plug



1.2 - GROUND CONTROL BOX

1.2.1 - Layout

General view



Controls and indicators

Marking	Name	Description	Function
8	SA620U	Jib lifting / lowering switch	Move upwards : Jib lifting
	SA620D		Move downwards : Jib lowering
9	SA530O	Boom telescoping switch	Move to the left : Boom extends
	SA530I		Move to the right : Boom retracts
10	SA520U	Boom raising switch	Move upwards : Boom raising
	SA52D		Move downwards : Boom lowering
14	SA250L	Turntable rotation switch	Move to the left : Counter clockwise (CCW) rotation
	SA250R		Move to the right : Clockwise (CW) rotation
15	SB801	E-stop button	Pulled out : E-stop activated
			Pushed in : E-stop deactivated
17	SA301	Engine pre-heating selector[1]	Move downwards : Engine pre-heating
18	SA900	ON/OFF selector	ON : Power turned ON
			OFF : Power turned OFF
21	SA302	Engine revs selector	Move to the right : Engine speed increases
			Move to the left : Engine idle speed
24	SA903	Beacon light on/off [2]	Move to the right : Beacon light on
			Move to the left : Beacon light off
43	SA907B	Horn button[3]	Horn
73	SA750R	Platform rotation switch	Move to the right : Clockwise (CW) rotation
	SA750L		Move to the left : Counter clockwise (CCW) rotation
74	SA650R	Jib rotation selector	Move to the right : Clockwise (CW) rotation
	SA650L		Move to the left : Counter clockwise (CCW) rotation
225	SA720U	Platform/Jib leveling resetting selector switch	Hold upwards : Raising compensation
	SA720D		Move downwards and hold : Compensation descent
228	SA905	Enable Switch / Back-up unit selector	Move upwards : Engine start
			Move downwards : Enable switch. If the engine is switched off, the emergency electropump is engaged automatically.
229	SA901	Control box energizing selector	Left : Platform control box energized
			Center : Axle extension box activation
			Right : Ground control box energized
245	SA801	"Overriding system" switch under cover	Emergency lowering system enabled when the cover is lifted. This must be used ONLY when normal operation from the ground box is unavailable - use in emergencies ONLY.
251	SA300	DPF[4]	Diesel Particle Filter

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

1.2.2 - Display Panel (LED'S 1 - 10)

Indicators / Cluster

Marking	Description
LED 1	**Overriding system :** • Permanently lighted while the overriding switch is being used
LED 2	**Fault :** • Rapid flashing if a fault is active (current defect) • Flashing if the service counter is at zero
LED 3	**Radius limitation** • Flashing : Calibration fault or automatic reach limitation • Permanently lighted : Movement disabled by the reach limitation system
LED 4	**Overload (For CE and AS standards only)** • Flashing : Faulty weighing system • Illuminated in case of overload
LED 5	**Combustion engine pre-heating :** • Illuminated while engine is pre-heating • Off if engine started and if post-heating
LED 6	**Engine warning :** • Flashing : 5 flashes when ignition is switched on if service counter is less than 20 hours • Constantly on : If the service counter is at zero
LED 7	**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
LED 8	**Not used**
LED 9[1]	**DPF regeneration required :** • Permanently lighted if the particle filter requires regeneration with a high clogging level (DPF : Diesel Particulate Filter)
LED 10[2]	**DPF regeneration in progress, high temperature in the exhaust system (HEST) (HEST : High Exhaust System Temperature)**

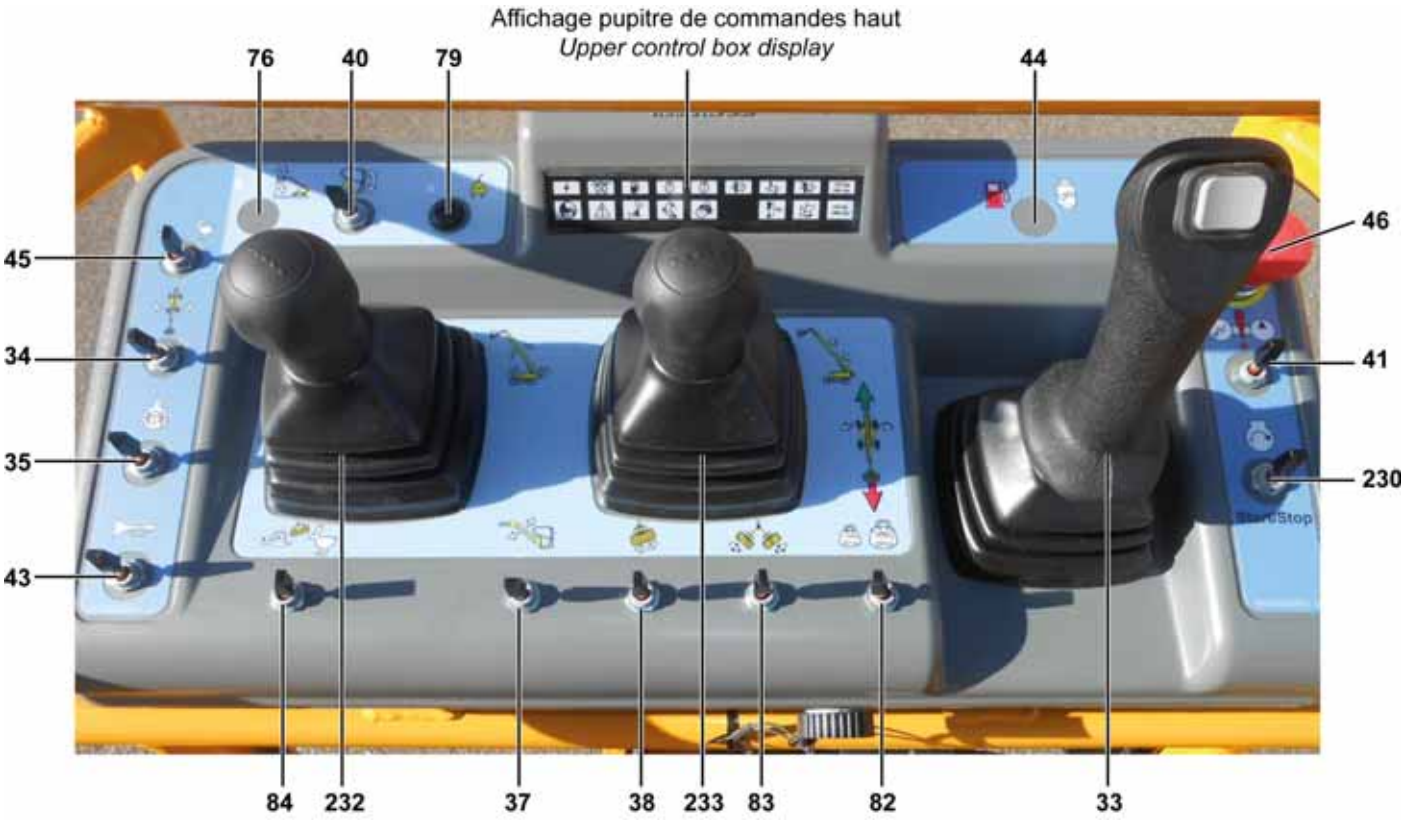
1. If engine equipped with Particulate Filter Regeneration
2. If engine equipped with Particulate Filter Regeneration

Symbol	Description
	**Illuminated when service counter is displayed**
	• Illuminated when engine is not running or when hour meter is displayed • Flashing engine in operation
	**Low fuel level**
	**Illuminated when engine is not running, or if the engine is running and there is an alternator fault**
	**Display of service counter for 3 s when the machine is switched on, then display of the hour meter for 3 s.** **Then** 1.Display of one or more faults, if present, with scrolling of faults every 2 s 2.Display of service counter if it is at zero 3.Display of hour meter
	**Indicates the engine speed**
	• Indicates engine temperature, if available on the engine • All the bars flash if engine overheating

1.3 - PLATFORM CONTROL BOX

1.3.1 - Layout

General view



Controls and indicators

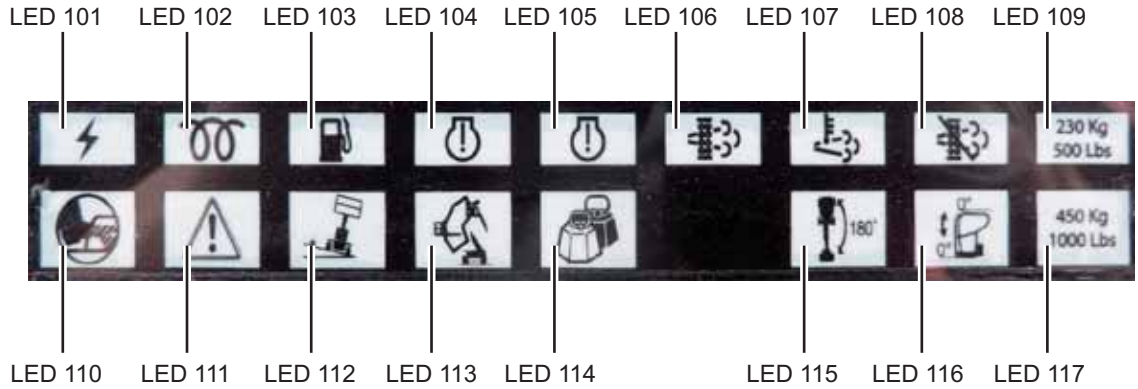
Marking	Name	Description	Function
33	SM902	Drive joystick	Move forward : Forward drive
			Move backwards : Reverse drive
		Front axle steering selector	Press right side of button : Right-hand steering
			Press left side of button : Left-hand steering
34	SA150D	Rear axle steering selector	Move to the right : Right-hand steering
	SA150L		Move to the left : Left-hand steering
35	SA100	Differential lock selector	Toggle and hold : Maximum drive torque (on difficult or sloping ground)
			Release : Standard torque
37	SA621U	Jib lifting / lowering switch	Move upwards : Jib lifting
	SA621D		Move downwards : Jib lowering
38	SA751D	Platform rotation switch	Move to the right : Counter clockwise (CCW) rotation
	SA751L		Move to the left : Clockwise (CW) rotation
40	SA721U	Platform leveling switch	Move upwards : Raise platform
	SA721D		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	Horn

Marking	Name	Description	Function
44	SA304	Fuel selector[1]	LPG : Propane Gas supply
			G : Petrol/Liquid propane gas or diesel supply
45	SA110	Drive speed selector	 High-speed drive
			 Low-speed drive
46	SB802	E-stop button	Pulled out : Platform control box energized
			Pressed in : De-energizes control system (Engine stopped)
76		Not used	
79	SA906	Generator selector[2]	Move to the left : Generator deactivated
			Move to the right : Generator activated
82	SA802	230 kg (500 lbs) or 450 kg (1000 lbs) load selector	Move to the left : 230 kg (500 lbs) load selected
			Move to the right : 450 kg (1000 lbs) load selected
83	SA651R	Jib rotation selector	Move to the right : Counter clockwise (CCW) rotation
	SA651L		Move to the left : Clockwise (CW) rotation
84	SA908	Platform movement speed selector	 High-speed movement
			 Low-speed movement
230	SA303	Engine start-up / stop selector	Start or stop the engine (depending on the machine's operating status) by pressing the push-button
232	SM900	Turntable rotation joystick	Move to the right : Counter clockwise (CCW) rotation
			Move to the left : Clockwise (CW) rotation
		Boom lift joystick	Move forward : Boom up
			Move backwards : Lower boom
233	SM901	Boom telescope joystick	Move forward : Retract boom Upper boom
			Move backwards : Extend boom Upper boom

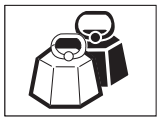
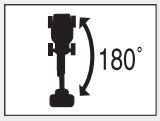
1. For machines fitted with
2. For machines fitted with

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[1]	HL301		DPF regeneration required
LED 107[2]	HL302		DPF regeneration in progress, high temperature in the exhaust system (HEST) (If equipped)
LED 108	HL303		Not used
LED 109	HL805	230 kg 500 lbs	Load selection 230 kg (500 lbs)
LED 110	HL807		Foot Switch
LED 111	HL801		Fault
LED 112	HL800		Tilt

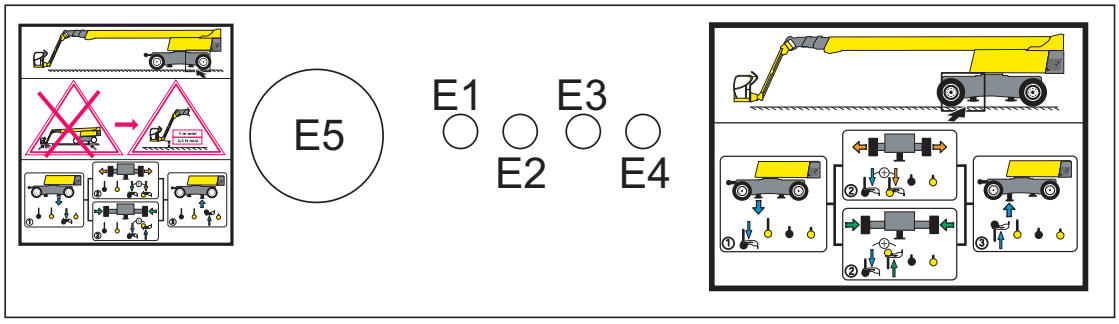
Marking	Name	Symbol	Function
LED 113	HL804		Radius limit
LED 114	HL802		Overload
LED 115	HL250		Turret at 180°
LED 116	HL720		Platform leveling
LED 117	HL806		Load selection 450 kg (1000 lbs)

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

1.4 - AXLE EXTENSION CONTROL BOX

1.4.1 - Layout

General view



Controls and indicators

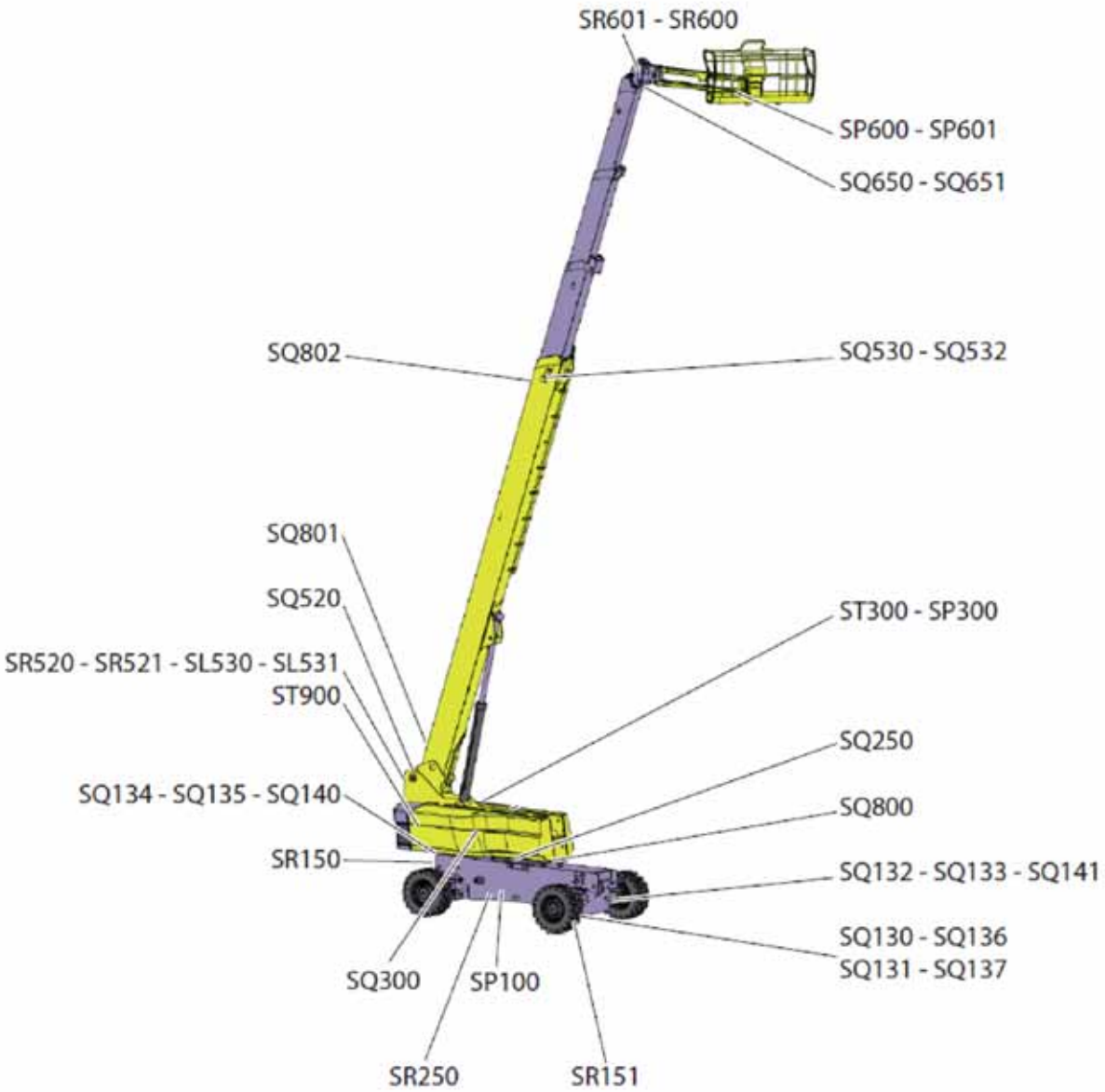
Marking	Function
E1	Cylinder lifting/lowering and chassis lifting/lowering on fixed axle
E2	Fixed axle extension/retraction
E3	Cylinder lifting/lowering and chassis lifting/lowering on swing axle
E4	Oscillating axle extension/retraction
E5	E-stop button

Notes

2 - List of actuators and sensors

2.1 - SENSORS

Sensors



C - Familiarization

Name	Description
SL530	Length transducer for telescopic boom
SL531	Length transducer for telescopic boom
SP100	Hydraulic high-speed drive pressure switch
SP300	Engine oil pressure detection
SP600	Small chamber pressure measurement for overload detection
SP601	Large chamber pressure measurement for overload detection
SQ130	Rear axle extension
SQ131	Front axle extension
SQ132	Extended rear axle position limit switch
SQ133	Extended rear axle position limit switch
SQ134	Extended front axle position limit switch
SQ135	Extended front axle position limit switch
SQ136	Rear axle extension
SQ137	Extended rear axle position limit switch
SQ140	Magnetic sensor for front axle stabilizer (=1 when retracted)
SQ141	Magnetic sensor for rear axle stabilizer (=1 when retracted)
SQ250	ILS detection for turret position (=1 if in front of magnet)
SQ300	Fuel reserve indicator
SQ520	Upper boom position limit switch
SQ530	Telescopic boom detection (if retracted = 1))
SQ532	Sensor Boom telescope detection ILS
SQ650	Jib position limit switch -90°/ +180°
SQ651	Jib position limit switch +5°/ -5°
SQ800	Tilt sensor
SQ801	Chain breakage position limit switch 1
SQ802	Chain breakage position limit switch 2
SR150	Front-axle angle sensor
SR151	Rear-axle angle sensor
SR250	Turntable angle transducer
SR520	Boom angle sensors
SR521	Boom angle sensors
SR600	Inclinometer for overload detection
SR601	Angle sensor transducer for overload detection
ST300	Engine temperature detection
ST900	Hydraulic oil overheating sensor

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
Hydraulic filter cartridge- Movements	2427002910	
Hydraulic filter cartridge- Driving	2427003110	
Primary air filter	2324005070	
Secondary air filter	2326001910	
Boom wear pads kit	KPATINFLECHEH43	
PERKINS Engine		
Diesel pre-filter	4000561430	
Diesel filter	2427003070	
Engine oil filter	2427003080	
Filter kit full[1]	KKIT250H-1104	
Filter kit [2]	KKIT250H-1104L	
Belt	2324001830	
DEUTZ Engine		
Diesel pre-filter	4000303960	
Diesel filter	4000700720	
Engine oil filter	2324000610	
Filter kit full[3]	KKIT250H-TCDT4	
Filter kit [4]	KKIT250H-TCDT4L	
Belt	4000356500	
Aggressive environment grease	4001088590	5 l(1,32 gal US)

1. 2 hydraulic filter cartridges + 2 air filters + 1 diesel filter + 1 engine oil filter
2. 2 air filters + 1 diesel filter + 1 engine oil filter
3. 2 hydraulic filter cartridges + 2 air filters + 1 diesel pre-filter + 1 diesel filter + 1 engine oil filter
4. 2 air filters + 1 diesel filter + 1 engine oil filter

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**
HATZ 41C	✓	✓	✓	✓
DEUTZ 2011/2012	✓	✓	✓	✓
PERKINS 403/804/1104	✓	✓	✓	✓
LOMBARDINI LDW 1404	✓	✗	✗	✓
KUBOTA D1105-W1	✓	✗	✓	✗
KUBOTA V2403	✓	✓	✓	✓
KUBOTA V2403 CR	✓	✗	✓	✓
KUBOTA V2703	✓	✓	✓	✓
KOHLER KD1903	✓	✗	✓	✓

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.

Engine oil viscosity

EMA LGR-1 / API CF, CF-4, CG-4, CH-4 / CI-4 Viscosity grade	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 CJ4 (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 5 µ
- COmpatibility with elastomers (polyurethane, NBR, VITON, etc.).
- Have properties such as :
  - Antifoam and deaeration
  - Anti-wear, anti-shear and antioxydant
  - Rust and corrosion inhibitors (copper)

Biodegradable oils may be used if they comply with the following requirements :

- HEES type biodegradable oil only according to standards ISO 15380 and VDMA 24568

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

N.B.-:-REFER TO CONSOMMABLES

	Viscosity grade	HV46	HV46 Biodegradable	HV32	HV68
Ambient temperature		Between - 15° C (- 9° F) and + 40° C (+ 104° F)	Between - 15° C (- 9° F) and + 40° C (+ 104° F)	Between - 35° C (- 31° F) and + 35° C (+ 95° F)	Between 0° C (+ 32° F) and + 45° C (+ 113° F)
Hydraulic oil temperature		Between - 15° C (- 9° F) and + 80° C (+ 176° F)	Between - 15° C (- 9° F) and + 80° C (+ 176° F)	Between - 35° C (- 31° F) and + 80° C (+ 176° F)	Between 0° C (+ 32° F) and + 85° C (+ 185° F)
	Standards				
Viscosity at + 40° C (+ 104° F)	ISO 3104	46 +/- 3 cst	46 +/- 3 cst	32 +/- 3 cst	68 +/- 3 cst
Viscosity at + 100° C (+ 260° F)	ISO 3104	> 8 cst	> 8 cst	> 8 cst	> 10,5 cst
Viscosity Index	ISO 2909	> 150	> 160	> 250	> 150
Flashpoint	ISO 2592	> 210° C (> 410° F)	> 220° C (> 428° F)	> 125° C (> 257° F)	> 220° C (> 428° F)
Pour point	ISO 3016	< - 40 ° C (< - 40° F)	< - 40 ° C (< - 40° F)	< - 50 ° C (< - 58° F)	< - 35 ° C (< - 31° F)

4.4 - GEAR MOTOR OIL

The recommended oil is EP type, the characteristics of which comply with standards MIL-L-2105 and API GL5.

N.B.-:-REFER TO CONSOMMABLES

	Mineral	Synthetic
Normal operating condition	SAE 80W/90	SAE 75W/90
Harsh operating condition	SAE 85W/140	SAE 80W/140 - SAE 75W/140

4.5 - COOLANT

Always use a 50/50 blend of coolant and clean soft water.

The coolant is available in different types. For this engine, use the ethylene glycol type (EG).

The procedure for the blend of water and antifreeze differs according to the manufacture of the antifreeze. Refer to standard SAEJ1034 and more precisely SAE J814c.

N.B.-:-REFER TO CONSOMMABLES

Antifreeze volume (%)	Freezing point		Boiling point	
	° C	° F	° C	° F
50	- 37	- 34	108	226

Never add a different brand of coolant. The different brands may have different additive components, and the engine may fail to perform as specified. When the liquid is mixed, do not use any radiator cleaning agent. If the liquid is mixed with a cleaning agent, an emulsion may form and the engine components may be damaged.

4.6 - CYLINDER STORAGE OIL

If a cylinder is not used, the surface of the cylinder rod may be exposed to a corrosive environment (Example : When new equipment is stored before shipping.).

1 time per month, apply oil diluted in a solvent (Recommendations : UNIL OPAL PROTECT SHX 12).

Procedure :

- Wash the machine completely to remove any trace of harsh environmental pollution. Clean the cylinder rods, which are sensitive to corrosion, using clean water.
- Perform a dynamic test. For each cylinder perform a movement from stop to stop (3 times each movement).
- Dry the cylinder rods.
- Grease the cylinder rods with protective oil (See recommendations)
- Verify absence of any oil leaks.

N.B.-:-REFER TO CONSOMMABLES

4.7 - GREASE

N.B.-:-REFER TO CONSOMMABLES

	Units	Standards	Grease for telescope	Shell gadus S2 V220AC 2 grease	Polyplex Bardahl grease
Nature of the lubricating oil			Semi-synthetic	Mineral oil	Semi-synthetic
Appearance			Viscous grease	Semi-solid	Semi-solid
Thickening nature			Lithium	Lithium / Calcium	Complex lithium
Color			Ivory	Red	Blue
Grade NLGI			1	2	2
Operating temperature	°C		- 40 at 140	- 20 at 120	- 20 at 160
Viscosity of the basic oil at 40° C / 104° F	mm² / s	ISO 3104	25	220	140
Viscosity of the basic oil at 100°C / 212° F	mm² / s	ISO 3104	-	18	14,5
Penetration at 25° C / 77° F	0,1 mm	ISO 2137	310 - 340	277	265 - 295
Drop point	°C / °F	ISO 2176	> 180	175	> 250
Welding 4 ball test	kg		> 315	-	> 315
Density at 20° C / 68° F			0,91	0,9	0,9

4.8 - MARINE PROTECTION

In harsh environments (high levels of salinity in the atmosphere: close to the sea, industrial environment with chloride emissions and/or humidity > 70%), we recommend applying the following protection process :

- Wash the machine completely to remove any trace of harsh environmental pollution.
- Dry all the machine.
- Apply directly a solvent-based oil leaving an oily film after evaporation of the solvent.
- Re-apply the product every month.

After washing the machine, make sure it is fully air-dry and does not contain moisture on corrosive parts (cylinders rods for example).

Do not wash any electrical components, particularly with high pressure washer. Wipe away dirt from around electrical components with a dry cloth.

N.B.-:-REFER TO CONSOMMABLES

Viscosity at + 40° C (+ 104° F)	4 mm²/s
Flashpoint	28 °C

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.

Movement	Speeds	Execution time	Configuration
Drive forward	Max speed	[36s – 40s]	Forward drive in high speed over 50m (max 5km/h, must be set before Micro speed)
	Max speed micro	[48s – 64s]	Forward drive in micro speed over 5m (max 0,375km/h)
	Deceleration		Decelerating ramp in high speed drive : 1.2m max
Drive reverse	Max speed	[36s – 40s]	Forward drive in high speed over 50m (max 5km/h, must be set before Micro speed)
	Max speed micro	[48s – 64s]	Forward drive in micro speed over 5m (max 0,375km/h)
	Deceleration		Decelerating ramp in high speed drive : 1.2m max
Turret rotation right	Max speed	[1mn13s – 1mn17s]	Turret rotation to the right for 1/4 turn with boom retracted
Turret rotation left	Max speed	[1mn13s – 1mn17s]	Turret rotation to the left for 1/4 turn with boom retracted
Boom raise	Max speed	[1mn17s – 1mn23s]	Boom raise from 0 to 48° with boom telescope retracted
Boom descent	Max speed	[1mn22 – 1mn28s]	Boom descent from 48° to 0° with boom telescope retracted (including lower stop slowdown)
Boom telescope extend	Max speed	[1mn42s – 1mn48s]	Boom telescope extend from 0 to stop with boom raised at max angle (around 68°)
Boom telescope retract	Max speed	[1mn22 – 1mn28s]	Boom telescope extend from 0 to stop with boom raised at max angle (around 68°)
Jib raise	Max speed	[49s – 55s]	Jib raise from lower to upper stop
Jib descent	Max speed	[42s – 48s]	Jib descent from lower to upper stop
Jib rotation	Max speed	[32s – 38s]	Jib rotate from one stop to other stop
Platform rotation	Max speed	[13s – 17s]	Platform rotation from one stop to other stop
Platform level raise	Max speed	[5s – 11s]	Platform level from -10° stop to +10° stop
Platform level descend	Max speed	[5s – 11s]	Platform level from +10° stop to -10° stop

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					
Hydraulic : oils, filters and hoses						
Replace the hydraulic filter	MP0006					
Arm, boom						
Control telescoping chains state and tension	MP0041 MP0042					
Control telescoping cables state and tension	MP0034 MP0035					

Preventive Maintenance Level 1 - Every 250H

Every 200H	Page or associated procedure	Every 250H	OK	NOK	Corrected	Comments
Chassis assembly : Wheel, reducer, steering, wheel pivot						
Grease the bushings and pins	MS0002					
Grease the axle extension pads	MP0040					
Slew ring						
Grease the turntable slew ring	MP0044					
PERKINS 1104D engine						
Clean the fuel filter	MP0026					
Arm, boom						
Grease the pads	MP0028					

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					
Tighten the steering system	MS0005					
Slew ring						
Tighten the slew ring	MP0019					
Check the movement reducer level	MP0038					
DEUTZ 2,9 TCD engine						
Drain the engine oil*	MP0036					
Replace the oil filter*	MP0004					
Clean the fuel filter*	MP0026					
Clean the air filter*	MP0030					
Check the belt tension - Checking the condition of belts*	MP0025/ MP0007					
DEUTZ 2,2 TCD engine						
Drain the engine oil*	MP0036					
Replace the oil filter*	MP0004					
Clean the fuel filter*	MP0026					
Clean the air filter*	MP0030					
Check the belt tension - Checking the condition of belts*	MP0025/ MP0007					
PERKINS 1104D engine						
Drain the engine oil*	MP0036					
Replace the oil filter*	MP0004					
Replace alternator belt*	MP0032					

D - Inspection and maintenance schedule

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.

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					
Check the condition of the axle extension pads						
Slew ring						
Drain the movement reducer	MP0039					
DEUTZ 2,9 TCD engine						
Replace the fuel filter	MP0005					
Replace the air filter	MP0010					
Replace the alternator pump belt**	MP0032					
DEUTZ 2,2 TCD engine						
Replace the fuel filter	MP0005					
Replace the air filter	MP0010					
Replace the alternator pump belt**	MP0032					
PERKINS 1104D 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					
Control telescoping chains state and tension	MP0041/ MP0042					
Control telescoping cables state and tension	MP0034/ MP0035					

** Do not take into account the deadline of 1 year, only 1000H.

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	MS0002/ MP0024					
Slew ring						
Check the slew ring clearance	MP0018					
DEUTZ 2,9 TCD engine						
Drain the oil tank	MP0020					
Drain the cooling circuit	MP0021					
DEUTZ 2,2 TCD engine						
Drain the oil tank	MP0020					
Drain the cooling circuit	MP0021					
PERKINS 1104D engine						
Drain the oil tank	MP0020					
Hydraulic : oils, filters and hoses						
Drain the hydraulic oil	MP0014					

D - Inspection and maintenance schedule

Preventive Maintenance Level 2 - Every 3000H

Every 3000H	Page or associated procedure	Every 3000H	OK	NOK	Corrected	Comments
DEUTZ 2,9 TCD engine						
Replace the water pump belt	MP0032					
PERKINS 1104D engine						
Drain the cooling circuit	MP0021					

Preventive Maintenance Level 2 - Every 7 years

Every 7 years	Page or associated procedure	Every 7 years	OK	NOK	Corrected	Comments
Arm, boom						
Replace telescoping cables						

Preventive Maintenance Level 2 - Every 8000H

Every 8000H	Page or associated procedure	Every 8000H	OK	NOK	Corrected	Comments
DEUTZ 2,2 TCD engine						
Replace the particulate filter						

Preventive Maintenance Level 2 - Every 10 years

Every 10 years	Page or associated procedure	Every 10 years	OK	NOK	Corrected	Comments
Arm, boom						
Replace telescoping chains						

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						

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®.

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

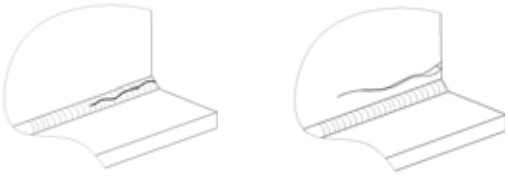
To guarantee the integrity of the machine, it is necessary to carry out periodical controls on the mechanical structure such as defines hereafter.

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

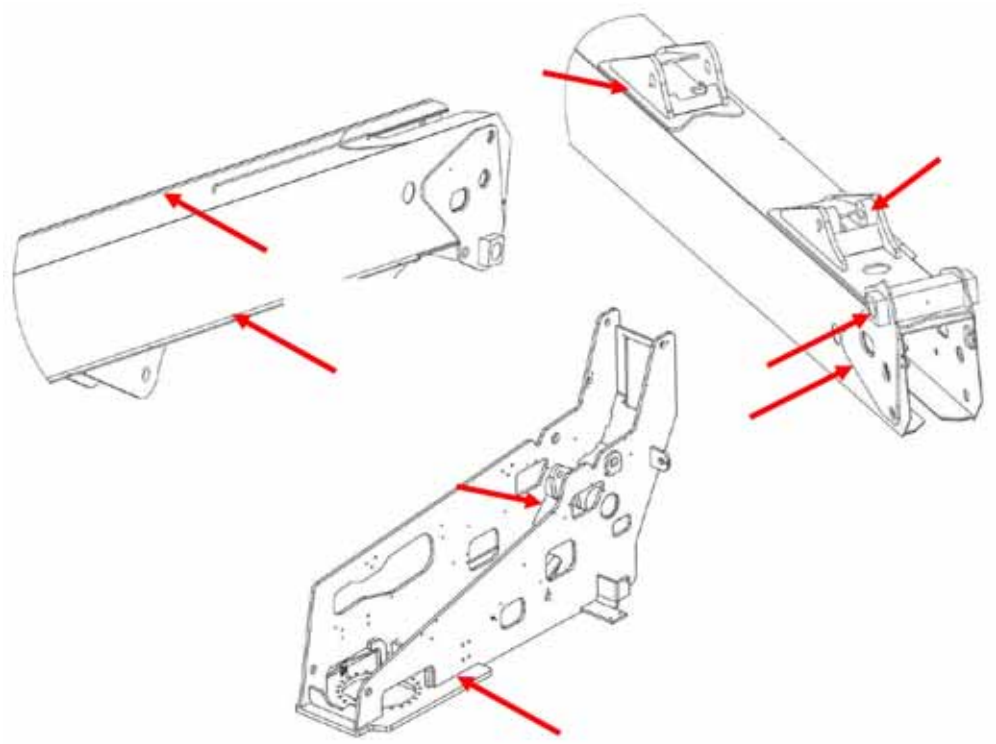
All structural part listed Section Familiarization must be disassembled and all weldsmust be review using non-destructive checks Section D - Inspection and maintenance schedule.

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

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- **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.

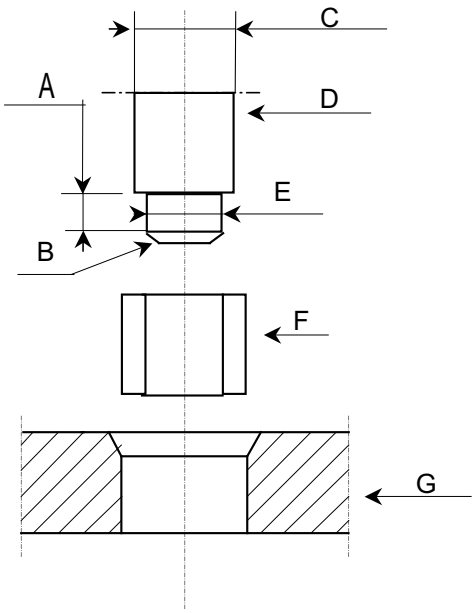
6 - Procedure of reassembly

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)

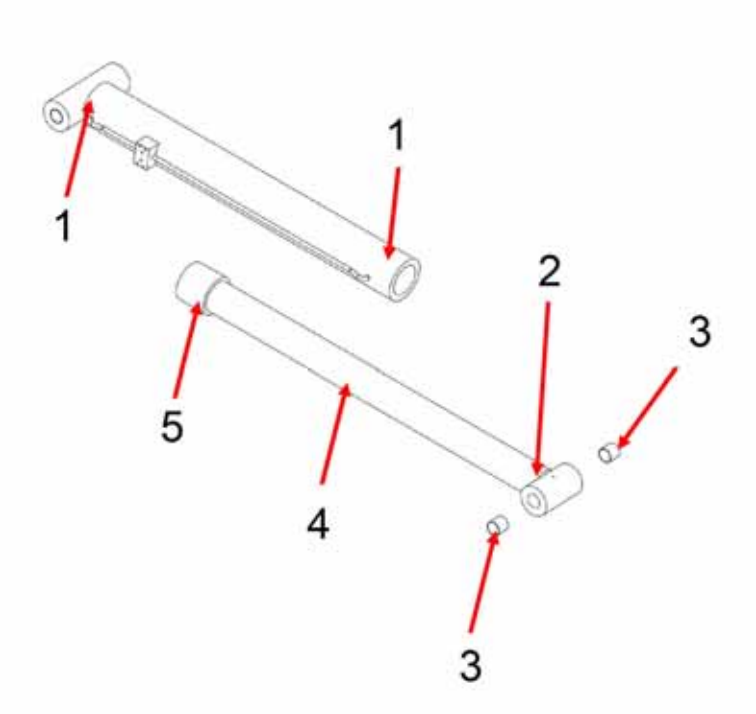
These tests must be made in conditions of equivalent temperatures.

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 - You will need

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

2 - Preliminary procedure

1. Place the machine in maintenance configuration. Refer to Section B 1.1 - Maintenance implementation.

3 - Filling-up

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.

Do not smoke.

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

4 - Additional operation

1. Place the machine in its operating configuration. Refer to Section B 1.1 - Maintenance implementation.

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 - 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.

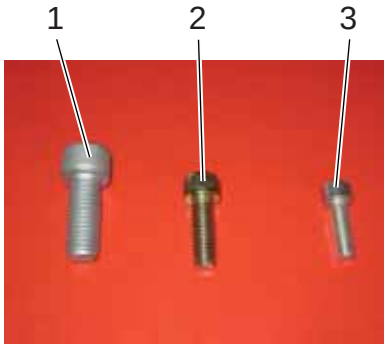
High speed :

- 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

1 - Torque (coarse thread)

Nominal diameter	Torque in N.m - lbf.ft		
	Class 8.8	Class 10.9	Class 12.9
M6x1	9 - 11-6,64 - 8,11	13 - 14-9,59 - 10,33	15 - 17-11,06 - 12,54
M7x1	15 - 19-11,06 - 14,01	21 - 24-15,49 - 17,7	26 - 28-19,18 - 20,65
M8x1.25	22 - 27-16,23 - 19,91	31 - 34-22,86 - 25,08	37 - 41-27,29 - 30,24
M10x1.5	43 - 45-31,72 - 33,19	61 - 67-44,99 - 49,42	73 - 81-53,84 - 59,74
M12x1.75	75 - 94-55,32 - 69,33	110 - 120-81,13 - 88,51	130 - 140-95,88 - 103,26
M14x2	120 - 150-88,51 - 110,63	170 - 190-125,39 - 140,14	200 - 220-147,51 - 162,26
M16x2	190 - 230-140,14 - 169,64	260 - 290-191,77 - 213,89	320 - 350-236,02 - 258,15
M18x2.5	260 - 320-191,77 - 236,02	360 - 400-265,52 - 295,02	440 - 480-324,53 - 354,03
M20x2.5	370 - 450-272,9 - 331,9	520 - 570-383,53 - 420,41	620 - 680-457,29 - 501,54
M22x2.5	500 - 620-368,78 - 457,29	700 - 770-516,29 - 567,92	840 - 930-619,55 - 685,93
M24.3x3	630 - 790-464,66 - 582,67	890 - 990-656,43 - 730,19	1070 - 1180-789,19 - 870,32
M27x3	930 - 1150-685,93 - 848,2	1300 - 1400-958,83 - 1032,59	1560 - 1730-1150,6 - 1275,98
M30x3.5	1260 - 1570-929,33 - 1157,97	1770 - 1960-1305,49 - 1445,62	2200 - 2350-1622,64 - 1733,27

2 - Torque (fine thread)

Nominal diameter	Torque in N.m - lbf.ft		
	Class 8.8	Class 10.9	Class 12.9
M8x1	24 - 29-17,7 - 21,39	33 - 37-24,34 - 27,29	40 - 44-29,5 - 32,45
M10x1.25	46 - 57-33,93 - 42,04	64 - 71-47,2 - 52,37	77 - 85-56,79 - 62,69
M12x1.25	83 - 100-61,22 - 73,76	120 - 130-88,51 - 95,88	140 - 150-103,26 - 110,63
M14x1.5	130 - 160-95,88 - 118,01	180 - 200-132,76 - 147,51	220 - 240-162,26 - 177,01
M16x1.5	200 - 250-147,51 - 184,39	280 - 310-206,52 - 228,64	340 - 370-250,77 - 272,9
M18x1.5	290 - 360-213,89 - 265,52	410 - 450-302,4 - 331,9	490 - 540-361,41 - 398,28
M20x1.5	410 - 510-302,4 - 376,16	570 - 630-420,41 - 464,66	690 - 760-508,92 - 560,55
M22x1.5	550 - 680-405,66 - 501,54	780 - 870-575,3 - 641,68	920 - 1000-678,56 - 737,56
M24x1.5	690 - 860-508,92 - 634,3	970 - 1070-715,44 - 789,19	1160 - 1290-855,57 - 951,46
M27x2	1000 - 1300-737,56 - 958,83	1400 - 1560-1032,59 - 1150,6	1690 - 1880-1246,48 - 1386,62
M30x2	1400 - 1700-737,56 - 958,83	1960 - 2180-1032,59 - 1150,6	2350 - 2610-1246,48 - 1386,62

1 - You will need

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

Use only adapted tools and auxiliary resources.

Always wear the required protective clothing.

This procedure must be performed after the first 50 hours and then every 250 hours or every 6 months.

2 - Preliminary procedure

All disassembly operations, if possible, must only be performed on equipment that has been completely deactivated and only by personnel with the necessary technical knowledge.

In addition to the safety precautions indicated in these instructions, follow all regulations concerning safety and accident prevention that are generally applicable.

Every precaution must be taken before working on or near the machine.

After work has been completed, all casings and safety devices must be restored completely and operational.

3 - Lubrication

Lubricant must be applied with a brush to the external chains at least every 250 hours or every 6 months. The frequency of application depends on surrounding conditions and conditions of use. The frequency of application must ensure that a sufficient quantity of fluid oil is present in the chain links.

If the chain has been exposed to corrosive fluids, clean the chain immediately and apply lubricant.

N.B.-:-TELESCOPING OPERATIONS MAY BE NECESSARY TO ACCESS ELEMENTS.

Before applying new lubricant, remove any foreign particles from the chain. Use recommended lubricants  Section C 4-Lubrication diagram.

When cleaning chains, follow regulations concerning the environment.

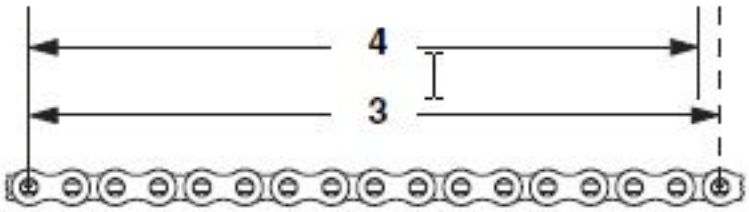
4 - Check the condition of the chains

To carry out the following operations, perform a complete telescoping.

- Check that the lifting chains and safety chains are clean.
- Check that there are no foreign particles on the chains and guide.
- Check that there are no signs of corrosion on chain elements.

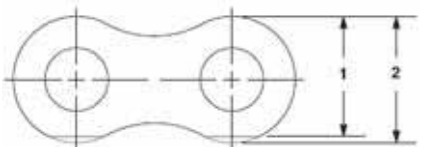
Chains with any of the defects described below must be replaced.

- Check for elongation wear :
- Elongation of up to 2 %, over 12 segments, of the original chain length is permitted.
- Measure the value of (3) using an appropriate method. Compare with the value of *1 indicated in the table below.



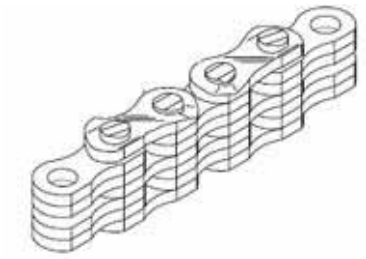
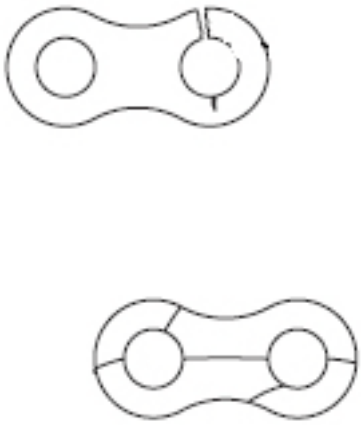
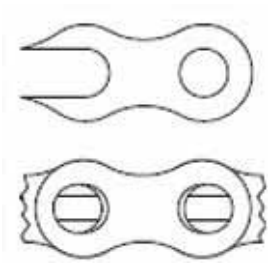
Machine	Link width (2)	Length of 12 links (4)
Star 6 - 8 - 10 HA32RTJ PRO - HA41RTJ PRO H28TJ+ - HT43RTJ PRO	11.5 mm	152.40 mm
Star 8 - 10	14.50 mm	190.50 mm
HTL 4014 - HTL 4017 - HTL 3614 - HTL 3617	24 mm	304.80 mm

- Check for external wear on rollers and links :
- External wear must not measure more than 2 % from the section of the original link (2), see table above.
- Measure the value of (1) using an appropriate method.

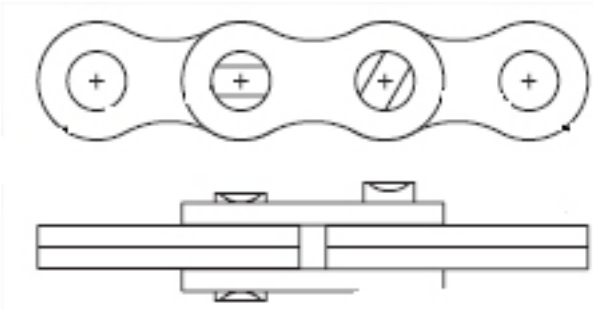


- Check that no line or element is damaged or missing.

- Check that links are not distorted, deformed or broken.

<table>
<tr>
<td>Distortion
  </td>
<td>Crack
  </td>
</tr>
<tr>
<td>Break
  </td>
<td>Wedging
  </td>
</tr>
</table>

- Check the connection points of links (the lines must be parallel).



5 - Check the tension of the chains

Refer to the technical data sheet for your product following this sheet. To make any other adjustments not detailed in this maintenance logbook : Contact Haulotte Services for further advice.

6 - Replacing the chains

The chains must imperatively be changed every 10 years.

Contact Haulotte Services for further advice.

Les chains and chain elements are made from case hardened steel in a high-quality process. Deliver any scrap chains or chain elements to a dealer specialised in metal recycling in compliance with regulations.

Notes

1 - You will need

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

Use only adapted tools and auxiliary resources.

Always wear the required protective clothing.

2 - Preliminary procedure

All disassembly operations, if possible, must only be performed on equipment that has been completely deactivated and only by personnel with the necessary technical knowledge.

In addition to the safety precautions indicated in these instructions, follow all regulations concerning safety and accident prevention that are generally applicable.

Every precaution must be taken before working on or near the machine.

After work has been completed, all casings and safety devices must be restored completely and operational.

3 - Checking the cable transmission system

In order to ensure safe use of machinery, Haulotte Group recommends that you perform the following inspections :

Daily inspection

- Place the machine on flat and firm ground.
- Power up the machine and select the console located on the turntable.
- Raise the boom to horizontal (For machines fitted with).
- Execute a complete extension/retraction cycle of the telescope assembly over approximately 2 m(6 ft7 in) or a complete lifting/lowering cycle for mast-type machines.
- Check that the movement is synchronized and symmetrical, and that there are no abnormal sounds. If you encounter a problem or suspect there may be a problem, carry out a more detailed inspection as described below.

Regular inspection

This operation must be performed after the first 50 hours, then :

- STAR : Every 250 hours or 3 months.
- other machines : Every 250 hours or 6 months.

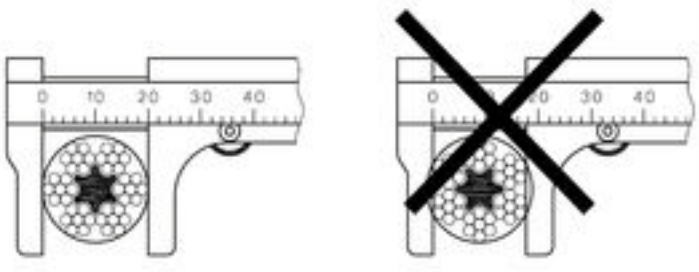
To access parts :

- Place the machine on flat and firm ground.
- Remove the protection covers and/or inspection flaps.
- Power up the machine and select the console located on the turntable.
- Raise the boom to horizontal (For machines fitted with)
- Check that the attachment device for the cables is in place and tight at all visible attachment points.
- Extend the structure to gain access to the cables :
- Extend the boom at least 3 m(9 ft10 in) for telescopic machines.
- Raise the mast assembly up to the inspection flaps.

Using a flash light, perform a visual inspection of the following items :

- Check that cables are properly aligned with one another.
- Check that the cables under are equal tension.
- Check that the pulleys are properly aligned with the cables.
- Check that the cable is properly seated in the pulley.

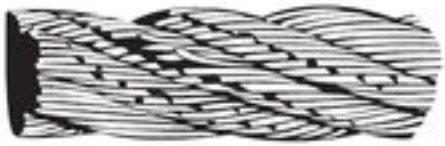
- Check that nothing blocks the chain guides.
- Check the condition of the cables. If any of the following defects are observed, replace the pair of cables.
- The maximum reduction in diameter from the original diameter must not exceed 1 mm.



Machine	Original diameter
STAR 6 - 8 - 10	3 mm
H21TX - H23TPX - H25TPX	9 mm
HT43RTJ PRO	19 mm

- No broken strands must be observed, in particular at the ends.
- Replacement is compulsory when 3 strands or more are broken along the length of the cable.
- Replacement is compulsory when 1 strand is broken near the ends.


- No deformed folds or frayed strands must be observed.




- No signs of corrosion must be observed.


4 - Check the tension of the cables

Refer to the technical data sheet for your product following this sheet. To make any other adjustments not detailed in this maintenance logbook : Contact Haulotte Services for further advice.

5 - Replacing the cables

Cables with a diameter measuring less than 6 mm (STAR) must be replaced every 5 years.

All other cables must imperatively be replaced every 7 years.

Replacement may be required more frequently for the following reasons :

- Machine operates in a particularly hostile environment.
- Abnormal noises are produced during movement of structure.
- Machine has been in storage for more than 6 months.
- Machine has been submitted to an abusive load or serious collision.
- Machine has been exposed to an electrical arc.

Contact Haulotte Services for further advice.

Cables and cable elements are made from case hardened steel in a high-quality process. Deliver any scrap cables or cable elements to a dealer specialised in metal recycling in compliance with regulations.

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.

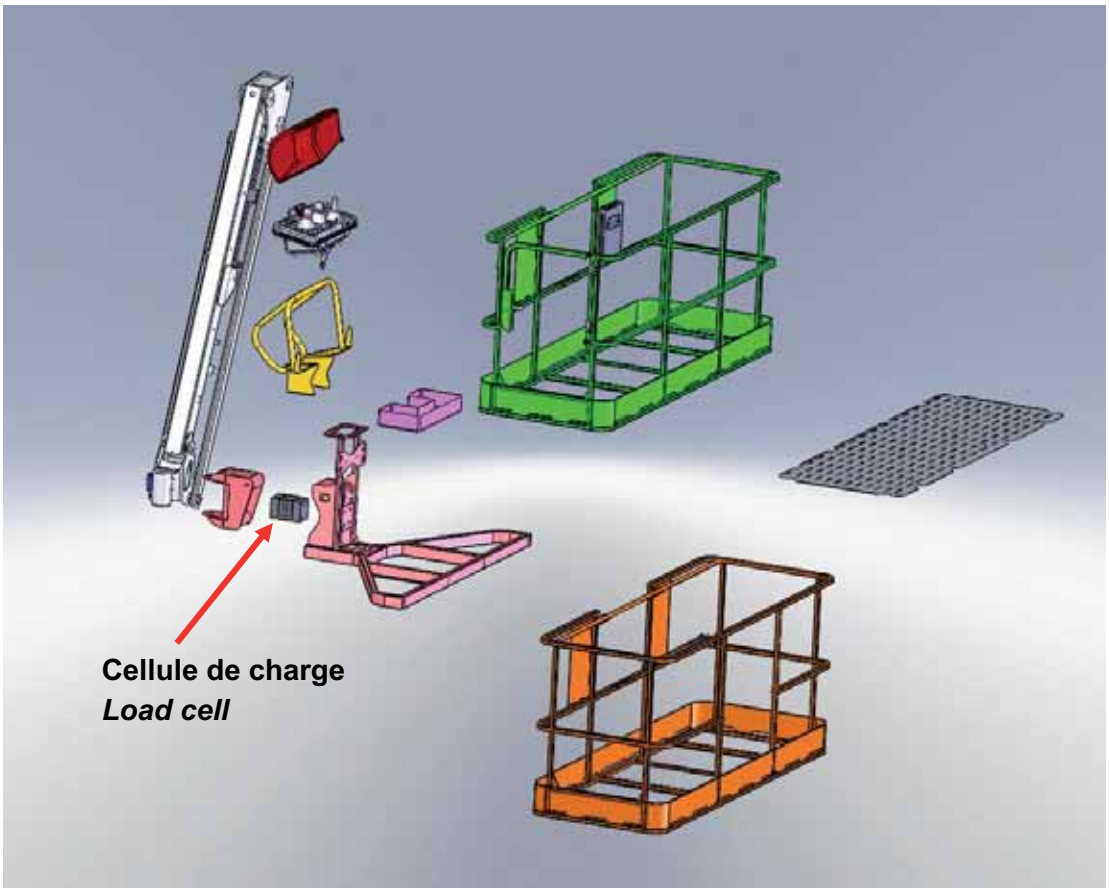
5 - Calibration procedure

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

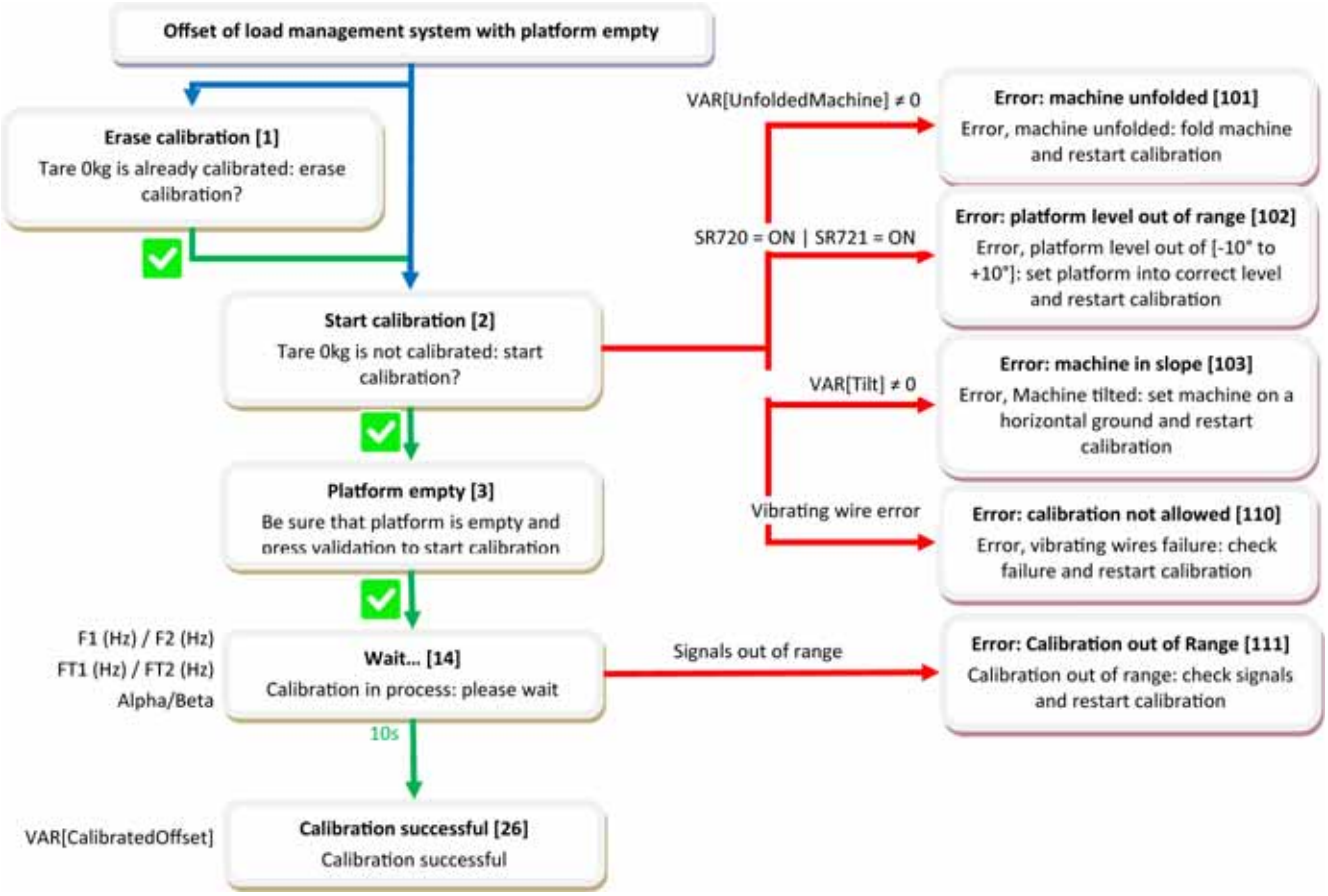
- Depending on the calibration you will do, select the code level 2 or 3 in ACCESS CODE : Main menu > Access code(Level 2 or 3)
- In the main menu select : Main menu > Machine settings > Calibration
- Then select the calibration you will do RESET 0KG (calibration of the offset) or RESET 250KG (calibration 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)

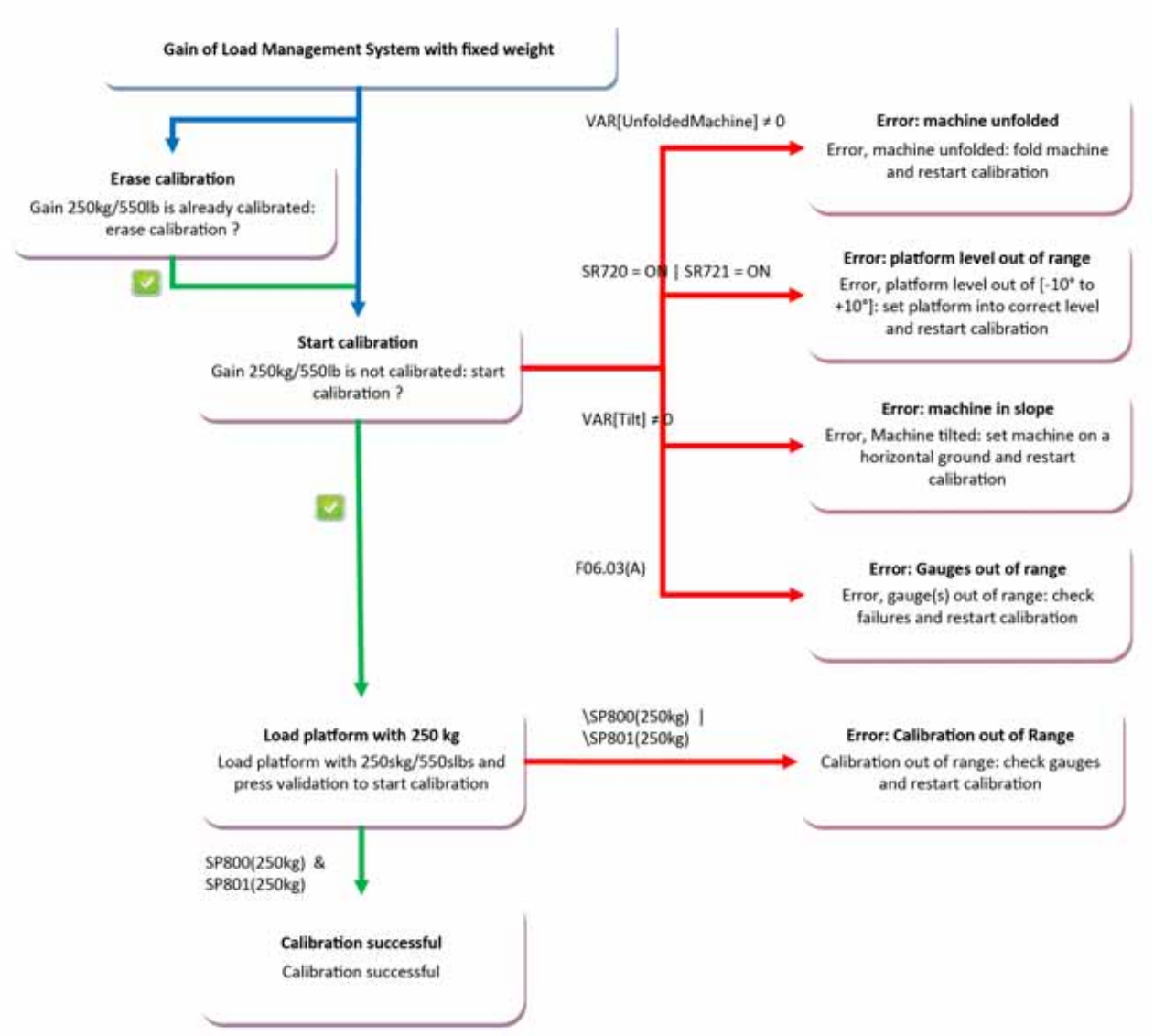

Offset of load management system with platform empty
Erase calibration [1]
Tare 0kg is already calibrated: erase calibration?
Start calibration [2]
Tare 0kg is not calibrated: start calibration?
Platform empty [3]
Be sure that platform is empty and press validation to start calibration
F1 (Hz) / F2 (Hz)
FT1 (Hz) / FT2 (Hz)
Alpha/Beta
Wait... [14]
Calibration in process: please wait
10s
VAR[CalibratedOffset]
Calibration successful [26]
Calibration successful
VAR[UnfoldedMachine] ≠ 0
Error: machine unfolded [101]
Error, machine unfolded: fold machine and restart calibration
SR720 = ON | SR721 = ON
Error: platform level out of range [102]
Error, platform level out of [-10° to +10°]: set platform into correct level and restart calibration
VAR[Tilt] ≠ 0
Error: machine in slope [103]
Error, Machine tilted: set machine on a horizontal ground and restart calibration
Vibrating wire error
Error: calibration not allowed [110]
Error, vibrating wires failure: check failure and restart calibration
Signals out of range
Error: Calibration out of Range [111]
Calibration out of range: check signals and restart calibration

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)

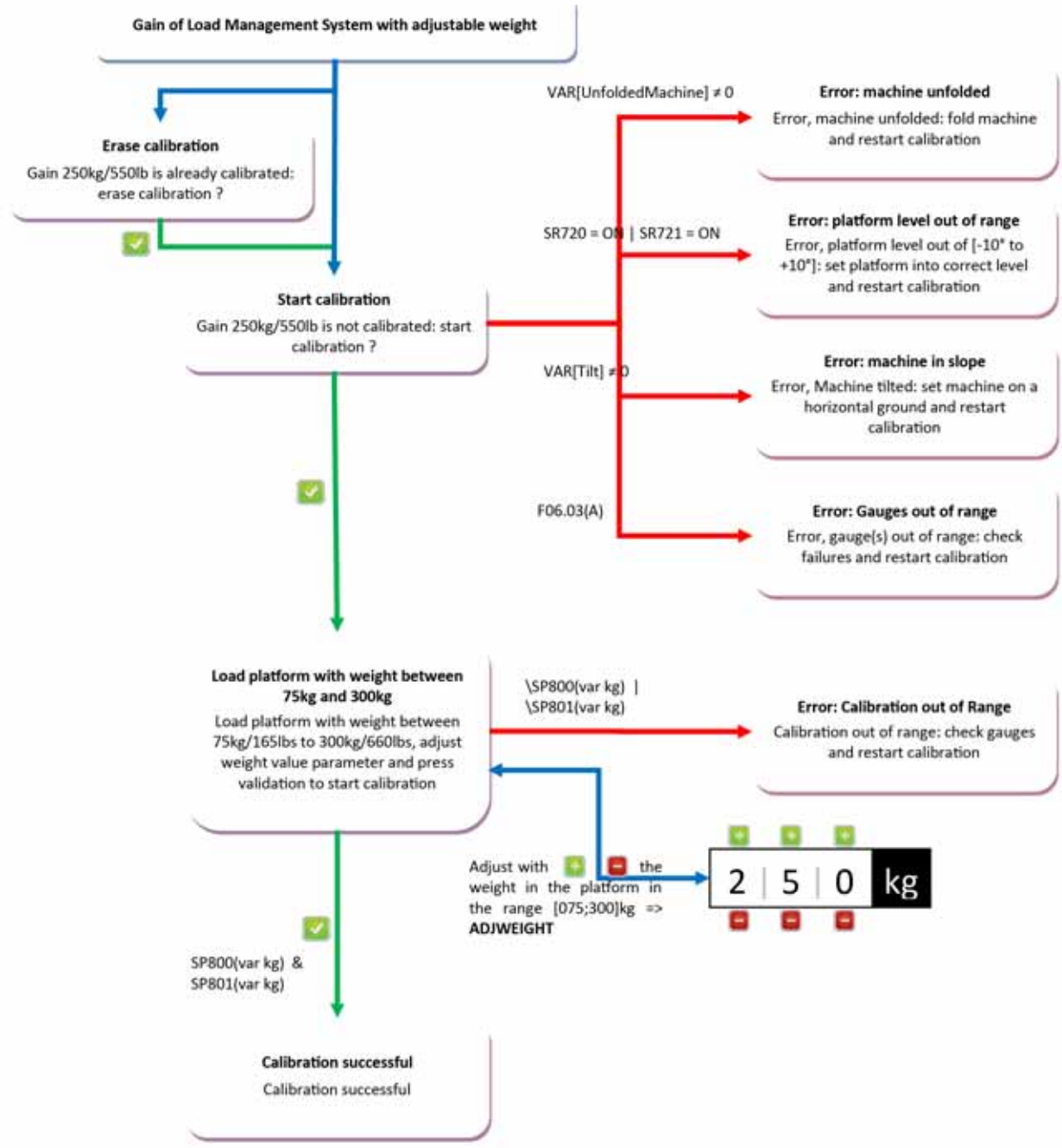


5.6 - CALIBRATION WITH A KNOWN WEIGHT OF ANY VALUE BETWEEN 75 KG (165 LBS) AND 300 KG (662 LBS)

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]° 4.Check the platform does not lie on an obstacle 5.Check weighing system (adjustment), check measured load when platform is empty 6.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 • Multimeter • Protective goggles • Gloves		• Place barriers around the perimeter of the work area

2 - Preliminary procedure

1. Place the machine in maintenance configuration. Refer to Section B 1.1 - Maintenance implementation.

N.B.-:-THE GENERATOR'S PERFORMANCES ARE LINKED TO THE HYDRAULIC OIL TEMPERATURE. ENSURE THAT THE HYDRAULIC OIL TEMPERATURE IS BETWEEN 30 °C(86 °F) AND 70 °C(158 °F) DURING THE OPERATIONS.

3 - Power supply voltage control

- Disconnect all equipment connected to the generator (welder, hand equipment, ...).
- Start up the machine.
- Start the generator.
- Wait for the generator to stabilize.
- Measure the voltage at the welder outlet using a multimeter.

N.B.-:-THE VOLTAGE BETWEEN EACH PHASE MUST BE BETWEEN 210 V AC AND 240 V AC.

- Measure the voltage at the 110 V outlet.

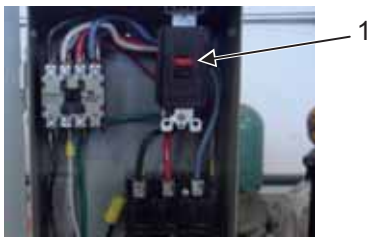
N.B.-:-THE VOLTAGE AT EACH OUTLET MUST BE BETWEEN 110 V AC AND 135 V AC.

If a malfunction occurs, contact HAULOTTE Services®.

4 - Differential protection control

- Disconnect all equipment connected to the generator (welder, hand equipment, ...).
- Start up the machine.
- Start the generator.
- Wait for the generator to stabilize.
- Press the TEST button on the 60 A cabinet.
- Check that there is no voltage at the welder outlet.

- Reset the contactor by pressing the RESET button.



- Press the TEST button on the plug located in the cage.
- Check that there is no voltage at the outlet.
- Reset the outlet by pressing the RESET button.

If a malfunction occurs, contact HAULOTTE Services®.

5 - Additional operation

1. Place the machine in its operating configuration. Refer to Section B 1.1 - Maintenance implementation.

1 - You will need

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

2 - Preliminary procedure

1. Place the machine in maintenance configuration. Refer to Section B 1.1 - Maintenance implementation.

3 - Control

Control carefully the cable carrier chain :

- Check the appearance of the mechanical parts of the the cable carrier chain : Premature wear, excessive friction
- Ensure that cables slide inside the cable carrier chain.
- Ensure that cables don't leave their socket. Locate them back in the socket if necessary.
- Check the electric wires and cables : Premature wear, excessive friction, non-insulated cable ... Replace cables if necessary.

4 - Additional operation

1. Place the machine in its operating configuration. Refer to Section B 1.1 - Maintenance implementation.

Notes

1 - You will need

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

2 - Preliminary procedure

This procedure mut be performed each 250 h imperatively.

Every precaution must be taken before working on or near the machine. Comply with the recommendations in the maintenance book for your machine.

For all tightening actions quoted in this document, ensure the symmetry of the cable tension is complied with by tightening the threaded rods one by one in quarter turns.

1. Place the machine in maintenance configuration. Refer to Section B 1.1 - Maintenance implementation.

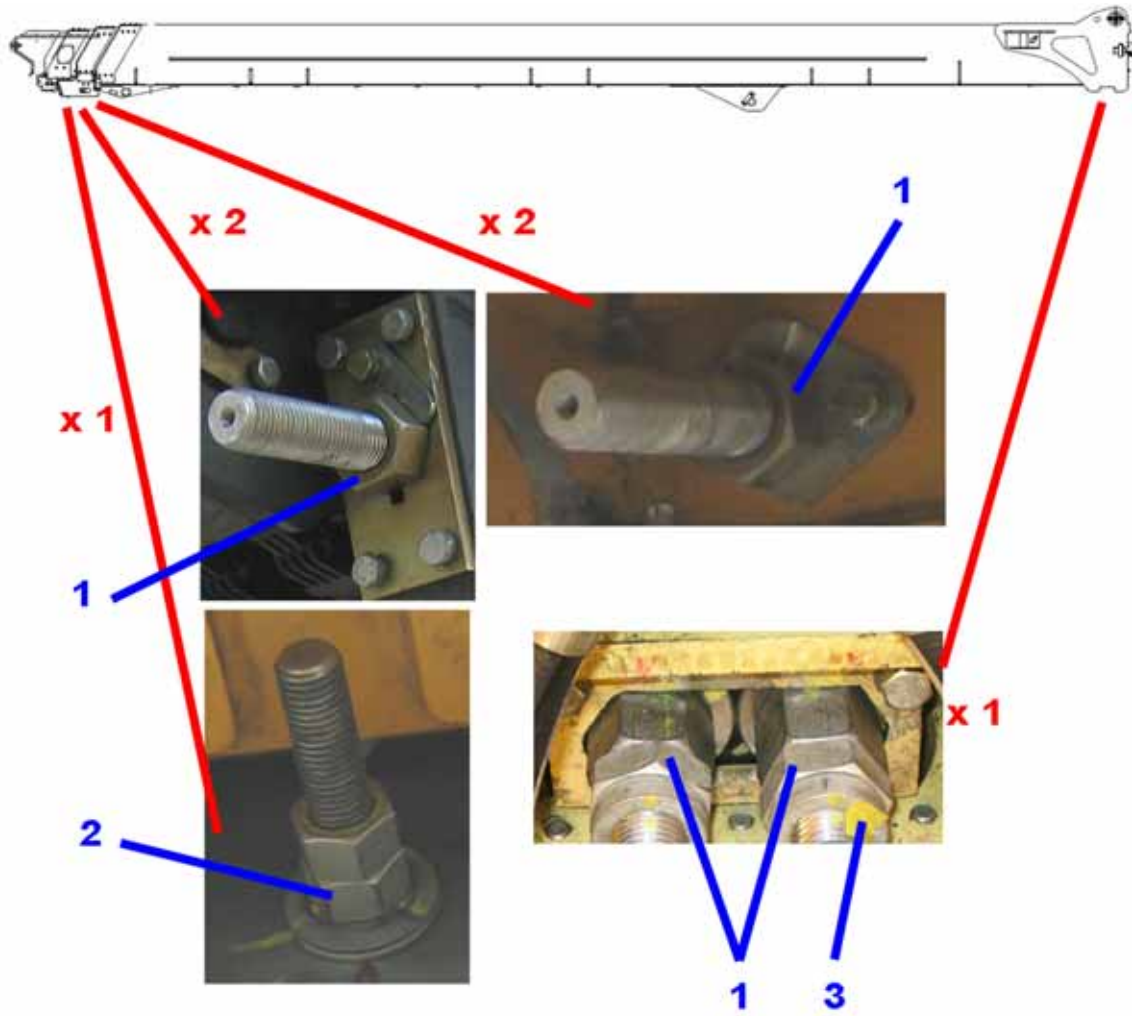
3 - Cable and chain tension

- Fully stow the machine on flat ground with the boom fully retracted.
- Lift the cover at the rear of the turret.

Remove the cable nut stops and unscrew the nuts from the cables and chains until they can be lifted from the contact surface :

- either by pulling the threaded rod by hand.
- Or by sliding a screwdriver under the nut.

Location of the cable nuts and chains



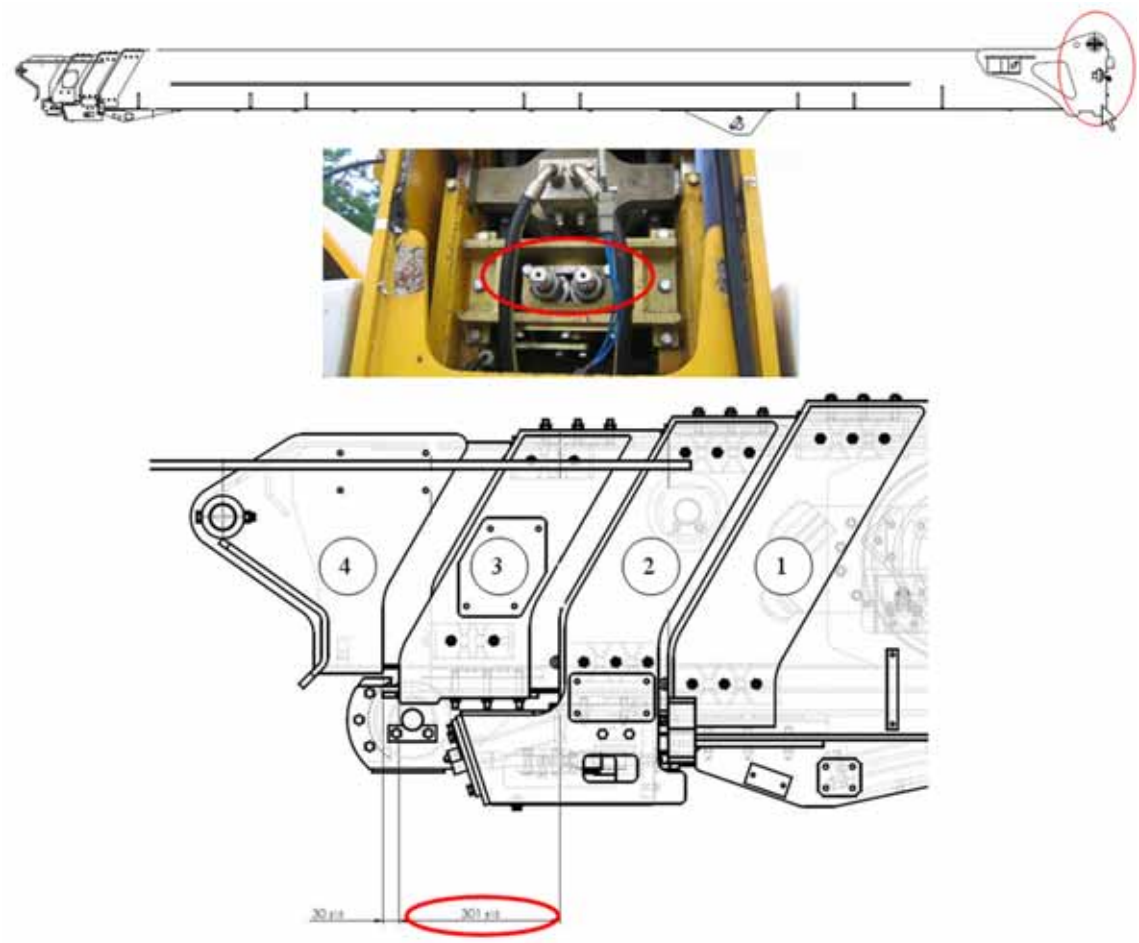
1. Wrench No. 46
2. Wrench No. 30
3. Flat bar 19

Start the thermal engine :

- Lift the boom to the highest position (without telescoping) to ensure that the sections are fully retracted.
- Come back to horizontal position.
- Stop the engine.
- Tighten the extension cables at the rear of the boom until element N° 3 moves, complying with the measurement of 301 +/- 15 mm.

Do not turn the cables *1 during the tightening operation. Prevent them from turning using a 19 wrench on the flat bars or if there are no flat bars, jam them using a pin wrench, protecting the threads.

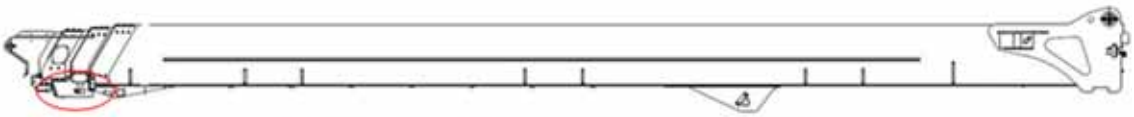
Element No. 3

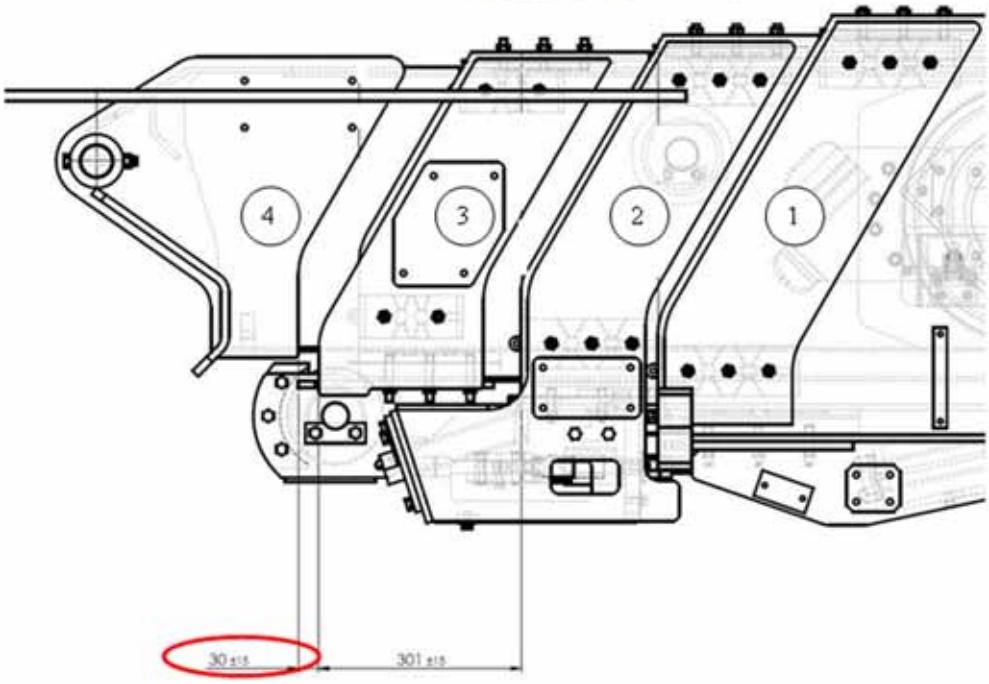


N.B.-:-IN THIS POSITION, THE THREADED ROD MUST EXTEND BEYOND THE NUT BY AT LEAST 50 MM.

- Tighten the extension chains from the end of element No. 2 to element No. 4 complying with the measurement of 30 +/- 15 mm.

Element No. 4

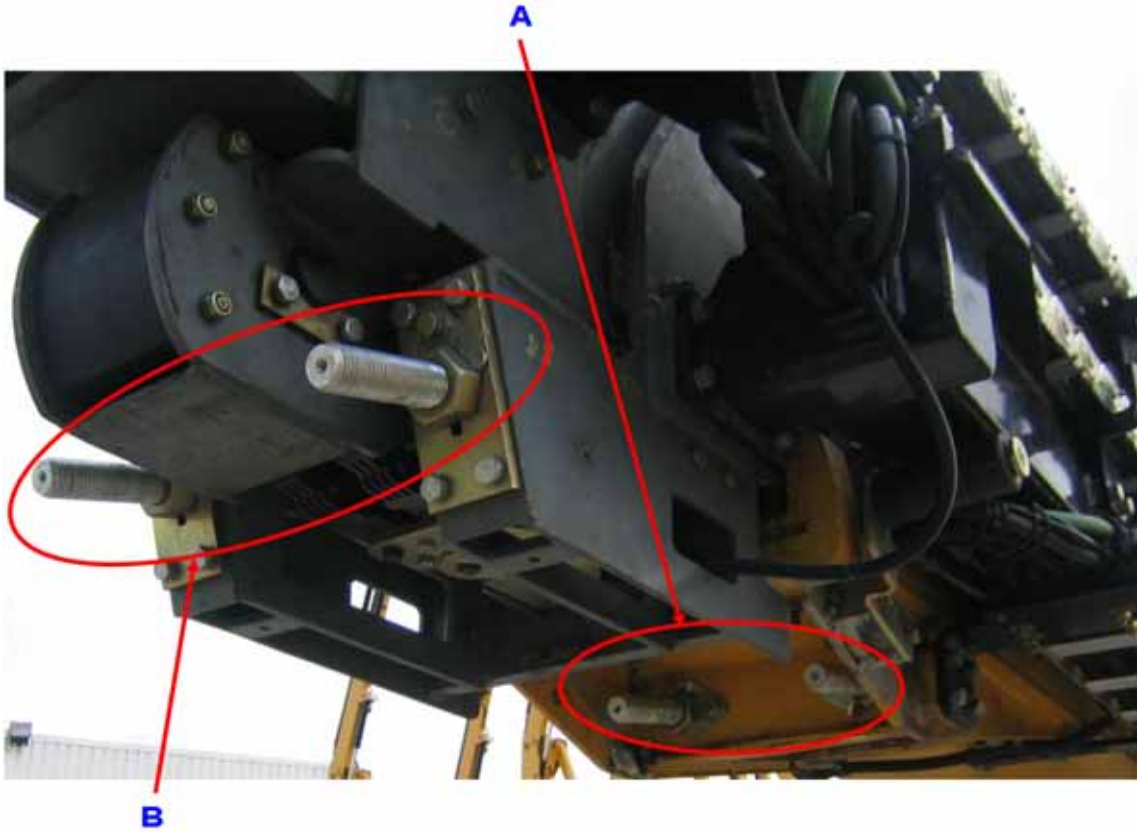




- Unscrew the extension chain and cable nuts by exactly 3. Make a mark on the nut to count the number of turns.

- Tighten the retraction cables at the end of element No. 1 until element No. 3 moves.

Do not turn the cables A during the tightening operation. Prevent the cables from rotating.



- Tighten retraction cables B at the ends of elements No. 1 and 2.
- Refit the retraction cable nut stops at the ends of elements No. 1 and 2.

- Tighten the extension cables and chains by 2,5 turns.

- remount the fastening locknut at the end of element No. 2.

- Refit the stop plate for the extension cable nuts at the rear of the boom and the locknuts for each cable.
- Move each telescope forwards and backwards 3 times by approximately 1 metre, ensuring that the movements are synchronised.
- Check that the measurements of 301 +/- 15 mm and 30 +/- 15mm are complied with.
- If these dimensions are not compliant, repeat the adjustment procedure above starting at the paragraph concerning removal of the cable nut stops.

4 - Additional operation

1. Place the machine in its operating configuration. Refer to Section B 1.1 - Maintenance implementation.

Notes

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		

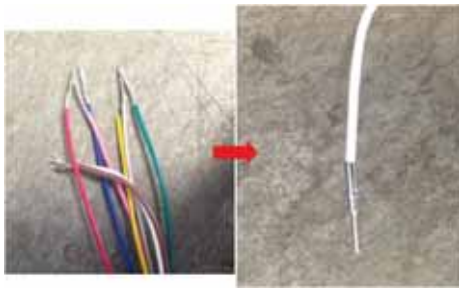
2 - Procedure

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 - 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

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

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

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

- **Only an authorised and qualified technician is permitted to work on the machines HAULOTTE®.**
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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 • Torque wrench		• Place barriers around the perimeter of the work area
	1 person		

5 - Procedure

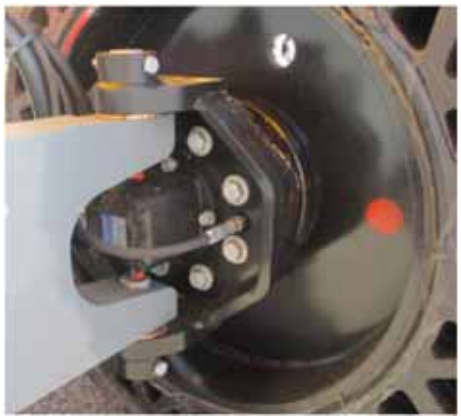
- Position the machine on a flat and firm surface, clear of obstructions (beware of power lines).
- Put the machine in stowed position, boom and arm fully retracted and lowered.
- Mark out the work area (barriers, cones, marking tape).
- Restrict access to the area (restricted access sign).
- Switch 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 : 650 N.m (479 lbf.ft).

wheel pivot / Reduction gear :

- Check the tightening torque of the 8 studs : 190 N.m (140 lbf.ft).



6 - Additional operations

- Clean the work area.

1 - Concerned machines

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- HT43 RTJ PRO - HT132 RTJ PRO

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3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

	• Standard tool kit • Jack 20T • Chocks 4000mm • 1 syringe for oil filling • Oil collection pan		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Gear box oil SAE 80W90

Packaging	Part number HAULOTTE®
Can 1L	4000530610
Can 20L	2420801370
Barrel 209L	2420801380

6 - Procedure

6.1 - 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 2 screws from the central plate and turn it over to disengage the reduction gear (1).
- Manually turn the wheel to position the filler cap to the top of the vertical axis (3).
- Open the cap (3) :
- If the level is correct, oil should drain from the orifice (3).
- If not, add oil via the cap (3) using the syringe until oil flows through the hole (3).
- Flip the central plate over.
- Tighten the screws (1), close the cap and wipe up any oil spillage on the ground.

6.2 - 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 (3).
- Open the cap (3) :
- If the level is correct, oil should drain from the orifice (3).
- If not, add oil via the cap (3) using the syringe until oil flows through the hole (3).
- Close the caps and wipe up any oil that has spilled on the floor.

7 - Additional operations

- Clean any oil traces.
- Clean the work area.

Notes

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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- **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

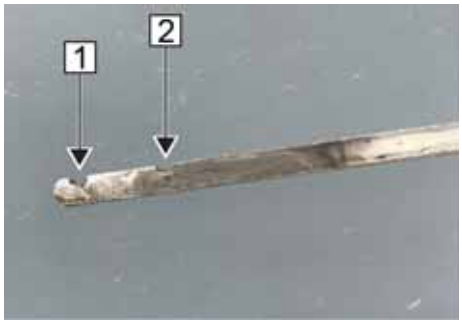
4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Rags • 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.
- 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 (4).
- Remove the gauge again :
- If the oil level is between the marks (1) and (2), the oil level is correct.
- If the oil level is lower than the minimum mark (1) :
- Remove the oil filling cap (3) 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.



6 - Additional operations

- Clean the work area.

1 - Concerned machines

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2 - Warning

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• 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

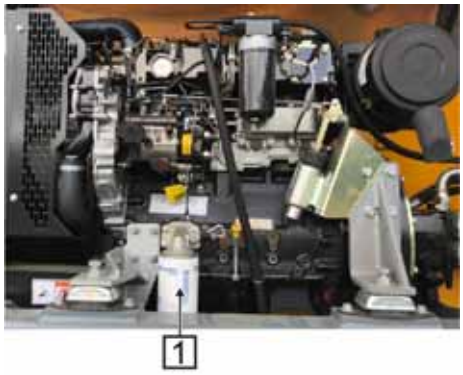
	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Oil filter wrench • Rags • Engine oil filter- Perkins – 2427003080 Engine • Engine oil filter- Deutz – 2324000610 Engine • Container		• Place barriers around the perimeter of the work area
	1 person		

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.
- 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.

- 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.

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- **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

	• Diesel pre-filter Perkins – 4000561430 engine • Diesel filter Perkins – 2427003070 engine • Diesel pre-filter Deutz – 4000303960 engine • Diesel filter Deutz – 4000700720 engine • "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Filter wrench • 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.
- 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.

- Close the taps of the fuel lines.
- Open the drain tap (2) and allow the fuel to drain into a recipient.
- Remove the filter bowl (1) from the filter head (3).
- Unscrew the filter element then remove the element from the bowl.

Scrap the worn component :

- Remove the O-ring from the filter bowl and clean the bowl.
- Check the condition of the filter bowl threads.
- Fit a new O-ring on the filter bowl 1.
- Place a new filter element in the filter bowl 1.
- Press and screw the element to immobilise it in the filter bowl.
- Fit the filter bowl (1) on the upper part of the filter head (3).
- Tighten the filter bowl by hand until it touches the filter head, then screw up by a 1/4 turn.

N.B.-:-DO NOT USE TOOLS TO TIGHTEN THE FILTER BOWL.

- Open the taps on the fuel lines.

6 - Additional operations

- Clean the work area.

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3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		Safety goggles

4 - You will need

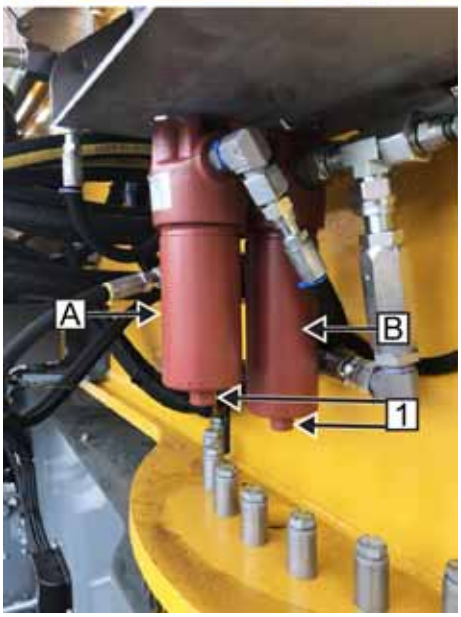
	• Filter replacement every year or every 1000 h • Hydraulic filter cartridge (Red) - 2427002910 • Hydraulic filter cartridge (Black) - 2427003110 • "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Vacuum pump • Rags • Container • Collection tray 1L		• Place barriers around the 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.

- There are two hydraulic filters (A and B).
- Place a container under the filter.
- Unlock the filter container using a wrench then unscrew by hand (1).
- 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.



6 - Additional operations

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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 • Tools for checking belt tension • Personal protective equipment • Standard tool kit • Lever		• Place barriers around the perimeter of the work area
	1 person		

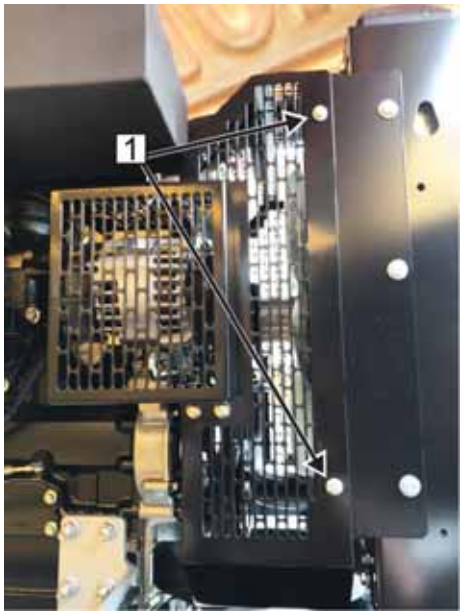
5 - Procedure

- 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.

- Swivel the engine casing to access the belt.

- Remove the screws from the protection grille then remove the grill (1).
- Place a tension measurement instrument in the centre of the part between the alternator pulley and the engine pulley.



These are dual belts. Check the tension of both belts and adjust the tension of the tighter belt.

- The correct tension of a new belt is 535 N (120 lb).
- If the tension is greater than 250 N, the tension is correct.
- If the belt tension is less than 250 N (56 lb) :
- Unscrew the alternator fastening screws (2).
- Set the belt to 535 N (120 lb).
- Tighten the alternator fastening screws again.
- Refit the protection grille.
- Close the engine casing.

6 - Additional operations

- Clean the work area.

1 - Concerned machines

- 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
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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		• Place barriers around the perimeter of the work area
	1 person		

5 - 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.

Notes

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Primary cartridge – 2324005070 • Secondary cartridge – 2326001910		• 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.

- 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.

1 - Concerned machines

- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Wear pads kit KITPATINHT28RTJ		• 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).

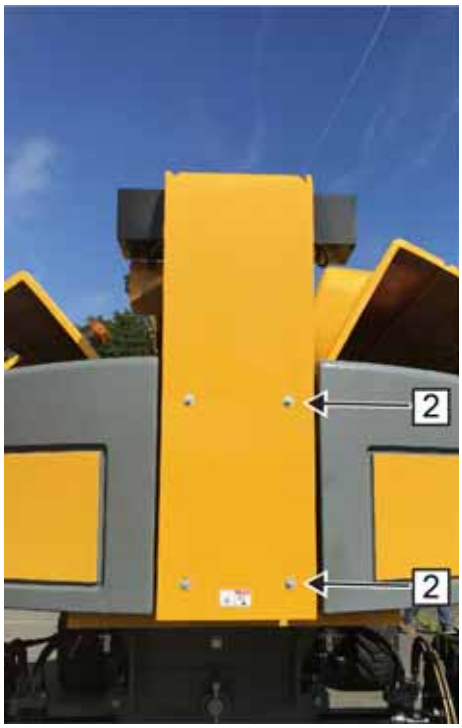
Front pads :

- Carefully fully extend the 3 tubes.

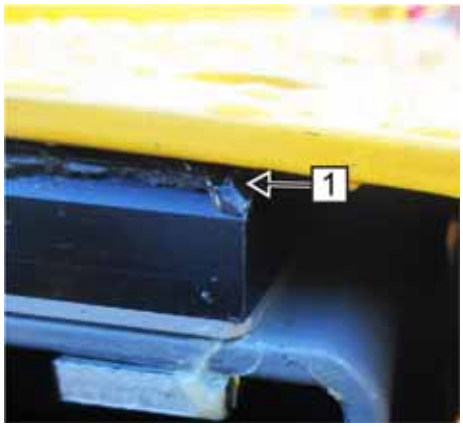
- Check the wear of the 6 pads on each tube.
- If the chamfers (1) are visible on the pads, the pad is compliant.
- If the chamfers are not visible on the pads, replace the pads.

Rear pads :

- Unscrew the 6 screws from the panel at the rear of the tube (2).
- Retract the 3 tubes.



- Check the wear on the 6 wear 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.
- Refit the panel : Screws 15 Nm. Nut 45 Nm.



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
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- **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

Reference	Part number HAULOTTE®
Can - 5L, Standard oil HV46	4000530620
20L bucket, Standard oil HV46	2420801320
Barrel 209L, Standard oil HV46	2420801310
Barrel 209L, Oil - Winter option	2505002640
Barrel 209L, Organic oil	2820304310

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.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 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		Safety goggles

4 - You will need

	• "DO NOT OPERATE" tag • Personal protective equipment • Standard tool kit • Vacuum pump • Funnel with a pipe of around 1 m / 3 ft 28 in • 200 L / 53 gals canister for hydraulic oil collection • Oil collection pan • Rags • Hand pump • 140 L / 37 gals tank		• Place barriers around the perimeter of the work area
	1 person		

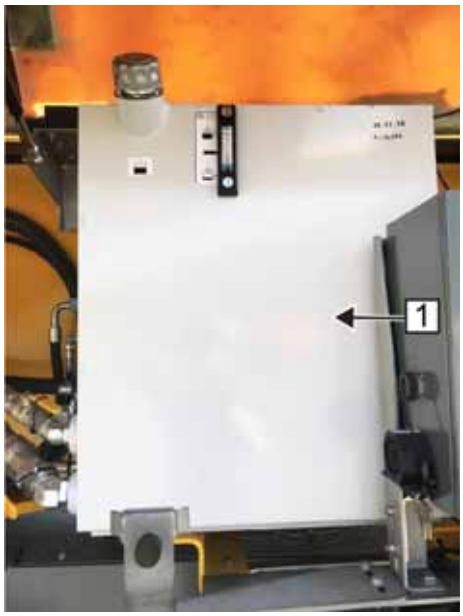
5 - Consumable

Hydraulic oil

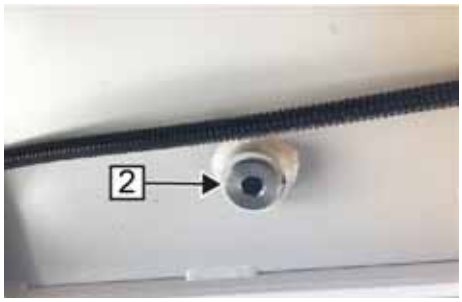
Reference	Part number HAULOTTE®
Can - 5L, Standard oil HV46	4000530620
20L bucket, Standard oil HV46	2420801320
Barrel 209L, Standard oil HV46	2420801310
Barrel 209L, Oil - Winter option	2505002640
Barrel 209L, Organic oil	2820304310

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.
- 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 recipient under the hydraulic oil tank (1).



- 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).

- Refit and tighten the drain out (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

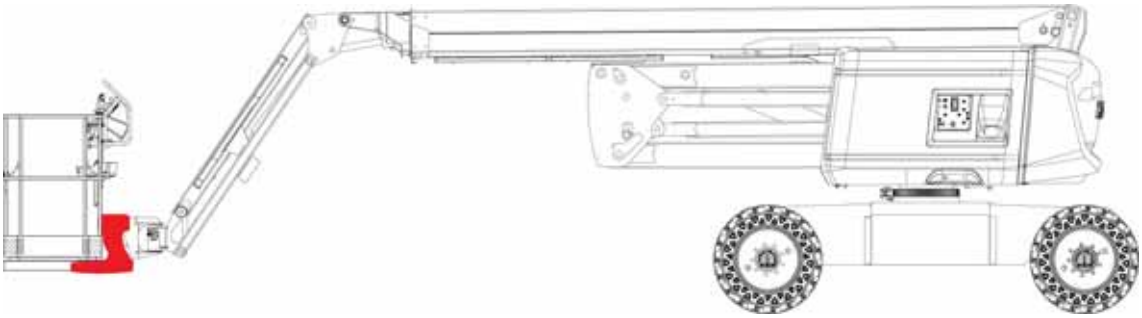
- Clean the work area.

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
- 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

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- **Generally speaking, the user must comply with regulatory obligations in force, particularly those relating specifically to working alone, co-activity and manual load handling...**
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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.

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

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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 • Torque wrench • Torque multiplier		• Place barriers around the perimeter of the work area
	1 person		

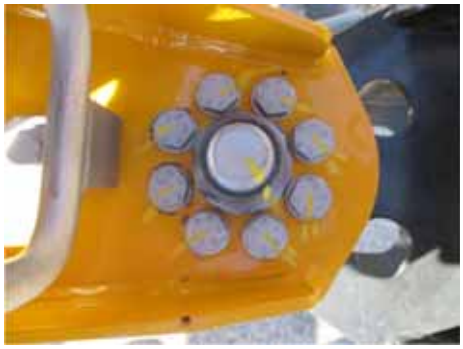
5 - Procedure

- 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.
- 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.



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
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- HT43 RTJ PRO - HT132 RTJ PRO

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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.
- 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

- 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
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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 • 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
- From the ground control box, align the turret at 90° to the chassis
- Boom at 30°.
- Telescope retracted.
- Horizontal platform and jib.

- Fix the magnetic comparator between the chassis and turntable (at 100mm from the bearing).

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

Put the machine into the following configuration :

- On flat ground.
- No load in the platform.
- Horizontal boom and jib platform set.
- Fully extend the telescopic cylinder.
- Note the clearance indicated by the magnetic comparator.

Clearance 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 the check of tightness, si the value remains lower than 2 mm, replace the slew ring.

1 - Concerned machines

- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - 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		

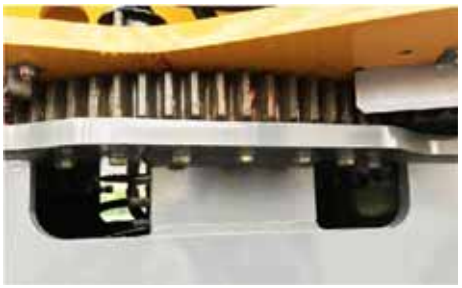
5 - Procedure

- 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.
- 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 32 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 under the hoses, check the tightness visually or using a flat spanner if possible.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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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		

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

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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- **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 10L • Coolant - Can 25L - 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

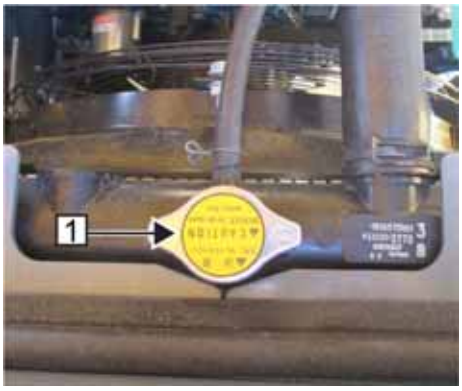
5 - Procedure

- 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.

- 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.-:-YOU ARE ADVISED TO PLACE A FUNNEL AND A PIPE BETWEEN THE DRAIN VALVES AND THE COLLECTION TRAYS.

- Once all of the coolant liquid is drained, close the drain valve again - (2) and (3).

- Fill with liquid via the radiator plug (1).
- 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).
- The level should be less than 13mm from the bottom of the filling pipe.

N.B.-:-WHEN MIXING ANTI-FREEZE AND WATER, ENSURE THAT THE PROPORTION OF ANTI-FREEZE IS 50%.

6 - Additional operations

- Clean the work area.

Notes

1 - Concerned machines

- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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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.
- 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 absence of radial gap > 0,5 mm (19690 µ 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.

Boom lifting cylinder

Boom lifting cylinder (Between the hydraulic tank and the oil tank)

Compensation cylinder

Front of the machine

Back of the machine

On each axle

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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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.

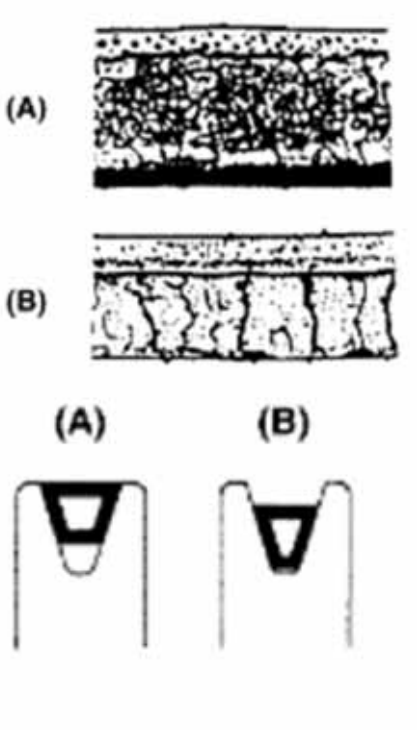
Do not start the engine and disconnect the battery.

- 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.

N.B.-:-FOR DUAL BELTS, REPLACE THE BELTS AT THE SAME TIME.



1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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- **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		• 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.

- Place a container under the filter (1).

- Open the drain valve (2). Allow the liquid to flow into the receptacle.
- When clean fuel flows out of the water separator, close the drain valve (2).
- Tighten the drain valve by hand only.

N.B.-:-DISPOSE OF THE DRAINED LIQUID PROPERLY.

1 - Concerned machines

- HT43 RTJ PRO - HT132 RTJ PRO

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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

Teflon grease aerosol

Packaging	Part number HAULOTTE®
Aerosol 400ml	2326005410

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

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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- **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

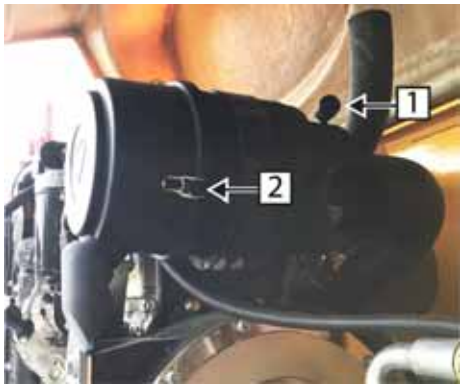
	• Personal protective equipment • Standard tool kit • Rags • Air compressor		• Place barriers around the perimeter of the work area
	1 person		

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 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).
- Remove the main element (3). Close the cover again using the pin (2).

Do not use oil.

Do not touch the secondary element unless it has to be replaced.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

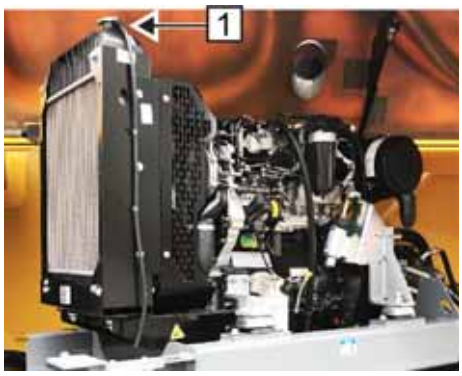
	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag • Coolant -37°, Can 25L - 4000564860		• Place barriers around the perimeter of the work area
	1 person		

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 (1).
- The coolant level should be 13mm from the bottom of the filling pipe at most.
- If the cooling liquid level is too low, find out why this is the case.



1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

2 - Warning

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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 • Engine belt- Perkins - 4000053460 Engine • Engine belt- Deutz - 4000356510 Engine		• Place barriers around the perimeter of the work area
	1 person		

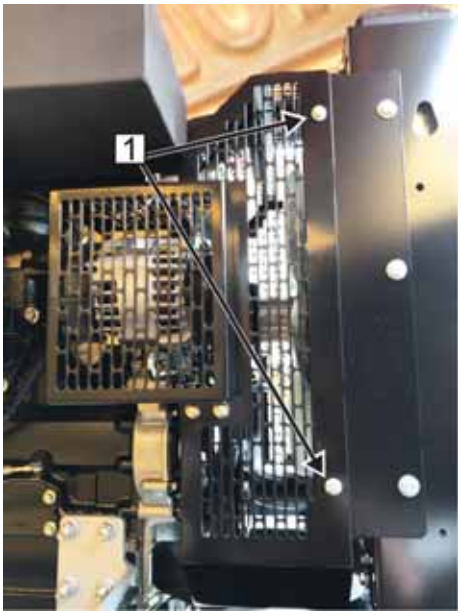
5 - Procedure

- 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.

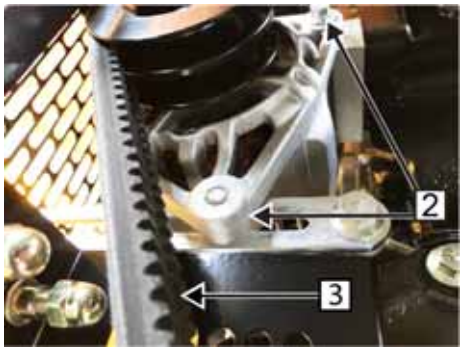
Do not start the engine and disconnect the battery.

- Swivel the engine casing to access the belt.

- Remove the screws from the protection grille then remove the grill (1).



- Loosen the alternator using the screws (2).
- Remove the fan belts (3).
- Replace the belt with two new parts.
- Refit the alternator.
- Check the belt deflection to tighten it correctly :
- Place a tension measurement instrument in the centre of the part between the alternator pulley and the engine pulley.



These are dual belts. Check the tension of both belts and adjust the tension of the tighter belt.

- The correct tension of a new belt is 535 N (120 lb) :
- If the tension is greater than 250 N, the tension is correct.
- If the belt tension is less than 250 N (56 lb):
- Unscrew the alternator fastening screws (2).
- Set the belt to 535 N (120 lb).
- Tighten the alternator fastening screws again.
- Refit the protection grille.
- Close the engine casing.

1 - Concerned machines

- 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

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3 - Risk prevention

Means of protection to be used when implementing the range

	Appropriate workwear		Gloves
	Safety shoes		

4 - You will need

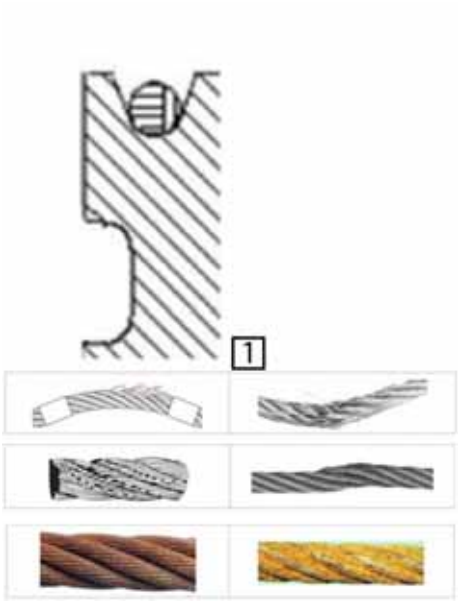
	• Personal protective equipment • Standard tool kit • "DO NOT OPERATE" tag		• Place barriers around the perimeter of the work area
	1 person		

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.

State :

- Check that cables are properly aligned with one another.
- Check that the cables under are equal tension.
- Check that the pulleys are properly aligned with the cables.
- Check that the cable is properly seated in the pulley (1).
- Check that nothing blocks the chain guides.
- Check the condition of the cables.
- Minimum diameter :
- Replacement is compulsory when 3 strands or more are broken along the length of the cable.
- Replacement is compulsory when 1 strand is broken near the ends.
- No deformed folds or frayed strands must be observed.
- No signs of corrosion must be observed.



1 - Concerned machines

- 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

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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		• 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.

- Fold the machine on a flat and released ground.
- Remove the protective cover SQ380 and SQ381.

- Insert a pin to lock the tubes (Ø16mm, Length 80cm) ; It may be necessary to lift or lower the boom slightly to align the boom shaft holes.

- Remove the plate on the back of the boom.

Step 1 :

- Put the nuts in contact with the washers of the output cables and measure the external dimension between the flat washers.

  They are adjusted behind the boom.
- Tighten the nuts to have a side equal to the distance D-2mm.

Step 2 :

- Put the nuts in contact with the washers of the input cables and measure the external dimension between the flat washers.
- Tighten the nuts to have a side equal to the distance D-2mm.

They are adjusted under the boom, on the cage side.

Step 3 :

- Tighten the nuts of the output cables to obtain a dimension equal to the distance D- 4mm.
- Tighten the lock nuts and seal.

Step 4 :

- Tighten the nuts of the input cables to obtain a dimension equal to the distance D- 4mm.
- Tighten the lock nuts and seal.
- Remove the pin .
- Retract/expand the boom telescope several times.

Notes

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Oil collection pan • Quantity 9.5L		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Engine oil 15W40

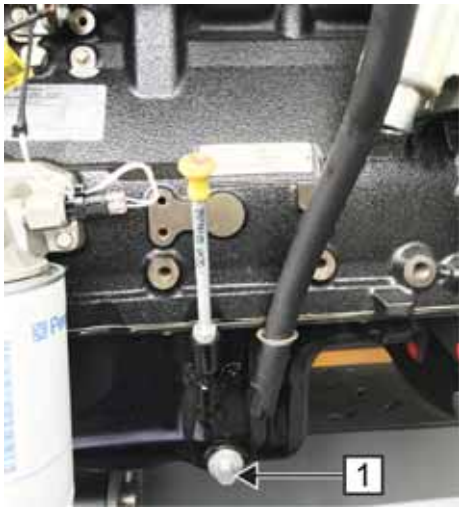
Packaging	Part number HAULOTTE®
Can 5L	4000530600
20L bucket	2420801360
Barrel 209L	2820305720

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.

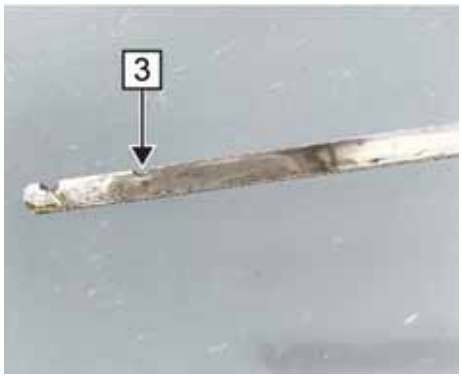
Shut off the engine before draining the engine oil.

- 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.



Notes

1 - Concerned machines

- 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
- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Filling syringe		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Gear box oil SAE 80W90

Packaging	Part number HAULOTTE®
Can 1L	4000530610
Can 20L	2420801370
Barrel 209L	2420801380

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.

- Loosen the filling cap (2).
- If the level is correct, oil should drain from the orifice (2).

- If not, add oil via the cap (2) using the syringe until oil flows through the hole (2).
- Close the caps and wipe up any oil that has spilled on the floor.

1 - Concerned machines

- 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
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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 • Funnel + Hose		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

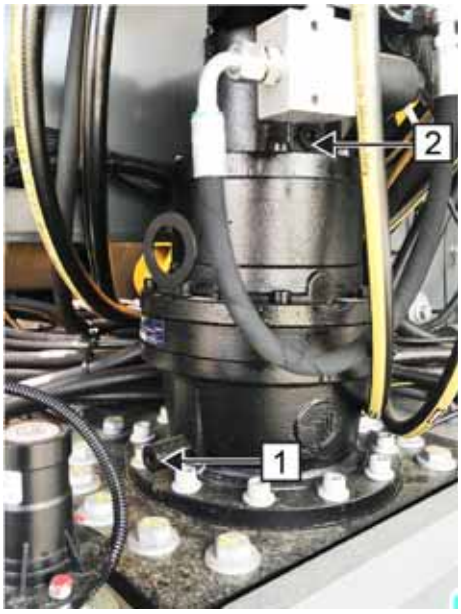
Gear box oil SAE 80W90

Packaging	Part number HAULOTTE®
Can 1L	4000530610
Can 20L	2420801370
Barrel 209L	2420801380

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.

- Under the drain plug (1), place a funnel and a hose leading to the collection tray.
- Open the drain plugs (1) and filling plugs (2) ; Allow the oil to run out.
- Refit and tighten the drain out (1).



- Using a filling syringe, fill with oil via the orifice (2) up to the orifice.
- Refit and tighten plug ; Wipe up any oil spills from the ground.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Brush		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumables

Teflon grease aerosol

Packaging	Part number HAULOTTE®
Aerosol 400ml	2326005410

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.

- Extend the axles.
- Clean the greased surfaces.
- Apply Teflon grease by aerosol or brush on the 4 sides of each axle extension.

1 - Concerned machines

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- HT43 RTJ PRO - HT132 RTJ PRO

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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		• 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.

To carry out the following operations, perform a complete telescoping :

- Check that the lifting chains and safety chains are clean.
- Check that there are no foreign particles on the chains and guide.
- Check that there are no signs of corrosion on chain elements.
- Check that no line or element is damaged or missing.
- Check that links are not distorted, deformed or broken.
- Check the connection points of links (the lines must be parallel).

Check for elongation wear :

- Elongation of up to 2%, over 14 segments, of the original chain length is permitted.
- Measure the value of 12 maillons using an appropriate method ; The nominal length is 152,40 mm.
- The measured length must not exceed 155,45 mm.

Check for external wear on rollers and links :

- External wear must not measure more than 2% from the section of the original link *2.
- Measure the value of using an appropriate method.
- The measured length must not be less than 11,27 mm.

Procedure diagram : Refer to  E016 - Cables and chains.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 RTJ PRO
- HT43 RTJ PRO - HT132 RTJ PRO

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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 • Gloves		• Place barriers around the perimester 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.

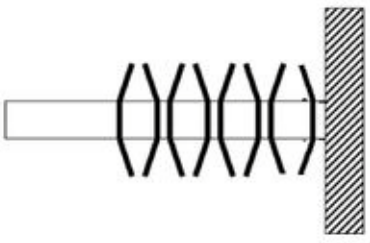
This procedure mut be performed each 250 h imperatively.

Every precaution must be taken before working on or near the machine. Comply with the recommendations in the maintenance book for your machine.

- Place the machine in maintenance configuration : Refer to Section B 1.1 - Maintenance implementation.
- Stow and park the machine on level cleared ground (The machine is not tilted and the boom is horizontal).

On zone 1 of the boom :

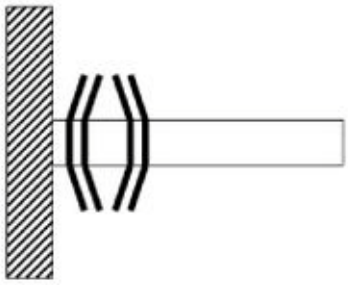
- Check that the 8 lock washers are present in the position shown on the diagram.



- Loosen the chains until they brush the locknut at the end of the threaded rod.
- Tighten the locknut.

On zone 2 of the boom :

- Check that the 4 lock washers are present mounted by 2.



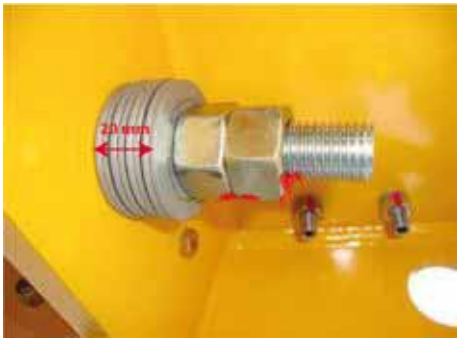
- Tighten the chains to obtain a measurement of 10 mm +/- 1 mm (from the lock nut at the end of the chain).

From the ground control box :

- Lift the boom to its highest point.
- Telescope the boom as far as possible.
- Fully retract the boom.
- Fully lower the boom.
- Extend the boom by 100 to 200 mm.
- Release the locknut on the platform side.

On zone 1 of the boom :

- Tighten the chains to obtain a measurement 20 (+0/-1) mm between the stop of the last washer and the base plane.



From the ground control box :

- Extend the boom by approximately 100 mm.
- Fully retract the boom.
- Extend the boom by 100 to 200 mm.

Validating the setting :

- If the dimension between the stop of the last washer and the base plane is stilll 20 (+0/-1) mm, lock the locknut.
- If the dimension is greater than 20 (+0/-1) mm, repeat the steps from the first paragraph "from the lower control box" until the tolerence dimension is obtained.

6 - Additional operation

1. Place the machine in its operating configuration : Refer to Section B 1.1 - Maintenance implementation.

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 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.**

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 20T • Chocks 4000mm • Filling syringe • Collection tray 1.5L		• Place barriers around the perimeter of the work area
	1 person		

5 - Consumable

Gear box oil SAE 80W90 - Quantity 1.1L

Packaging	Part number HAULOTTE®
Can 1L	4000530610
Can 20L	2420801370
Barrel 209L	2420801380

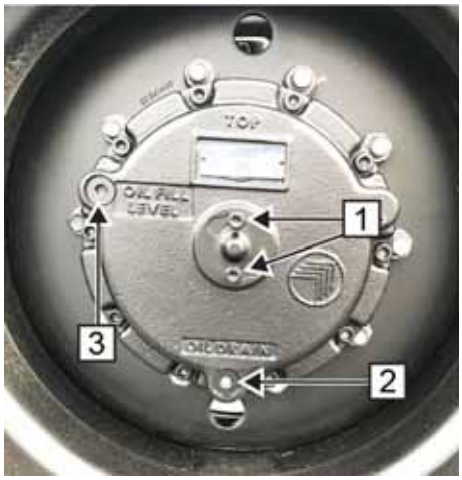
6 - Procedure

- 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 :

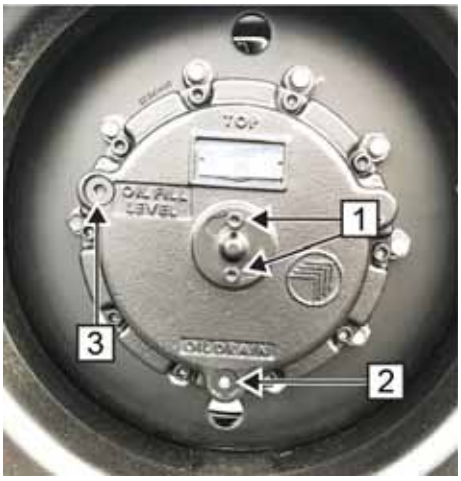
- Lift the machine with the jack to raise the wheel off the ground.
- Place wedges under the chassis and lower the jack slowly.

- Disconnect the gear system :
- Loosen the 2 screws from the central plate and turn it over to disengage the reduction gear (1).
- Turn the wheel manually to position the drain plug at the bottom of the verticle axis (2).
- 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.
- Refit and tighten the drain out (2).
- Add the oil via the hole (3) using a syringe until the oil flows from the hole (2).
- Quantity 1.1L.
- Close the filling plug (3) and wipe up any oil spillage on the floor.
- Flip the central plate and tighten the screws (1), close the plugs.



You do not have the means to lift the machine :

- Turn the wheel manually to position the drain plug at the bottom of the verticle axis (2).
- 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.
- Refit and tighten the drain out (2).
- Add the oil via the hole (3) using a syringe until the oil flows from the hole (2).
- Quantity 1.1L.
- Close the filling plug (3) and wipe up any oil spillage on the floor.
- Flip the central plate and tighten the screws (1), close the plugs.



Notes

1 - Concerned machines

- HA32 RTJ PRO - HA100 RTJ PRO - HA41 RTJ PRO - HA130 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.**

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

Lead-free grease

Packaging	Part number HAULOTTE®
Aerosol 0.4L	2820304330
Can 5L	2820304340

Extreme-pressure lithium grease

Packaging	Part number HAULOTTE®
Extreme-pressure lithium grease	2820304320

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 2 greasers located on each side of the machine above the slew ring :
- Lead-free grease.

- 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.

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

1.4 - LIST OF FAILURES PER CATEGORY

Failures	N	C	Description
Contactors			
F02.02 **Emergency Pump** KM4	D		Safety pump relay failure --> KM4=FAIL • Check relay • Check connection to ground • Check connection to U100 ECU • Check connection on PLATFORM
F02.04 **Power Contactor**	D		Emergency stop pushed and electro valves still supplied, meaning that power contactor KMP is stuck --> 12V254 = 0 & 12V201 = 1 • Check emergency stops • Check relay • Check fuses • Check wiring • Check connection on PLATFORM
F02.05 **Heating Relay**	D		Preheating relay Failure (open circuit or short circuit) with TIERIII configuration --> KM6=FAIL & CFG[Engine]=TIER3 • Check relay • Check connection to ground • Check connection to U100 ECU • Check connection on PLATFORM

Failures	N	C	Description
Relays			
F03.06 **Horn Relay** KA37	D		Horn relay failure (open or short circuit) --> KA37=FAIL • Check relay • Check connection to ground • Check connection to U100 ECU
F03.08 **Start Relay** KA2	D		Start relay failure (open or short circuit) --> KA2=FAIL • Check relay • Check connection to ground • Check connection to U100 ECU
F03.09 **Supply/Key Switch** KP1	D		Engine supply relay Failure (open circuit or short circuit) --> KP1=FAIL • Check relay • Check connection to ground • Check connection to U100 ECU
F03.10 **Throttle Relay** KT2	D		Throttle relay (open circuit or short circuit) with TIERIII configuration --> KT2=FAIL & CFG[Engine]=TIERIII • Check relay and output • Check connection to ground • Check connection to U100 ECU
F03.11 **Generator Relay** YV906	D		Generator valve failure (open circuit or short circuit) and generator switch activated (because the generator is not always present on the machine) -->YV906=FAIL & SETP[Generator]> 0 • Check relay and output • Check connection to ground • Check connection to U100 ECU

E - Trouble shooting and diagram

Failures	N	C	Description
Electrovalves			
• For all proportional valves for movements (boom, telescope, turret rotation, upper movements and drive) : the failure is detected while executing the corresponding movement if FU7 fuse is detected OK (out of the movement, the supply input of the PVG valve controlled by the ECU is not activated) • For digital safety valves concerning movements (boom, telescope, turret rotation) : the failure is detected while executing the corresponding movement if FU7 fuse is detected OK (out of the movement, the ground supply input of the valve controlled by the main ECU is not activated)			
F04.01 **Steering** YV900/150L-R/ YV151L-R	D	1	Steering proportional valve's failure while steering --> YV900=FAIL & (CTRL[SteeringFront]≠0 | CTRL[SteeringRear]≠0) • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.6) • Check connection to U100 ECU analog output (pin1<–>22.3) • Note that YV900S output is always seen as "Failure", do not consider this information
		2	Steering front left on/off electro valve failure --> YV150L=FAIL • Check connection to +12V (12V201) • Check connection to U100 ECU (8.9) through the revolving joint
		4	Steering front right on/off electro valve failure --> YV150R=FAIL • Check connection to +12V (12V201) • Check connection to U100 ECU (8.10) through the revolving joint
		8	Steering rear left on/off electro valve failure --> YV151L=FAIL • Check connection to +12V (12V201) • Check connection to U100 ECU (15.6) through the revolving joint
		16	Steering rear right on/off electro valve failure --> YV151R=FAIL • Check connection to +12V (12V201) • Check connection to U100 ECU (15.3) through the revolving joint
F04.02 **Compensation** YV900/720U/720D	D	1	Platform Level proportional valve's failure while leveling --> YV900=FAIL & CTRL[PlatformLevel]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.6) • Check connection to U100 ECU analog output (pin1<–>22.3) • Note that YV900S output is always seen as "Failure", do not consider this information
		2	Platform level raise on/off electro valve failure --> YV720U=FAIL • Check connection to +12V (12V201) • Check connection to U104 ECU (105.27) on upper control box
		4	Platform level descent on/off electro valve failure --> YV720D=FAIL • Check connection to +12V (12V201) • Check connection to U104 ECU (105.28) on upper control box
F04.03 **Turret rotation** YV250/805	D	1	Turntable orientation proportional valve's failure while orientation --> YV250=FAIL • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>9.2) • Check connection to U100 ECU analog output (pin1<–>24.3) • Note that YV250S output is always seen as "Failure", do not consider this information
		2	Turret Rotation's safety on/off electro valve failure --> YV805=FAIL • Check connection to ground (via LSD1.x U100 digital output , A.6 & A.5) • Check connection to U106 ECU (A.14)

E - Trouble shooting and diagram

Failures	N	C	Description
Electrovalves			
F04.05 **Boom** YV520/806	D	1	Boom proportional valve's failure while boom's movement --> YV520=FAIL & CTRL[Boom]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.2) • Check connection to U100 ECU analog output (pin1<–>23.3) • Note that YV520S output is always seen as "Failure", do not consider this information
		2	Boom's safety on/off electro valve failure --> YV802=FAIL & CTRL[Boom]≠0 • Check connection to ground (via LSD1.x U100 digital output , A.6 & A.5) • Check connection to U106 ECU (B.29)
F04.06 **Telescope** YV530/804	D	1	Boom telescoping valves failure --> YV530= FAIL & CTRL[Telescope]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>13.2) • Check connection to U100 ECU analog output (pin1<–>25.3) • Note that YV530S output is always seen as "Failure", do not consider this information
		2	Telescope's safety on/off electro valve failure --> YV801=FAIL & CTRL[Telescope]≠0 • Check connection to ground (via LSD1.x U100 digital output , A.6 & A.5) • Check connection to U106 ECU (B.6)
F04.07 **Jib** YV900/620U/620D	D	1	Jib proportional valve's failure while jib lifting --> YV900=FAIL & CTRL[Jib]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.6) • Check connection to U100 ECU analog output (pin1<–>22.3) • Note that YV900S output is always seen as "Failure", do not consider this information
		2	Jib raise on/off electro valve failure --> YV620U=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.31) on upper control box
		4	Jib descent on/off electro valve failure --> YV620D=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.32) on upper control box
F04.08 **Cage Rotation** YV900/750L/750R	D	1	Platform rotation proportional valve's failure while rotating --> YV900=FAIL & CTRL[PlatformRotation]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.6) • Check connection to U100 ECU analog output (pin1<–>22.3) • Note that YV900S output is always seen as "Failure", do not consider this information
		2	Platform rotation left on/off electro valve failure --> YV750L=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.33) on upper control box
		4	Platform rotation right on/off electro valve failure --> YV750R=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.34) on upper control box

E - Trouble shooting and diagram

Failures	N	C	Description
Electrovalves			
F04.09 **Jib Rotation** YV900/650L/650R	D	1	Jib rotation proportional valve's failure while rotating --> YV900=FAIL & CTRL[PlatformRotation]≠0 • Check connection to +12V (pin2<–>12V201) • Check connection to ground supply (pin3<–>8.6) • Check connection to U100 ECU analog output (pin1<–>22.3) • Note that YV900S output is always seen as "Failure", do not consider this information
		2	Jib rotation left on/off electro valve failure --> YV650L=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.29) on upper control box
		4	Jib rotation right on/off electro valve failure --> YV650R=FAIL • Check connection to ground (12V201) • Check connection to U104 ECU (105.30) on upper control box
F04.10 **Drive** YV160F/YV160B	D	1	Failure is detected on proportional electro valve (forward drive) --> YV160F=FAIL • Check connection to +12V (12V201) • Check connection to U104 ECU (31.2)
		2	Failure is detected on proportional electro valve (reverse drive) --> YV160B=FAIL • Check connection to +12V (12V201) • Check connection to U104 ECU (54.2)
F04.11 **Principal movements** YV800	D		LS valve failure detected : short circuit or open circuit --> YV800=FAIL • Check connection to ground (via LSD2.x U100 digital output , A.3) • Check connection to U106 ECU (B.7)
F04.20 **Drive Speed** YV110	D		Drive speed valve failure --> YV110=FAIL • Check connection to +12V • Check connection to U100 ECU digital output
F04.34 **Front Axle Unlocking** YV101	D		Oscillating axle unlocking valve failure --> YV101=FAIL • Check connection to +12V • Check connection to U100 ECU digital output
F04.35 **Brake Releasing** YV102	D		Brake releasing valve failure --> YV102=FAIL • Check connection to +12V • Check connection to U100 ECU digital output
F04.37 **Differential Locking** YV100	D		Differential locking valve failure --> YV100=FAIL • Check connection to +12V • Check connection to U100 ECU digital output
F04.38 **Axles and Blockings** YV900/YV106/YV103	D	1	Axles and blockings proportional valve YV900 failure (short circuit) during axles or blockings movement --> YV900 = FAIL & CTRL[AxlesExtension]> 0
		2	Axles and blockings selection valves YV106 and YV103 (same track of the rotating joint) failure (open or short circuit) --> YV106 = FAIL | YV103 = FAIL

Failures	N	C	Description
Joysticks			
All joystick failures are checked only if failure F08.05 is not active (node B output 5V) in order to not trigger them if their supply 5V is not OK			
F05.01 **Drive Joystick** SM902Y	D	1	Drive joystick failure : Out of range [0.2..4.8] V SM902Y<0.20V |SM902Y>4.80V SM902Y : • Check 5V supply • Check connection to ground • Check joystick
		2	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
F05.03 **Telescope Joystick** SM901Y	D	1	Boom telescoping joystick failure : Out of range [0.2.4.8] V -->SM901N=1 & (2.45V<SM901Y<2.55V)
		2	Boom telescoping joystick failure : Analogue signal and out of neutral incoherence --> SM901N = 1 & (2.45V<SM901Y<2.55V) --> Or SM901N=0 & (SM901Y<2.00V | SM901Y>3.00V)
F05.04 **Boom Joystick** SM900Y	D	1	Boom lifting joystick failure : Out of range [0.2.4.8] V --> SM900Y<0.2V | SM900Y>0.2V
		2	Boom telescoping joystick failure : Analogue signal and out of neutral incoherence --> SM901N = 1 & (2.45V<SM901Y<2.55V) --> Or SM902N=0 & (SM901Y<2V | SM901Y>3V)
F05.05 **Turret Joystick** SM900X	D	1	Turntable orientation joystick failure : Out of range [0.2.4.8] V --> SM900X<0.2V | SM900X>0.2V
		2	Turntable orientation joystick failure : Analogue signal and out of neutral incoherence --> SM900N = 1 & (2.45V<SM900X<2.55V) --> Or SM900N=0 & (SM900X<2V | SM900X>3V)
F05.11 **Joystick neutral** SM902Y	A		No detection of drive joystick's neutral position at machine start up --> SM902Y<2.35V | SM902Y>2.65V | SM902Y<2.35V | SM902Y>2.65V SM902Y: : • Check SM902Y / SM902F / SM902B • Check joystick • Check 5V supply
F05.12 **Joystick neutral 2** SM901Y	A		No detection of telescope joystick's neutral position at machine start up --> SM901Y<2.35V | SM901Y>2.65V | SM901Y<2.35V | SM901Y>2.65V SM901Y: : • Check SM901Y / SM901N • Check joystick • Check 5V supply
F05.13 **Joystick neutral 3** SM900X/SM900Y	A		No detection of joystick's neutral position at machine start up --> SM900X<2.35V | SM900X>2.65V | SM900X<2.35V | SM900X>2.65V| SM900Y<2.35V | SM900Y>2.65V | SM900Y<2.35V | SM900Y>2.65V SM900Y: : • Check SM900X / SM900Y / SM901N • Check joystick • Check 5V supply

E - Trouble shooting and diagram

Failures	N	C	Description
Overload			
F06.01(A) **No Loading Cal** Calibration required	A	1	Angle/pressure weighting system missing --> no response from slave to the request Load Management status of the master
		2	Angle/pressure weighting system not calibrated for weight 230kg -->No learning data into slave
		4	Angle/pressure weighting system not calibrated for weight 450kg -->No learning data into slave
		8	Angle/pressure weighting system failure -->Checksum incoherence of learning data or Load Management parameters
		16	Angle/pressure weighting system not configured -->Platform's slave not configured for Load Management (pin ADR0 = CN106.18 is not connected)
F06.02 **Incoh Pressure Node** SP600/SP601 inverted	D		Incoherence in measuring differential pressures : check the harness of pressure sensors --> Resulting pressure (PGC - PPC x SPC/SGC) < 0 <-->PGC < 0.75 x PPC --> and -20° < Platform angle < +20°

Failures	N	C	Description
Sensors			
All failures are inhibited at engine startup and during 1s to avoid wrong detection due to voltage drop			
F07.02 **Chain Alarm** SQ801-2 / Chain / Cable	D	1	Telescope's chain alarm, check chain and sensors --> SQ801=OFF
		2	Telescope's chain alarm, check chain and sensors --> SQ802=OFF
F07.03 **Boom Angle** SR520/SR521	D	1	Analogue signal corrected SR520C of boom angle sensor out of range --> VAR[BoomAngleCalibOK] = 1 & (SR520C > SR520CMin+30 |SR520C < SR520CMax-30)
		2	Analogue signal corrected SR521A of boom angle sensor out of range --> VAR[BoomAngleCalibOK] = 1 & (SR521C < SR521CMin-30 | SR521C > SR521CMax+30)
		4	Incoherence between analogue signals calibrated SR520A and SR521A of boom angle sensor --> (SR520A - SR521A) < -3° | (SR520A -SR521A) > 3°
F07.04 **Boom Angle Position** SR520-1/SQ520	D		Incoherence between boom angle calibrated given by SR520/SR521 and boom position sensor SQ520(Boom on turret) and Boom angle failure F07.03 not active --> VAR[BoomAngle]>8° & SQ520 = 1 & F07.03(A)=0
F07.10 **Teles. Length** SL530/SL531	D	1	SL530 sensor's signal is out of range for 1s (filtered by length software module) --> VAR[TelescLengthOutOfRangeSL530]=1
		2	SL531 sensor's signal is out of range for 1s (filtered by length software module) --> VAR[TelescLengthOutOfRangeSL531]=1
		4	Measured length between SL530 and SL531 sensors is far more from 250mm for 1s seconds (filtered by length software module) --> VAR[TelescLengthIncoherence]=1

E - Trouble shooting and diagram

Failures	N	C	Description
Sensors			
F07.11 **Teles. Length** SL530-1/SQ530/SQ532	D	1	Incoherence between the retracted telescope's switch and the analogue length for 1 seconds(Filtered by length software module) --> VAR[TelescLengthRetractedIncoh]=1
		2	Incoherence between the zone identifier and the measured length for 1 seconds(Filtered by length software module) --> VAR[TelescLengthZoneIncoh]=1
		4	Incoherence between boom position magnet and retracted telescope's switch for 2 seconds(Filtered by length software module) --> VAR[TelescMagnetRetractedIncoh]=1
		8	Max zone identifier exceed for 1.5 seconds(Filtered by length software module) --> VAR[TelescZoneMaxIncoh]=1
F07.13 **Turret Angle** SR250	D		Analogue angle of Turntable orientation is out of range --> (SR250<0.2V | SR250>4.8V)
F07.14 **Turret Position** SR250/SQ250	D		Angle of Turntable orientation and state of digital sensor for aligned position are not coherent --> (VAR[TurntableAngle]>30° & SQ250=1)
F07.19 **Axle Telescoping Pos** SQ130/1/2/5/6/7	D		Status of axles is incoherent: extended and retracted at the same time
F07.20 **Rod Pressure Sensor** SP600	D		Analogue signal of rod pressure sensor SP600 out of range [4 to 1016pts] and failure F08.05 not active --> (SP600<0.2V | SP600>4.9V) & F08.05(A) = 0
F07.21 **Bore Pressure Sensor** SP601	D		Analogue signal of bore pressure sensor SP601 out of range [4 to 1016pts] and failure F08.05 not active --> (SP601<0.2V | SP601>4.9V) & F08.05(A) = 0
F07.22 **Relative Angle Error** SR601	D		Analogue signal of jib/platform angle SR601 out of range [4 to 1016pts] --> SR601<4pts | SR601>1016pts
F07.23 **Absolute Angle Error** SR600	D		Analogue signal of platform angle SR600 out of range [4 to 1016pts] --> SR600<4pts | SR600>1016pts

E - Trouble shooting and diagram

Failures	N	C	Description
Sensors			
F07.30 **Engine oil pressure** SP300	N		Incoherence between engine oil pressure sensor SP300 and alternator signal D+ on TIER III engine --> SP300=0 & DPLUS=0 & CFG[Engine]=TIERIII
F07.31 **D+ signal** D+	N		Incoherence between alternator signal D+ and engine speed on TIER IV engine --> DPLUS=1 & CTRL[Engine]≠RUNNING & CFG[Engine]=TIERIV
F07.37 **Drive press. Sensors** SP160F/SP160B	D	1	Drive forward pressure sensor out of normal operating range when drive pump safety config is active --> Config[DrivePumpSafety] = 1 & (SP160F < 200mV | SP160F > 4800mV)
		2	Drive reverse pressure sensor out of normal operating range when drive pump safety config is active --> Config[DrivePumpSafety] = 1 & (SP160B < 200mV | SP160F > 4800mV)
F07.42 **Jib rotation position detectors** SQ560/SQ561	D		Jib rotation position detectors incoherence : jib is in line with boom and in transport position --> SQ561 = 1 & SQ560 = 0

Failures	N	C	Description
Electric circuit			
F08.02 **Supply fuses** Check FU70 20A	D		Fuses FU70 is detected as blown : Power is ON, emergency stoppers are OFF (pulled), so electro valves are not supplied --> 12V201=0V & 12V254=12V
F08.03 **Supply fuses 2** Check FU8 5A	D		Fuses FU8 is detected as blown : Power is ON, emergency stoppers are OFF (pulled), so sensors are not supplied --> 12V242=0V & WUI=OFF
F08.04 **Calc. Input Supply** U100/U104/U106	D	1	Supply of master ECU (SPU) greater than supply of slave ECU 1 (Node A): more than 1V --> (12VP – VBAT_A) > 1V
		2	Supply of master ECU (SPU) greater than supply of slave ECU 2 (Node B2): more than 1V --> (12VP – VBAT_B2) > 1V
		4	Supply of master ECU (SPU) too high: more than 17V --> 12VP > 17V
		8	Supply of slave ECU 1 (Node A) too high: more than 17V --> VBAT_A > 17V
		16	Supply of slave ECU 2 (Node B2) too high: more than 17V --> VBAT_B2 > 17V
F08.05 **Calc. Outputt Supply** Platform 5V supply	D		Detected failure on regulated 5V output of U104 ECU (Platform slave node) supplying the joysticks
F08.07 **Circuit Selector** Check Key selector	D	1	Incoherence on the key selector SA901 --> (SA901TU= 1 & SA901PF= 1 & SA901F= 1)
		2	Incoherence on the key selector SA901 --> (SA901TU= 1 & SA901PF= 1)
		4	Incoherence on the key selector SA901 --> (SA901PF= 1 & SA901F= 1)
		8	Incoherence on the key selector SA901 --> (SA901TU= 1 & SA901F= 1)
		16	Incoherence on the key selector SA901 --> (SA901TU= 0 & SA901PF= 0 & SA901F= 0)

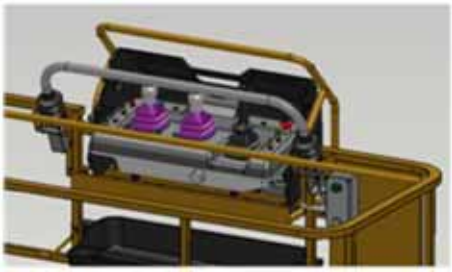
E - Trouble shooting and diagram

Failures	N	C	Description
Engine			
F09.01 **Water temperature** Engine overheat	D		Engine overheat --> T2s(ST300 & T15s(VAR[EngineStatus]=RUNNING)
F09.02 **Oil pressure** Engine pressure	D		Engine oil pressure --> T6s(SP300 & T15s(VAR[EngineStatus]=RUNNING)
F09.07 **Amber warning lamp** Engine Warning	D		Available with Tier IV engine, warning lamp received from engine ECU: J1939 SPN
F09.08 **Red stop lamp** Engine Stop	D		Available with Tier IV engine, stop lamp code received from engine ECU: J1939 SPN
F09.10 **D+** Engine alternator	D		Alternator failure : only for future TIV versions/semi electronic engines --> T2s(DPLUS=OFF & VAR[EngineStatus]=RUNNING)
F09.16 **DPF** Exchange required	D	1	DPF Exchange required
		2	DPF Exchange required, Warning - Level 1
		4	DPF Exchange required, System reaction active
F09.17 **Oil - Exchange required**	D		Oil exchange required due to operation time in standstill regeneration

Failures	N	C	Description
Functions			
F10.01 **Drive** Drive over current	D		While driving in micro speed, measured current for YV600 or YV620 proportional electro valves is too high --> T2s(ST300 & T15s(VAR[EngineStatus]=RUNNING)
F10.02 **Drive 2** Driving pressure	D	1	While driving in micro speed, pressure is detected in the hydraulic high speed circuit --> VAR[UnfoldedMachine]≠0 & SP100=OFF Probably hydraulic failure, or SP100 disconnected
		2	While driving in high speed, no pressure is detected in the hydraulic high speed circuit --> VAR[UnfoldedMachine]=0 & CONTROL[DriveSpeed]=High & CONTROL[Drive]≠N & SP100=ON Probably SP100 failure (shunt, wrong calibration adjusting pressure)
F10.04 **Reach limit calib.** Driving pressure	A		Reach limit system is detected as not calibrated --> VAR[ReachLimitCalibMode]≠0
F10.07 **Reach limit engine cut** Driving pressure	D	1	Rear reach limit (platform side) is out of safety range while reach limit system is calibrated and without pending errors --> VAR[ReachLimitLengthError] < -30cm
		2	Front reach limit (turret side) is out of safety range while reach limit system is calibrated and without pending errors --> VAR[ReachLimitAngleError] < -5°
F10.08 **Reach limit error** Driving pressure	D	1	Rear reach limit (platform side) is out of allowed range while reach limit system is calibrated and without pending errors --> VAR[ReachLimitLengthError] < -20cm
		2	Front reach limit (turret side) is out of allowed range while reach limit system is calibrated and without pending errors --> VAR[ReachLimitAngleError] < -2.3°

Failures	N	C	Description
Securities			
F11.08 **Drive pressure diff.** Check the drive pump	A		Only checked if drive pressure sensor OK (F07.37 not present). Absolute pressure difference in drive circuit is greater than 20bar, except if the following conditions are true (because they cause the pressure difference to raise) : • Machine is driving • Or steering is active --> ABS(VAR[DrivePressureDiff]) > 20 bar & 5s{TRL[Drive] = Neutral & (CTRL[Steering] = Neutral | CTRL[BrakeReleasing] = ON)}

E - Trouble shooting and diagram

Failures	N	C	Description
Internal faults			
F12.01 **CAN Fault** Check wires	D	1	CAN link failure between master ECU (SPU) and slave ECU 1 (Node A one or several frames not received by master or slave ECU
		2	CAN link failure between master ECU (SPU) and slave ECU 2 (Node B2 one or several frames not received by master or slave ECU
F12.02 **E2P Read/Write Error** Change calc. SPU	D		EEPROM failure of master ECU (SPU): stack full or read/write error
F12.03 **Battery Cell Low** -> Haulotte service	D		Battery cell of slave ECU 1 (Node A) low (Node 2000 set year A ECU when its battery is low)
F12.04 **E2P Param Reset** Check SETTINGS	D		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)
F12.05 **Machine not set** Set machine settings	D	1	Machine's model is not set
		2	Country not set
		4	Serial number not set
		8	Some speed or ramp parameters are not set
		16	Some options are not set
		32	Machine component not set (Engine Type)
		64	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 

Failures	N	C	Description
Switches			
F13.01 **Lower Box Switches** 2 dirs active	D	1	Incoherence between the 2 signals of Turntable orientation switch of turret box (both active) --> SA250L = 1 & SA250R = 1
		2	Incoherence between the 2 signals of boom telescoping switch of turret box (both active) --> SA530O = 1 & SA530I = 1
		4	Incoherence between the 2 signals of boom lifting switch of turret box (both active) --> SA520U = 1 & SA520D = 1
		8	Incoherence between the *1 signals of jib lifting switch of turret box (both active) --> SA620U = 1 & SA620D = 1
		16	Incoherence between the 2 signals of jib rotation switch of turret box (both active) --> SA650U = 1 & SA650D = 1
		32	Incoherence between the 2 signals of platform rotation switch of turret box (both active) --> SA750U = 1 & SA750D = 1
		64	Incoherence between the 2 signals of platform level switch of turret box (both active) --> SA720U = 1 & SA720D = 1
F13.02 **Platform switches** 2 dirs active	D	1	Incoherence between the 2 signals of front steering switch of platform box (both active) --> SM902L = 1 & SM902R = 1
		2	Incoherence between the 2 signals of rear steering switch of platform box (both active) --> SA150L = 1 & SA150R = 1
		4	Incoherence between the 2 signals of jib lifting switch of platform box (both active) --> SA621U = 1 & SA621D = 1
		8	Incoherence between the 2 signals of jib rotation switch of platform box (both active) --> SA651U = 1 & SA651D = 1
		16	Incoherence between the 2 signals of platform rotation switch of platform box (both active) --> SA751L = 1 & SA751R = 1
		32	Incoherence between the 2 signals of platform level switch of platform box (both active) --> SA721U = 1 & SA721D = 1

Failures	N	C	Description
Switches			
F13.10 **Neutral switch** Turret Neutral Switches	A	1	Neutral position of Turntable orientation switch of turret box not detected after power on --> SA250L = 1 | SA250R = 1
		2	Neutral position of boom telescoping of turret box not detected after power on --> SA530O = 1 | SA530I = 1
		4	Neutral position of boom lifting switch of turret box not detected after power on --> SA520U = 1 | SA520D = 1
		8	Neutral position of jib lifting switch of turret box not detected after power on --> SA620U = 1 | SA620L = 1
		16	Neutral position of jib rotation switch of turret box not detected after power on --> SA650U = 1 | SA650L = 1
		32	Neutral position of platform rotation switch of turret box not detected after power on --> SA750U = 1 | SA750D = 1
		64	Neutral position of platform level switch of turret box not detected after power on --> SA720U = 1 | SA720D = 1
		128	Neutral position of start/stop switch of turret box not detected after power on --> SA905S = 1
		256	Neutral position of Foot Switch/emergency pump switch of turret box not detected after power on --> SA905E = 1

Failures	N	C	Description
Switches			
F13.11 **Switches neutral 2** Check plat. switches	A	1	Neutral position of front steering switch of platform box not detected after power on --> SM902L = 1| SM902R = 1
		2	Neutral position of rear steering switch of platform box not detected after power on --> SA150L = 1| SA150R = 1
		4	Neutral position of jib lifting switch of platform box not detected after power on --> SA621R = 1| SA621D= 1
		8	Neutral position of jib rotation switch of platform box not detected after power on --> SA651R = 1| SA651D= 1
		16	Neutral position of platform rotation switch of platform box not detected after power on --> SA751L = 1 | SA751R= 1
		32	Neutral position of platform level switch of platform box not detected after power on --> SA721R = 1 | SA721D= 1
		64	Neutral position of differential lock switch of platform box not detected after power on --> SA100= 1
		128	Neutral position of start/stop switch of platform box not detected after power on --> SA303= 1
		256	Neutral position of emergency pump switch of platform box not detected after power on --> SA800= 1
		512	Neutral position of horn switch of platform box not detected after power on --> SA907= 1
		1024	Neutral position of platform Foot Switch of platform box not detected after power on --> SB800= 1
		2048	Neutral position of generator switch of platform box not detected after power on or while platform control box is not selected --> SA906= 1

Failures	N	C	Description
CAN J1939			
F15.06 Check CAN2	D		Problem detected in J1939 CAN Machine not supplied, with multimeter, check the resistance between 2001 (CAN high) and 2002 (CAN low) is nearly 60 ohms (if 0 ohm or 120ohm : failure, check RES TERM connection for all ECUs). Check ECU supplies line. Check CAN connection for Display and/or engine.

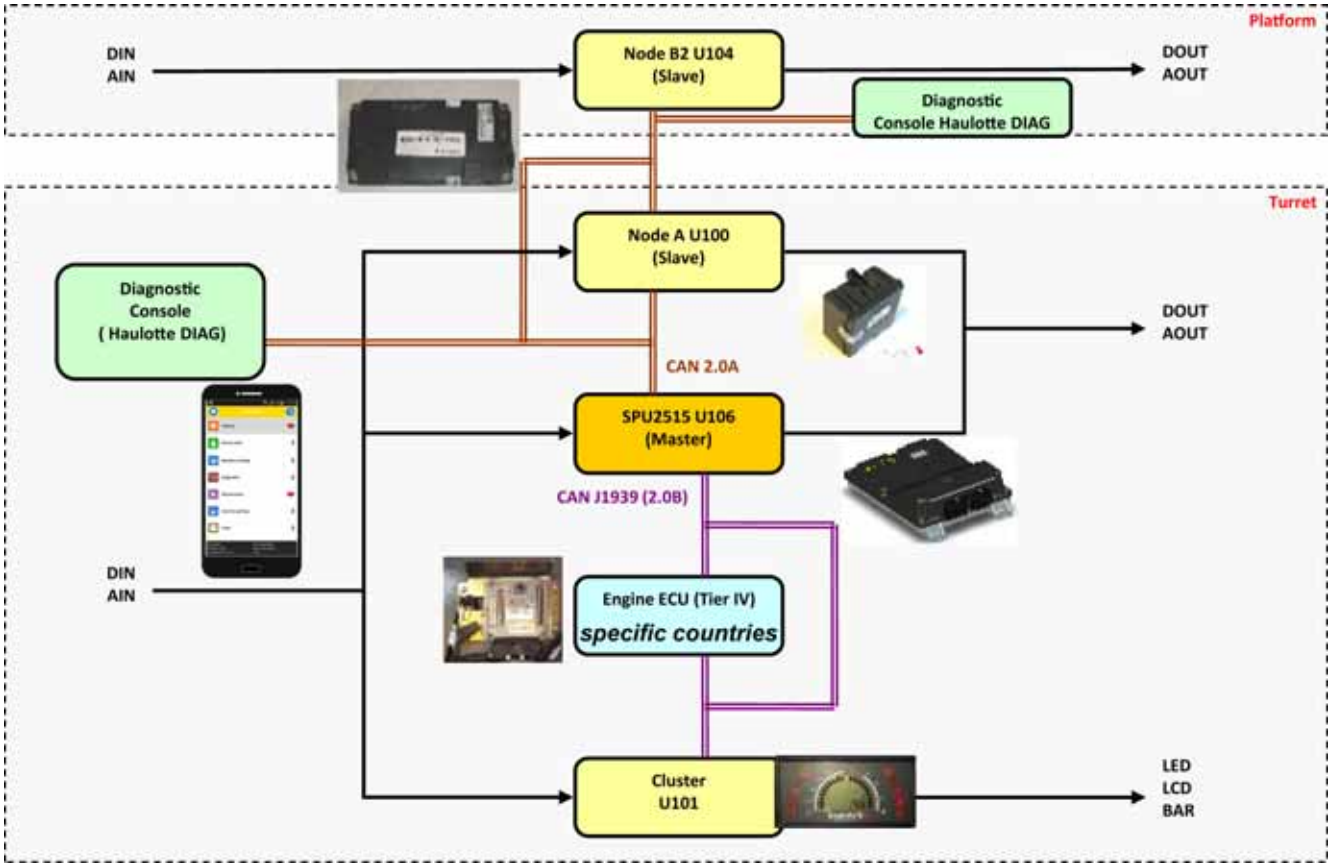
2 - Legend

2.1 - SYSTEM ARCHITECTURE

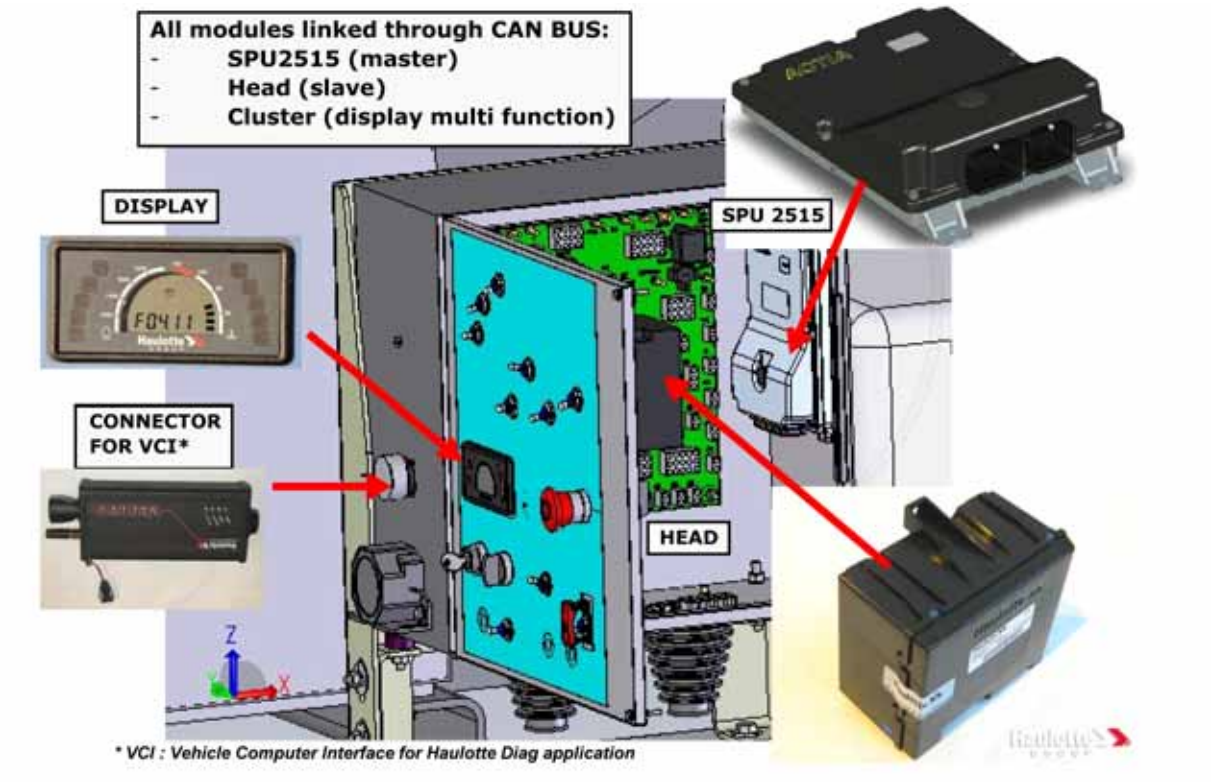
The system has 3 ECU modules :

- On turret : 1 SPU master and 1 HEAD slave.
- On platform : 1 node B2 slave.

The U101 multi display and the ECU module for engine are linked to the SPU through a standard CAN BUS J1939, whereas the ECU modules U100 and U104 is linked to the SPU through HAULOTTE® U101.



Details on LCB

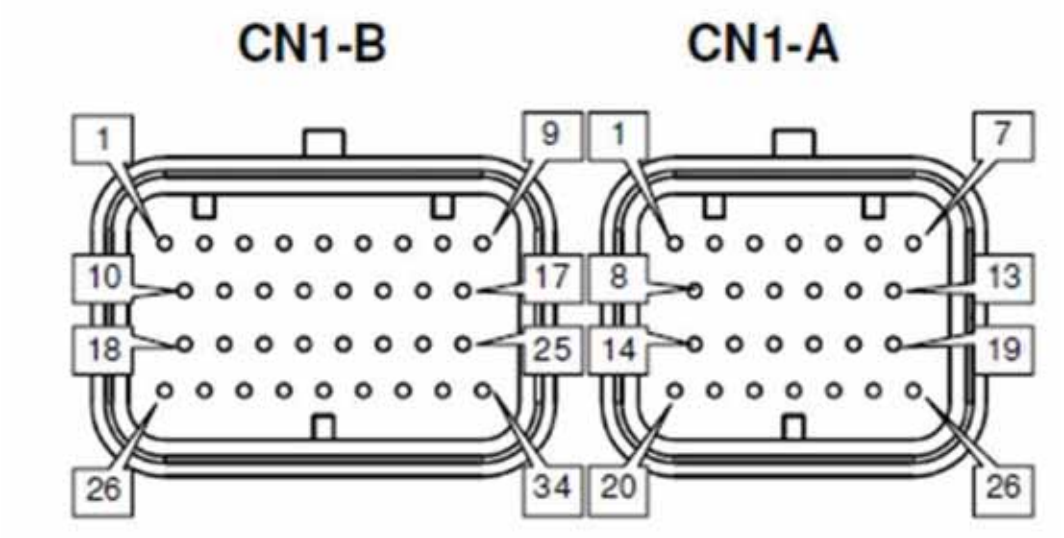


2.1.1 - The ECU modules

2.1.1.1 - U106 SPU 2515

This module master is located in turret near the lower control box.

Detail of connectors



Plug CN1A

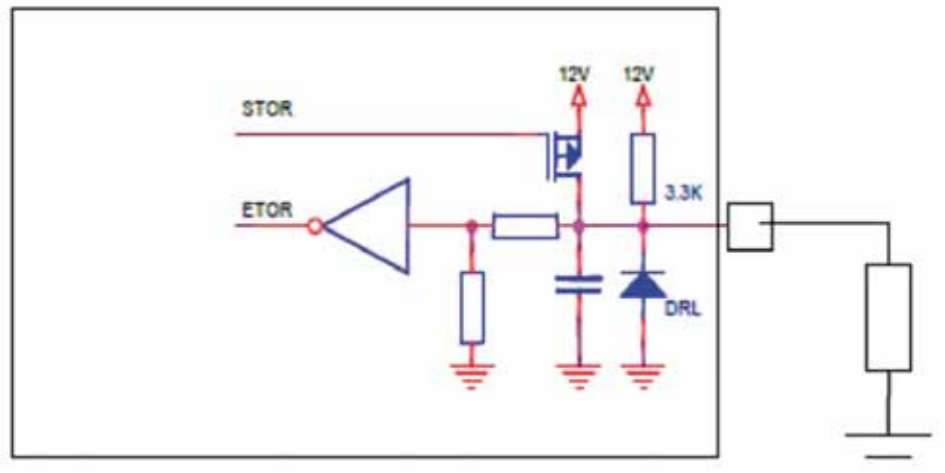
Pin	Wire	Name	Function
1			Not used
2	174	ST300	Temperature probe to cool fluid in engine
3	395		+5 V SQ531 (ILS telescope extended) SQ520 (ILS boom lifted) SQ420 (ILS arm angle)
4	144	SA800	Emergency command
5	0	GB1	Battery (-)
6	0	GB1	Battery (-)
7			Not used
8	189	SQ300	Low fuel level
9	385	SA905	Engine start / stop (Lower controls)
10			Not used
11	860	SA250	Turret rotation right side
12	0	GB1	Battery (-)
13			Not used
14	109	FU7 (15 A)	V bat ECU turret
15	340	SA530	Telescope extension (Lower controls)
16			Not used
17	300	SA520	Main boom lift
18	123	YV160	PVG in error
19			Not used
20	105	FU11 (7,5 A)	V bat
21	200	SA420	Arm lift
22			Not used
23			Not used
24			Not used
25			Not used
26			Not used

Plug CN1B

Pin	Wire	Name	Function
1	120		Command load sensing valve YV800 (+)
2	187		Command horn relay KA9
3	686		High speed drive supply on valves YV110 / YV111
4	192		Command generator relay KA2
5	0		Battery (-)
6	620		Command YV900, movements ON/OFF and steering
7	170		Command stop engine relay KA3
8	121		Command load sensing valve YV800 (-)
9			Not used
10	201		Command arm lift YV420U
11	600	SA300	Regeneration engine Tier IV (option)
12	481	SA720	Basket compensation descent (Lower controls)
13	500	SA620	Jib lifting (Lower controls)
14	610	SA300	Regeneration engine Tier IV inhibited (option)
15	510	SA620	Jib descent (Lower controls)
16	1003		CAN
17	1003		CAN
18	103		V power from fuse FU13
19			Not used
20	114	SA901	Information selection basket from SA901
21	150	SQ800	Tilt sensor
22	386	SA905	Enable switch (Lower controls)
23	480	SA720	Basket compensation lift (Lower controls)
24			Not used
25	1001		CAN HG L
26			Not used
27	621		Command crab mode steering YV607
28	188		Command EL901, option flashing light
29	186		Buzzer HA901
30	162		Command preheating relay KM160
31	880		Command turret rotation YV250
32	103		V power from fuse FU13
33			Not used
34	1002		CAN HG H

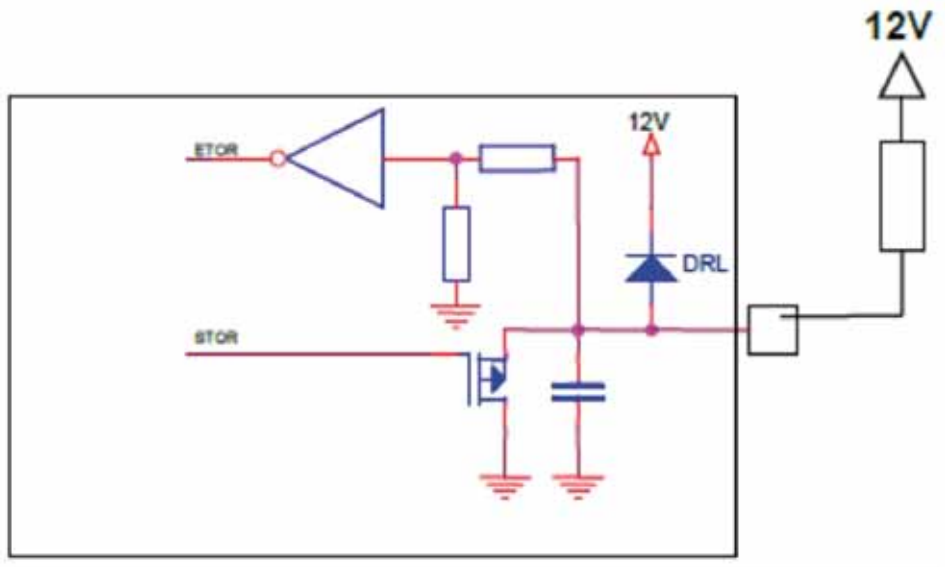
N.B.-:-On SPU module, there are two types of digital outputs : LS (Low Side) and HS (High Side).

High side digital output



Charge must be connected to mass.

Low side digital output



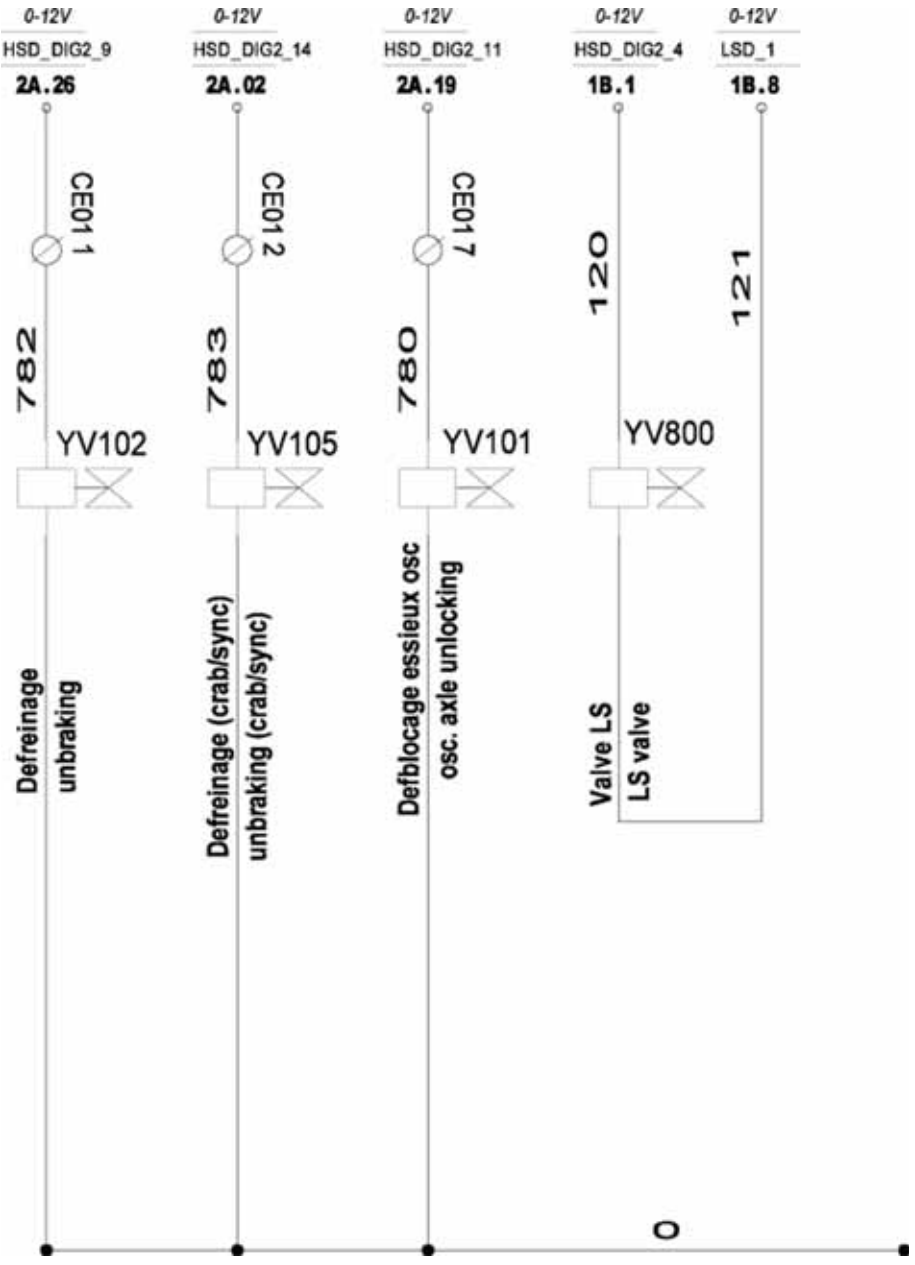
Charge must be connected to power supply.

- At state OFF, we detect a possible open circuit.
- At state ON, we detect a possible short circuit.
- In case of failure, the output is deactivated.

E - Trouble shooting and diagram

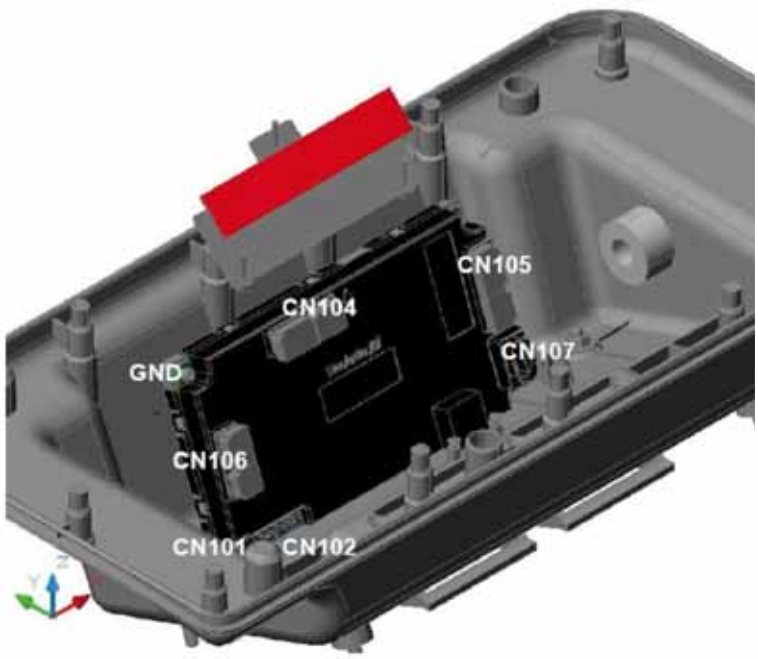
Exception for safety valves where HS and LS outputs are combined as follow.

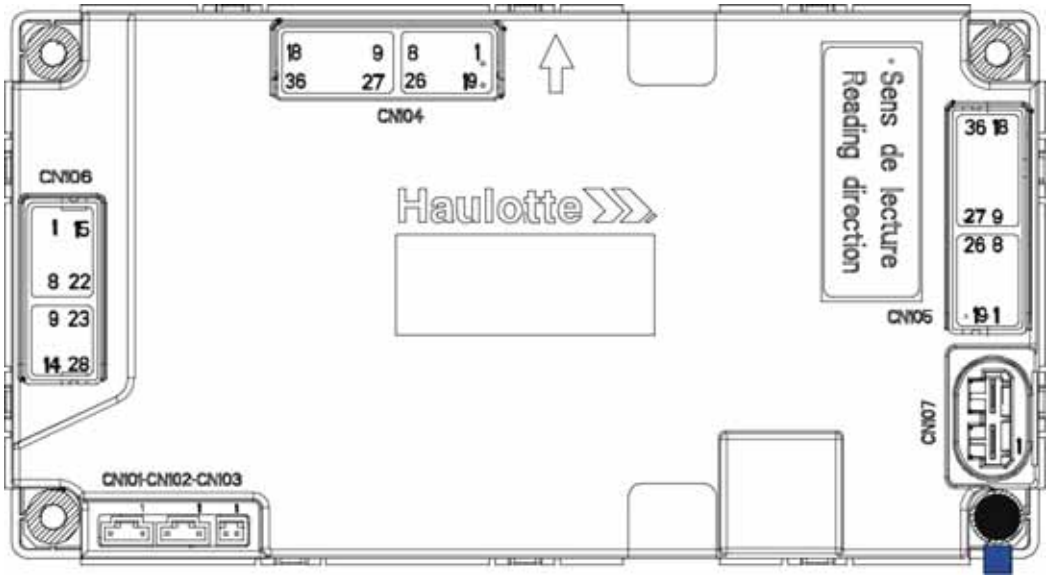
For all these outputs, at OFF state, the module detects an open circuit but the software ignores this information and drives the outputs (Example below with YV800 valve).



2.1.1.2 - U104 node B2 slave

This slave module is located inside the upper control box.



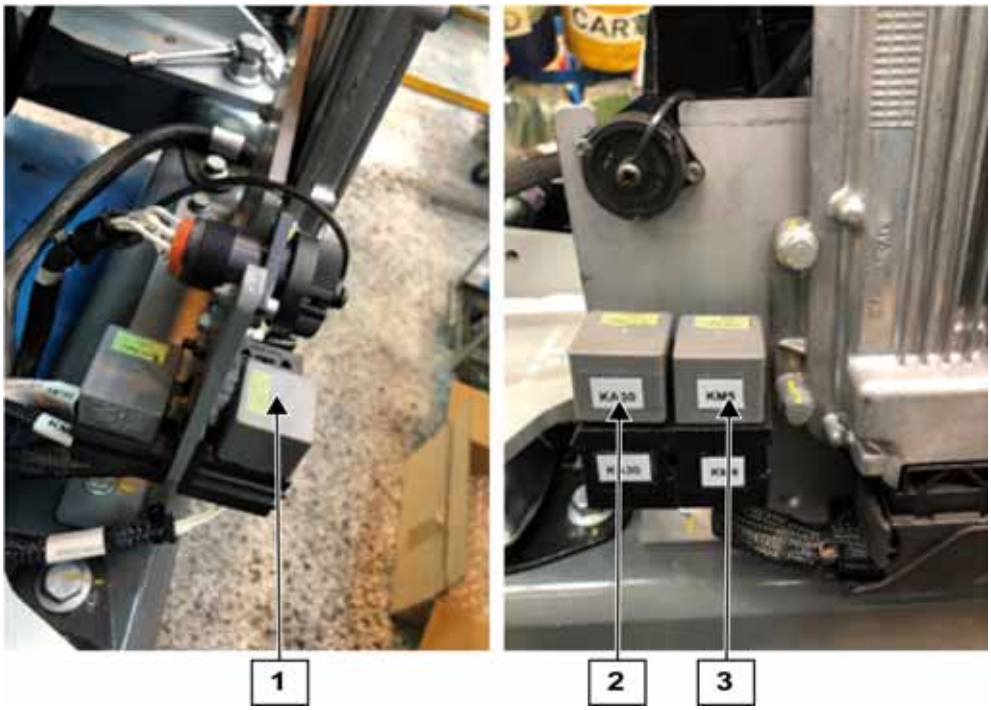


2.1.1.3 - EDC Deutz module (for TIER IV)

This module called EDC is located in turret and controls all engine actuators (rpm/temperature).

2.1.1.4 - EDC Deutz module (for STAGE V)

Location of components and EDC module for STAGE V engine



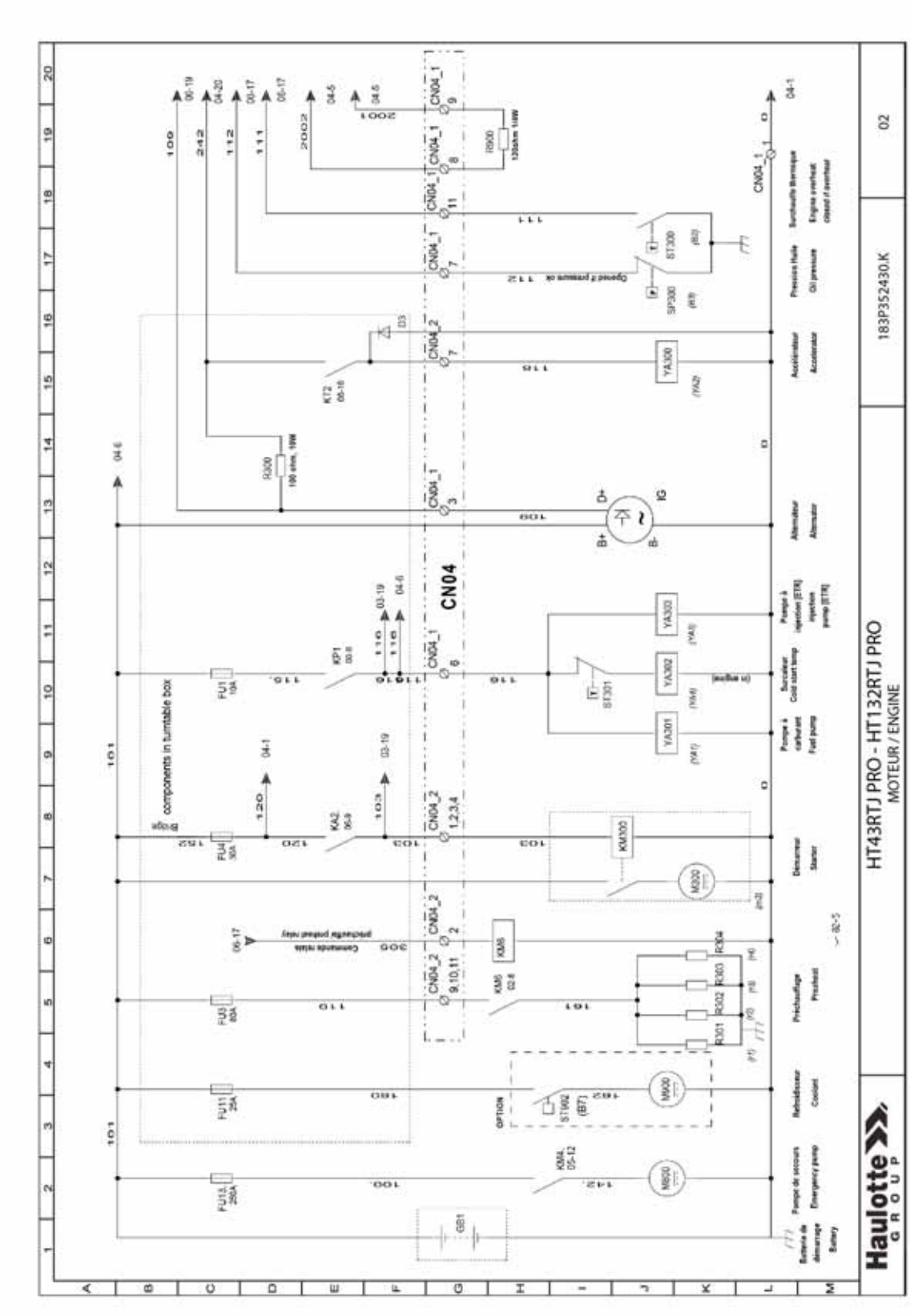
Marking	Name	Description
1	KA15	Start relay
2	KA30	Fuel pump relay
3	KM6	Preheating relay

2.2 - HYDRAULIC CIRCUIT

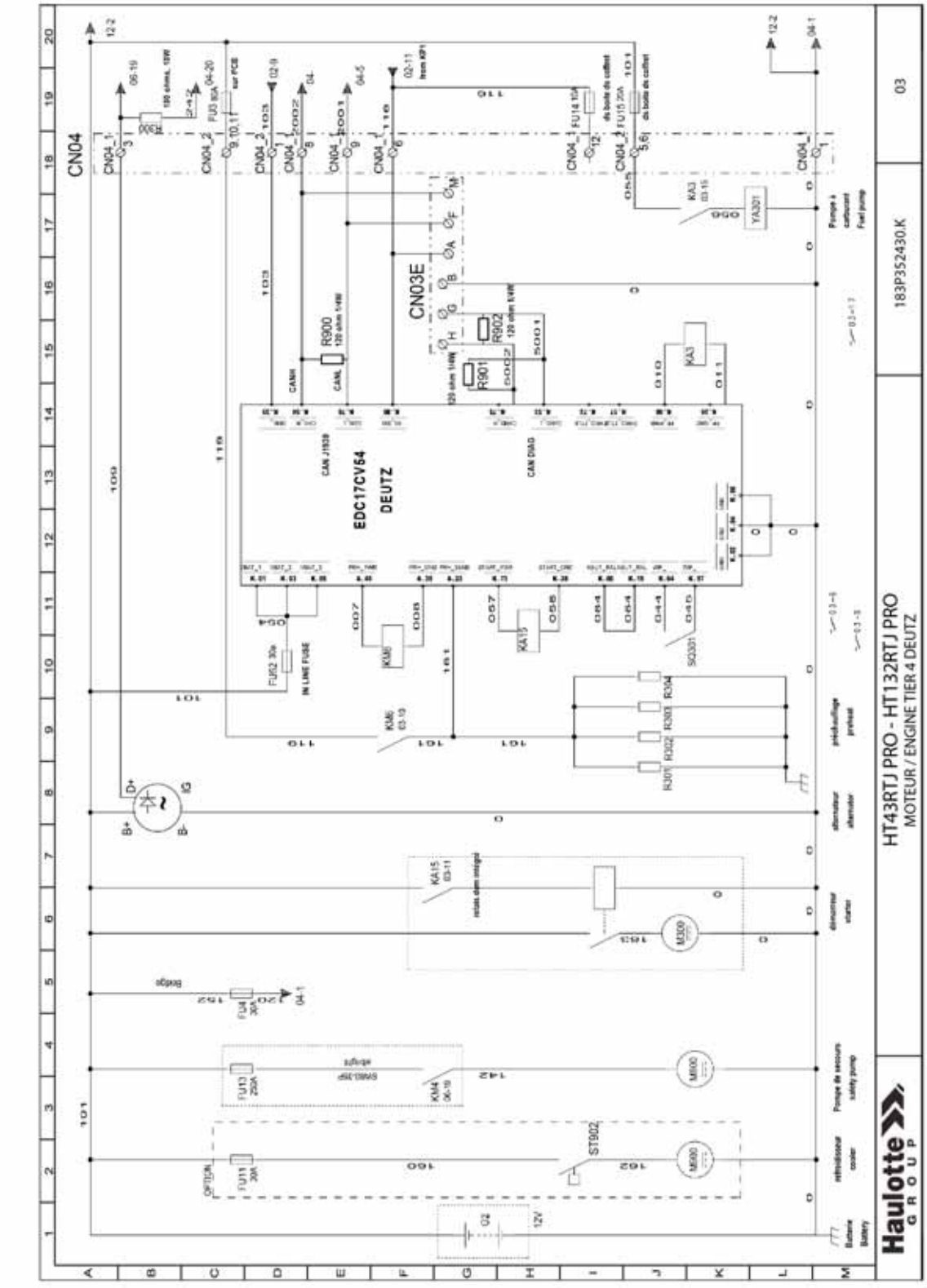
Refer to Section E 4 - Hydraulic diagram

3 - Electric diagram

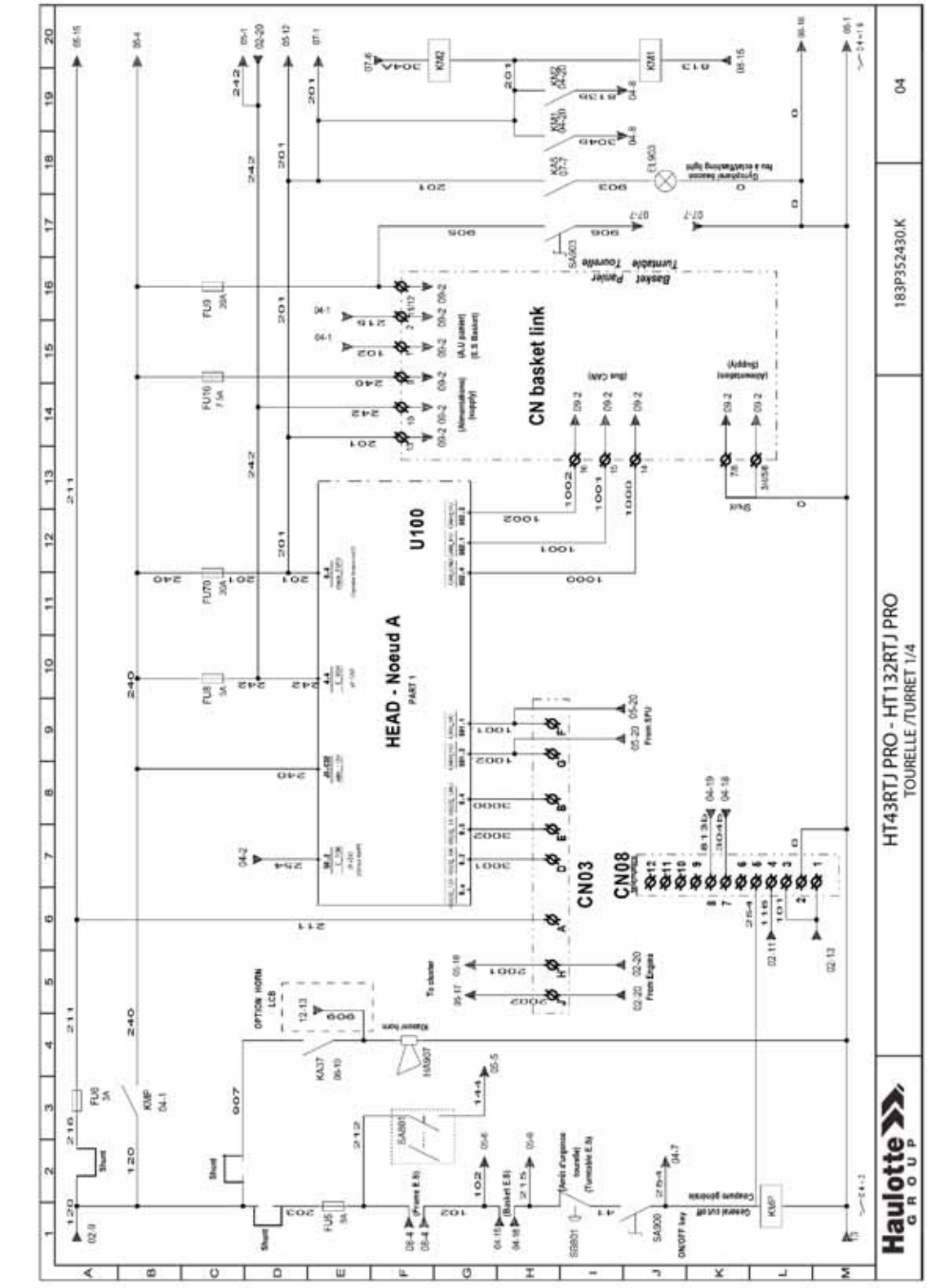
Engine — TIER3 PERKINS



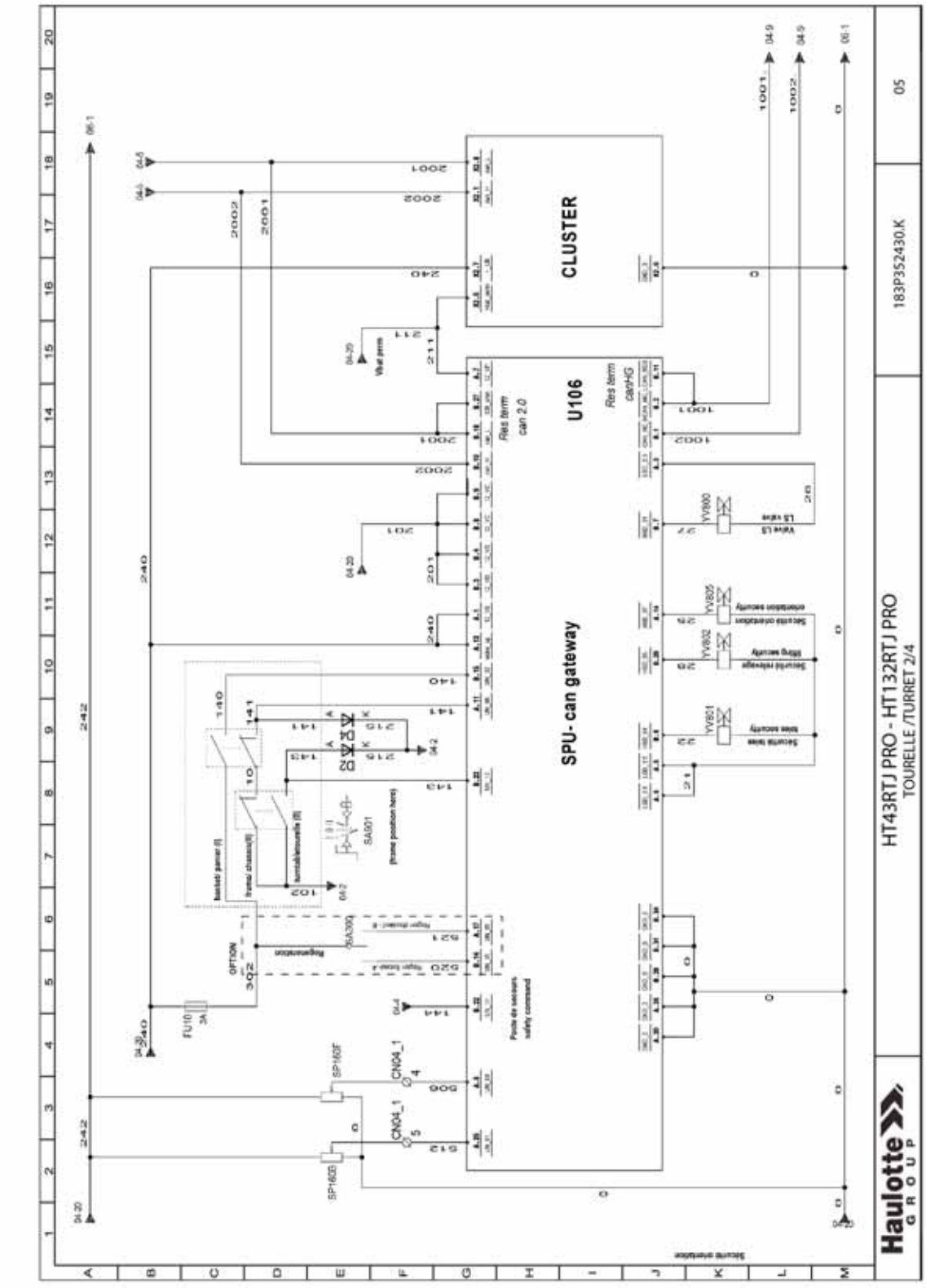
Engine — TIER4 DEUTZ



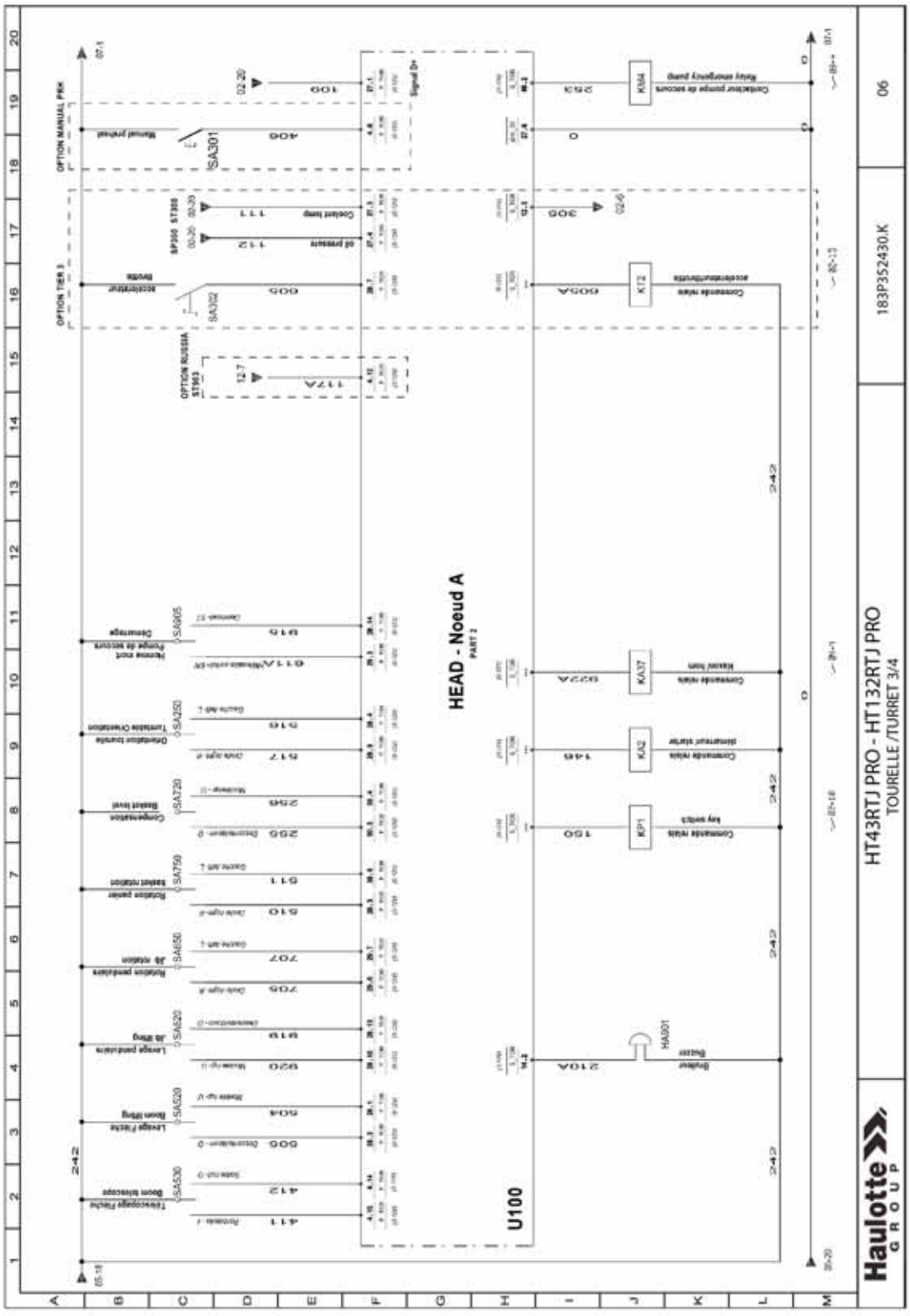
Turntable — 1/4



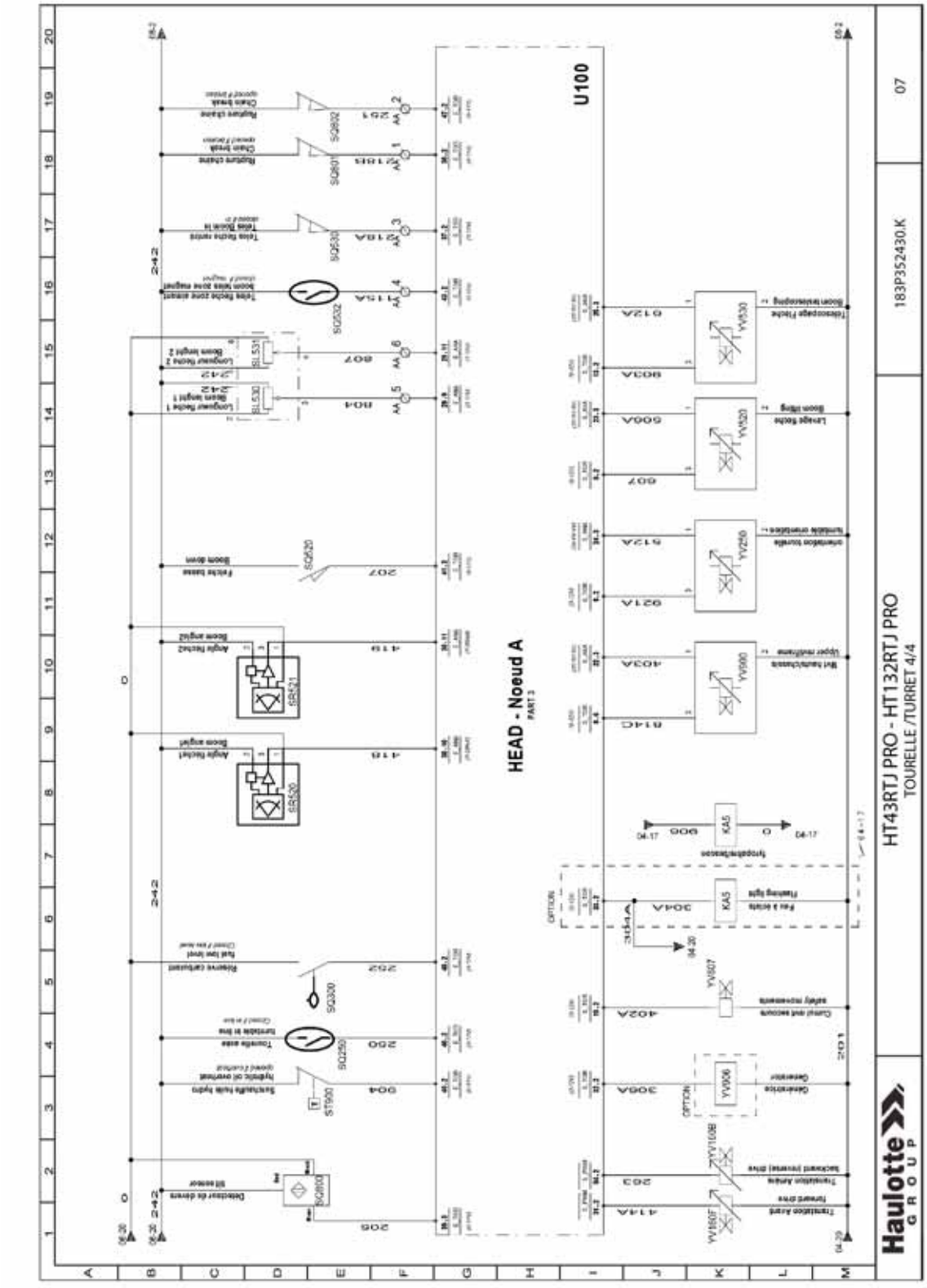
Turntable — 2/4



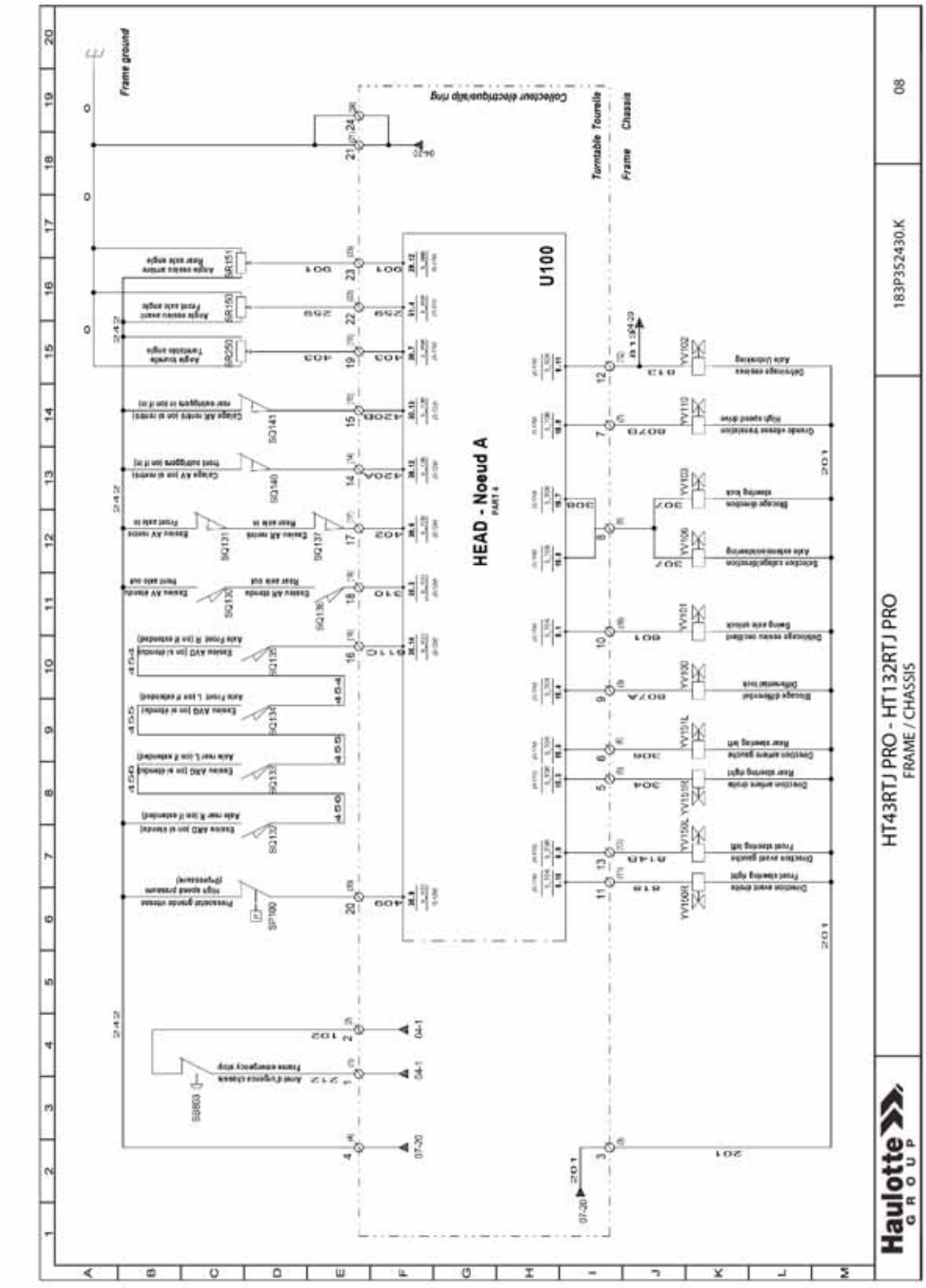
Turntable — 3/4



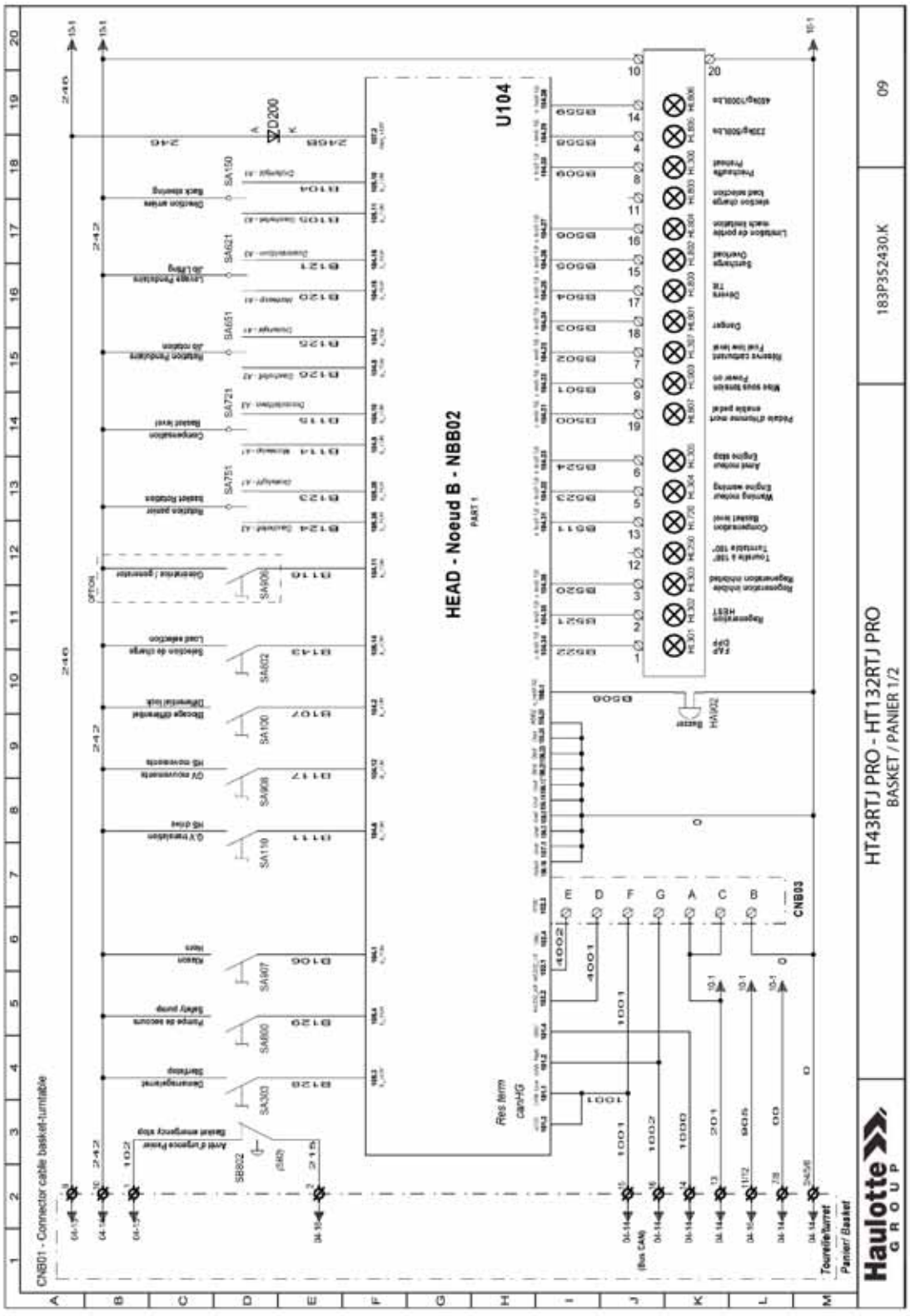
Turntable — 4/4



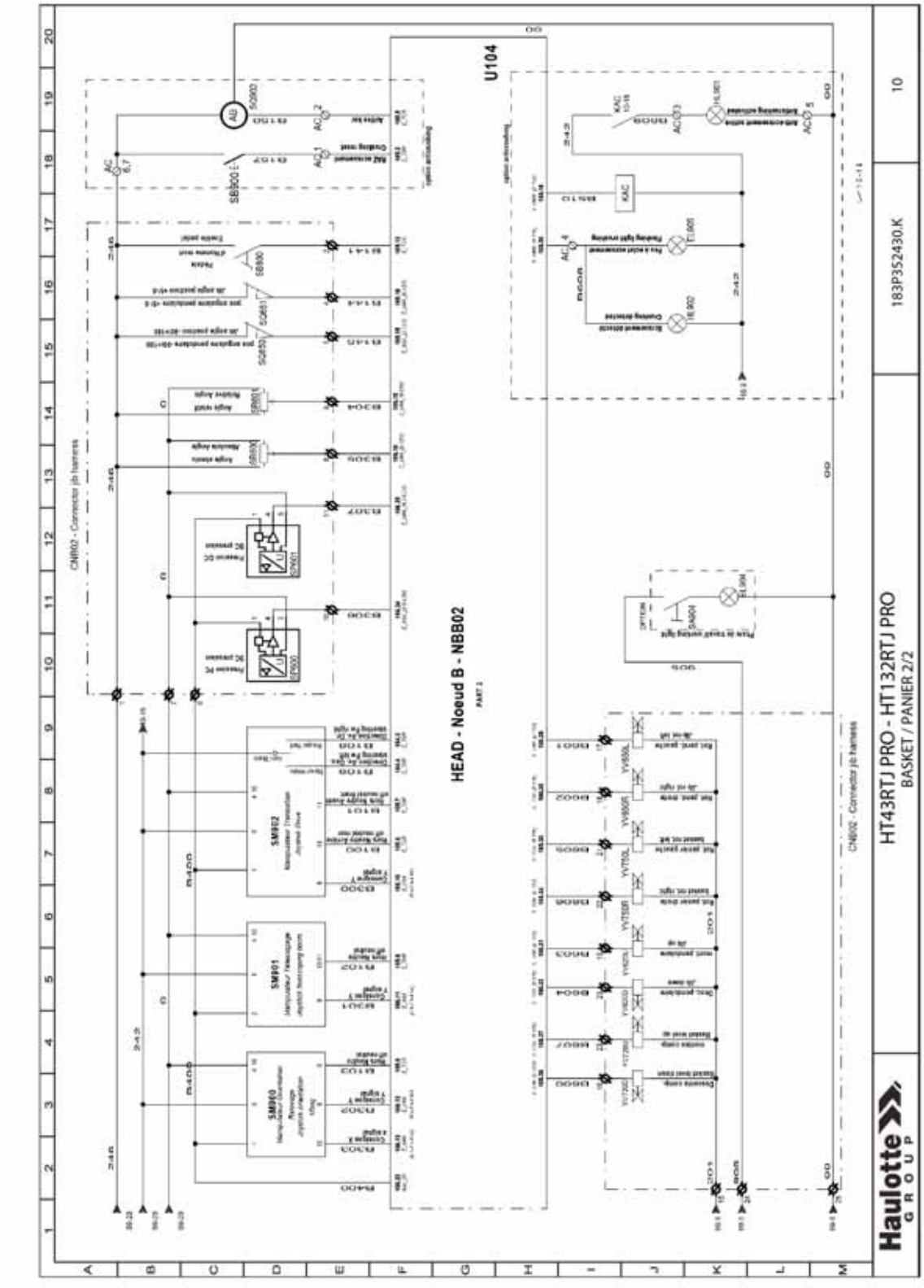
Chassis


HEAD - Noeud A
PART 4
U100
Frame ground
Collecteur électrique/slip ring
Turntable
Tourelle
Frame
Chassis
08
183P352430.K
HT43RTJ PRO - HT132RTJ PRO
FRAME / CHASSIS
Haulotte GROUP

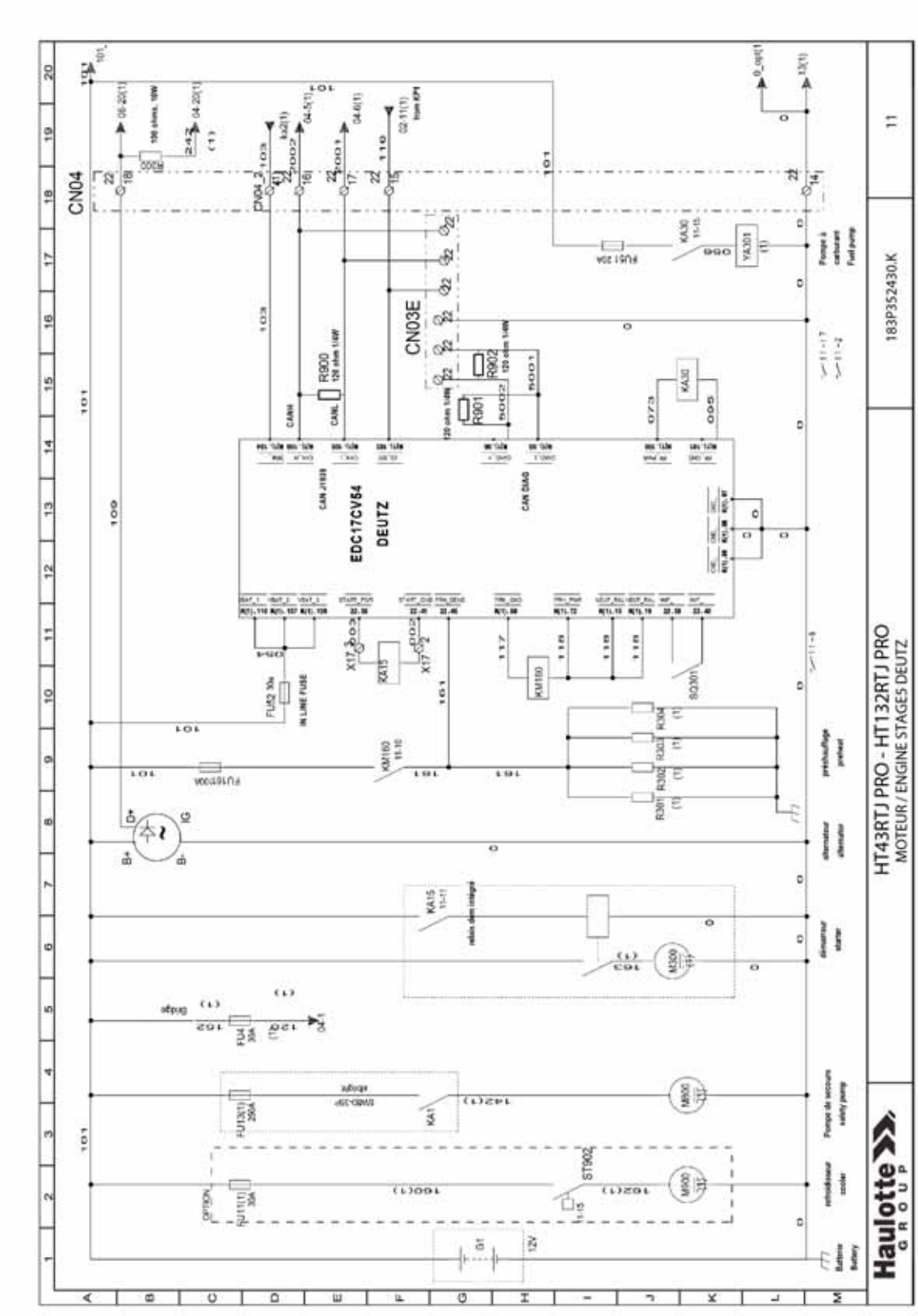
Platform — 1/2


HEAD - Noeud B - NBB02
PART 1
U104
HT43RTJ PRO - HT132RTJ PRO
BASKET / PANIER 1/2
183P352430.K
09
Haulotte GROUP
CNB01 - Connector cable basket-turntable
CNB03
Panier/ Basket
Tourelle/turret

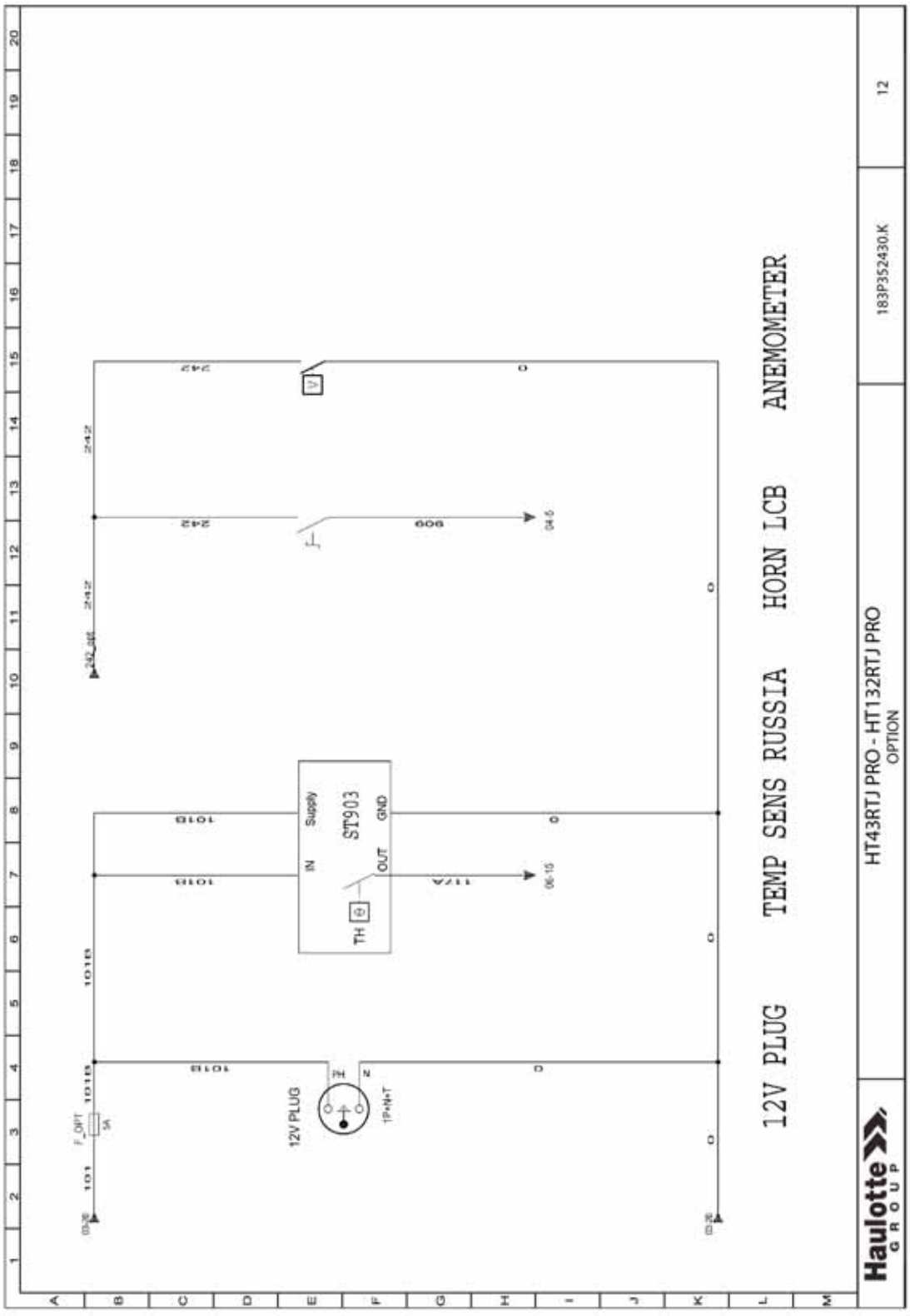
Platform — 2/2


HEAD - Noeud B - NBB02
U104
HT43RTJ PRO - HT132RTJ PRO
BASKET / PANIER 2/2
183P352430.K
10
Haulotte GROUP

STAGE5 DEUTZ Engine

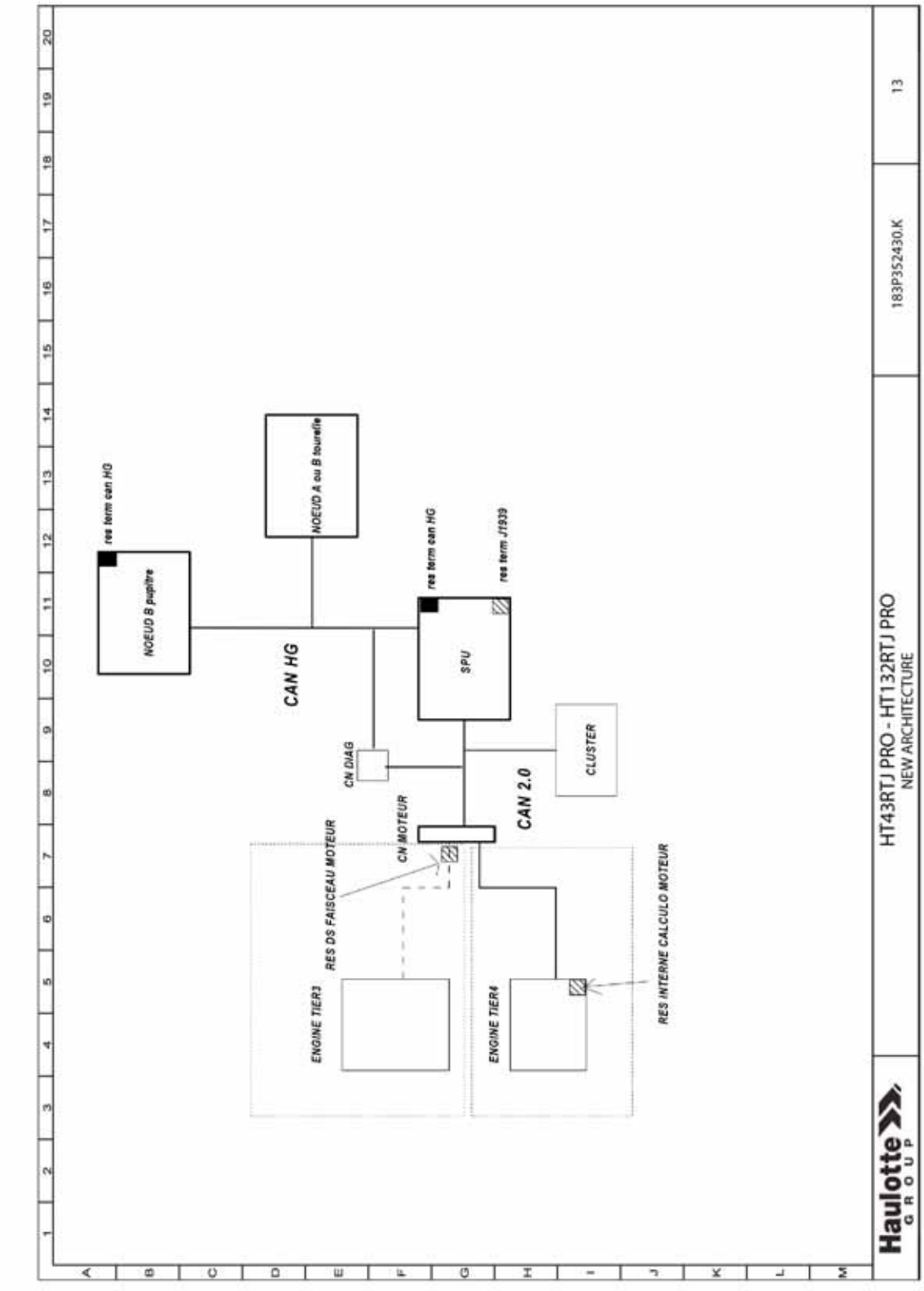


Option


12V PLUG
TEMP SENS RUSSIA
HORN LCB
ANEMOMETER
ST903
Supply
GND
IN
OUT
TH
12V PLUG
1P+N+T
F_OPT
5A
HT43RTJ PRO - HT132RTJ PRO
OPTION
183P352430.K
12
Haulotte GROUP

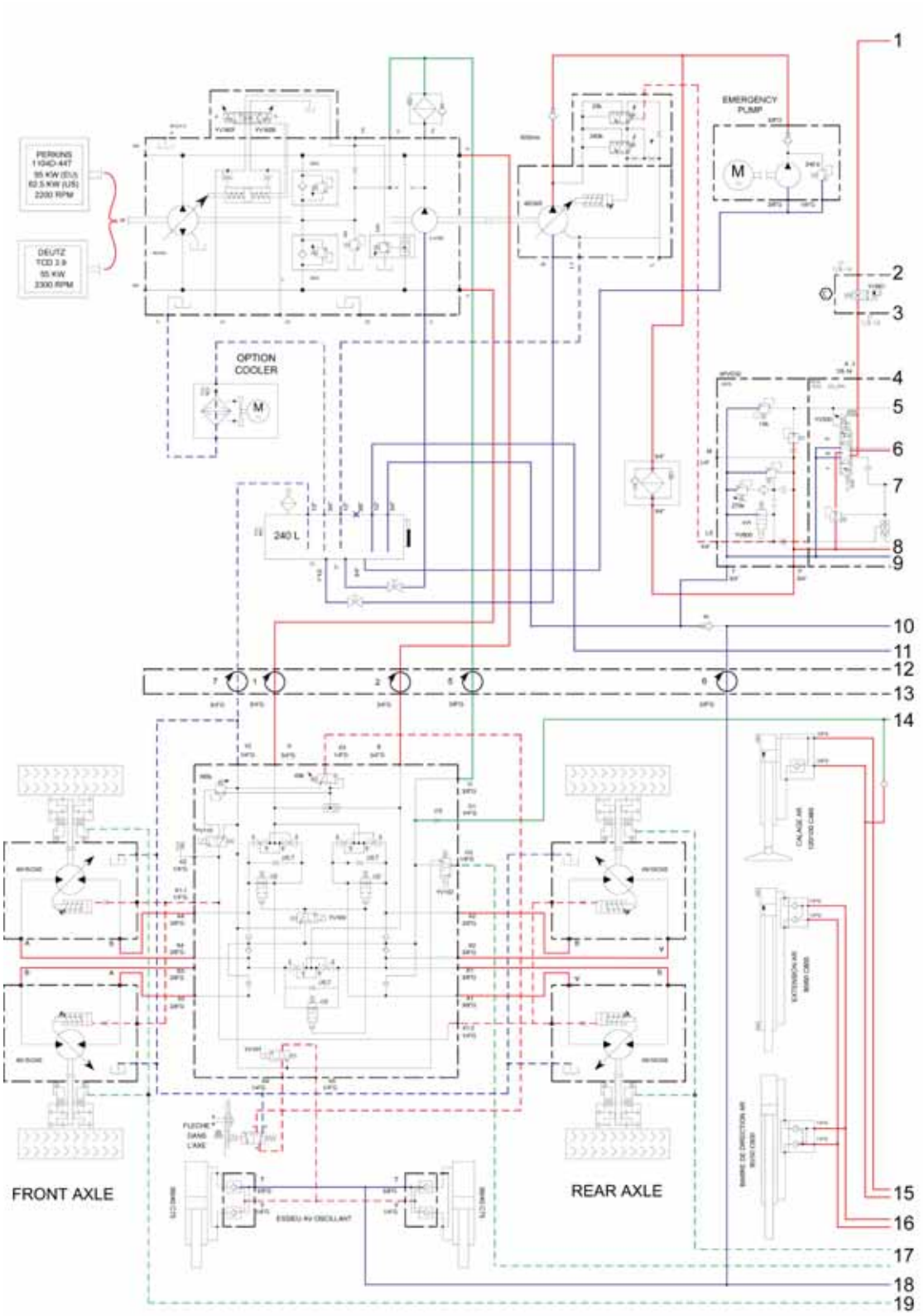
E - Trouble shooting and diagram

New architecture

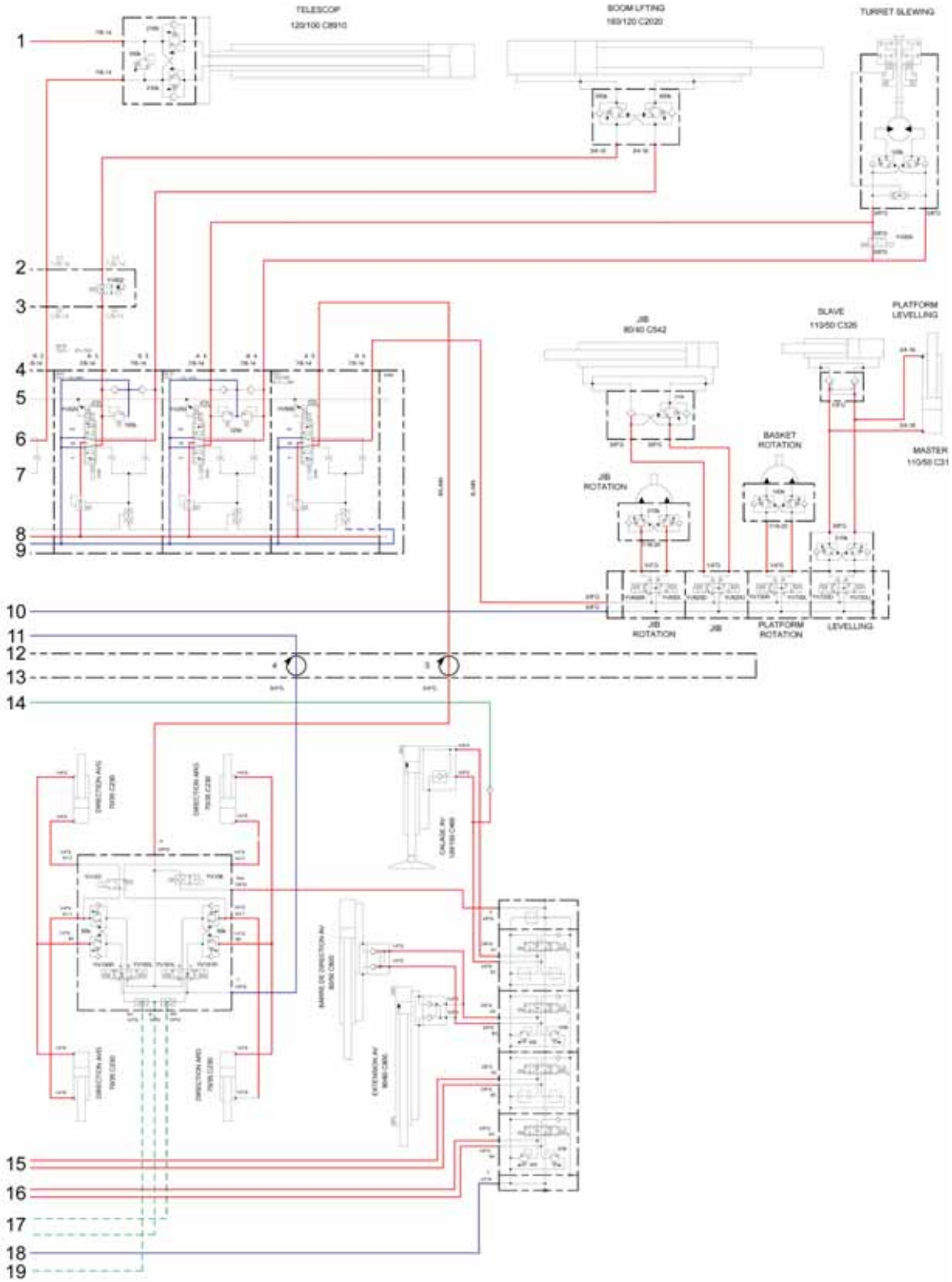


4 - Hydraulic diagram

183P344550C - 1/2



183P344550C - 2/2



Notes

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