



SAMPO ROSENLEW



HR 46

Harvester

instruction manual

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10/2013
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Englanti

Introduction

The purpose of this book is to familiarize the operator with the forest harvester. It is of utmost importance that the operator becomes familiar with the structures, adjustments and maintenance of his harvester. Compliance with the advice and instructions given in this manual guarantees the best results at the lowest costs.

This manual provides descriptions of as well as operating and maintenance instructions for the forest harvester. The other manuals you will find useful when using and servicing your forest harvester include the instructions and spare parts catalogue for the harvester head, the instructions for the harvesting computer, the instructions for the crane, the instructions for the base machine control system as well as the engine manual and the spare parts catalogue.

Have these manuals always in the cab, in the special pocket reserved for them, for convenient reference. If, for some reason, they are not supplied together with the harvester, send immediately for new manuals.

Item "Technical Specifications" has a description of all the features of the forest harvester in accordance with the delivery contract. It does, however, not include retro-fitted accessories.

The Manufacturer reserves the right to modify the structure, adjustments or accessories of the harvester as well as the service and maintenance instructions without further notice.

Sampo Rosenlew Ltd

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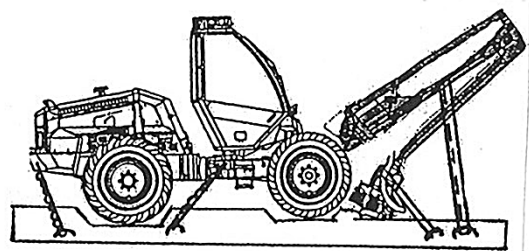
Safety precautions

Read carefully these instructions on safety and use before starting to operate the harvester. The time spent becoming familiar with the instructions now will save you money or may even spare you from injury.

Before accepting the delivery of the harvester, make sure it conforms to the delivery contract. Do not fit the harvester with any accessories not approved of by the Manufacturer. The Manufacturer of the forest harvester is not responsible for any damage or injury caused by such accessories either to people or property. If any information provided in this manual contradicts the laws and regulation of the country in which the harvester is used, local regulations are to be followed.

1. Transportation on a vehicle or by rail

Make sure you know the measurements and weights of the harvester and the transporter. Comply with any regulations concerning transportation. Use increased tyre pressure, minimum of 3 bar, to improve stability. Fix the harvester securely to the transporter. For road transport lower the crane fully and fix it to the transporter.



Harvester tying

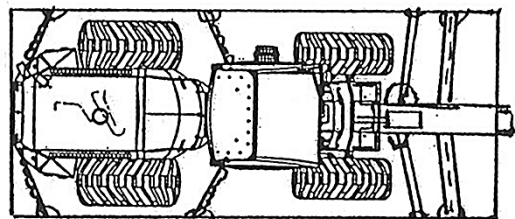
Slow Vehicle sign



2. Driving in traffic

On public roads a transporter shall be used to move the harvester. Remember that the harvester has articulated steering. Test brake functions before driving on the road. Wear the safety belt. Never drive downhill with the gear in neutral. Only shift gear on level ground. Never carry passengers on the harvester. Never use the harvester for transporting goods.

If the harvester fault diagnostics detects a malfunctioning brake or drive pedal, the driver can still drive the harvester in for a service, but at a low speed and with slow crane movements.



Danger zone for Crane and harvester head

60 m

3. Forest harvesting

Get familiar with the structure of the forest harvester by studying the manual before starting harvesting.

Make sure the protective guards are properly attached and in good condition.

Sound the signal to warn people around the harvester before starting the engine.

Never use the forest harvester for anything except harvesting trees.

Manual feeding of trees into the harvester head is forbidden.

Before starting, particularly reversing, make sure that everybody nearby is aware of your intentions.

Fasten the seat belt. This is important, particularly when driving across steep terrain.

Test the brakes as soon as you start, and stop immediately if the brakes or steering operate defectively.

Never adjust the seat or joysticks while driving.

Never leave the cab while the harvester is moving.
Never leave the engine running unattended.
Beware of the crane and the moving parts in the harvester head.

Never saw with the saw guide bar pointing towards the cab. If the saw chain comes loose it is dangerous and may penetrate the window.

In cold weather heat the oil by circulating it through the harvester head, too, at low revolutions and low pressure before starting work.

Drive carefully on hillsides; the harvester may overturn, particularly with the crane on the downhill side.

The forest harvester cab is a safety cab.

The harvester has two exits. The left-side door is the normal exit. The right-hand side window may be used as an emergency exit when the lock has been opened.

Always before getting in the cab, open or ensure from the outside that the lock on the right-side door is unlocked.

When the harvester is in use, the exits must be closed. For safety reasons their construction must not be changed. When driving on frozen rivers or lakes, make sure the ice is strong enough. When driving on ice, keeping doors open helps exiting cabin. In this case beware of tight curves that may cause rear tyre to hit the door

Note the recommended safety distances when harvesting under power lines.

Stop the engine before cleaning or servicing the harvester.

Stop the harvester and the engine immediately if there is an alarm or any abnormal sounds or smells. Find out the reason for them, and solve the problem before carrying on with harvesting.

If there are leaking hydraulic connections, tighten the connections and wipe the oil off the frame and underpan.

Support or lock the crane and the harvester head before going beneath them.

Never clean the harvester without proper equipment.

When leaving the harvester, lower the crane, stop the engine, remove the ignition key, lock the door and turn the master switch to its zero position.

SAFETY DISTANCES WHEN HARVESTING UNDER OPEN-WIRE POWER LINES

The minimum space between the harvester and power lines with voltage must be in accordance with the enclosed illustration, in which the danger zone is darkened.

Low-voltage power lines (230/400V) can be distinguished from high-voltage lines (over 1 kV) by the smaller insulators and the fact that there are usually 4 low-voltage lines. In case the height or voltage of the power line is difficult to estimate, the Electric Company shall be consulted.

In case the height or voltage of the power line is difficult to estimate, the Electric Company shall be consulted.

In case of accident

If there is an accident despite all precautions, keep calm and consider carefully what to do. First try to reverse the harvester away from the power line. If there are other people near, ask them to check that the harvester is not stuck in the line. If the harvester is just leaning against the lines, try to drive it away from them. Follow the advice from the people nearby. Due to their own safety, they shall stay a minimum of 20 metres away from the harvester touching the power line.

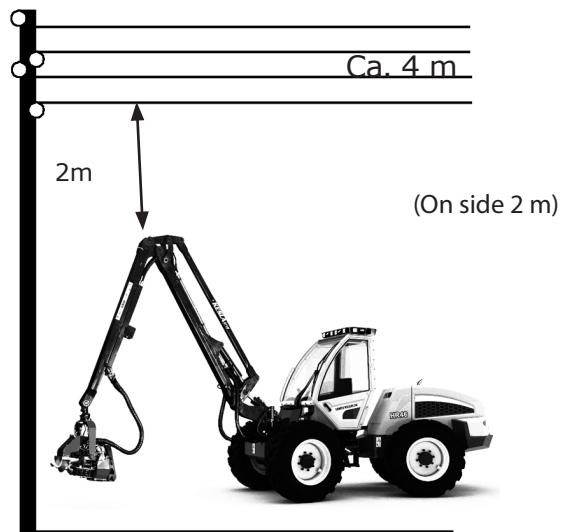
If the harvester cannot be driven off, and you have to leave the machine, jump down with your feet together in order not to touch the harvester and the ground simultaneously. Do not make yourself a conductor through which electricity can pass; the real danger lies in touching the harvester and the ground simultaneously.

Get away from the harvester jumping either with your feet together, or with only one foot on the ground at a time. Otherwise the electric field on the ground may create a fatal electric current between your legs. You will be safe at a distance of 20 metres from the harvester. Beware of broken power lines lying on the ground.

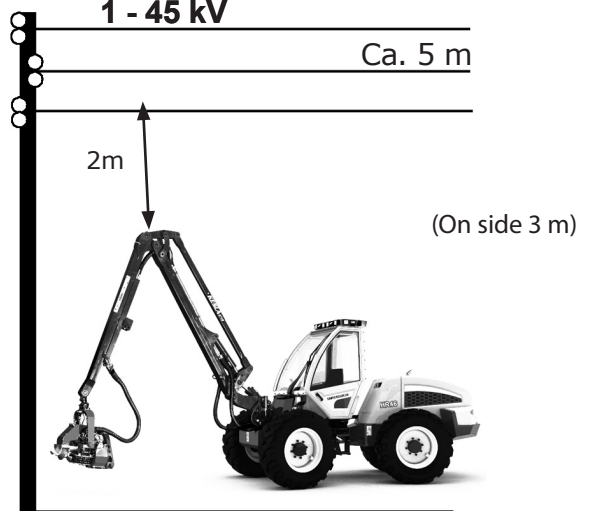
A harvester touching a power line may catch fire. Leave the harvester immediately if smoke starts coming from the tyres.

Make sure the harvester will be guarded at a safe distance. Do not try to get on the harvester even if the power in the power lines may seem to have gone off.

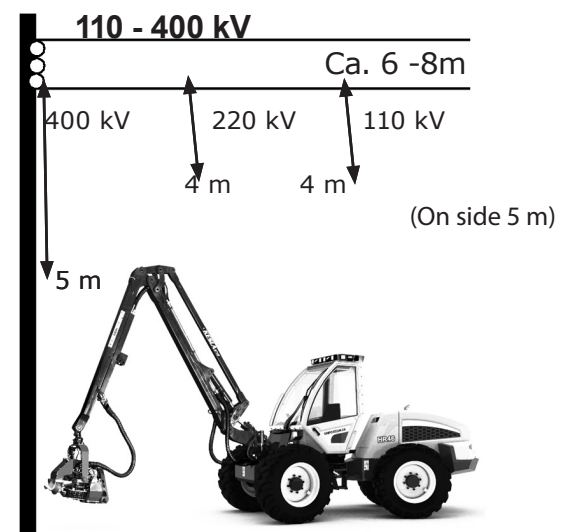
400/230 V



1 - 45 kV



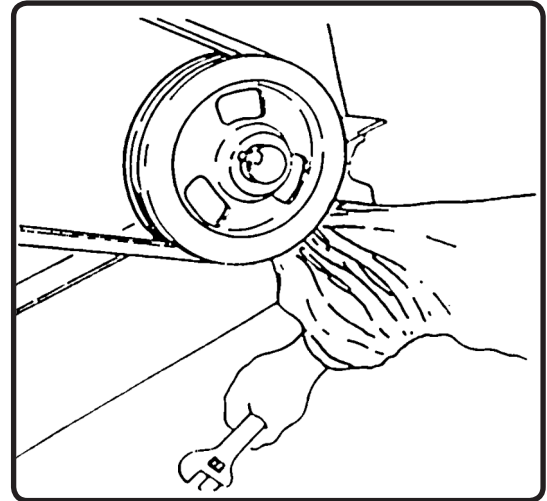
110 - 400 kV



Remember that open-wire lines never have a "blown fuse", but they are always dangerous unless made dead by an electrician. Even if the power went off, it might come back on in a while due to technical reasons. This may be repeated several times.

Contact the Electric Company and inform them about the exact site of the accident. By doing this, any risk can be eliminated and the fault repaired. Ask the Electric Company for advice and follow it. Inform them about any contact with power lines even if there was no actual damage.

Source: Koneviesti Magazine 15/87



4. Repair and service

Always keep the harvester in good condition. Check the condition of fast moving parts daily. Pay special attention to the transmission mechanism and the rotating parts in the harvester head. Replace defective parts before they become dangerous.

Clean, repair and service the harvester with the transmission and engine off, the ignition key off the ignition switch and main switch off.

The harvester head has many danger points. Read the harvester head manual to familiarize yourself with them. On some models turning of the measuring wheel by hand makes the knives, tracks and rolls close. This is extremely dangerous if the engine is running or there is pressure in the hydraulic accumulator of the harvester head. Do not go near the harvester head, particularly the knives, tracks and rolls, with the engine running.

Before welding, disconnect the battery cables, input cable of the diesel engine control unit (the left hand side cable under the cover of the control unit attached to the engine), all the cables to the PC processor, the cables of the measuring device head module (MCC) and the cab MCI module, connector of the large wiring harness between the frames, the two large connectors positioned on the rear frame that connect the frames and the central unit cables of the optional fire extinguishing system.

Always have the earth cable of the welding set near where welding is done.

Do not use inappropriate tools to connect and disconnect the battery.

Do not make an open fire or smoke near the battery.

Handle the battery acids with care.

Do not add air in the tyres without a pressure gauge due to risk of explosion.

Do not add coolant with the engine running.

Do not remove the radiator cap from an overheated engine.

Beware of hot surfaces of the engine and exhaust pipe.

Do not refuel with the engine running.

Do not smoke while fuelling.

Do not adjust the hydraulic working pressure without a pressure gauge due to possible injury and damage to the components.

When servicing the hydraulics, be aware of the high pressure in the system. Make sure there is no pressure in the system, not in the head pressure accumulator, either, before disconnecting the connectors.

Never use over-sized fuses; they involve risk of accident.

Never start the harvester with anything but the ignition key.

When refitting a wheel, tighten the fixing screws to the correct torque. Switching on the diesel engine is allowed only when the hub is connected to the motor. Do not make any such structural changes or additions to the harvester that would make it less safe.

Tow the harvester only from designated points.

5. Local laws and regulations

Forest harvester is a complex device, and dangerous if misused. User manual must always be preserved with the machine at the place reserved for it and if needed, new drivers should be instructed to operate the machine. Different countries have different safety at work and traffic regulations. Get to know the existing regulations of your area.



This symbol in The manual refers to a special risk involved in taking a certain measure, due to which extra caution shall be practised.

6. Fire safety

Two factors are needed to start a fire: flammable material and ignition. Oxygen is always available. In the forest highly flammable dust accumulates in and on the harvester. Clean the harvester periodically. Oil and fuel leaks also increase the risk of fire. Repair any detected defects immediately. The engine and the exhaust pipes, the electric system in case of a short circuit and overheated brakes pose a real risk of fire.

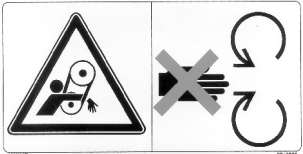
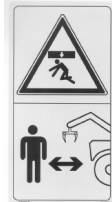
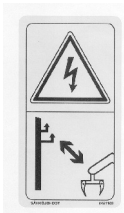
The harvester comes with two 6-kilo hand extinguishers. They are stored above the rear wheel inside the side guard that opens rearwards. The extinguishers shall be inspected every 6 months by an authorized service outlet.

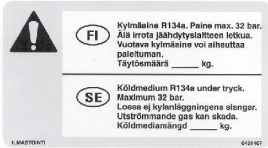
The harvester may be equipped with a semi-automatic fire extinguishing system. Make sure to comply with the manufacturer's instructions when using the system.

Marking of danger points

Although an effort has been made to build the forest harvester as safe to use as possible, there are certain risks involved in its use. These are to be kept in mind when operating the harvester. The danger points have been marked on the harvester using danger symbols. On the following page you will find the key to these symbols. The danger symbols are based on the international ISO 11 684 standard.

Danger symbols

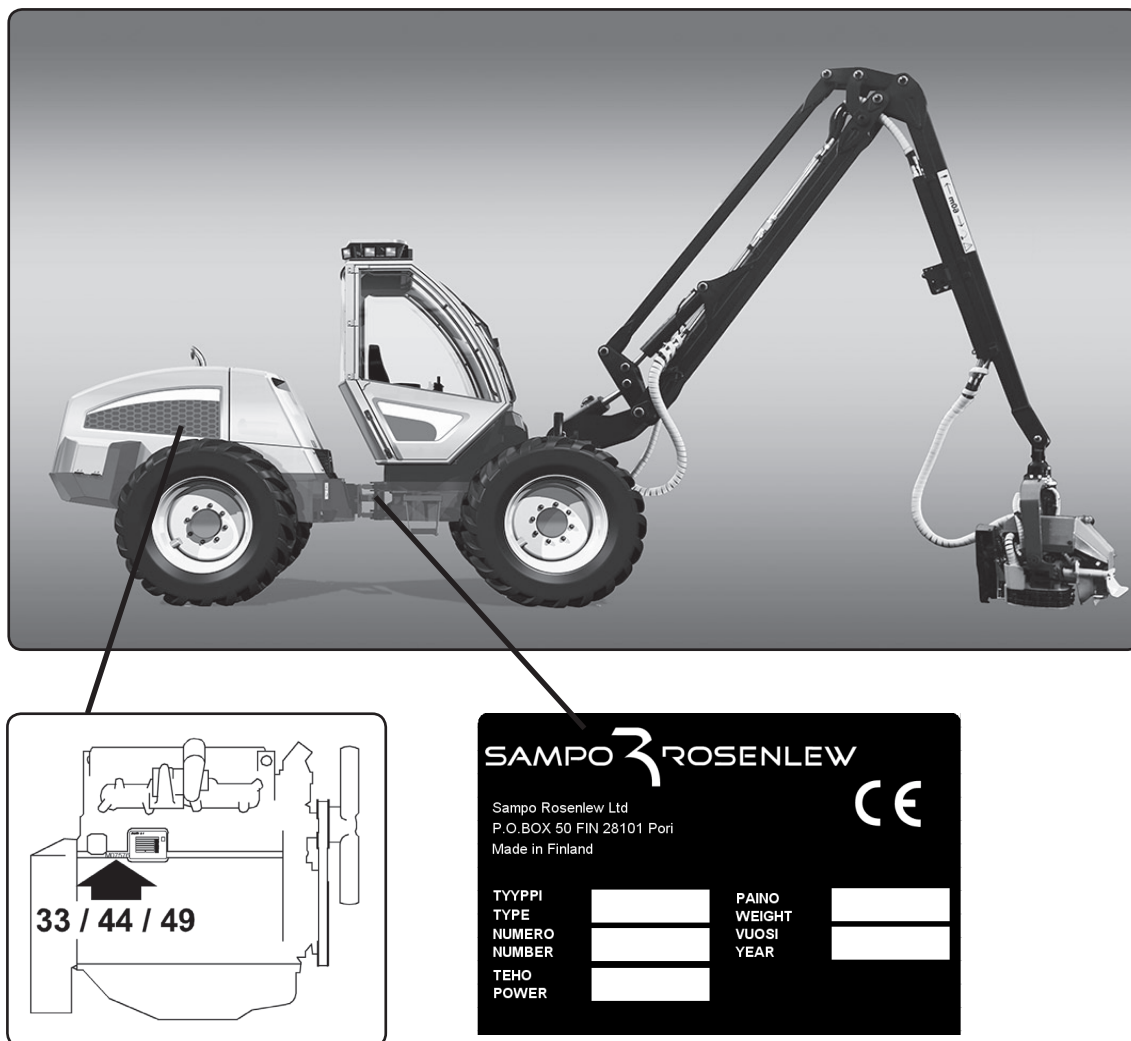
Danger	To avoid danger	Symbol
Subject to danger due to insufficient information	Read the manual before starting the harvester	
A raised part may fall down	Support raised parts before going under them	
Gap in belt drive	Stop the engine and remove the ignition key before removing any guards	
Getting entangled in moving parts	Keep at a safe distance from jointed components	
Falling of the machine or of objects handled with it	Keep at a safe distance from the harvester, the crane, the head and the wood handled	
Electric shock	Keep at a safe distance from power lines. See the safety distances above	

Danger	To avoid danger	Symbol
Fire	In case of fire: - turn off the engine - turn off the main power - extinguish the fire - get help if necessary	
Fire	Extinguish the fire with the fire extinguisher stored under the guard marked with this sticker.	
Service measures	Before starting of service: - turn off the engine - turn off the main power - when servicing the harvester head, remove pressure from the pressure accumulator as instructed	
Safety belt not worn	Always wear a properly adjusted safety belt while working and driving on the road	
Normal exit not available	Open the handle on the right-hand door and exit through the open door Before starting work make sure that emergency exit is unlocked also from the outside.	
Pressurized oil spray	Before disconnecting hydraulic connections, let the pressure off the pressurized oil tank by opening the breather filter with a gloved hand while keeping your face far from the breather.	
Refrigerant	Leaking refrigerant may cause frostbite	

Type marking

When ordering spare parts or service, always quote the type marking and number shown on the machine plate. When ordering engine parts, also quote the engine number.

Write down the serial numbers of the forest harvester and engine on this page (and in the spare parts list).



Fill in the serial numbers of the crane and the harvester head

Engine number

Note! Left side of the forest harvester = The side of the cab with the stairs
Right side of the forest harvester = The side with the side instrument panel

Technical specifications

The base forest harvester with articulated steering includes: the cab, valves, and crane on the front frame, the engine, pumps and tanks on the rear frame.

Weight	Weight approx. 8000-9500 kg
Maximum permissible weight (ROPS)	10000 kg
Main Dimensions	
Length without crane	4.9 m
Width	2.1 – 32,3 m
Height in transport position	3.14m
Ground clearance	0.65 m
Engine	Agcosisudiesel 44 CTA
- power	84 kW/2200 rpm
- fuel tank	135 l
Transmission	
Traction hydraulics pump	123 l / min & 420 bar
Rear wheels with hub motors	3150 /1575 cc
Three speed ranges forward and backward	Slow 0-3km/h, Fast 0-6km/h, Front Wheel Drive 0-12km/h
Electrically controlled flow divider valve, continuous traction control	
Tyres	
Front	500/60-26.5, 500/65R28, 540/65R28, 600/55-26.5, 650/60-26.5
Rear	500/60-26.5, 500/65R28, 540/65R28, 600/55-26.5, 650/60-26.5
Hydraulic system	
Pump in working hydraulics	300 l/min, 230 bar
Load sensing, programmable electric joystick control (IQAN-Design)	
Oil tank	110 l
Electric system	
Voltage	24 V
Battery	2 x 145 Ah
Charging generator	100 A
Working lights	19
Crane	Kesla H671
Operating range	7,13m
Lifting capacity (gross)	55 kNm
Crane weight	1200 kg
Harvesterhead e.g. Keto: 51, 51 Supreme, 51 EcoSupreme, 55 Supreme, Kesla 18RH, Nisula 400H	
	3-hose hydraulic system
Max. delimbing diameter	420 mm
Weight	500-550 kg
Brakes	
Negative multi-disc brakes	
Cab	Quiet safety cab (FOPS, ROPS, OPS)
Noise level	< 71 dB (A)
Windows	Lexan Margard polycarbonate
Harvesting computer	Motomit IT / PC

Certificate on conformity to the EU directives

CERTIFICATE ON CONFORMITY TO THE EU DIRECTIVES

Manufacturer

Sampo-Rosenlew Ltd
Konepajanranta 2A, P.O.Box 50
28101 Pori Finland

Collector of technical spec:

Jari Karén
Address:
Sampo-Rosenlew Ltd
Konepajanranta 2A, P.O.Box 50
28101 Pori Finland

Description of the machine: Forest harvester **HR46**

- complies with the machinery directives (2006/42/EC) and requirements of the national regulations set into force by that.
- complies with the requirements specified in the following machinery directives:

97/68EEC directive on diesel engine exhaust fumes

89/336/EEC directive on electro-magnetic compatibility

The machinery has been designed in conformity with the following international standards:

SFS-EN-ISO 12100 Safety of machinery. Basic concepts, general principles for design.

SFS-EN 14861 Forest machinery Self propelled machinery - Safety requirements

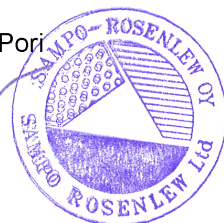
EN-ISO 14982-1998 Electromagnetic compatibility.

Test methods and acceptance criteria.

16.8.2013 Pori



Jari Prihti



Guarantee

Sampo Rosenlew Ltd, later called the Manufacturer, grants a guarantee regarding defects in the material and workmanship.

1. The guarantee period starts as soon as the harvester has been delivered to the customer.
2. The guarantee does not cover:
 - freight and postage costs
 - transport damage
 - damage due to carelessness, misuse or injury
 - damage due to impurities in the hydraulic oil or the use of wrong type of oil
 - damage due to non-compliance with the operating instructions
 - damage due to neglected periodical maintenance procedures
 - damage caused by spare parts not approved of by the Manufacturer
 - damage due to the natural wear of parts; parts and materials likely to show natural wear, such as :
 - rubber hoses
 - light bulbs, sensors
 - chain and guide bar
 - tyres
 - belts and chains
 - windscreen wipers
 - fuel, oil, coolant and brake fluids
 - filter cartridges
 - packing and gaskets
 - electric cables
 - injection nozzles
 - windows and guards made of polycarbonate
 - damage due to measures taken by the purchaser affecting the quality and structure of the harvester. Increasing of the hydraulic working pressure and pressure limits may cause damage;
 - indirect damage, such as
 - loss of output or down time
 - compensation claims submitted by a third party
 - overtime and holiday compensations
 - damage to property caused by the equipment
 - if there is a change in the ownership of the harvester
3. When working in cold conditions, the guarantee is valid only when the outdoor temperature does not drop below -25oC.
4. Any compensation claims under guarantee shall be submitted to the Manufacturer in a complete form within two weeks of the damage.
5. The guarantee compensation is limited, and the Manufacturer shall only replace the defective component unless otherwise agreed with the customer.
6. The components replaced under guarantee are the property of the Manufacturer, and they shall be returned to the Manufacturer upon request. Otherwise they shall be scrapped.
7. The guarantee on components delivered or repaired during the guarantee period will run out at the same time as the guarantee on the harvester.

Structure and functions of the forest harvester

Structure

The Sampo HR46 forest harvester has been designed to meet the demands set on the first thinning of forest. It is light and easy to handle, small but with a wide operating range. It does not damage standing trees and due to its light weight, it does not cause damage to the roots. HR46 model has increased the efficacy of both work and drive hydraulics while improving fuel economy and ergonomics by reducing recommended diesel RPM.

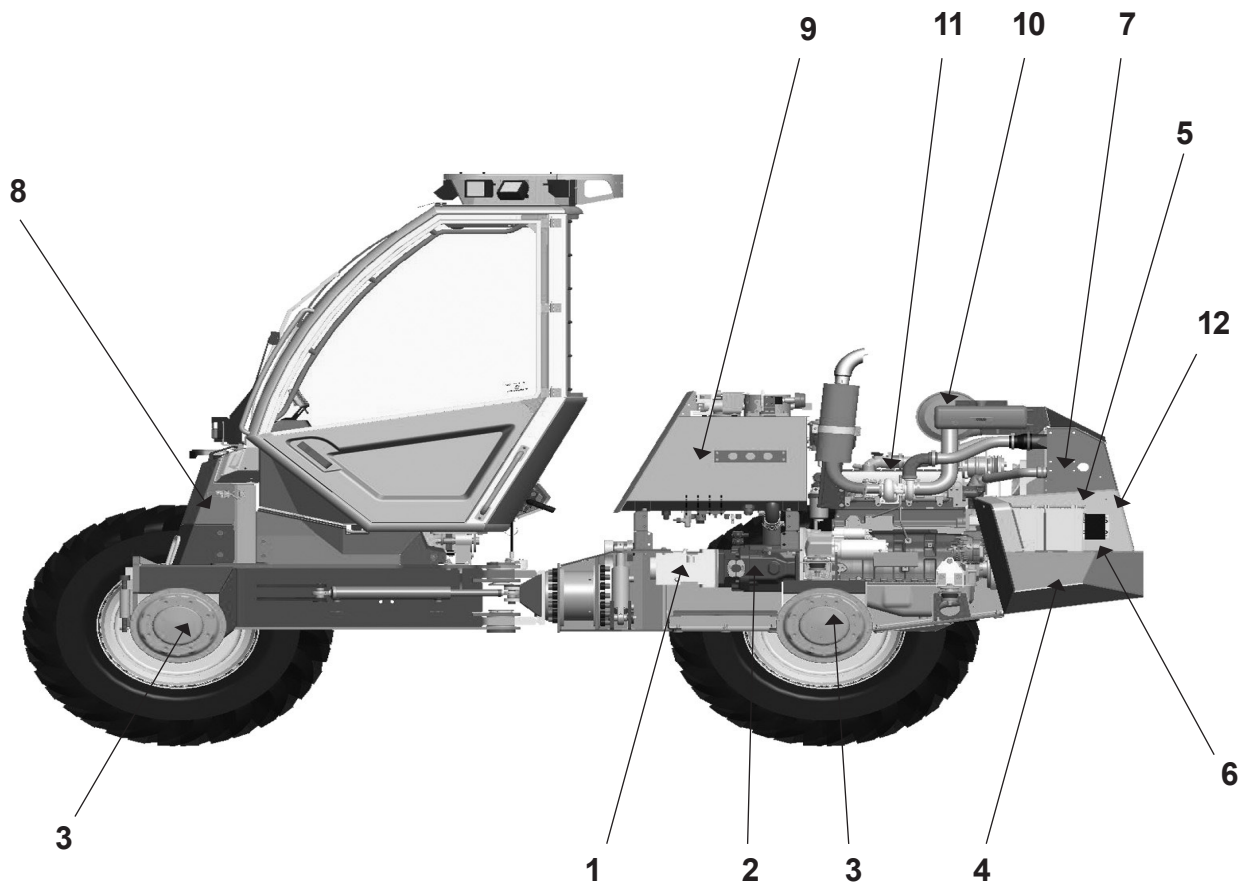
The forest harvester has articulated steering. The crane, gears and cab are located on the front frame. The engine, hydraulic pumps and oil and fuel tanks are located on the rear frame. The harvester is steered and tilted by means of a joint. The weight of the crane, which is the outermost part of the harvester, is low down. Therefore the whole operating range of the harvester can be utilised and it is easy to get close to the trees. A crane that is near and at a low height does not block the view, and its route is visible even when harvesting from the side. The inner rims of both the front and rear tyres go along the same tracks, which means that the harvester is easy to handle even in dense forest as you only need to keep your eye on the front. The harvester is extremely nimble as the turning angle of the frame joint is 50° and the turning radius only 4.0 m. Depending on the tyres, the width varies between 2.5 – 3.0 m. Although the harvester has been designed to be used in first thinning, it also performs efficiently when clearing larger trees off the driving tracks.

Harvester head

The harvester head cuts and fells the tree. After that the tree is delimbed and cut into a pre-set length. When harvesting, make sure the engine revolutions are high enough to produce sufficient working pump output to enable the required work movements. Too high working revolutions are heavy on petrol. The Sampo harvester is supplied with alternative harvester heads. The 3-hose system in hydraulics and the CAN route with its easily detachable connectors used in controlling of the head make it easy to change heads. As a harvesting computer is Motomit IT, and when necessary, an on-board computer with a GPS and a data transfer function can be selected.

For further harvesting instructions, check the user manuals for the harvesting computer and the harvester head.

Cut - away picture of the forest harvester



1. Traction hydraulics pump
2. Working hydraulics pump
3. Hub motor
4. Fuel tank
5. Radiator

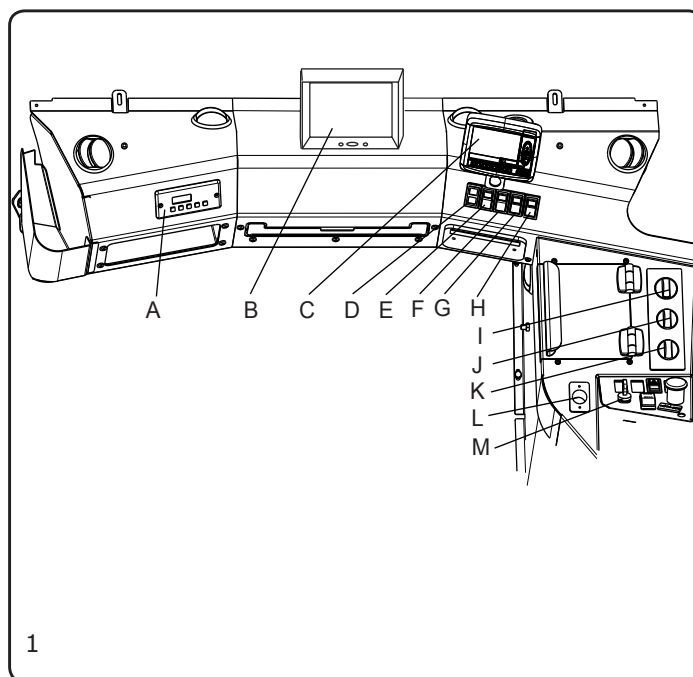
6. Oil cooler
7. Intercooler
8. Hydraulic valve
9. Oil tank
10. Air filter

11. Engine
12. AC condenser

Operator control instruments

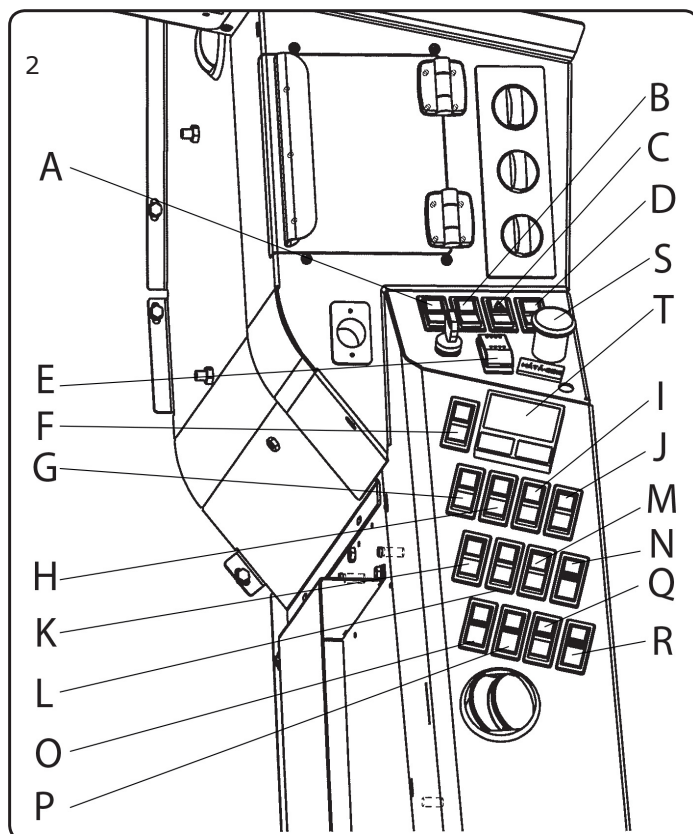
Equipment on the instrument panel (fig. 1)

- A Engine heater display
- B Harvesting computer display
- C IQAN system display
- D Charge indicator light
- E Turning signal
- F Headlights, dipped
- G Headlights, full
- H Emergency light
- I Fan speed regulator
- J AC regulator
- K Heater thermostat
- L Phone outlet
- M Ignition, starter (and electric stop)



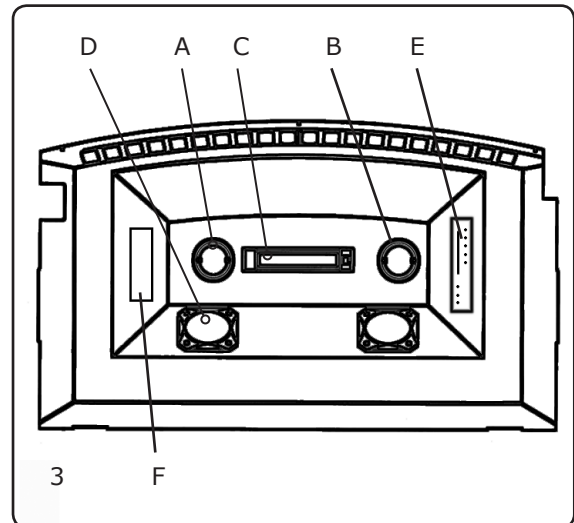
Switches on the instrument panel (fig. 2)

- A Crane automatic stabilization
- B PC
- C Frame lock
- D Brakes
- E Harvesting computer
- F Throttle
- G Emergency light (red)
- H Working lights
- I Working lights + delayed light
- J Seat heating
- K -
- L 4WD
- M Lock (Traction transmission)
- N Sound signal
- O Automatic greasing (optional)
- P Windscreen washer
- Q Windscreen wiper
- R Master switch
- S Emergency stop
- T Measuring device touchpad



Equipment on the ceiling (fig. 3)

- A) Alarm light (yellow)
- B) Fire extinguishing system light (red)
- C) Indoor light
- D) Speaker
- E) Radio
- F) PC



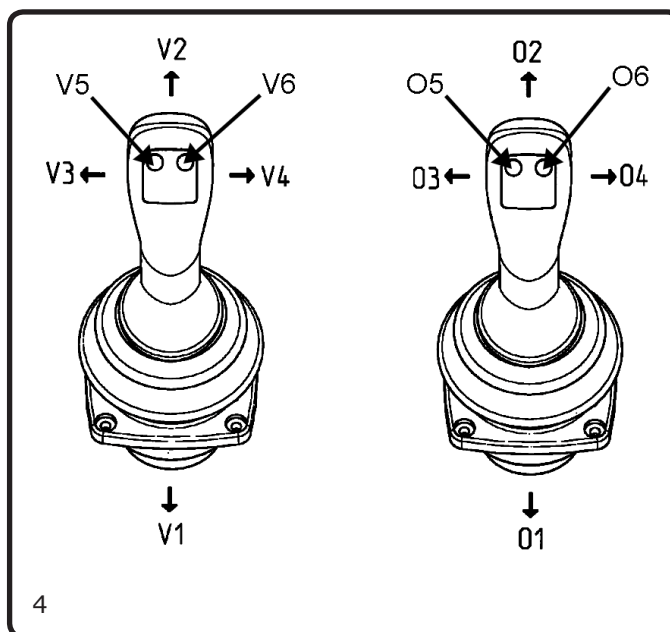
Vertical levers (fig. 4)

Crane control lever, left

- V1 Outer boom inwards
- V2 Outer boom outwards
- V3 Crane turn left
- V4 Crane turn right
- V5 Change gear
- V6 Side tilt automation reset

Crane control lever, right

- O1 Crane lift up
- O2 Crane lowering down
- O3 Frame steering left / rotator turn
- O4 Frame steering right / rotator turn
- O5 Sidetilt left
- O6 Sidetilt right



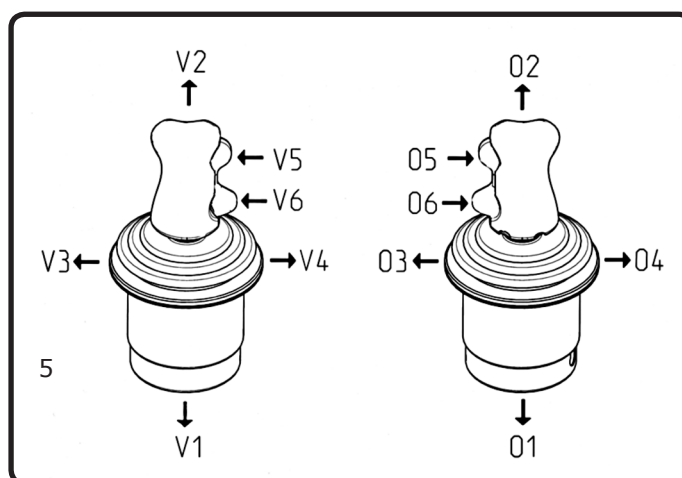
Mini levers (fig.5)

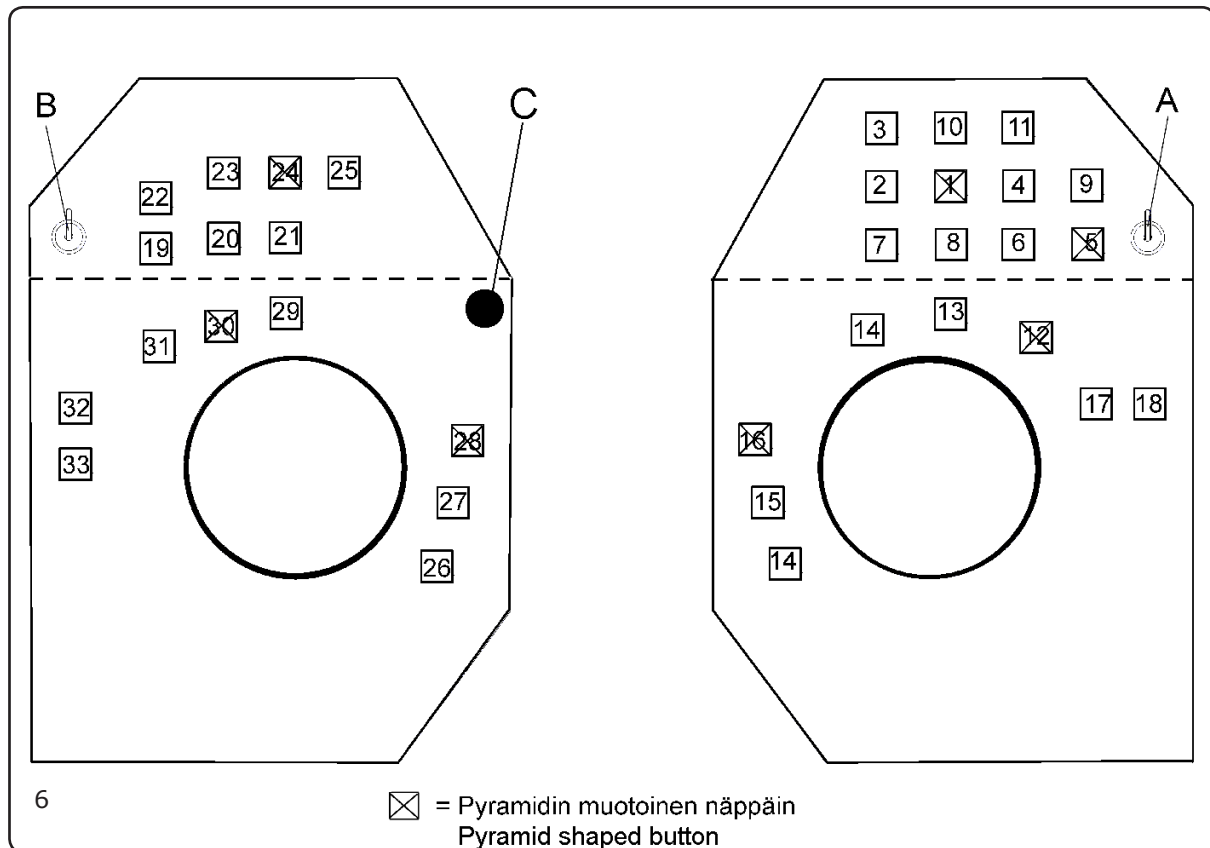
Crane control lever, left

- V1 Outer boom inwards
- V2 Outer boom outwards
- V3 Crane turn left
- V4 Crane turn right
- V5 Sidetilt left
- V6 Sidetilt right

Crane control lever, right

- O1 Crane lift up
- O2 Crane lowering down
- O3 Frame steering left / rotator turn
- O4 Frame steering right / rotator turn
- O5 Head open / up
- O6 Head closed / down





Switches on the push button boards on mini joysticks (fig. 6)

Left-side push button board

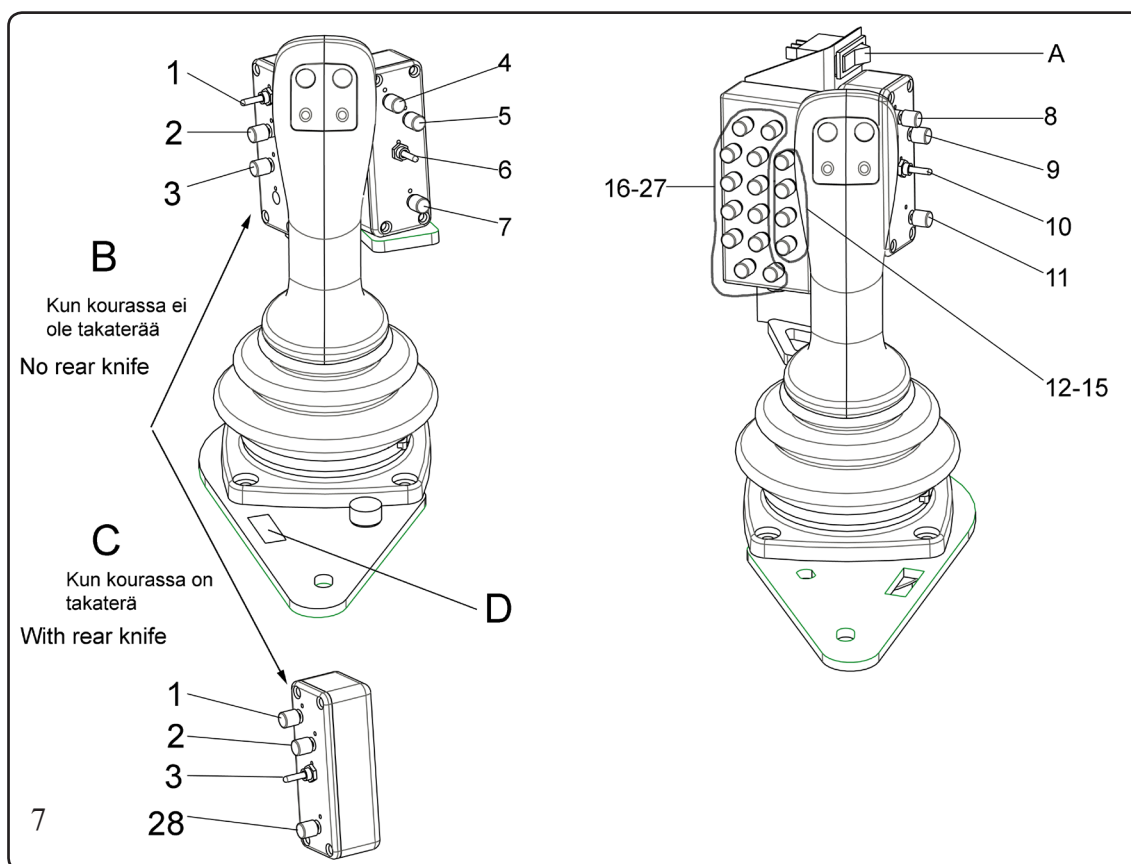
- 19 Programmable (tree species 1)
- 20 Programmable (tree species 2)
- 21 Programmable (color B)
- 22 Programmable (tree species 3)
- 23 Programmable (tree species 4)
- 24 Programmable (color A)
- 25 Programmable (shift)
- 26 Rear knife open
- 27 Tracks / rolls open
- 28 Front knives / knives open
- 29 Speed Range Selection switch
- 30 Tilt up
- 31 Tilt down
- 32 Boom side tilt vertical straightening
- 33 Single wipe
- B Driving direction

Right-side push button board

- 1 Programmable (preset)
- 2 Programmable (preset)
- 3 Programmable (preset)
- 4 Programmable (preset)
- 5 Programmable (down)
- 6 Programmable (preset)
- 7 Programmable (preset)
- 8 Programmable (preset)
- 9 Programmable (up)
- 10 Programmable (preset)
- 11 Programmable (preset)
- 12 Slow feed backward
- 13 Slow feed forward
- 14 Feed backward
- 15 Feed forward
- 16 Saw
- 17 Programmable (color test)
- 18 Programmable (urea)
- A Drive / harvest toggle switch

Functions displayed on this list are usually programmed in the programmable switches. However, it is possible to tailor the programming for each customer.

Joystick switches on vertical levers (fig. 7)



Vertical lever switches when the harvester head does not have a rear knife B.

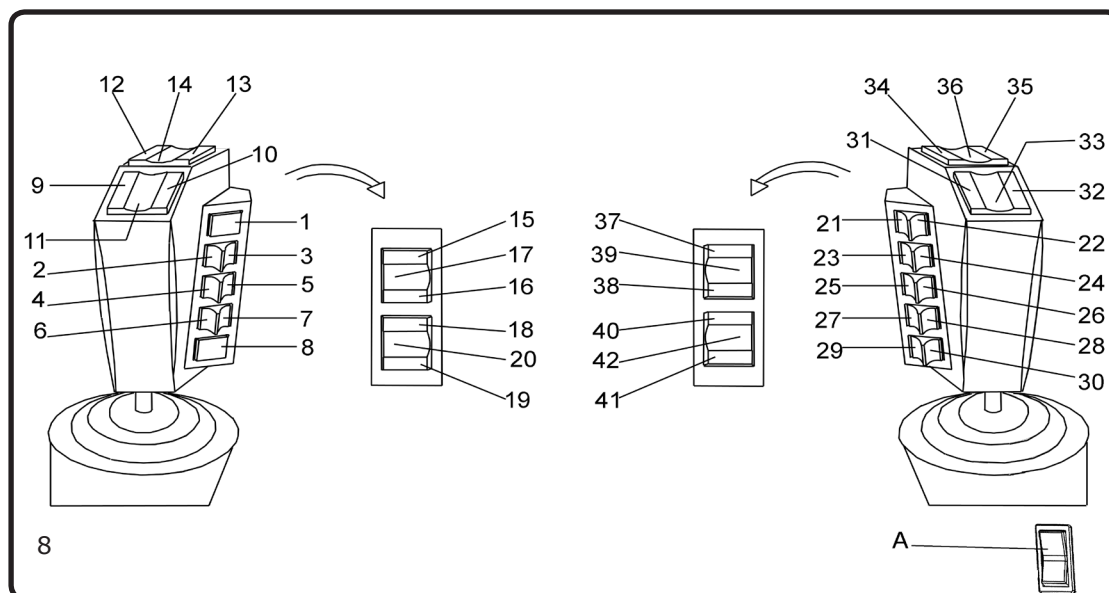
Vertical lever switches when the harvester head has a rear knife C.

- 1 Tilt up / down
- 2 Knives open
- 3 Tracks / rolls open
- 4 Slow feed forward
- 5 Slow feed backward
- 6
- 7 Programmable (urea)
- 8 Fast feed forward
- 9 Fast feed backward
- 10 Head open / closed
- 11 Saw
- 12-15 Programmable (tree species 1-4)
- 16-27 Programmable (preset)
- A Drive / harvest switch
- D Driving direction

- 1 Knives open
- 2 Tracks / rolls open
- 3 Tilt up / down
- 28 Rear knives open

Functions displayed on this list are usually programmed in the programmable switches. However, it is possible to tailor the programming for each customer.

Joysticks switches on the EME levers (fig. 8)



- | | |
|---|--|
| 1 Saw | 21 Programmable (quality 1) |
| 2 Programmable (tree species 1) | 22 Programmable (quality 2) |
| 3 Programmable (tree species 2) | 26 Programmable (quality 3) |
| 4 Programmable (tree species 3) | 24 Programmable (quality 4) |
| 5 Programmable (tree species 4) | 25 Programmable (quality 5) |
| 6 Driving direction backwards | 26 Programmable (quality 6) |
| 7 Driving direction forward | 27 Programmable (color test) |
| 8 Single wipe | 28 Programmable (shift) |
| 9 Feed backward | 29 Programmable (new frame) |
| 10 Feed forward | 30 Programmable (reset) |
| 11 Vacant | 31 Head open |
| 12 Slow feed backward | 32 Head closed |
| 13 Slow feed forward | 33 Vacant |
| 14 Vacant | 34 Knives open |
| 15 Tilt up | 35 Tracks / rolls open |
| 16 Tilt down | 36 Rear knife open |
| 17 Vacant | 37 Programmable (up) |
| 18 Boom side tilt vertical straightening,
or side tilt automation reset | 38 Programmable (down) |
| 19 Boom side tilt vertical straightening or
side tilt automation reset (the same
function as above) | 39 Programmable (cross-cutting length) |
| 20 Vacant | 40 Boom side tilt right |
| | 41 Boom side tilt left |
| | 42 Vacant |
| | A Drive / harvest switch |

Signs and symbols

Glow		Hour gauge	
Suction filter		Pressure filter	
Return filter		Hydraulic oil level	
Hydraulic oil temp.		Fuel	
Seat heating		Windscreen washer	
Ignition lock		Diesel engine stop	STOP
Oil pressure		Charge	
Engine revolutions		Gear diagram	
Sound signal		Gear 1	1
Working light		Gear 2	2
Phone		Turning signal	
Fan		Windscreen wiper	
Rotating flasher		Parking light	
Heat alarm for coolant		Air conditioning	
Headlight, full		Emergency flasher (red symbol)	
Brake		Headlights, dipped	
Differential lock		Indoor light	
4WD		Joint lock	
Master switch (electric)		Harvesting computer	
Air filter		PC	
		Emergency exit	EXIT

Alarm symbols appear on the Iqan display, with the exception of the low charging voltage symbol on the front instrument panel.

Operation and Adjustments

The harvester functions have been divided into two different functioning environments: harvesting in forest and longer-range driving. The difference between these operating environments is in automation. With the harvesting / driving switch (fig 6,7, and 8 switch A) in the harvesting position, the harvester head can always be rotated using the right-side joystick with the drive pedal in its mid position. When depressing the drive pedal, the right-side joystick starts to steer the frame thus enabling a quick and efficient change from harvesting to driving towards the next tree.

Both the brakes and the frame lock can be made to function automatically depending on the drive pedal position. When depressing the frame lock switch (fig 2, switch C) and the working brake switch (fig 2, switch D) in their forward position, the working brakes and the frame lock get always engaged when the drive pedal is in its mid position. Correspondingly when depressing the drive pedal, the working brakes and the frame lock get disengaged. This keeps the harvester stationary and stable during harvesting, but allows nimble moving towards the next tree.

Doorswitch

When the left side door is open, the crane movements, frame steering, drive and head movements are switched off. **Note**, in this case steering does not work and some models of harvesting heads may move back to the resting position, in other words close.

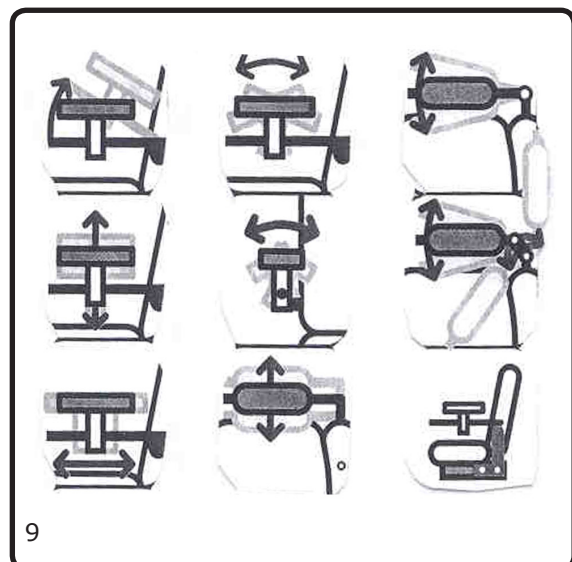
After disconnection by the door switch harvester head is reset back to functional status as follows:

- Press ENTER from the Harvesting computer
- Select the service menu, and then press ENTER
- Click Reset, and then press ENTER
- Select the **switch on harvester head** menu and then press ENTER
- Close the head, and then press ENTER
- Press the ESC button twice

The printer of the harvesting computer has its own power switch. Turn it on when you want to print.

Joystick positions can be adjusted (fig. 9)

The positions of the crane joysticks and seat armrests can be adjusted at several points. To facilitate entering and leaving the cab, the joystick near the door can be turned both up/down and sideways. After adjustment it is important to lock the positions of the joystick and the armrest to prevent unwanted movements.

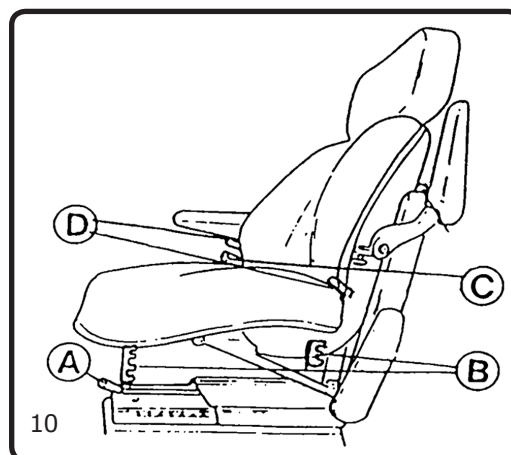


Seat has several adjustments (fig. 10)

1. To adjust the fore and aft position of the seat, lift lever A and move the seat in the required direction.
2. Adjust the height using forks B at the front and back of the seat.
3. Adjust the suspension using lever C.
4. Adjust the backrest angle using lever D.

Air suspended seat has more adjustments (fig. 11)

1. To adjust the fore and aft position, unlock lever A and move the seat in the required direction.
2. Adjust the height and fore/aft tilt by pressing levers B on the side of the seat and lifting/depressing the front or rear of the seat.
3. Adjust the seat suspension pneumatically by pressing button C.
4. Adjust the backrest angle using lever D.
5. If the seat has side tilt, it can be tilted using the regulator unit on the armrest.

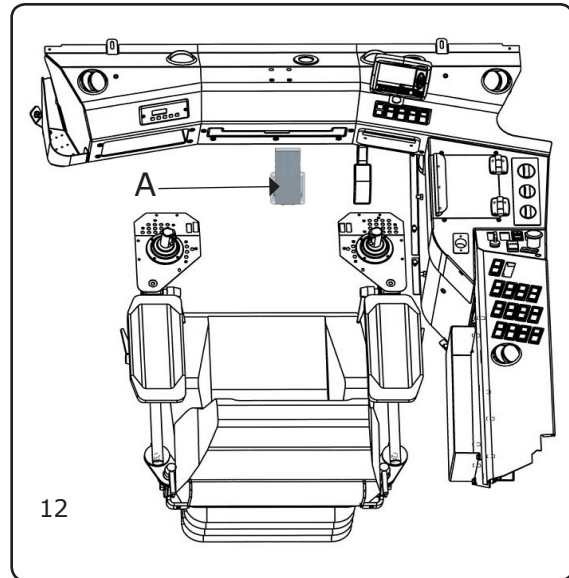


Brakes while driving and harvesting (fig. 12)

The harvester has negative hydraulic Oil Immersed Multi Disc Brakes. Braking power is generated by springs, and the brakes are released using hydraulics. Each wheel hub has its own brake. With the gear engaged, the hydrostatic drive transmission always brakes itself when the drive pedal goes toward its mid-position.

The brakes are mainly controlled from the cab using a triple-position switch (fig. 2, switch C). Using the triple-position brake switch, the brakes can be engaged, disengaged and put in their automatic position hydraulically. In their mid-position the brakes are always engaged, and when depressed all the way back they are always disengaged. In their forward position, that is the automatic position, the brakes operate depending on the position of the drive pedal. When harvesting or driving on hilly roads, the brake switch should be in its automatic position.

In the cab there is also brake pedal A, which can be depressed to generate braking power on the brake shoes comparable to pedal power. The brake pedal is mainly intended for use on the road to meet the road traffic regulations.



Parking brake

The parking brake gets engaged automatically when the engine is switched off. Multi-disc brakes operates as parking and working brakes.

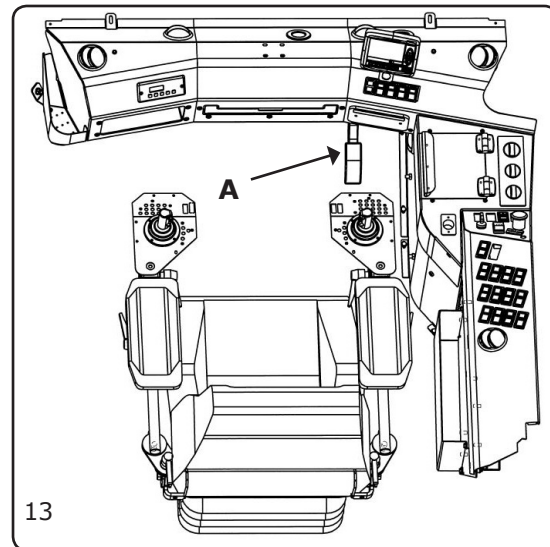
Frame lock

The frame lock operates similarly to the brakes. Depending on the position of the frame lock switch, the dual-function cylinders either locks the frames together, allows them to turn independent of each other or operates in the automatic position at the same time with the brakes. With the frame lock switch (fig. 2, switch C) in its mid-position, the frame lock is always engaged and when depressed backward, the frame lock is disengaged. Normally when harvesting, the frame lock switch should be in its automatic, that is in its forward position.

Traction transmission

Engine power is transmitted to the consecutive work and drive pumps by means of a flexi switch. From the pump to the hydraulic motor of the gear box the power is transmitted by means of liquid. The pump output is adjusted steplessly using the drive pedal between positions 0 and +/- maximum.

The harvester has 2-speed hydraulic motors in the wheel hubs. Slow speed range should be used in difficult terrain. In High speed range speed is doubled. Normally, at start slow speed range is selected. Pressing the driving speed range selector button when driving (left button keypad 29) goes the high speed range on. After a stop slow speed range is selected again. If you want to drive fast all the time, press the button 29 at a longer period of time when staying stationary. Similarly, to get back on the slow speed range, press the button 29 for longer period of time when staying stationary .



13

The speed of the harvester is controlled by drive pedal A. When the pedal is not pressed, the harvester is stationary. Driving direction (forward/backward) is chosen by switch close to left joystick (switch A, picture 13a). Drive direction forward is selected by pushing switch forward. Correspondingly drive direction backwards is selected by pushing switch backwards. Speed is controlled by pedal. Also the engine speed (r/min) and potentiometer B (fig 13a) near left joystick affect the speed.

When driving in traffic, the harvester head should be kept close to the harvester and tied. The harvesting computer must be switched off in case of unintended crane movements.

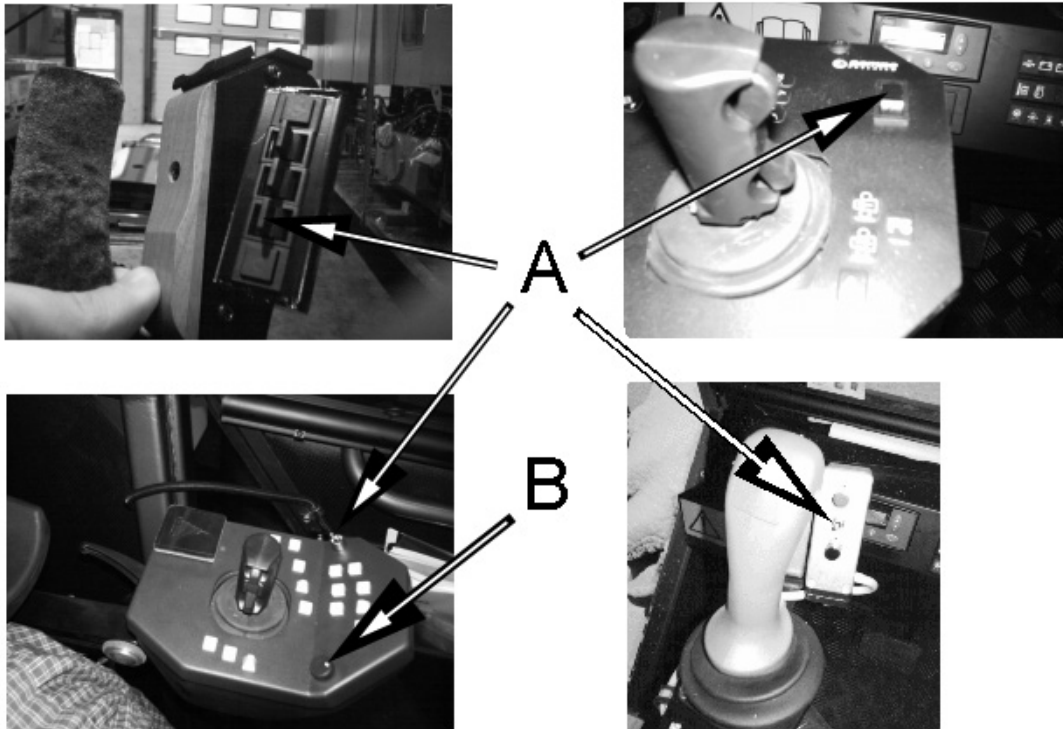
When parking forest harvester equipped with hydrostatic transmission, the parking brake must always be engaged. The hydraulic motor cannot keep the harvester stationary for a long period.

Four wheel drive

4-wheel drive is switched on electrically using switch L on the right-side instrument panel, fig. 2. The coupling shall be done with the harvester stationary. 4WD is available on both speed ranges. When towing the harvester, four-wheel drive must be off and the engine running to allow the wheel motors to be disengaged. Tap near the oil tank should be in towing position. Short-distance towing at a low speed is permitted if the engine and the drive pump cannot be kept running.

Four wheel drive lock

There are sometimes situations when some of the wheels do not have sufficient grip in respect to the required traction power. In this case the wheel stops gripping, which will further decrease the traction power. This can be avoided by engaging Traction transmission lock using switch M, (fig. 2). The engagement of the Traction transmission lock generates anti-skid between wheels. The lock does not hold 100 %. Thus it allows different wheels to turn at a different speed. On solid ground the 4WD lock makes turning difficult, so it should be switched off.

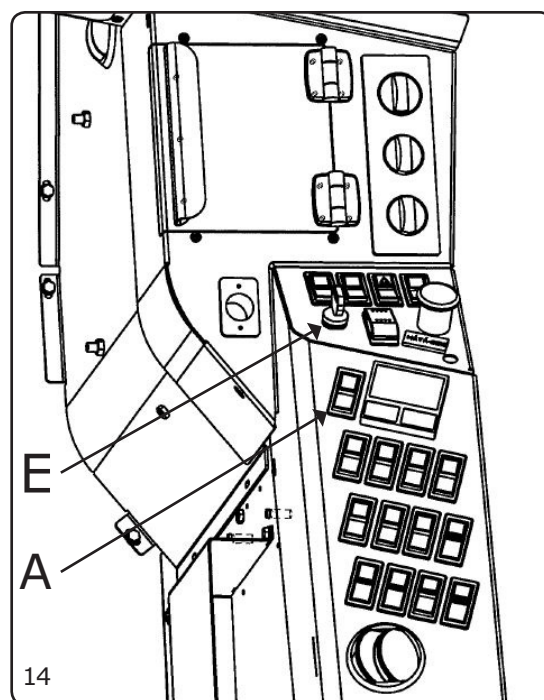
**13a**

Starting of the engine (Fig. 14)

The forest harvester is equipped with a safety ignition system, which prevents the harvester from moving with the engine being started. It allows the start-up to take place only when the drive pedal is not pressed.

The engine is started using the ignition key E. Turn the key to the right to switch on the ignition. The same position also operates the engine glow. During the glow, the engine will not start, and this is also displayed on the Iqan display. When turning the ignition key farther to the right, to position HS, the engine starts.

With the throttle A in its rear position, the engine runs at idle. In the center position, the working revolutions are used. When pressed forward, the diesel engine uses full revolutions. Have the engine always idle before switching the diesel off and on. The instructions on adjusting the revolutions are available in the section Using the Iqan display.

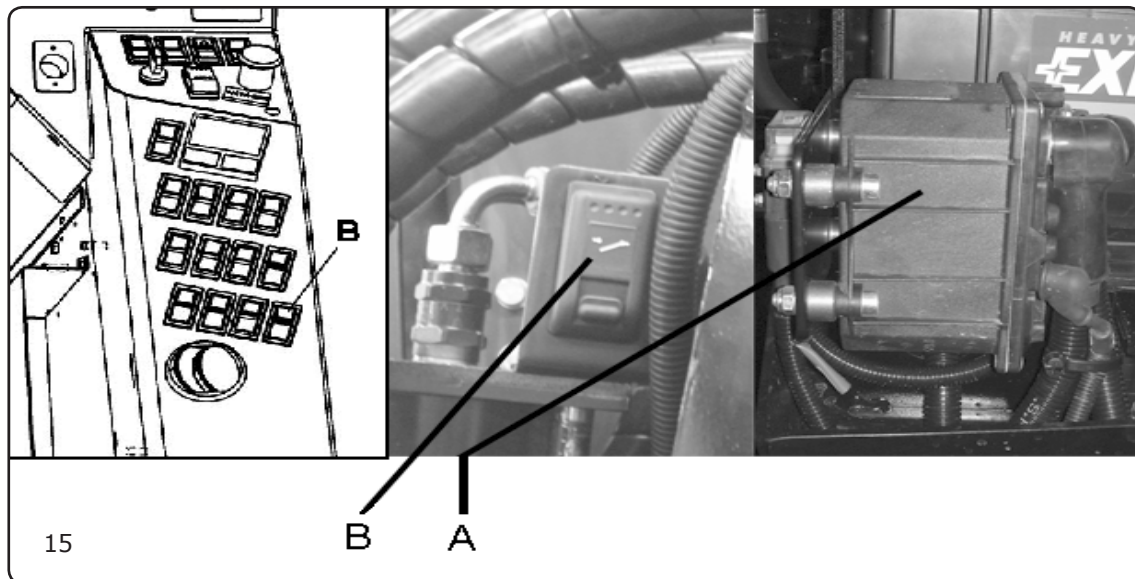


Stopping of the engine

Before stopping of the engine, move the throttle into the idling position. The engine is stopped using the electric stopper by turning the ignition key to position 0.

Beware of the movements of the harvester head when you switch off the diesel engine. When the power is switched off, the harvester head controls switch off as well and the head may return to its resting position from certain functions. These kinds of functions include, for example, Head closed and Tilt down, depending on the type of the head. The harvester heads often also contain pressurized batteries, potentially causing there to be enough power left for head movements even after the power has been switched off. When finishing working it is recommended to turn off harvesting computer and PC. In this case there is no danger that even accidental use of harvesting head would cause unwanted movements in restarting.

When you turn the ignition key to the left of the 0 position and press it simultaneously down, the vacuum pump of the oil tank switches on automatically. This is a way to protect the environment and reduce oil waste in cases of hose breaks. The vacuum also should be used when servicing the hydraulic system. Do not try to run the machine while the vacuum pump is on since a vacuum causes cavitation and quickly damages the hydraulic pumps.



Main power switch (Fig. 15) Controls Electricity for the Whole Forest Harvester

There is an electric main power switch to control the electrical instruments of the harvester. It is located on the left-hand side, behind the rear wheel inside a closed box. There are two power switches B. One is inside the cabin on the side instrument panel, and the other one inside the box behind right rear wheel.

When you leave the cab for an extended period of time, always switch the power off from the main switch as well. Just turning the ignition key to the 0 position leaves several electrical equipment on, including the fan motor. This uses enough power to potentially cause the battery to empty while you are away.

Emergency stop

When the emergency stop switch (fig. 2, switch S) is depressed all the way, the diesel engine gets switched off, but there is still current in the electrical system, but the power to the joysticks, the crane control module and harvester head module switches off. This engages the brakes. When the engine is switched off, the harvester cannot be steered.

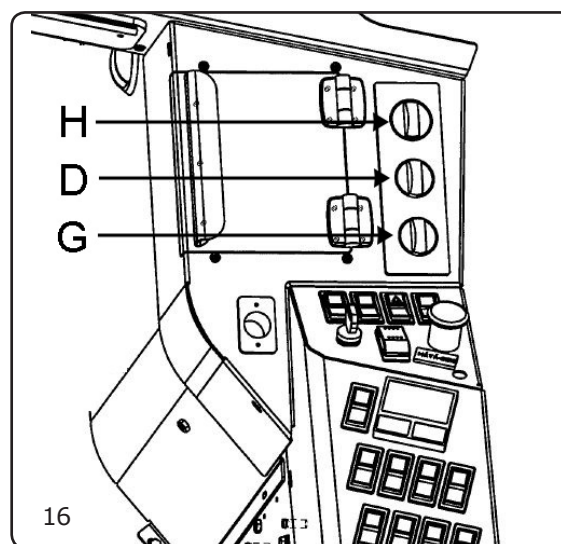
Working lights

You can select the number of the working lights that are on using the working light switches on the instrument panel (figure 2, switches H and I). For the working lights controlled by switch I, it is possible to use a so-called delayed light function by leaving these lights on before turning the main power switch off. Some of the harvester's working lights remain on to light the surroundings while you leave the harvester. The lights switch off on their own in about 90 seconds.

Cab Fresh-air fan Provides Good Ventilation

The 4-speed fan is started using switch H (fig. 16). To change the airflow direction, turn the nozzles on the panels. The fan air is filtered in from the left-hand rear bottom corner of the cab. The outer-most filter is of a coarse mesh type, and the inner one is the actual fresh air filter.

To keep up the fan capacity and secure the purity of the air, the filters shall be cleaned or replaced often enough to prevent impurities and fungi from clogging the filters. In dusty conditions it is necessary to clean the coarse mesh filter several times a day.



Heater Provides Additional Heat from the Engine

The air in the cab is heated by a heating element in which the engine coolant circulates. Turn switch G to the right to increase the amount of coolant circulating in the element. This will increase the temperature in the cab.

Air conditioner cools the Air in the Cab

The cab can be equipped with air conditioning system.

Turn switch D fig. 16, to the right to switch on and regulate the air conditioner.

Note! A difference of over 8°C between indoor and outdoor temperature is harmful to your health.

Keep the cab door closed when the air-conditioning is on. Keep the heater regulator lever in its cold position, i.e. the heater water circulation off.

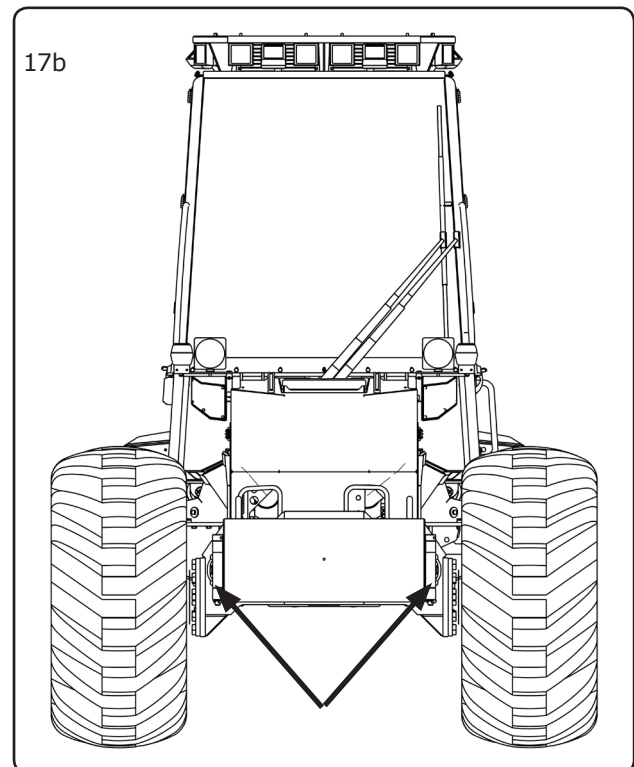
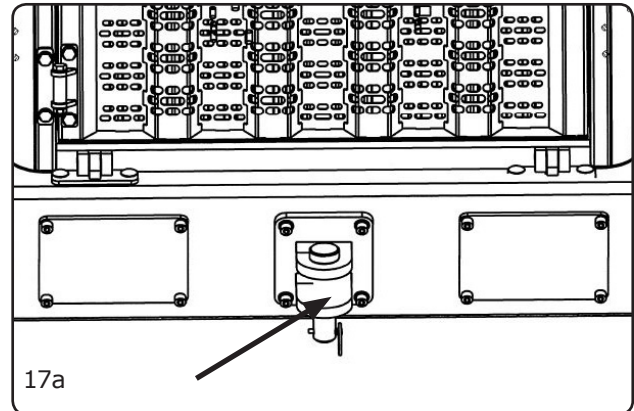
Towing (fig. 17) Allowed from Towing Points Only

The harvester may be towed from designated points only. When towing backward, the towline is put around the pin as shown in fig. 17a. When towing forward, there are holes as shown in fig. 17b near the traction motor. With the harvester on tow, the operator must be in the cab and the engine running to enable steering. Four-wheel drive must be off.



Unless the engine can be started, the harvester must be towed with great care; as steering is not working. In this case, the brakes should also be released mechanically

When towing on the road, statutory traffic regulations must be followed.



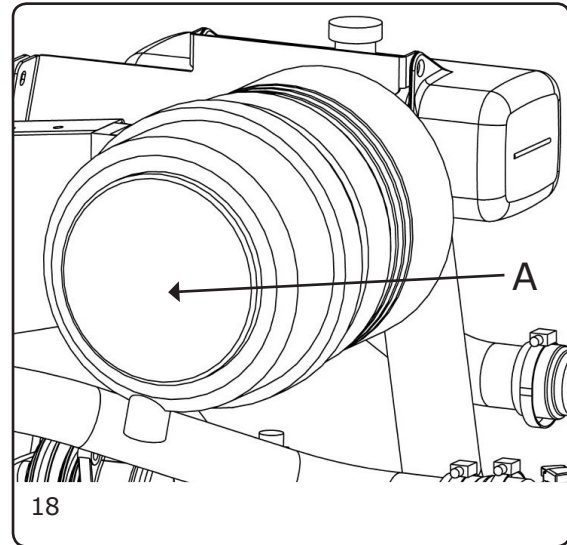
Engine, source of power

The engine is a water-cooled, four-stroke Common rail diesel. For a more detailed description of the engine, see the engine manual.

Power is transmitted from the rear of the engine to the working hydraulics and traction transmission pumps. The front of the engine houses belt drives for the fan and the alternator generators and the AC compressor.

Suction air filter (fig. 18)

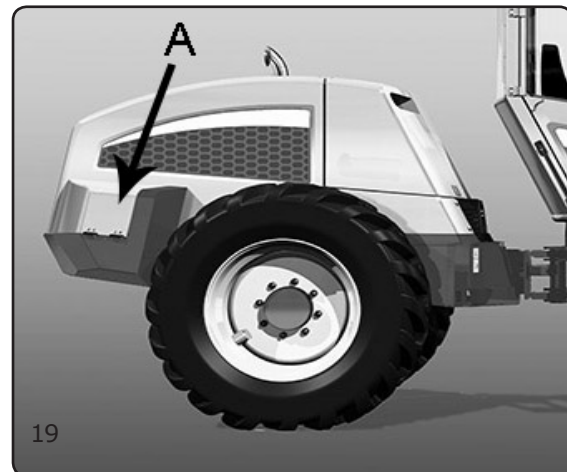
The engine suction air is cleaned by prefilter and two-part paper filter A. A warning text and symbol in the Iqan display indicate a blockage in the filtering system. See cleaning instructions under service and maintenance.



Fill the tank with fuel free from impurities (fig. 19)

The volume of the fuel tank is 150 litres. Use high-quality diesel oil as fuel. Check the fuel requirements in the engine manual. The fuel must be free from any impurities and water. Before refuelling, remove all impurities from around filler A. Never drain a spare tank into the fuel tank, as impurities and water tend to settle on the bottom. If fuel is added from a spare tank, a funnel with a sieve must be used.

There are air bleeds on the outer rim of the filler through which air gets into the tank. Make sure these bleeds stay unblocked. Never use a filler without air bleeds.



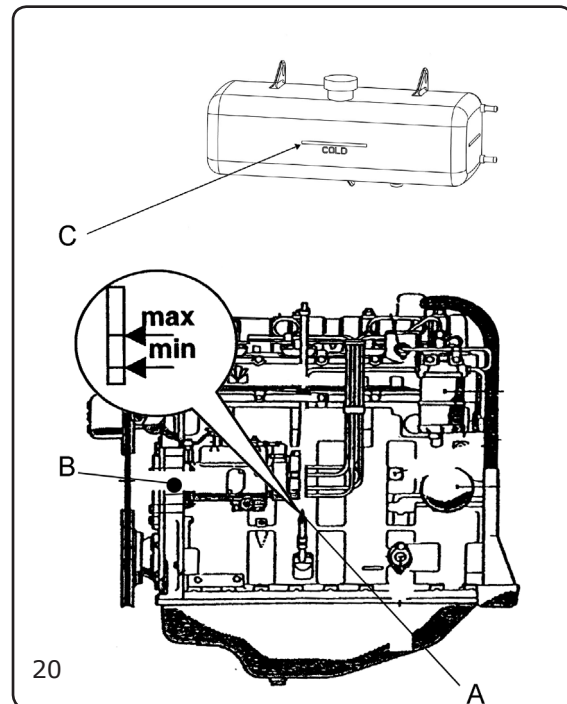
It is able to refuel the fuel tank using electric filling pump. Refueling point can be found behind the right rear tire and under the hinged hatch. Connect the quick coupler equipped hose to the farm tank etc. Turn the three-way cock valve to the down position. Start the filling pump. Finally, remove the refuel hose and turn the three-way cock valve to the upright position. Close the hatch.

WFuel tank consists of two parts. Bigger tank welded to frame and a smaller one from which the fuel is sucked into the diesel engine. Electric pump operates in the normal work situation as the fuel transfer pump from bigger tank to smaller one. It pumps the small tank full after start-up if there is still fuel left in the big tank. For a longer period of use, the pump also makes a filling. The refueling interval is adjustable at Iqan screen using FP-PA pump running interval parameter.



Daily Checks of the Engine (Fig. 20) Lubrication System

It is of utmost importance to use correct lubricating oil types, in accordance with the load placed on the engine. See Lubrication Table under "Maintenance". Check the oil level daily before starting; it shall be between the minimum and maximum marks on dipstick A, preferably near the maximum, fig. 20. Oil is refilled through filler B. Symbol on the iqan monitor indicates low oil pressure. Should the oil pressure warning light come on with the engine running, stop the engine immediately and find the cause for the trouble.



Cooling System

The engine cooling system is filled with coolant that has 40-50 % ethylene glycol in it. Do not use plain water as coolant as it damages the engine. Before refill, the engine must cool off. When refilling, remember the coolant expands considerably when it gets warm, so do not fill up the system. The coolant level is correct when the cells are clearly covered by the coolant, and the coolant level can be seen at level indicator C in the middle of the expansion tank. Check the coolant level daily before starting.

The coolant temperature can be seen on the iqan monitor. It shall be between 75-95°C. A warning symbol on the iqan monitor indicates engine overheating when the temperature reaches 95°C. If the temperature starts to rise, check that the outside of the radiator is not clogged. The best way to clear blockage is to direct compressed air from the side of the fan through the radiator, or use a brush for cleaning. Always be careful not to damage the lamellas. Behind the cooler coarse mesh filter there is a small-holed screen. To clean it, first open the rear door and then lift the screen.

Crane side tilt automation

An automatic stabilizer function is available for the crane side tilt as an optional feature. It helps keep the crane in an upright position even if the machine itself is tilted sideways on a slope. This automatic function can be switched on from the side instrument panel. If the side tilt is used manually, the automatic stabilizer function is disengaged. The automatic stabilizer can be re-engaged by pressing the side tilt vertical straightening button on the joysticks. The same button must also be pressed after starting the diesel engine. This is to avoid accidental movements that the driver may not notice.

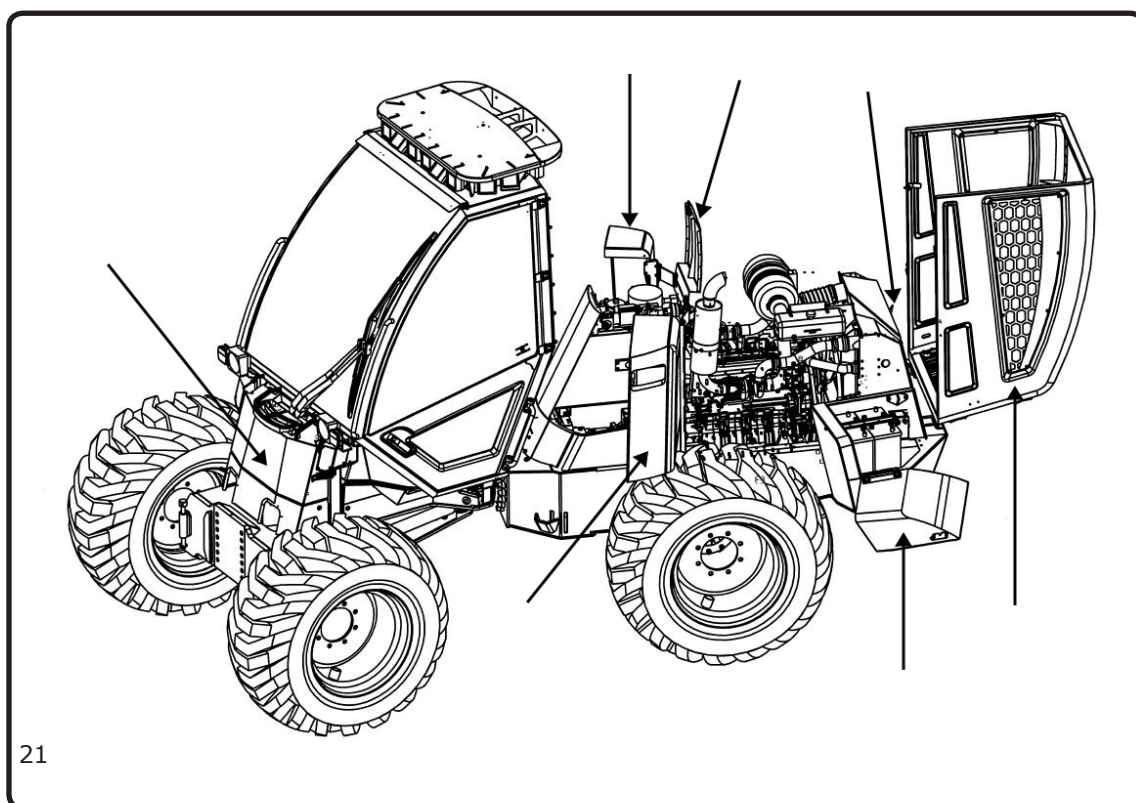
Fire extinguishers

The harvester is supplied with two portable 6-kg fire extinguishers. They are located above the rear wheel inside a side guard that opens backwards. The extinguishers shall be checked every six months by an authorised service outlet.

The harvester may also be equipped with a semi-automatic fire extinguishing system, which shall be operated in compliance with the Manufacturer's instructions.

Opening of the guards

The movable guards of the forest harvester are equipped with latches and quick-release locks.. The guards can be locked placing an ordinary padlock in the hole for the quick-release lock.



Hydraulics

Hydraulics is divided in traction and working hydraulics. They have a joint oil tank on the rear frame of the harvester.

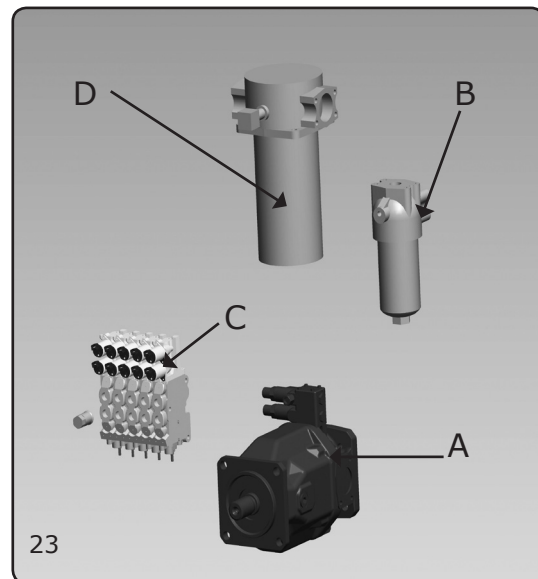
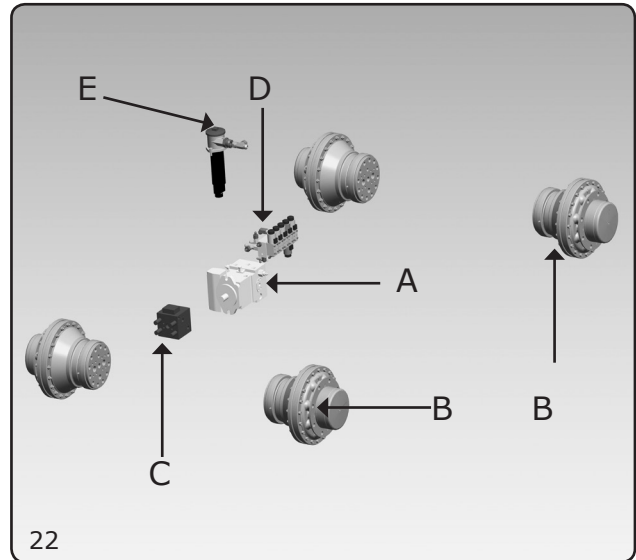
Traction hydraulics (fig. 22) includes a suction-/return filter, drive pump, distributor valve, five directional valves, and four hub motors.

The drive pump produces pressure corresponding to the drive resistance and a volume flow corresponding to the drive pedal position. When using four-wheel drive forward, the oil flows into the distributor valve. The distributor valve distributes the volume flow between every hydraulic motor. From the distributor valve the oil flows to the hydraulic motors at the front and from there onwards to the pump. The oil flows from the distributor valve to the rear hub motors through the directional valves. The flow from the rear motors goes through the joint return directional valve back to the drive pump. When using front-wheel drive, the directional valves close off the connection to the distributor valve and the drive pump. At the same time they engage the rear hub motors in neutral.

- A Drive pump
- B Hub motors
- C Distributor valve
- D Directional valves
- E Suction-/return filter

Working hydraulics in the basic harvester (fig. 23) includes a work pump, pressure filter, load sensing directional valve and return filter. Crane movements are controlled by a load-sensing valve. The work pump produces the right pressure and output in relation to the load weight and speed. This enables fast and precise movements in every circumstance.

- A Work pump
- B Pressure filter
- C Directional valve
- D Return filter

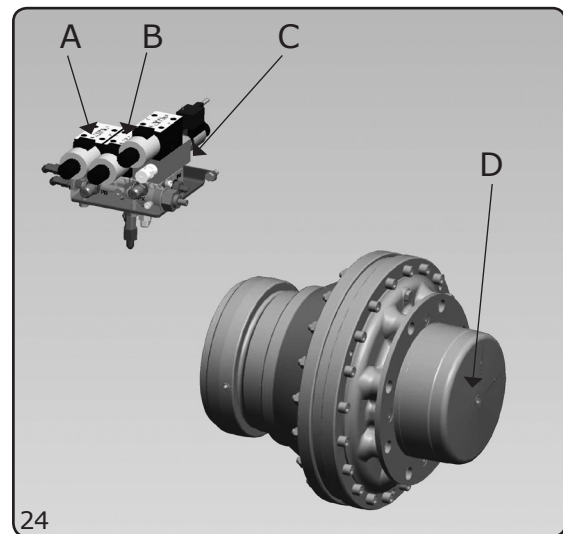


It is forbidden to change the pressure in working and traction hydraulics without permission from the Manufacturer, as it may damage the harvester and cause risk of injury to the mechanic and the harvester operator.

Drive motors 2-speed range(high speed range) is turned on using directional valve A.

The operations of the brakes (fig. 24) are controlled by directional valve B. The brakes get disengaged when the pressure is directed to the housing of the hydraulic motors brake. When unpressurised, brakes are on. Releasing the brakes derive their driving force from the pump in working hydraulics by means of a pressure reducing valve.

Individual work pump pressures are set for the harvester head functions from the measuring device. In addition, depending on the head it is possible to set compression pressures based on the type of tree being handled for knives and tracks/rolls, for example (valve C).



- A 2-speed valve
- B Brake valve
- C Harvester head pressurization
- D Brakes

The frame lock is equipped with a dual-function cylinder. The cylinder derives its load from the return flow. When the frame lock is engaged, the directional valve closes the flow routes and the cylinder becomes locked in its place.

The basic harvester is equipped with a separate cooler for the hydraulic oil. The cooler includes a pump and condenser. The pump receives oil from the tank as well as from leaks in the working hydraulics pump and the harvester head, and its pumped through the condenser and the Suction-/return filter back to the tank.

When dealing with hydraulics, uncompromising cleanliness is of utmost importance. The oils used shall comply with the Manufacturer's instructions. Refill shall always be done through the return filter.

Electricity

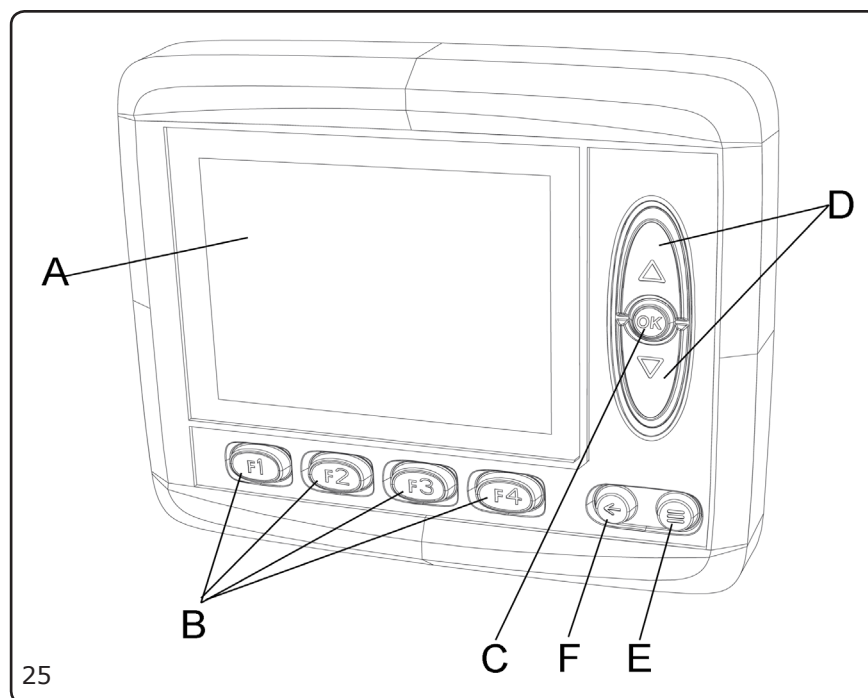
Fuses

The fuses F1-F54 are located on the circuit board below the side instrument panel. The fuses F55-F60 are located in the trailer next to the starting motor.

F1	15A	+12V socket cabin	F37	3A	measuring shares
F2	7,5A	radio,time delay light control,AC compressor K16	F38	7,5A	control 4WD,traction control, body link,lock/brakes switches
F3	7,5A	PC +12V			
F4	4A	+12V measure shears, sunit,hub module	F39	3A	+15 option
F5	7,5A	A4 printer +12V	F40	10A	vacuum pump/valve
F6	5A	radio memory	F41	5A	AC compressor
F7	15A	motor heater	F42	3A	blinkers right
F8	20A	worklights (time delay)	F43	20A	seat compressor,heater,tilt
F9	10A	motor heater water pump	F44	10A	fire protection
F10	5A	motor heater clock and remote control ,MD3 rtc	F45	10A	option
F11	10A	cabin blower	F46	7,5A	parking light
F12	3A	main switch control	F47	3A	joystics
F13	20A	worklights E6,E7,E10,E11	F48	20A	iqan XA2
F14	20A	head module voltage supply	F49	3A	blinkers left
F15	25A	start motor solenoid	F50	5A	drive light left front
F16	5A	CTA +15 control	F51	5A	drive light right front
F17	20A	worklight, voltage reduce U1	F52	10A	fuelpumps/valves Y13
F18	20A	worklights E8,E9,E26	F53	5A	drive light long left
F19	20A	worklights E12,E13,E18,E19	F54	5A	drive light long right
F20	20A	worklights E14,E15,E22,E23	F55	30A	+Bat main fuse battery box
F21	20A	worklights E1,E2,E3,E4	F56	150A	main fuse +30 rear body
F22	20A	measuring device	F57	30A	CTA motor control box supply +30
F23	10A	hazard blinkers, rear body sensors+24V, extra fuel pump control	F58	150A	motor grid heater
			F59	100A	hydraulic fullpump
F24	10A	+30 option	F60	20A	motor room cover
F25	15A	rotating beacon	F61	500mA	motor heater control remote
F26	3A	switches/sensors +24V	F62	20A	extra fuel pump/fill pump
F27	3A	sierra box +24V supply			
F28	15A	horn, stump treatment full pump			
F29	20A	PC fuse reserved			
F30	3A	iqan screen supply,K9 fire protection control			
F31	10A	worklights E24,E25 hydraulic fullpump worklights control			
F32	10A	magn.valves four wheel drive			
F33	3A	generator D+, CTA ignition			
F34	7,5A	blinkker relay,AC compressor			
F35	15A	wind wiper, washer, switch symbol light,Ac panel backlights			
F36	5A	clockswitch eber.,ambient +15, lubrication			

Do not fit an oversized fuse as it may damage the respective electrical instrument. If a fuse blows on the same location repeatedly, find out the reason for it.

Iqan control system



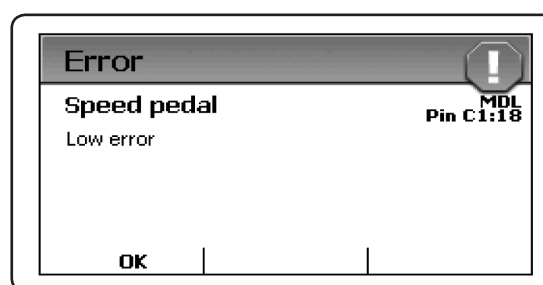
The Iqan monitor consists of the following elements:

- monitor display A
- bottom F1-F4 buttons B
- OK button C and the arrow buttons above and below it D
- Menu button E at the bottom right (three horizontal lines)
- Back button F (arrow to the left)

The display brightness can be adjusted by pressing the Menu button and selecting the back-light setting

SAFETY SYMBOLS

Various notifications and warnings can be displayed in the Iqan monitor. They appear in separate windows partly covering the basic display. The F1-F4 buttons of the display are used to select the most suitable option at the bottom of the warning window. For example, the sensor error in the picture here can be reset by selecting OK, or pressing the F1 button.



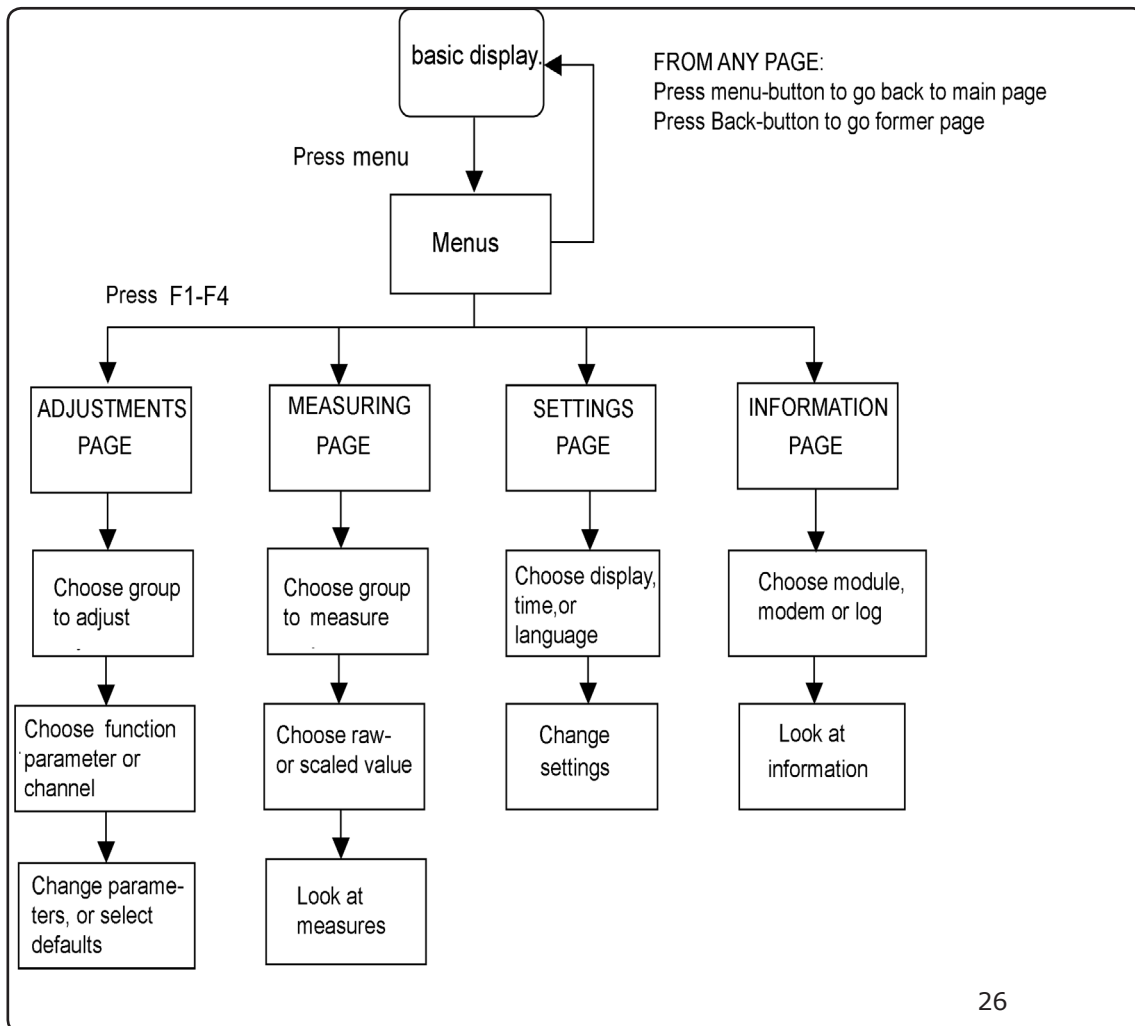
There are seven types of notifications and warnings. The type Message is the least serious and Critical is the most serious. The important notifications are always shown before the less critical ones. The following is a list of all notifications and warnings in the order of importance.

- message
- information
- confirmation
- warning
- alarm
- error
- critical

The notifications and warnings detected by the Iqan machine control system are always messages, alarms or errors. The notifications and warnings from the diesel engine and base machine are primarily information and warnings.

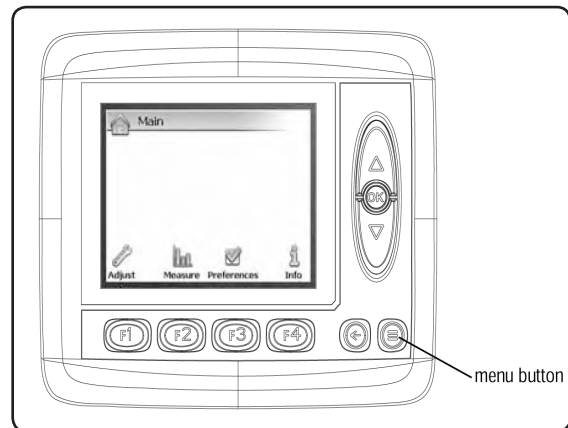
IQAN DISPLAY MENUS

The Iqan display has a graphical user interface and a menu structure. The menu structure is shown in figure 26.



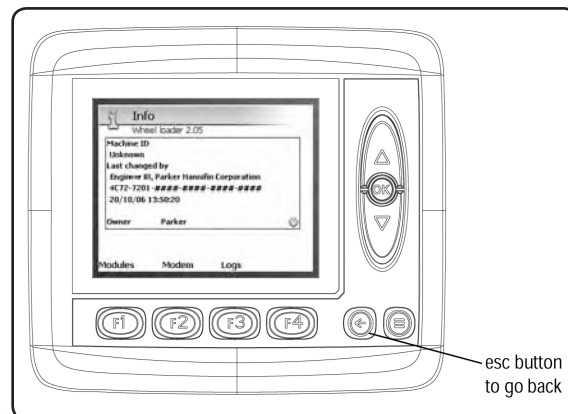
MAIN MENU

The menus contain the base machine setup, input and output measurements, settings and module status and related logs. The menus can be accessed by pressing the Menu button (three horizontal lines). Pressing the Menu button again takes you back to the basic display.



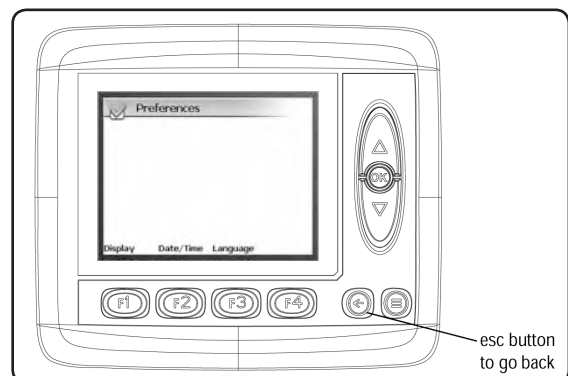
SYSTEM INFORMATION

When you press the F4 button in the main menu, you can view system information such as the name of the software loaded in the monitor, author of the last revision and the date of the revision. By pressing F1, F2 or F3 you can view information on modules, the modem or log. The Back button takes you back to the previous page. Pressing F1 on the subpages takes you directly back to the main menu.



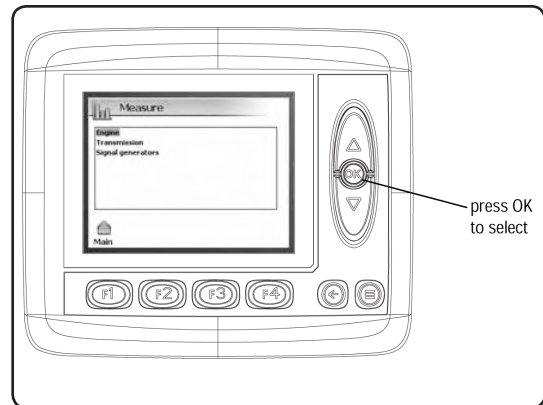
SETTINGS

You can change the display settings by clicking the F3 button in the main menu. Then by pressing F1, F2 or F3 you can view information on the display, date and time as well as language. The Back button takes you back to the previous page. Pressing F1 on the subpages takes you directly back to the main menu.



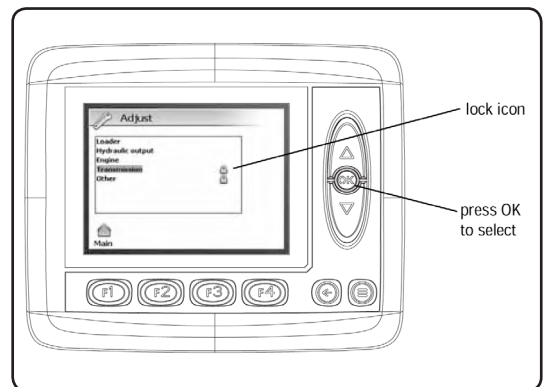
MEASURING

You can measure the sensors and valves connected to the Iqan control system by pressing F2 in the main menu. First, a page with different measurement groups such as crane, joysticks, steering/rotator etc. opens. The desired measurement group is selected with the up/down arrows and by pressing OK. Use the arrow buttons also to select a measurement route such as a sensor or valve. You can toggle between the raw value provided by the route and the scaled value using the F2 button. The Back button takes you back to the previous page. Pressing F1 on the subpages takes you directly back to the main menu.

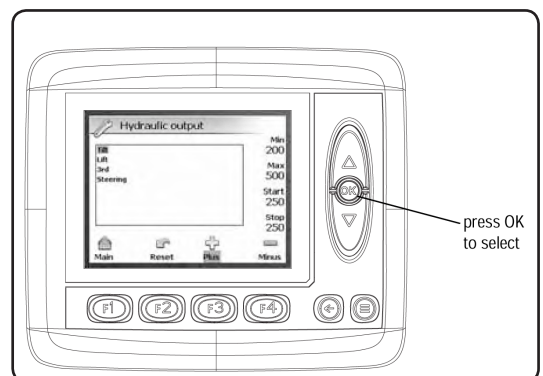


ADJUSTMENTS

You can access several outputs and parameters in order to adjust them by pressing the F1 button in the main menu. First a page opens on screen with a number of adjustable groups such as diesel engine revolutions, crane adjustments, driver selection, function parameters etc. The desired adjustment group is selected with the up/down arrow buttons and by pressing OK. A lock symbol may be displayed behind the adjustment group name. This means that a password is needed for adjustments.



After selecting the adjustment group, select the desired measurement route such as a sensor or valve using the arrow buttons. Several instruments have two different directions of movement. The correct direction +/- is selected with the F3 or F4 button. The current adjustment values are displayed on the right side of the display. After you have selected the desired route and direction, press OK.



Adjusting a parameter

You are now on the page where the actual adjustment is done. You can move from one parameter to be adjusted to the next by pressing the OK button repeatedly. When you are at the parameter you want to adjust, press the up or down arrow button. The parameter value on screen changes with each time a button is depressed. You may reset to the default values at any time after the adjustment by pressing the Reset button, or F2. The Back button takes you back to the previous page. Pressing F1 on the subpages takes you directly back to the main menu.

INTERNAL DIAGNOSTICS OF THE IQAN DISPLAY

The Iqan display has its own diagnostics page showing information on the status of the display. You can access the diagnostics page by pressing the Back and the Menu buttons simultaneously while switching on the power. To exit the testing mode, switch off the power and switch it on again normally.

INSTRUMENT PANEL DISPLAY

The middle of the instrument panel display shows the diesel engine revolutions as numerical values. On the left side of the revolutions is engine coolant temperature, both as a tachometer and as numerical values. On the right side is the hydraulic oil temperature both as a tachometer and as numerical values. On the most left is the fuel gauge.



When the power is on but the diesel engine off, the display shows red alarm symbols. The section Signs and symbols explains the meaning of the symbols. When the diesel engine is on, the symbols disappear from the display if the parts they refer to function correctly. A symbol that is displayed while the diesel engine is on indicates an active problem. After resetting the error message, the problem may continue to be active and the symbol remains visible indicating a problem. These problems indicated by the symbols will also activate the yellow alarm light in the ceiling of the cab. Investigate the cause of an active problem immediately and take the necessary corrective measures.

When selecting slow seed-range, number 1 appears below engine revolutions. When selecting high speed-range, number 2 appears.

When using the brakes electronically the brake symbol will appear below the number of the speed-range, depending on whether the brake is on or off. That is, the letter P is displayed when the brakes are on.

At the bottom of the screen shows a dark blue backgrounded harvester character. The harvester's front end is on the left, joint in the middle and the rear end on the right. Green triangle mark on the harvester front frame indicates the drive direction forward. The green indicator triangle on harvesters rear frame indicates the drive direction backward.

Differential lock symbols on harvester axles indicates engaged traction transmission lock.

When selecting four wheel drive, 4WD- symbol appears in the rear frame of the harvester character.

SUBMENUS

The images and text at the bottom of the main display indicate the functions of the F1-F4 buttons in each display. The purpose of these submenu displays is to provide you with some of the most important facts collected on templates.

Adjustments

When pressing the F1 button in the main menu, a window opens in which you can select the crane adjustments, driver selection and function parameters.



The function parameters open a new page on which you can select the vibration filters, power limits or other parameters.



You can return to the previous page from the subpages by pressing the F4 button.

Adjusting the diesel engine revolution speed

When you press the F4 button in the main display, the diesel engine revolution adjustment window opens.

In this window, you can

- adjust the idle speed by pressing F1
- adjust working revolutions by pressing F2
- adjust full throttle by pressing F3
- return to the main page by pressing F4



Diesel temperatures, oil pressure, operating hours, and fuel consumption and load percentage

When you press the F2 button in the main display, a page opens displaying the diesel engine coolant temperature, fuel temperature, intake air temperature and oil pressure.



When you press F1, you can view the total hours, operating hours and working hours.

The total hours indicate the time that the machine power has been on. The operating hours indicate the time the diesel engine has been on. The working hours indicate the time the diesel engine's speed has exceeded 1,200 rpm. You can return to the main display from the subpages by pressing the F4 button.

On Diesel temperatures page, pressing the F2 gets you to see momentary fuel consumption, longer cycle fuel consumption of diesel = trip meter and the momentary load percentage. Measurement for a longer period fuel consumption is started by pressing F1 button on this screen.



Crane measurements

Pressing the F3 button in the main display opens a window showing the status of the crane controls. You can return to the previous page from the measurement pages by pressing the Back button.



Parameters in the iqan control system

Below you can find a list with explanations of the data adjustable and observable on the display.

INPUTS

Voltage Inputs:

VIN Brake Valve [mV]	Brake switch information
VIN Drive pedal [mV]	Drive pedal sensor
VIN Tilt Sensor [°]	The crane side tilt sensor (range -15°...+15°)
VIN Hand throttle	Select the diesel engine revolution direction
VIN Fuel sensor	Fuel level sensor
VIN Hydraulic oil temperature	Hydraulic oil temperature sensor
VIN Alarm symbols	An indicator for low hydraulic oil level, blocked diesel engine intake air filter as well as for blocked vacuum, pressure and return filter of the hydraulics
VIN Speed reduction potentiometer	Potentiometer for maximum speed limit

Digital Inputs:

DIN Ignition	Ignition key information
SW Activation	A door switch that stops the crane, frame steering and rotator movements
DIN Joint angle	Sensor that grounds the input when the frame steering angle is wide
DIN Steering/rotator [%]	Selects whether the right joystick controls the steering ring of the frame or rotation of the head°
Mini/EME sidetilt right	Side tilt switch data (mini/EME lever)
Mini/EME sidetilt left	Side tilt switch data (mini/EME lever)
Banana sidetilt right	Side tilt switch data (vertical grip)
Banana sidetilt left	Side tilt switch data (vertical grip)
Harvester Head closed	Head closed (vertical grip/EME lever)
Harvester Head open	Head open (vertical grip/EME lever)
SW Steering angle	End dampening sensor for articulated steering
DIN Side tilt automation on	Selects whether the crane side tilt automation is on or off
DIN Side tilt automation reset	After the start of the harvester or manual use of the side tilt, the crane does not return to the center position automatically until the reset button is pressed.
DIN Side tilt automation reset (vertical levers)	After the start of the harvester or manual use of the side tilt, the crane does not return to the center position automatically until the reset button is pressed on the vertical levers.
SW Differential lock switch act.	Differential lock switch information.
DIN Drive pump zero angle sensor NPN	Sensor that grounds the input when the drive pedals are in the center position
DIN Gear 1 engaged	Sensor for gear 1
DIN Gear 2 engaged	Sensor for gear 2
DIN Four wheel drive button	Four wheel drive switch information
DIN Four wheel drive lock button	Four wheel drive lock switch information
DIN Automatic. fuel pump	Fuel filling

Joystick Inputs:

JS Steering/Rotator [%]	Articulated steering/ Rotator
JS Lift [%]	Crane lift
JS Harvester Head [%]	Head open/closed
JS Slew [%]	Crane slew
JS Jib [%]	Crane jib
JS-Tilt [%]	Crane side tilt

Adjustable parameters

FP Idle [rpm]	Diesel engine idle speed
FP Working revolutions [rpm]	Diesel engine working revolutions
FP Full throttle [rpm]	Diesel engine maximum operating speed
JS Trigger + [%]	If the joystick is turned to the right more than the % value, the harvester head rotator will start rotating to the right.
JS Trigger – [%]	If the joystick is turned to the left more than the % value, the harvester head rotator will start rotating to the left.
Tilt Down Up Setting [1/0]	With the value at 1, the harvester head automatic tilt up is in use after the head open function. With the automatic tilt up it is also required that the head open button or lever is pressed for more than 0.7 seconds.
FP Steering Deceleration [%]	Deceleration speed of articulated steering while end damping happens
FP Autotilt Stopping Angle [°]	Side tilt automation does not try to correct deviations from the mid-position smaller than this angle. Standard setting $\pm 1.5^\circ$
FP-Autotilt Deceleration Angle [°]	The angle at which side tilt automation starts decelerating movement speed towards mid-position. Standard setting 6°
FP-Autotilt Start Slope [ms]	Side tilt automation acceleration ramp at the beginning of the correction movement
FP Side tilt sensor installed [1/0]	Defines whether the side tilt sensor has been installed. The value 0 disables the sensor.
Lever selection [1/0]	The value for the mini levers and EME levers should be 1
FP- Automatic gear shift	Automatic exchange of speed-range from slow to high, when the pedal is pressed enough. Value 0, the feature is not enabled.
FP Fuel pump running intermediate	This value provides a time after which the fuel pump is starting to move fuel from bigger tank to smaller tank. Normal operating interval is about 60 minutes.
FP Dampening Steering	Dampening of vibration in the frame steering. Prevents the vibration from the hand from transferring to the steering. The greater the value, the greater the hand vibration that is dampened.
FP Dampening Turn	Dampening of the vibration in the crane turn. Prevents the vibration from the hand from transferring to the crane. The greater the value, the greater the hand vibration that is dampened.
FP Dampening Lifting	Dampening of the vibration in lifting. Prevents the vibration from the hand from transferring to the crane. The greater the value, the greater the hand vibration that is dampened. .
FP Dampening Angle	Dampening of the vibration in the crane angle. Prevents the vibration from the hand from transferring to the crane. The greater the value, the greater the hand vibration that is dampened.

FP Dampening Side tilt	Dampening of the vibration in the crane side tilt. Prevents the vibration from the hand from transferring to the crane. The greater the value, the greater the hand vibration that is dampened
FP-damping Driving	Dampening of the vibration in driving. Prevents the vibration from the foot from transferring to the transmission. The greater the value, the greater the foot vibration that is dampened.
FP Steering power limit	Deceleration of the frame steering speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect.
FP Turn power limit	Deceleration of the crane turning speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect.
FP Lift power limit	Deceleration of the crane lifting speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect
FP Angle power limit	Deceleration of the crane angle speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect
FP Side tilt power limit	Deceleration of the crane side tilt speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect.
FP- Drive power limit	Deceleration of the drive speed to the value set with this parameter when the diesel engine revolutions decrease under load. The smaller the value the smaller the effect

OUTPUTS

Current Outputs:

PV- Drive pump [%]	Traction transmission pump (proportional)
PV Lift [%]	Crane lift (proportional)
PV Steering [%]	Harvester articulated steering (proportional)
PV Sidetilt [%]	Crane Sidetilt (proportional)
PV Jib [%]	Crane jib (proportional)
PV Slew [%]	Crane slew (proportional)

Digital Outputs:

DOUT-Start diesel	Diesel engine start
DOUT-Differential lock	Differential lock engaged
DOUT-Four wheel drive	Four wheel drive engaged
DOUT-Four wheel drive lock engaged	Four wheel drive lock engaged (hydraulic)
DOUT-Break and frame lock	Automatic control of the breaks and the frame lock disengaged
DOUT- Fuel transfer pump	Fuel transfer pump on

Service and maintenance

Safety

Installations and adjustments may be carried out only by a person with the required skills and qualifications and the necessary knowledge of the machine in question.

Installations and adjustments as well as repairs must be carried out when the engine is stopped and the key removed from the ignition. Moving parts must be in balance and stopped, and when necessary, locked.

For example, the crane and harvester head may move or slide on their own over time.

Make sure that there is no stored pressure in the fluid systems before you open mechanical or hydraulic joints (pressurized oil tank, harvester head pressure battery, AC equipment, radiator etc.)

Make sure there is no danger of injuries if you need to start the engine while performing maintenance and also after maintenance work.

Ensure that all periodic maintenance work and cleaning are performed on schedule in accordance with the instructions. This reduces the risk of danger caused by malfunctions.

Proper maintenance and service guarantee a long working life and the validity of the warranty.

General instructions:

- Make sure you are sufficiently qualified before you perform maintenance tasks. If you are not sure, have the work performed by a qualified individual.
- Familiarize yourself with the structure of the harvester and the maintenance instructions before you start the maintenance work.
- Wear protective clothing suitable for the work
- Use appropriate tools and other equipment.
- Handle the machine to be maintained and the substances used as instructed so that there is no danger to yourself, other people or the environment.

Service measures
daily or every 8 hours

1. Checking of the engine oil level

Stop the engine on level ground and wait for a few minutes. The oil level shall be between the marks on the dipstick. Fig. 27.

Fig. 27

A Oil measuring dipstick

B Oil filler

C Coolant check / refill

2. Checking of the coolant level

Note! Open the over-pressurised radiator cap with great care when the engine is hot.

Never use plain water as coolant!

Do not pour cold coolant into a hot engine.

The coolant level shall be approx. half way up the expansion tank.

Coolant is added through the expansion tank. Make sure there is anti-freeze in the radiator in the cold season.

3. Checking of the hydraulic oil level

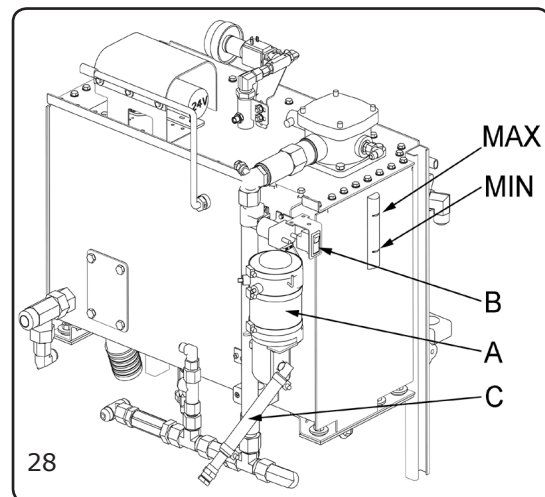
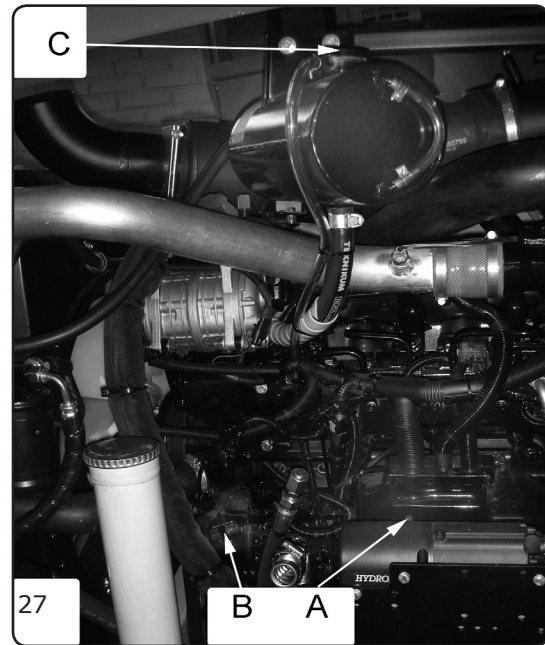
Check the hydraulic oil level in the measuring glass on the tank with the lift cylinders in their inner position.

Note! The oil level shall always be visible in the measuring glass.

Add oil using the oil refill pump A (figure 28). The pump starts from switch B and oil is sucked into the tank through hose C. This will leave all the impurities in the filter.

4. Daily lubrication

Lubricate the daily lubrication points in compliance with the lubrication table. See Lubrication Table.



5. Cleaning of radiator grilles

Depending on the operating environment, the radiator grilles shall be cleaned often enough to prevent the engine from overheating. Clean the rear cog screen and the removable grille using compressed air or a brush (fig. 29). When necessary, clean the oil, engine and air conditioner condensers. **Note!** The rear cog and the grilles must not be covered with the engine running.

6. Checking of tyre air pressure

Check the tyre air pressure and external condition visually. Use manometer if necessary. The correct air pressure for the 500/60-26.5 tyres is 3.7 bar, the 600/55-26.5 tyres 4.0 bar, the 540/65R28 tyres 3.2 bar. Do not exceed the indicated pressures.

7. Checking for leakage

Check for any liquid, fluid and oil leakage.

8. Checking of connections

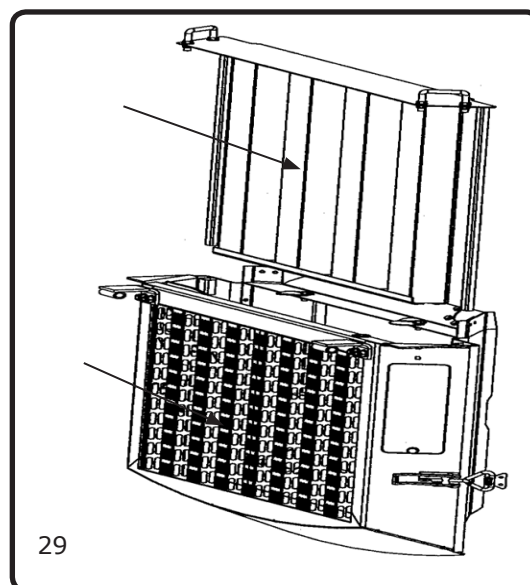
Check the screw and pipe connections visually.

Note! During the first operating month the tightness of the screw connections in the crane, shafts and joint shall be checked daily.

It is important to tighten the screw connections to the correct torque. The required wrench sizes and torques:

Screw size	Wrench size (mm)	Tightening torque for screws of 8.8 strength class (Nm)
M 6	10	11
M 8	13	25
M 10	17	47
M 12	19	78
M 14	22	120
M 16	24	180
M 20	30	335

Note! Tightening torques for wheel fixing screws 540 Nm



Service measures weekly or every 50 hours

1. All daily service measures

The service measures to be taken every 50 hours include all the measures listed in service measures daily or every 8 hours.

2. Lubrication in compliance with the lubrication table

Lubricate in compliance with the lubrication table paying attention to any special instructions. See the lubrication table.

Service measures every 100 hours

1. Cleaning of engine air filter

The engine suction air is cleaned by a pre-filter and a dry paper filter of a dual-element type. Faultless functioning of the filter is of utmost importance to the long lifespan of the engine. The filter housing is located in the engine compartment. The filter housing cover is fastened with locking brackets and the filter cartridges are under the cover (fig. 30). The outer filter cartridge shall be replaced when blockage is indicated on IQAN- monitor or at least every 100 hours. The outer cartridge can also be cleaned, but no more than five times. Open the locks on the rear filter cover and twist the cartridge out of the housing. Be careful not to damage the paper. Do not remove the inner cartridge unless it needs replacing. The filter protects the suction channel against impurities during service.

Blow dry compressed air (not over 5 bar) inside the filter. Great care shall be taken not to damage the filter cartridge or allow dust inside.

After cleaning, check the condition of the filter. Direct a strong light from the inside. In case the outer filter cartridge is broken, it shall be replaced. The inner filter shall also be replaced as it has become dirty. Otherwise the inner cartridge is replaced after five filter services or every other year.

Clean the inside of the filter housing carefully before removing the inner cartridge. When refitting the filters, make sure that the gaskets are intact, the mating surfaces clean and that the filter fits well.

When servicing the filter, check the condition and attachment of the air hoses and the cleanliness of the hose in the exhaust fume ejector.

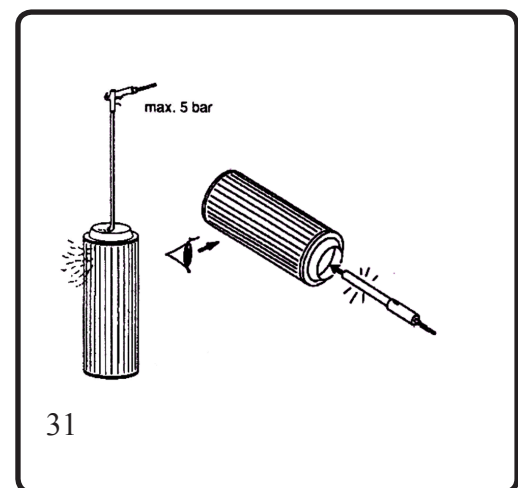
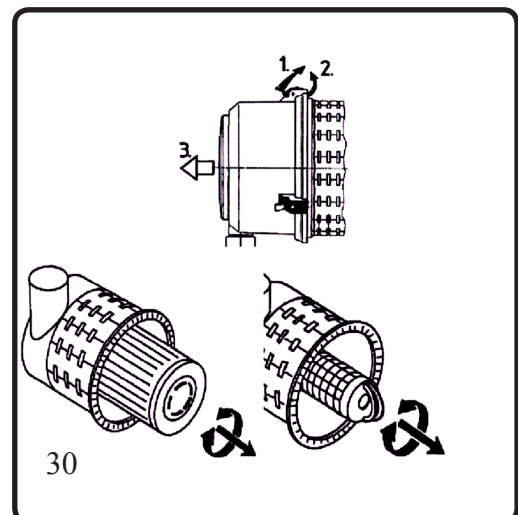
NOTE! Never run the engine without filters.

2. Checking of battery fluid level

Clean the battery housing carefully. Check that the battery fluid level is 5-10 mm above the cells. Make sure the cable lugs are properly tightened. Remove any oxidisation with hot water. Coat the cable lugs with copper or aluminium paste.

3. Cleaning of breather on the hydraulic tank

Clean the filter and the surrounding area carefully (fig. 32).



4. Checking of the condition of traction transmission

Check the attachment of hub motors. Ensure there are no cracks. Check the attachment of the hydraulic pumps. Check for leaks in hose connections.

5. Cleaning of cab air filter

Remove the cab fresh air filter with its housing and clean it carefully with compressed air. Replace a soiled or broken filter. The paper filter shall be replaced at least once a year. Check also the condition of the air intake suction channel.

6. Checking of light operations

Make sure the headlights, working lights, turning signals and signal lights function properly. When replacing bulbs, comply with the Manufacturer's recommendations.

7. Draining of water out of water separator

The fuel pre-filter with water separator is located on the left side of the engine. Drain any accumulated water into a dish weekly. Replace the filters in compliance with the service table or more often if you suspect a clogged filter. Fault code "Fuel pressure low" indicates a clogged pre-filter or air leakage in the pipes. When changing the filter, remember to take the metal water separator plug from the old filter.

Used filters are problem waste that must be dealt with accordingly. For further instructions, refer to the engine manual.

8. Checking of brake functions

9. Check Fan Belt Tightness

The engine is equipped with a spring loaded belt tensioner and the belt is of V-ribbed type. The tensioner tightens the belt automatically during the operation.

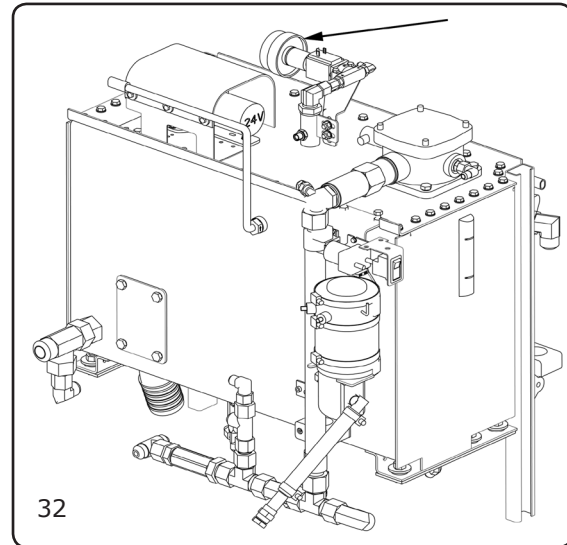
Check the belt visually. Change a worn, oily or damaged belt.

Belt Replacing

Turn the tensioner against the direction of tightening until the belt to be loosened.

- using a 3/8 in square drive inserted into the square hole in the tensioner.
- pay attention to free rotation of tensioner roller and also the right tightness of fixing screw 48 Nm.
- fit the new belt and other loosened parts.

Make sure the engine cannot be started during belt replacing. Disconnect the battery before doing this job.



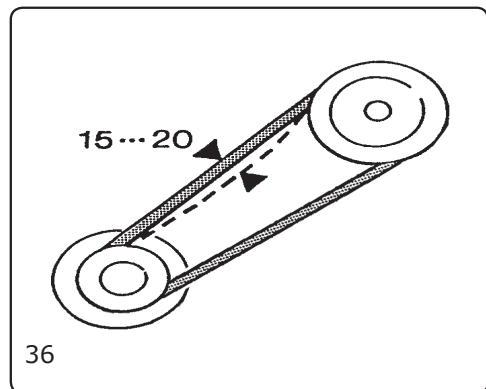
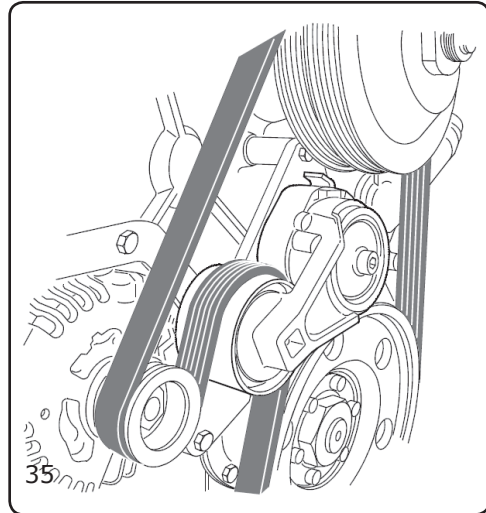
10. Compressor belt in the air conditioner

Check the tension of belt in air conditioner. The tension is correct when there is a deflection of 15-20 mm when pressing with your thumb. Replace worn and damaged belts (fig. 36).

11. Cleaning of polycarbonate windows

Remove any particles that may damage the window surface. Avoid using any sharp objects. Use mild and environmentally friendly detergents and plenty of water for washing. Substances suitable for removing stains include pure isopropyl alcohol, white spirit, heptane, white gas, butyl ethylene glycol, methanol, hexane and butanol. Use plenty of water for rinsing after the removal of stains.

NOTE! Do not use other solvent substances such as gasoline for cleaning windows.



Service measures every 500 hours

1. All daily and weekly service measures.

The service measures to be taken every 500 hours include all the measures listed under service measures daily or every 8 hours as well as the measures listed under service measures weekly or every 50 hours and every 100 hours.

2. Changing of engine oil and filter

Keep the engine running until it warms up. Open the drain plugs A in the underpan and the engine sump. Drain the oil into a pan. When all the oil has been drained, close the drain plug with a new gasket (fig. 37).

The oil filter is replaced every time the oil is changed. Clean around the oil filter. Remove the old filter using a filter key. Coat the gasket of the new filter lightly with new oil (fig. 38), and make sure the gasket surfaces are clean. Attach the filter manually. Wipe off any excessive oil. Pour new oil through the filler B to the top mark on the dipstick. Pay attention to the amount of oil poured into the filter.

Acceptable oil types and amounts are given in the Lubrication Table and the Engine Manual. For further instructions, see the Engine Manual.

NOTE! Only use oil recommended by the manufacturer

Check the engine breather pipe every time the oil is changed. The pipe shall be clean inside and it must not be dented.

3. Checking of the operations of the drive pedal

Check the operation and position of the drive pedal. The pedal shall move to its upper position as the foot is removed off the pedal. The frame lock and the brakes shall be disengaged slightly before the harvester starts moving.

4. Use Of An Additional Heater And Air Conditioning Outside The Heating Season

The heater shall be used approx. once a month outside the heating season, too. This is done to prevent the fan motor and water pump from getting stuck. Also air conditioning must be used at least once a month.

5. Replacing Of The Hydraulic Oil Filters

For more information on filter replacement, see items Service Measures Every 1000 Hours.

6. Checking Of Screw Tightness After The First 500 Operating Hours

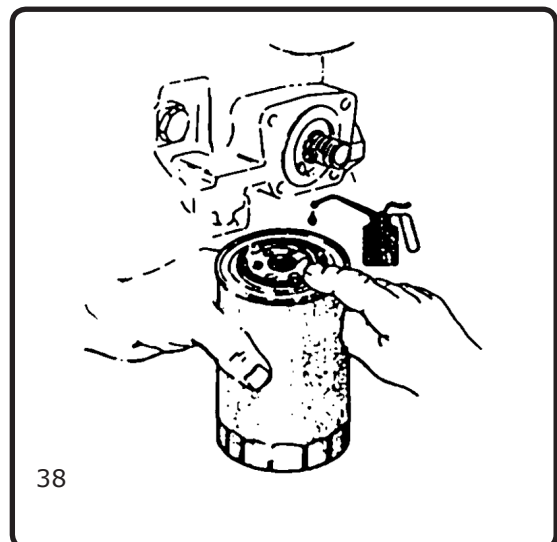
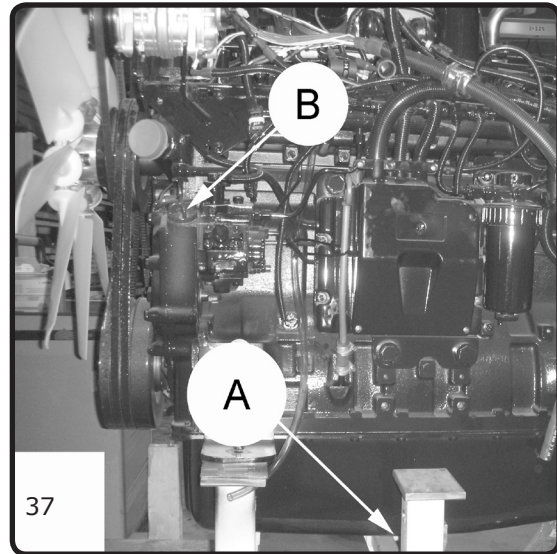
Screw tightness in the crane and joint shall be checked after the first 500 operating hours. Torque for the crane M24x2 screws in strength class 10.9 is 1000Nm and in strength class 12.9 1200Nm.

Torque for the M10 screws in the joint (strength class 10.9) is 68Nm, for the M16 screws (strength class 10.9) torque is 300Nm, and for the M20 low-headed screws (strength class 10.9) 550Nm, and for ordinary hexagonal socket-head screws 700Nm (strength class 12.9).

7. Adjusting the diesel engine valves

Adjust the diesel engine valves after the first 500 operating hours and then every 1000 operating hours.

For detailed information, see the engine manual.



Service measures every 1 000 hours

1. All service measures to be performed daily, weekly and every 100 and 500 hours

The service to be performed every 1 000 hours includes all the service measures listed under service measures daily or every 8 hours, service measures weekly or every 50 hours and service measures every 100 and service measures every 500 hours.

2. Changing of the fuel filter

See instructions in the Engine Manual, fig. 40.

3. Draining of condensed water out of the fuel tank

Run a little fuel from the filler at the front of the fuel tank into a pan.

4. Changing of the oil in the crane turning motor

The oil in the turning motor (fig.41) is changed every 1000 hours. However, the first time the oil is changed after 50 hours. See further instructions in the crane manual.

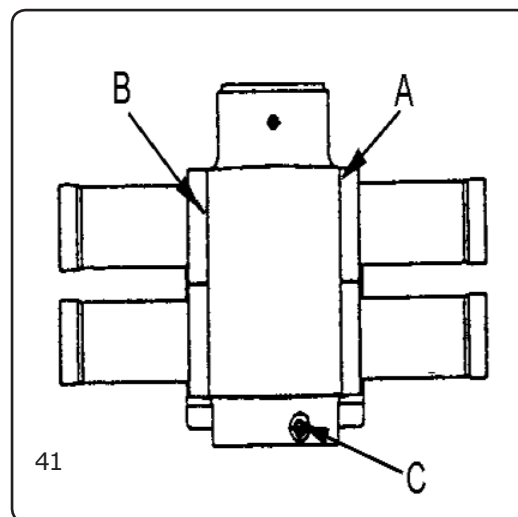
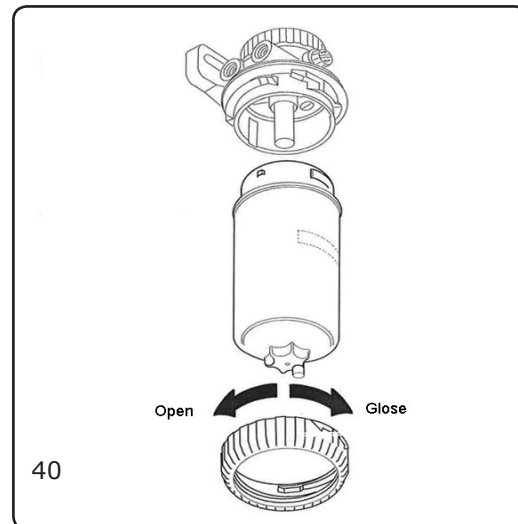
Refill in accordance with the oil table.

- A Filling opening
- B Control opening
- C Drain opening

5. Changing of the hydraulic oil filter

Change the filters in the working and traction hydraulics (fig. 42).

- A Return filter
- B Breather
- C Pressure filter
- D Suction-/return filter



The hydraulic oil does not need to be drained when changing the filters.
See further instructions in item SERVICE MEASURES EVERY 1500 HOURS

6. Checking condition of hydraulic hoses

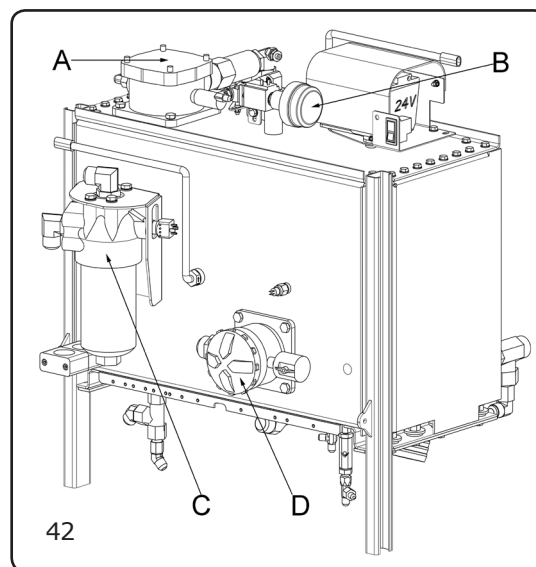
Check The condition of hoses. Replace worn out and leaking hoses to New. Replace all hoses with new ones at least once in 15 years.

7. Checking air hoses of cooler and engine

Check hoses visually. Replace with new if needed. Engine's cooling water hoses must be changed at least every five year.

8. Adjust diesel engine valves

See instructions in the engine manual.



Service measures every 1500 hours

1. All service measures to be performed daily, weekly, every 100 and 500 hours

The service to be performed every 1500 hours includes all the service measures listed under service measures daily or every 8 hours, service measures weekly or every 50 hours , service measures every 100 and service measures every 500 hours.

2. Changing of hydraulic oil and filters

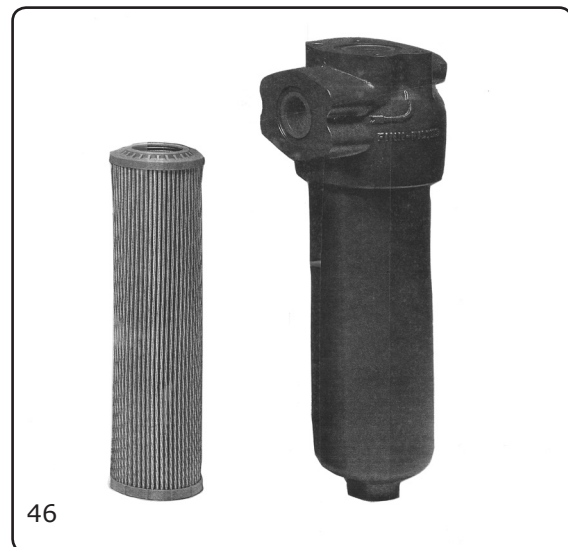
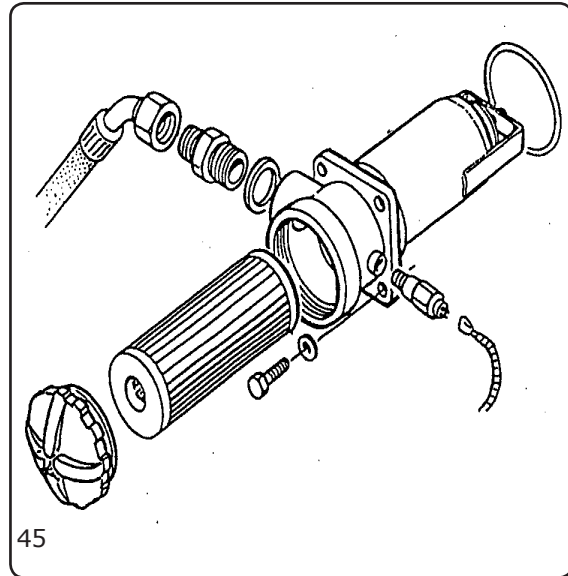
Traction and working hydraulics have a joint oil tank. Oil should be changed at least once a year. Before changing the oil, run the system until it is warm and adjust all the cylinders in their shortest position.

Oil is drained from the system by unplugging the drain plug at the end of the drain hose. Have a sufficiently large pan handy, as there is approx. 100 litres of oil. Clean around the filters carefully before removing them.

NOTE! The oil does not need to be drained when the filters are changed.

When changing the Suction-/return filter, turn the filter cover counter clockwise.

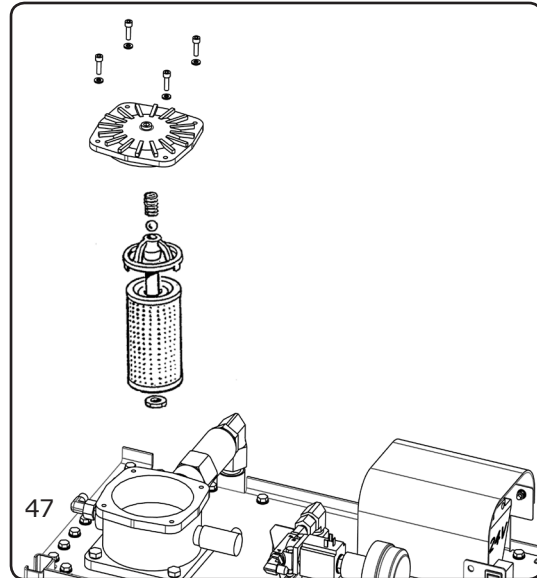
The pressure filter is replaced by turning the bottom of the filter off, after which the filter can be replaced by hand, fig. 46.



To change the return filters, unscrew the four fixing screws on the filter cover. The cover is spring loaded, which means the screws shall be unscrewed evenly. Remove the fixing nut at the bottom of the filter element and change the filter cartridge (fig. 47).

Use only genuine filters and oil types in compliance with the oil table to guarantee perfect functioning. Make sure there are no impurities in the oil or the funnel.

After the oil change let the engine idle for approx. 30 minutes, during which time hydraulics must not be used. During this period the oil circulates through the filter several times and any impurities in the oil are filtered off. Monitor the oil level and check for any leakage in the filter.



There is a glass gauge on the side of the oil tank to monitor the oil level. The oil level shall be visible in the gauge window. Add oil, when necessary.
REFILL ALWAYS THROUGH THE RETURN FILTER PLUG!

At the base of the oil filter there is an alarm switch to indicate pressure loss through the filter. In case the alarm light is on in the cab and the oil is in its operating temperature, the filter cartridge is clogged and shall be replaced.

If hydraulic oil becomes over-heated

The temperature of the hydraulic oil should not exceed 70 degrees C. A temperature increase of 10 degrees cuts the oil lifetime in half. When the signal light comes on, the temperature of the hydraulic oil is 90 degrees. In this case you should wait long enough to let the temperature decrease. The engine can be kept running, but unloaded. Find out the reason for the excessive oil temperature. The most common reason is blockage in the radiator and its protective screens.

3. Checking condition of hydraulic hoses

Check The condition of hoses. Replace worn out and leaking hoses to New. Replace all hoses with new ones at least once in 15 years.

SERVICE MEASURES EVERY 2000 OPERATING HOURS

1. Inspect and clean the diesel engine injectors (EEM3 service tool)

SERVICE MEASURES EVERY 4000 OPERATING HOURS

1. Check compressor clearances / check the cleanliness of the intercooler element
For detailed instructions, see the SisuDiesel manual.

Service measures every 6 months

The fire extinguishers shall be serviced every 6 months or more often if so stipulated in local regulations.

Service measures every 1 year

If the harvester is equipped with an automatic extinguishing system, it shall be serviced as instructed by the Manufacturer. See Servicing of the Fire Extinguishing System in the Operator Manual. In some countries, an annual official inspection of the machine is required in the insurance terms and conditions.

Service measures every 2 years

1. Replacement of the AC drying cartridge

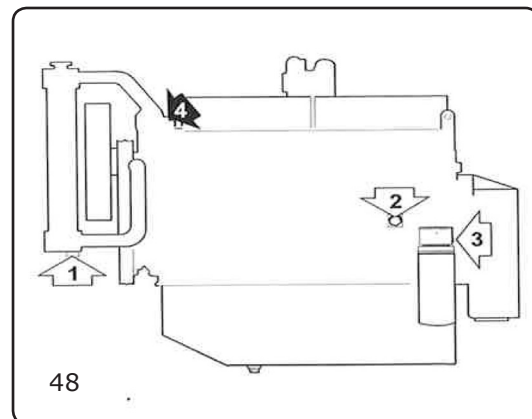
To guarantee faultless functioning of the air conditioning, the drying cartridge needs to be replaced every 2 years.

2. Changing of engine coolant

The coolant shall be changed at least every other year to maintain its anti-corrosion properties. The cooling system is drained by opening the draining taps in the radiator water cell and on the left-hand side of the engine at the rear and by unscrewing the cap in the expansion tank. In order to drain the coolant from the heater cell, too, turn the thermostat to its maximum position.

Used coolant is problem waste, which shall be disposed of in an appropriate manner. Therefore the draining taps are equipped with connectors to which a collection hose can be attached to drain the liquid (fig. 48).

1. Radiator draining
2. Engine draining
3. Oil cooler draining
4. Bleeder plug



NOTE! See further instructions in the engine manual.

The dual-functioning thermostat must not be removed to reduce the temperature, as this would make most of the coolant circulate through the side circulation pipe, which reduces cooling capacity.

On models equipped with an additional heater, air shall be bled from the heater when more coolant is added. See the heater instructions!

Lubrication

Do not lubricate while the engine is running. Remove the ignition key before starting lubricating. The table below gives recommended lubricants to be used in different temperatures. The table also gives different types of air conditioning liquids, although they do not normally have to be changed.

* If you want to use biodegradable hydraulic oils, consult the Manufacturer.

Recommended lubricant	Oil grade API	Viscosity SAE		Filling quantity l	Change interval
		-25...+30°C	+10...+45°C		
Engine - Common Rail	CI-4	10W40	10W40	12	500 h
Hydraulics ¹	Shell Esso Shell	Tellus S4 VX 32 Univis 32 TellusOil TX32	Tellus S4 VX 32 Univis 46 TellusOil TX46	130	1500 h
Lubrication points	CB/CC	10W30	15W40	–	–
Grease points	Lithium grease	NLGI 2	NLGI 2	–	–
AC oil	PAG	500 SUS	500 SUS	1.8 dl initial fill	–
AC refrigerant	HFC R134a	–	–	1.6 kg	–
Crane turning motor	See the crane manual				1000 h
Chain oil	See harvester head manual				

Initial fills

Engine: Shell Rimula R5 E 10W-40
 Hydraulics: Shell Tellus S4 VX 32
 Lubrication grease: SHELL Rhodina Grease EP2

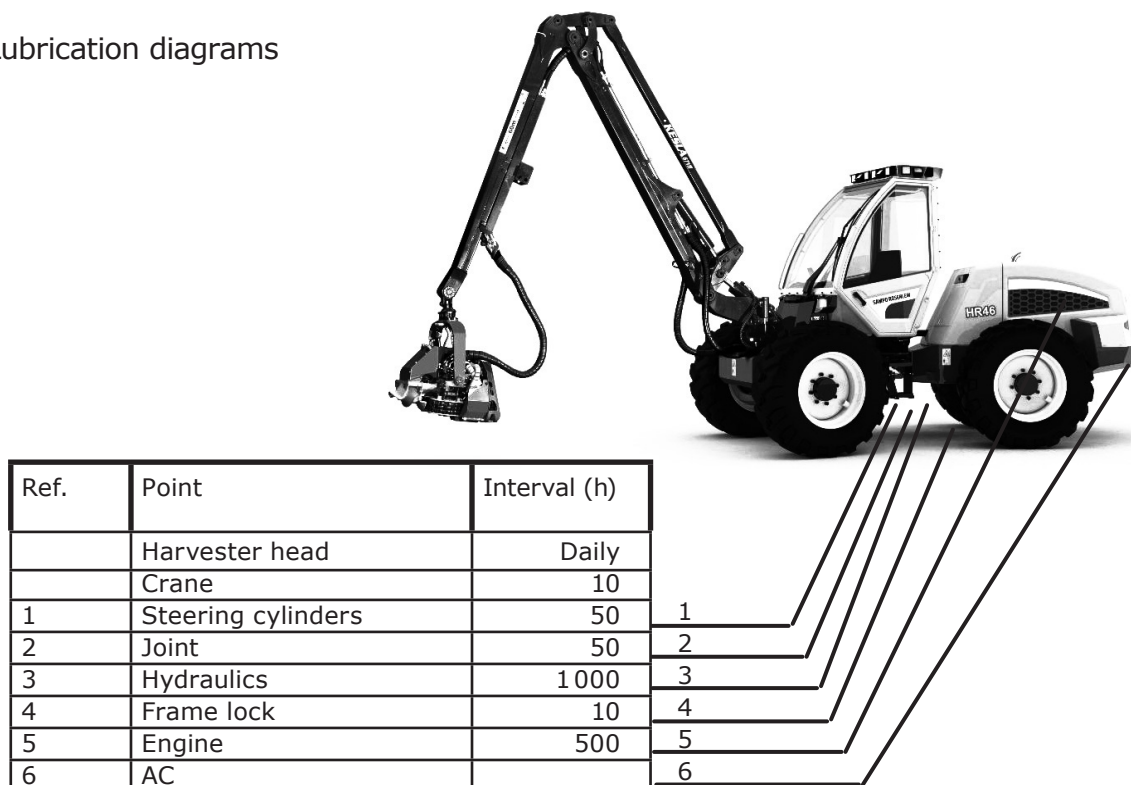
The initial installation oils are those with a temperature range of –25...+30°, except in hydraulics where the oil should be Shell Tellus Arctic 32. In the first maintenance, switch to oil types suitable for the area where the machine is used.

The guarantee is valid only when lubricants in compliance with the initial fill lubricants are used!

Correct lubrication is of major importance to the perfect functioning and long working life of the forest harvester, due to which the lubrication recommendations shall be followed carefully while simultaneously monitoring if any place requires more lubrication.

All the lubricants shall be free from impurities. Even the slightest impurities may cause damage. Oil fillers and nipples shall be wiped clean. Apply grease on the nipples in accordance with the lubrication table. Apply machine or engine oil to places to be oiled.

Lubrication diagrams

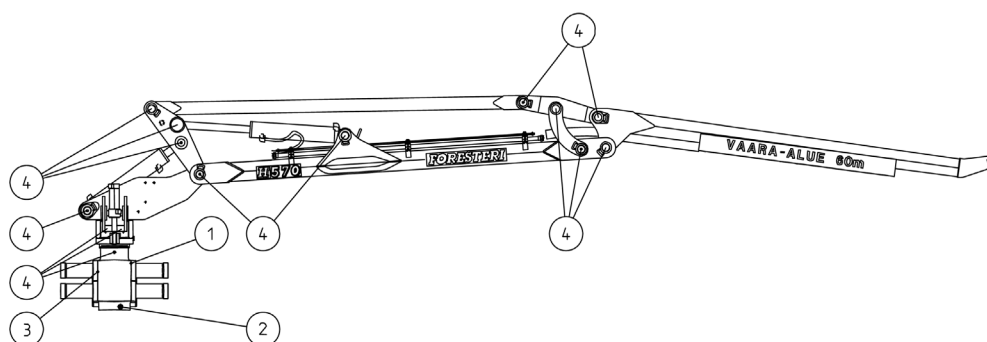


Lubrication of crane and changing of oil in turning motor

The crane is lubricated every 10 hours. The lubrication points are shown in picture

The oil change interval in the turning motor is 1000 hours.

Hypoid oil type SAE 80W/90, API GL-5 is used in the turning motor. See further instructions in the Crane Manual.



Ref.	Point	Pcs	Action	Interval hours
1	Turning motor, oil window	1	Checking	10
2	Turning motor, lower plug	1	Emptying, draining water twice a year	1000
3	Turning motor, upper plug	1	Filling, adding if necessary	1000
4	Joint- and sliding bearing	22	Greasing with press	10

Summary of periodical procedures

The summary always includes checks and service performed at shorter intervals. For more detailed crane and harvester head service instructions, see the respective manuals.

Daily or every 8 hours:

1. Check the engine oil level
2. Check the radiator coolant level
3. Check the hydraulic oil level
4. Lubricate the points to be lubricated daily
5. Clean the coolers and the grille
6. Check the tyre air pressure visually
7. Check for any fluid and oil leakage
8. Check the connections

Weekly or every 50 hours:

1. Lubricate all the points specified in the lubrication table

Every 100 hours:

1. Clean the engine air filter (*)
2. Check the battery fluid level
3. Clean the breather area on the oil tank
4. Check the condition of the power transmission equipment
5. Clean the cab air filter
6. Check the light functions
7. Drain water out of the water separator
8. Check the brake functions
9. Check the belt tension
10. Clean the windows

(*) or when the blockage indicator alarms

Every 500 hours:

1. Change the engine oil and filter.
2. Check the drive pedal function.
3. Run the additional heater and air conditioning outside the heating season.
4. Replace the hydraulic oil filters after the first 500 operating hours.
5. Check the screw tightness after the first 500 operating hours, particularly in the crane and the joint.
6. Adjust the diesel engine valves after the first 500 operating hours and then every 1000 operating hours.

Every 1000 hours:

1. Change the fuel filter (*)
2. Change the fuel pre-filter (waterseparator) (*)
3. Drain condensed water out of the fuel tank minimum once a year
4. Change the oil in the crane turning motor
5. Change the hydraulic filters (**)
6. Check the hydraulic hoses. Replace the hoses at least every 15 years.
7. Check the radiator and engine air hoses visually, replace if necessary.
8. Change the engine cooling water hoses at least every five years.
9. Adjust the engine valves

(*) or when indicated by service code in the engine system

(**) or when the blockage indicator alarms

Every 1500 hours:

1. Change the hydraulic oil
2. Checking condition of hydraulic hoses

Every 2000 hours

1. Inspect and clean diesel engine injectors (EEM3 service tool)

Every 4000 hours

1. Inspect compressor clearances / check the cleanliness of the intercooler

Every 6 months:

1. Service the fire extinguisher

Every 1 year:

1. Check/ service of the automatic fire extinguishing system

Every 2 years:

1. Replace the AC drying cartridge
2. Change the engine coolant

Storage when not in use

In case of a longer storage, the pre-storage service is recommended. The pre-storage service can be divided into three parts, in order of performance: cleaning, checking and protection.

Cleaning:

Dirt is efficiently removed from a dry harvester by compressed air. A high-pressure washer may also be used with caution. To reduce drying time, use warm water. Do not direct water jets at the bearings, as the packing does not hold against a strong spray of water. Apply suitable solvent on heavily greasy spots before washing. Start cleaning from the top. Clean the radiator cells by blowing air from the direction of the wings.

Checking:

Take a pen and paper and write down all the shortcomings and required service measures in the following order:

- Condition of the harvester head
- Bearing clearances and attachments
- Wear, corrosion and dents

It is important to have the recorded defects repaired before storage to ensure the efficient functioning of the harvester in the future.

Protection:

Use engine oil or special protective oil in a sprayer.

Places to be protected:

- Scratched paintwork (paint)
- Electrical connections (special protective spray)

Cab ventilation:

Clean the filters. Clean the air channels and the fan unit with its cells. This may be done with a vacuum cleaner.

Air Conditioning:

Clean the air conditioner condenser and vaporiser cells preferably with compressed air.

Engine:

Clean the engine externally.
Replace the fuel filter.
Change the engine oils.
Replace the engine oil filter.
Check the anti-freezing quality of the coolant.
Clean or replace the air filter.
Clean the cable lugs and apply grease to them.

Electrical instruments:

Clean the battery surfaces, check the fluid level and charge the battery full. Charge the battery every three months.

Recommended tools and accessories

Recommended accessories

- Pulse sensors
- Inductive sensors
- Light bulbs
- Connection relays
- Gaskets and packing

For the saw

- Chains
- Spare guide bar

General Parts

- Hexagonal screws M6-M12, the most common lengths of 16-40 mm, strength class min. 8.8.
- Hexagonal nuts M6-M12, strength class 8. A few lock nuts.
- Washers and spring washers, 6.5-13 mm.
- Spring cotters, 3-8 mm, lengths 20-50 mm.
- Grease nipples 6 mm and 1/8", straight and angled.
- Fuses 7.5; 10, 15; 25; 40A

Battery

The gas generated by the battery is very explosive. Avoid open fire and sparks in the vicinity of the battery.

When servicing an electrical instrument, disconnect the negative cable of the battery.



Checking of the charge state of the battery

During harvesting the engine recharging equipment keeps the battery charged. At other times, check the state of the battery at regular intervals and recharge if necessary. An acid gauge may be used for checking. In the table below you can see the charge state of the battery compared with the acid specific weight.

Specific weight reading	Charge state
1 280	Fully charged
1 240	75 % "
1 200	50 % "
1 160	25 % "
1 120	No charge

Do not leave a flat battery unused for a long time. A low-charged battery freezes easily and exposure to frost will cause extensive damage. If a recharging device is available, recharging can also be done at home.

Before starting to recharge:

Disconnect the battery cables.

Unplug the cells.

Make sure the fluid level is high enough.

Use 5-10 % of the Ah of the battery for charging current. For example: A 100 Ah battery may be recharged using 5-10 ampere current. Recommended recharging interval is 6-10 weeks.

Cleaning of battery and other maintenance

Clean the battery cover regularly.

Remove any oxidation off the battery poles and cable lugs.

Make sure the cable lugs are properly tightened.

Coat the outer faces of the poles and lugs with Vaseline. Check that the battery is properly fastened and the poles protected. Make sure the rubber rug on the battery is properly adjusted.

Check the fluid level a few times a year and before storage. Add distilled water, if necessary, up to the upper fluid level.

NOTE! Wrong connection of either the battery or the generator will damage the generator.

Before electrical welding, disconnect the battery and generator cables.

Check the condition of the cable insulation and the protective cables on a regular bases and perform any necessary repairs.

Using of auxiliary battery

If additional power is needed for starting, proceed as follows:

As a source of additional power use 24 V input for example: another 24V vehicle, startbooster or two 12V batteries in series. Make sure the harvester batteries has not frozen; a flat battery freezes in -10°C.

Follow carefully the connecting sequence given below:

1. Connect the auxiliary starting cable to the positive pole of the additional power source. Connect other end of the cable to the 30-pole of the main switch (that is +24V cable from harvester batteries fig.49).
2. Connect one end of another auxiliary starting cable to the frame of the harvester (same point where batteries grounding is located fig.49). Connect the last end to the negative pole of the additional power source.

Do not lean over the batteries while making the connections.

Start the engine.

Disconnect the cables in exactly the opposite order.

Installation of Additional Electrical Instruments

When installing additional electrical instruments to the harvester, make sure the size of the charge generator is 100 A. The total consumption of a basic forest harvester in the dark is 70-90 A consisting mainly of the following:

Headlights	6 A
Working lights	40 A
Gauge lights approx.	1 A
Cab fan	7 A
Harvesting computer	7 A
Hydraulics	8 A
Joystick functions approx.	3 A

