SAMPO ROSENLEW

C10
C12
C20
C22
C24

Combine Harvester Instruction Book

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X XXX XXX 07/2022
English

Operator’s manual

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

Have this manual always in the cab, in the special pocket reserved for it, for convenient reference.

This manual provides descriptions of as well as operating and maintenance instructions for several models in the series. Every combine does not have all the described features. The actual structure as well as the number of accessories and optional equipment depend on what was agreed in the delivery contract. This is to be kept in mind when reading the manual. The combine images shown in this manual are for illustration purposes only and may not be an exact representation of your combine.

Item “Technical Specifications” has a description of the features of the combine. It does, however, not include retrofitted accessories.

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

SAMPO ROSENLEW Ltd

Contents

Safety precautions

Carefully read these instructions on safety and use before starting to operate the combine. Time spent in becoming familiar with the instructions now will save you money or may even spare you from injury. Before accepting the delivery of the combine, make sure it conforms to the delivery contract.

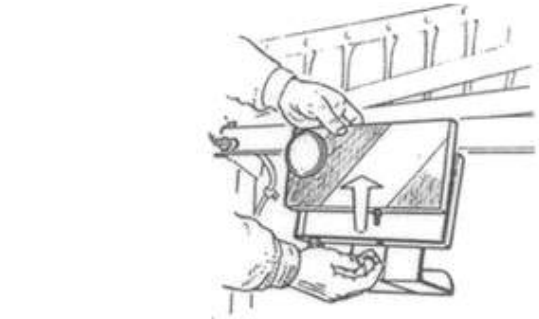
Do not fit the combine with any accessories not approved of by the Manufacturer. The Manufacturer is not responsible for any damage or injury caused by such accessories either to people or property.

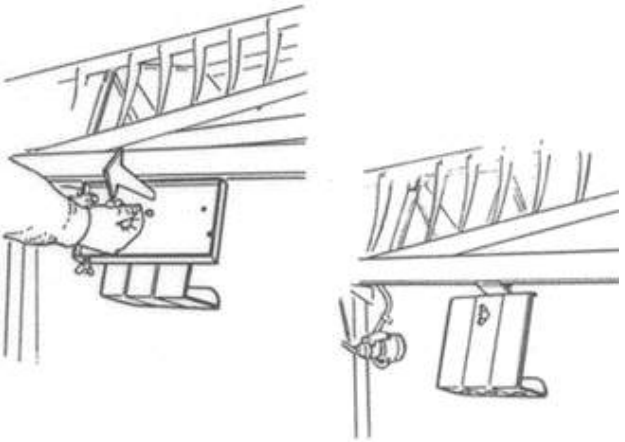
1. TRANSPORTATION ON A VEHICLE OR BY RAIL

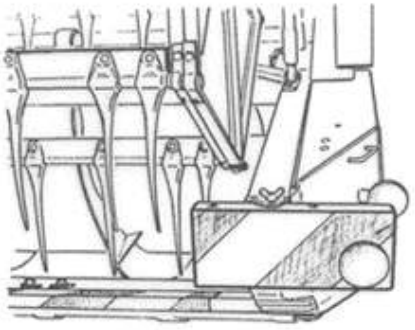
Make sure you know the measurements and weights of the combine and the transporter. Comply with any regulations governing the transportation.

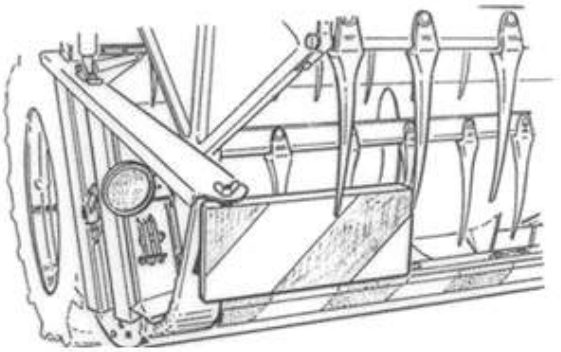
Use increased tire pressures (2…2.5 Bar) to improve stability.

Fix the combine securely in the transporter. For road transport lower the cutting header fully or disengage it.









2. DRIVING IN TRAFFIC

When driving on public roads, comply with the relevant statutory traffic regulations. Remember the combine has rear-wheel steering.

The brake pedals must be latched together. Test brake functions before driving on the road. Brake smoothly as the rear wheels of the combine easily rise from the ground when applying the brakes violently. **The road switch on the instrument panel must be engaged.** The threshing equipment must be disengaged, **the straw dividers removed.**

Front warning signs shall be fitted onto the header, if it is permitted to drive on the road with the cutting header engaged.

The front and rear lights and the rear-view mirrors shall be correctly aligned.

Never drive downhill with the gears in neutral. Never carry passengers on the combine.

Never use the combine for transporting goods.

Always have the grain tank empty and folded covers down when driving on the road.

3. THRESHING

Get familiar with the structure of the combine by studying the manual before starting threshing. Wear appropriate clothing. Avoid loose clothing that may get caught in moving parts. Keep the doors closed when working to prevent dust and noise entering the cabin. Use of hearing protectors is recommended.

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

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

Adjust the rear-view mirrors before starting to ensure good visibility of the road or the working area behind. Never use the combine for anything but threshing. Manual feeding of crops onto the cutting table is prohibited.

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

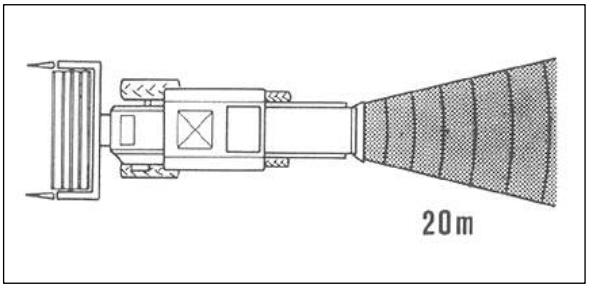
Test the brakes as soon as you start and stop immediately if the brakes or steering operate defectively.

Never adjust the seat or steering wheel while driving. Never leave the cab while the combine is moving. Never leave the engine running unattended.

Do not open the guards with the engine running. Do not mount, or allow others to mount, on top of the grain tank or the rotors with the engine running.

Beware of the cutting mechanism and the rotating chopper knife.

Keep in mind that with the chopper rotating, there is a 20 m no-access danger zone behind it.



Drive carefully on hillsides; the combine may overturn, particularly with the grain tank full.

The combine cab is no safety cab.

THE RIGHT-HAND SIDE DOOR MAY BE USED AS AN EMERGENCY EXIT. PULL UP THE HANDLE AND OPEN THE WINDOW.

Note the recommended safety distances when threshing under power lines.

Stop the engine before cleaning or servicing the combine.

Stop the combine and the engine immediately if there is an alarm or any abnormal sounds or smells. Find out the reason for them and remove the problem before carrying on with threshing.

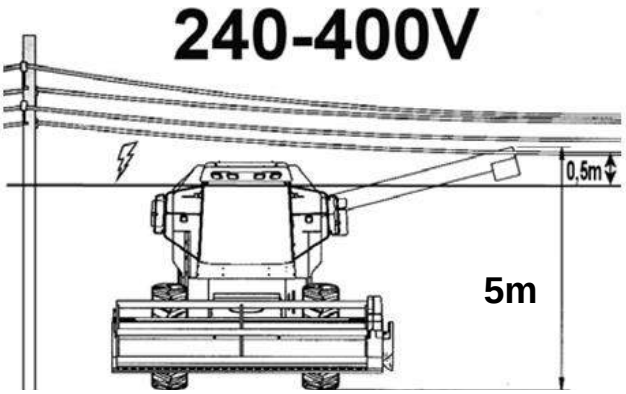
Support or lock the cutting header and pick up reel before going beneath them.

Never clean the combine without the proper equipment.

When leaving the combine, lower the cutting header, lock the parking brake, stop the engine, and remove the ignition key.

SAFETY DISTANCES WHEN THRESHING UNDER OPEN-WIRE POWER LINES

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

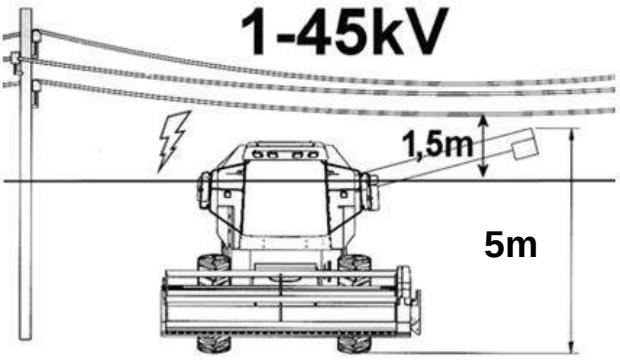


Low-voltage power lines (240/400V), can be distinguished from high-voltage lines (over 1 kV) by the smaller insulators and the fact that there are usually 4 low-voltage lines.

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

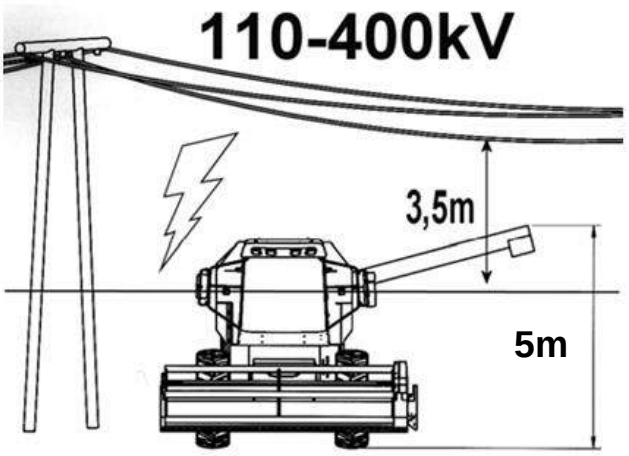
In Case of an Accident

If there is an accident despite all precautions, keep calm and consider carefully what to do. First try to reverse the combine away from the power line. If there are other people near, ask them to check that the combine is not stuck in the line.



If the combine is just leaning against the lines, try to disengage it by driving. Follow the advice from the people nearby. Due to their own safety, they shall stay a minimum of 20 meters from the combine touching the power line.

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



Get away from the combine 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 meters from the combine. Beware of broken power lines lying on the ground.

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

Make sure the combine is guarded at a safe distance.

Do not try to get on the combine even if the power in the power lines may seem to have gone off.

Remember that open-wire lines never have a safety fuse, and they are always dangerous unless made powerless by an electrician. Even if the power went off, it may 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 combine in good condition.

Check the condition of fast-moving parts daily.

Pay special attention to the transmission mechanism and the rotating chopper knives. Replace defective parts before they become dangerous.

Make sure that all the guards and other safety equipment are in good condition and mounted before the combine is used.

Clean, repair and service the combine with the transmission and engine off, the ignition key off the ignition and the master switch in its off position. Disconnect the battery minus cable before repairing the engine or the electrical instruments.

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 tires without a pressure gauge due to risk of explosion.

Do not add coolant with the engine running.

Do not remove the coolant expansion tank cap from an overheated engine.

Do not refuel with the engine running.

Do not smoke while fueling.

The combine harvester is equipped with either mechanical or electrical master switch.

Do not adjust the hydraulic working pressure without a pressure gauge due to possible damage to the hoses. When servicing the hydraulics, be aware of the high pressure in the system. Make sure there is no pressure in the system or in the pressure reservoir before disconnecting the connectors.

Never use over-sized fuses; they involve risk of accident. Never start the combine with anything but the ignition key.

When refitting a wheel, tighten the fixing screws to the correct torque. Attach accessories such as the trailer using the appropriate equipment. Tow the combine only from designated points.

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

5. THE LAWS AND REGULATIONS

Combine 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.

6. FIRE SAFETY

Two factors are needed to start a fire: flammable material and ignition; oxygen is always available.

Threshing generates a lot of light and highly flammable dust. Therefore, it is important to clean the combine on a regular basis and the engine compartment daily.

Oil and fuel leaks increase the risk of fire. Repair any defects immediately.

High temperature near the exhaust pipe makes the area fire prone. A fire may also be caused by a short circuit in the electric system, slipping of an overloaded belt, a damaged bearing or overheating of the brakes.

Make sure there is at least one 6-kilo class AB fire extinguisher always located in its marked place on the combine.

In particularly dry and dusty circumstances another similar extinguisher is to be placed near the engine compartment.

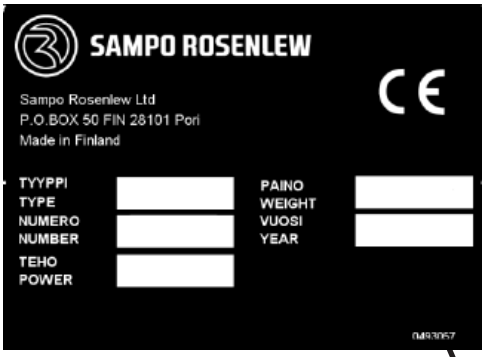
Type marking

When ordering spare parts or service, always quote the type marking and serial number of the combine. When ordering parts for the cutting header, also quote the type marking and number shown on the cutting header.

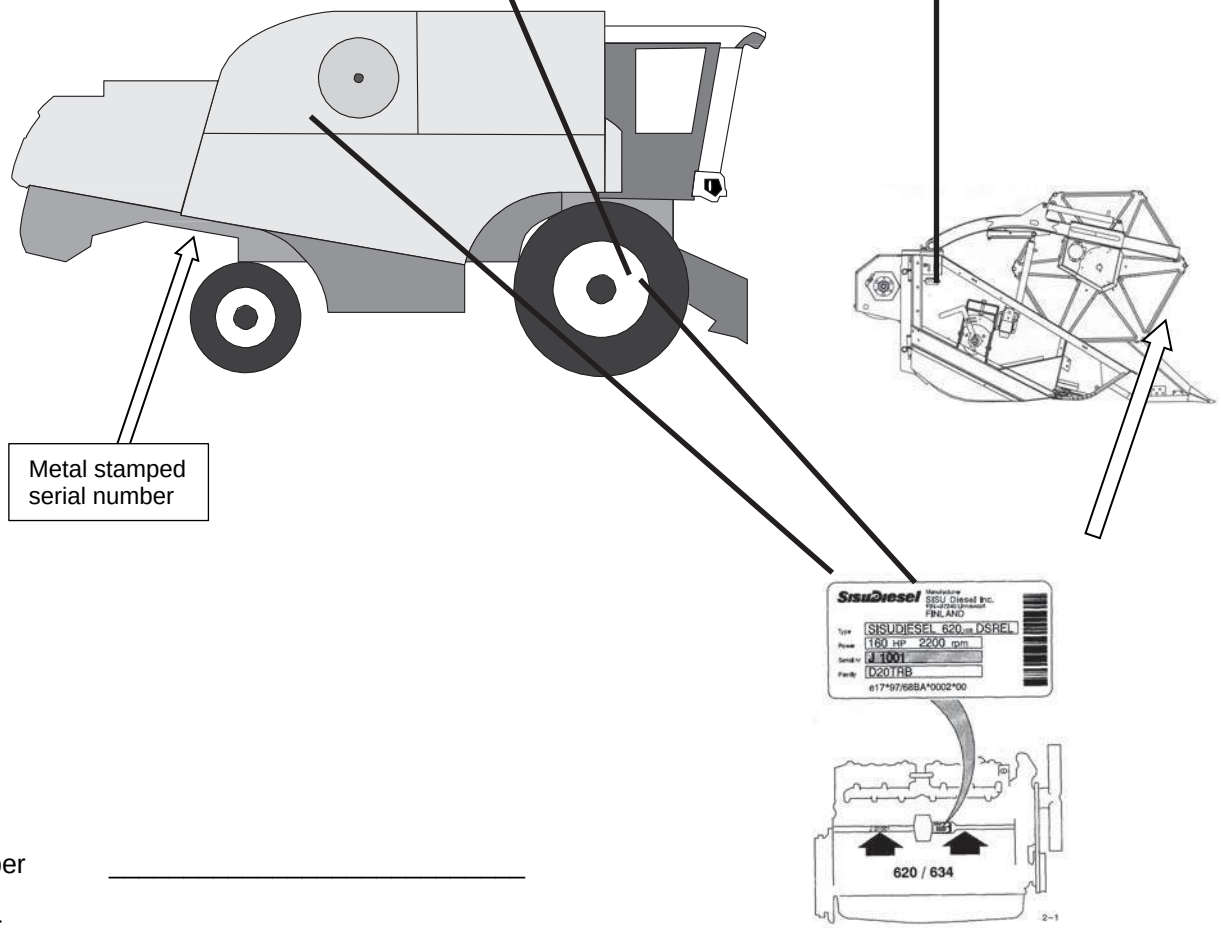
When ordering engine parts, also quote the engine number.

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

Combine type plate



Cutting header type plate



Combine number _____

Engine number _____

Note! Left side of the combine = The side of the cab with the stairs

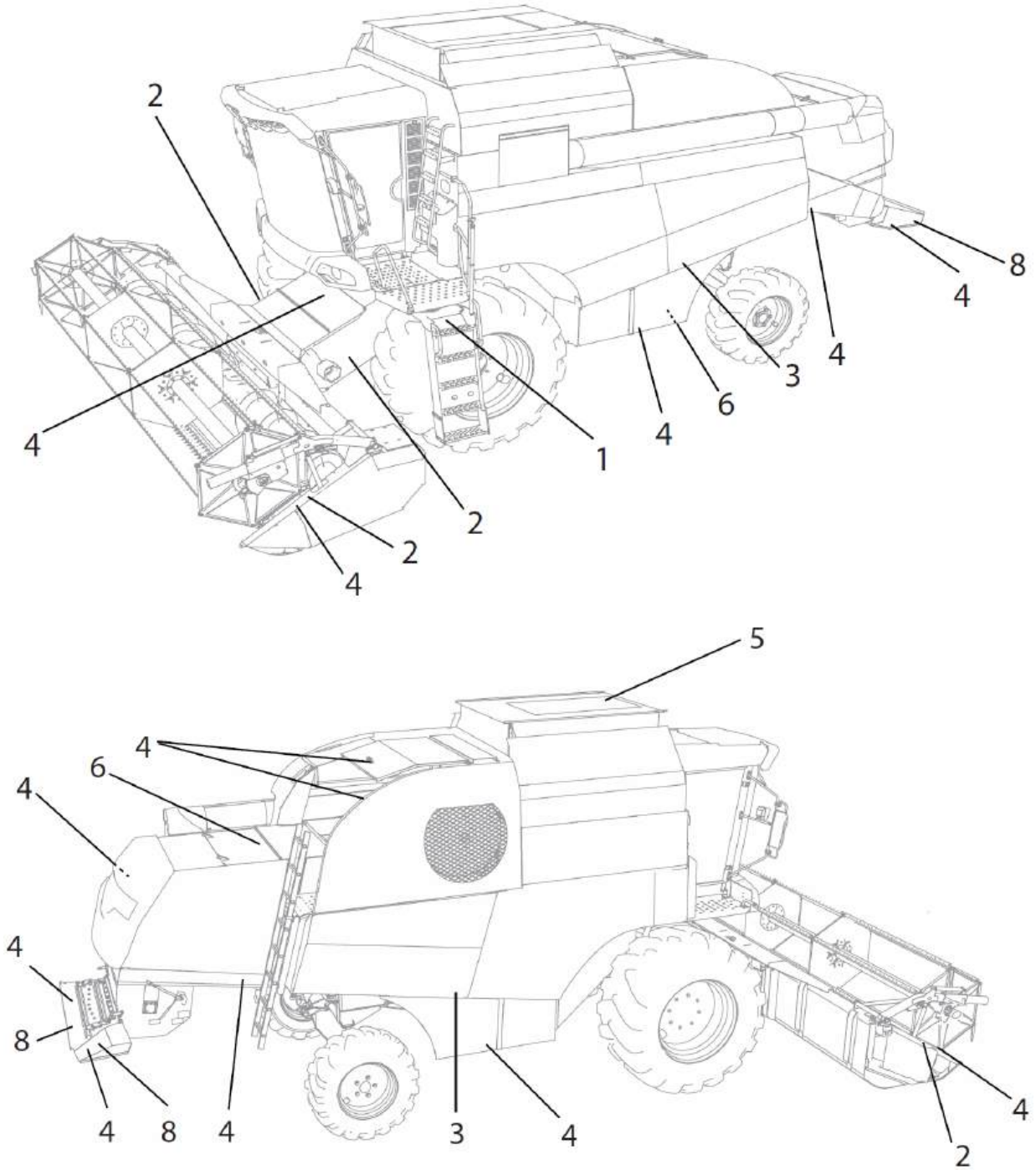
Right side of the combine = The side with the fuel tank

Warning symbols

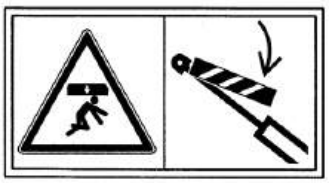
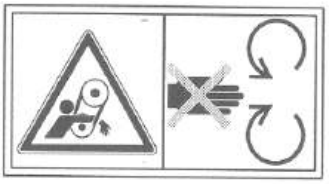
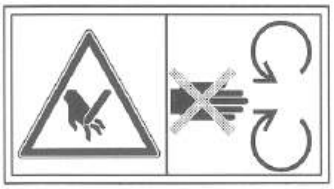
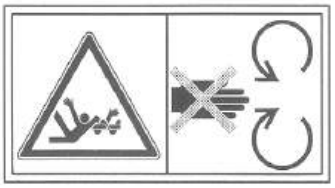
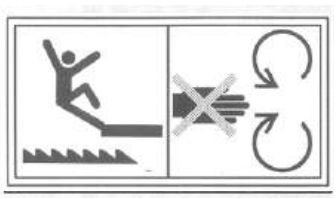
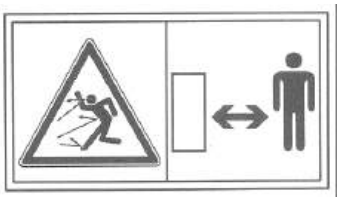
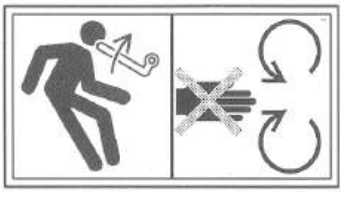
The structures of the combine have been designed to be as safe to use and service as possible. This manual provides instructions on how to eliminate any risks there may be in the use of the combine. The danger points have been marked on the combine using danger symbols. The following diagram shows the location of the markings. Check regularly that the markings are clearly visible.

On the following page you will find the key to these symbols. The danger symbols are based on the international ISO 11 684 standard.

Location of the Danger Symbols



DANGER SYMBOLS

Danger	How to avoid it	No	Symbol
Subject to danger due to insufficient information	Read the manual before starting the combine	1	
A raised part may fall down	Support raised parts before going under them	2	
Gap in belt drive	Stop the engine and remove the ignition key before removing any guards	3	
Getting entangled in moving parts	Stop the engine and remove the ignition key before removing any guards and /or reaching danger zone	4	
Getting entangled in rotating auger	Stop the engine and remove the ignition key before removing any guards	5	
Getting entangled in rotating auger	Do not reach into an opening with the engine running	6	
Falling into moving machinery	Stop the engine and remove the ignition key before removing any guards	7	
Danger caused by hurtling objects	Keep at a safe distance from the combine	8	
Kickback or upward motion of arm handle	Stop the engine and remove the ignition key before inserting the handle	9	

Technical specification C10 & C12

(ISO 6689 standard has been used in measuring)

Cutting header

Cutting width (m)	4,5	4,8	5,1	5,7	6,0	6,3	6,9
Cutting height (m)	-0,20…+1,30						
Knife	1020 cycles/min						

Reel

Diameter (m)	1,05
Speed range RPM	0…50

Threshing Cylinder

Width (m)	1,33	Pre-threshing Cylinder	1,33
Diameter (m)	0,5		0,40
Number of rasp bars	8		
Speed range RPM	600...1300 MD		
	400…1150 (Maize)		

Concave

Area (m²)	0,62	Pre-Concave	0,41
Angle of wrap	105°		
Number of rasp bars	12		
Clearance in front (mm)	6...42		

Straw Walkers

Number	6
Separating area (m²)	6,30
CPS drum	Option

Shaker Shoe

Area	4,50 m²	Chaffer 2,30 + 0,40 m²	Sieve 1,8 m²

Grain Tank

Volume (m²)	6,00	7,60
Unloading height (m)	4,40	4,40

Engine Agco Power	**C10**	**C12**
Power kW / hp / num.of cyl.	175/238/6	221/300/6
RPM	2000	2000

Traction Drive Hydrostatic

Driving speed (km/h) *

Final drives	**Hydrostatic Traction Drive**					
CIT	I	0…6,6	0…5,3 (DE)	4WD	0…5,8	0…4,6 (DE)
	II	0…10,7	0…8,8 (DE)	4WD	0…8,5	0…7,0 (DE)
	III	0… 25	0…20 (DE)			

* Speeds may vary depending on the size of the tires

Turning radius (m) 7,7 (C10) 8,0 (C12)

Tyres / Air pressure (bar)

Front

Tires	Weight limit kg				
	10500	11200	11230	11700	12700
650/65 R38 157A8	1,6	1,8	2,0	2,0	2,0
650/75 R32 172A8	1,6	1,8	2,0	2,0	2,0
800/65 R32 172A8	1,5	1,6	1,6	1,8	1,9
900/60 R32 176A8	1,4	1,5	1,5	1,7	1,8
1050/50 R32 178A8	1,3	1,4	1,4	1,5	1,6

Rear

Tyres	Weight limit kg				
	10500	11200	11230	11700	12700
380/70 R24 125A8	1,9	1,9	1,9	2,0	2,0
480/65 R24 133A8	1,8	1,8	1,8	1,9	1,9
540/65 R24 146A8	1,7	1,7	1,7	1,8	1,9

Wheel track (m)

Front

Final drives	Tyres					
	650/65R38 rim 18x38	650/65R38 rim 16x38	650/75R32	800/65R32	900/60R32	1050/50 R32
CIT	2,78 / 2,89	2,68 / 2,99	2,85 / 2,81	2,93	3,03	3,22

Rear

Tyres		
380/70R24	480/65R24	540/65R24
2,71	2,61 (2,80 4WD)	2,61 (2,80 4WD)

Volumes (liters) (Oil volumes mentioned in the manual lubrication table)

Fuel tank	350 (C10)	450 (C12)
Cooling system	27	
DEF	60	

Weight (kg)	**C10**	**C12**
Without table and chopper	10920	12240

Cutting header (m)	**4,5**	**4,8**	**5,1**	**5,7**	**6,0**	**6,3**	**6,9**
Weight (kg)	1290	1340	1400	1500	1500	1600	1650

Chopper weight (kg)	280
Corn header 6 row (kg)	2000

Length (m)	**C10**	**C12**
On the road	9,9	10,4
Without cutting header	8,5	9
In the field	11,4	11,9

Width (m)

On the road w/o header

Final drives	Tyres 650/65R38 rim 18x38	650/65R38 rim 16x38	650/75R32	800/65R32	900/60R32	1050/50R32
CIT	3,4 / 3,5	3,28 / 3,58	3,5 / 3,46	3,73	3,93	4,27

With Header (m)	4,5	4,8	5,1	5,7	6,0	6,3	6,9
	5,03	5,34	5,64	6,25	6,56	6,86	7,47

Height with cabin (m)	3,95

Noise level in cabin dB(A) (O. E. C. D.-1967/6)	75

The weighted acceleration subjected to operator's arms does not exceed 2,5 m/s² (ISO-5349)
The weighted acceleration subjected to operator's body does not exceed 0,5 m/s² (ISO-2361)

Technical specification C20, C22 & C24

(ISO 6689 standard has been used in measuring)

Cutting header

Cutting width (m)	6,3	6,9	7,50 (optional Vario)
Cutting height (m)	-0,20…+1,30		
Knife	1020 cycles/min		

Reel

Diameter (m)	1,05
Speed range RPM	0…50

Threshing Cylinder

Width (m)	1,33	Pre-threshing Cylinder	1,33
Diameter (m)	0,5		0,40
Number of rasp bars	8		
Speed range RPM	400...1200		

Concave

Area (m²)	0,62	Pre-Concave	0,41
Angle of wrap	105°		
Number of rasp bars	9		
Clearance in front (mm)	6...42		

Rotors

Number of cylinders	2
Rotation	480, 700 rpm
Separating area (m²)	3,10

Shaker Shoe

Area	4,50 m²	Chaffer 2,30 + 0,40 m²	Sieve 1,8 m²

Grain Tank	**C20**	**C22**	**C24**
Volume (m²)	7,60	9,00	10,00
Unloading height (m)	4,40	4,40	4,40

Engine Agco Power	**C20**	**C22**	**C24**
Power kW / hp / num.of cyl.	221/300/6	221/300/6	221/300/6
RPM	2000	2000	2000

Traction Drive Hydrostatic

Driving speed (km/h) *

Final drives	**Hydrostatic Traction Drive**	
CIT	I 0…6,6 II 0…10,7 III 0… 25 0…20 (DE)	

* Speeds may vary depending on the size of the tires

Turning radius (m) 7,7 (C20) 8,0 (C22) 8,0 (C24)

Tires / Air pressure (bar)

Front

Tires	Weight limit kg				
	10500	11200	11230	11700	12700
650/75 R32 172A8	1,6	1,8	2,0	2,0	2,0
800/65 R32 172A8	1,5	1,6	1,6	1,8	1,9
900/60 R32 176A8	1,4	1,5	1,5	1,7	1,8
1050/50 R32 178A8	1,3	1,4	1,4	1,5	1,6

Rear

Tires	Weight limit kg				
	10500	11200	11230	11700	12700
500/70 R24 164A8	1,7	1,7	1,7	1,8	1,9
540/65 R24 146A8	1,7	1,7	1,7	1,8	1,9

Wheel track (m)

Front

Final drives	Tires			
	650/75 R32	800/65 R32	900/60 R32	1050/50 R32
CIT	2,85 / 2,81	2,93	3,03	3,22

Rear

Tires	
500/70 R24	540/65 R24
2,61	2,61

Volumes (liters) (Oil volumes mentioned in the manual lubrication table)

Fuel tank	450 (C20)	450 (C22)	450 (C24)
Cooling system	27		
DEF	60		

Weight (kg)	**C20**	**C22**	**C24**
Without table and chopper	12900	14200	14600

Cutting header (m)	**5,7**	**6,0**	**6,3**	**6,9**
Weight (kg)	1500	1500	1600	1650

Chopper weight (kg)	280
Corn header 6 row (kg)	2000

Length (m)	**C20**	**C22**	**C24**
Without cutting header	7,8	8,2	8,2
In the field	11,4	11,9	11,9

Width (m)

On the road w/o header

Final drives	Tires 650/75R32	800/65R32	900/60R32	1050/50R32
CIT/HS	3,5 / 3,46	3,73	3,93	4,27

With Header (m)	5,7	6,0	6,3	6,9
	6,25	6,56	6,86	7,47

Height with cabin (m)	3,95

Noise level in cabin dB(A) (O. E. C. D.-1967/6)	75

The weighted acceleration subjected to operator's arms does not exceed 2,5 m/s² (ISO-5349)
The weighted acceleration subjected to operator's body does not exceed 0,5 m/s² (ISO-2361)

CERTIFICATE ON CONFORMITY TO THE EU DIRECTIVES

Manufacturer
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Finland

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28101 Pori
Finland

Declares that the machinery placed on the market:
Combine Harvester

Type: _____

Serial number: _____

Complies with the technical requirements specified in the:

2006/42/EC	Machinery directive
97/68/EEC	Engine emission directive
89/336/EEC	Electromagnetic compatibility

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

EN-ISO 4254-7	Combine harvesters and forage harvesters, safety
EN-ISO 14121-1	Safety and machinery; Risk assessment
EN-ISO 14982-1998	EMC acceptance criteria

6.4.2022 Pori, Finland

SAMPO-ROSENLEW OY
SAMPO ROSENLEW Ltd

Jussi Malmi
CEO
Sampo-Rosenlew Ltd

Acceptance inspection and getting started

The combine leaves the factory packaged in an appropriate way to ensure undamaged delivery.
Before using the combine, the following measures shall be takes.

- Read the instruction manual carefully.
- Remove any loose parts stored in the grain tank.
- Check the combine for any transport damage or lost parts. (If necessary, contact the dealer or the transport company.)
- Make sure the combine complies with the purchase contract. (If necessary, contact the dealer.)
- Attach any parts removed before shipment such as lamps, mirrors, etc.
- Put the fire extinguisher in its place.
- Check the oil and coolant levels.
- In case the combine has been stored for over a year, perform annual service according to the manual.
- Check and lower tire pressures to comply with the manual.
- Make sure the threshing mechanism can rotate unhindered and that there are no foreign objects inside the combine before starting the engine.
- Engage the cutting table if delivered disengaged.
- Assemble, fit and adjust the straw dividers as shown in the drawings in the spare parts catalogue
- Fit the crop lifters as instructed in the manual.
- Test-run the combine as instructed in the manual under Storage when Not in Use.

IMPORTANT NUMBERS

Check and write down the following numbers:

Combine serial number _____

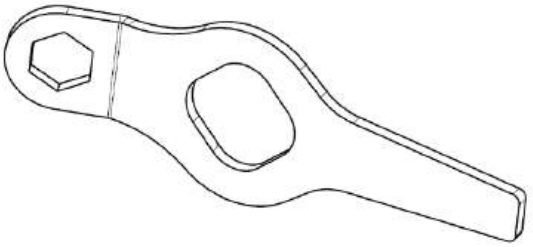
Cutting head serial number _____

Engine serial number _____

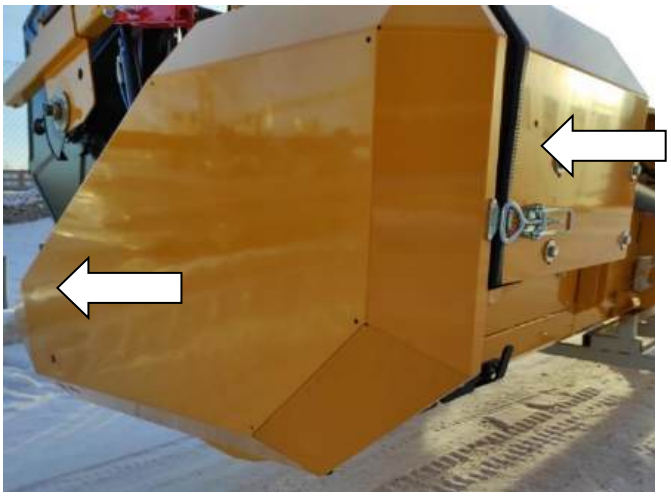
Cabin key number _____

Fuel tank key number _____

Opening the guards



To ensure safety, the movable guards in the combine have been equipped with a locking device. They can be opened with the appropriate tool supplied with every combine, hanging on a hook on the back wall of the cab. (The guards can also be opened with a 13 mm socket wrench or a screwdriver.) The guards get locked automatically when closed. Some guards also have additional clamps



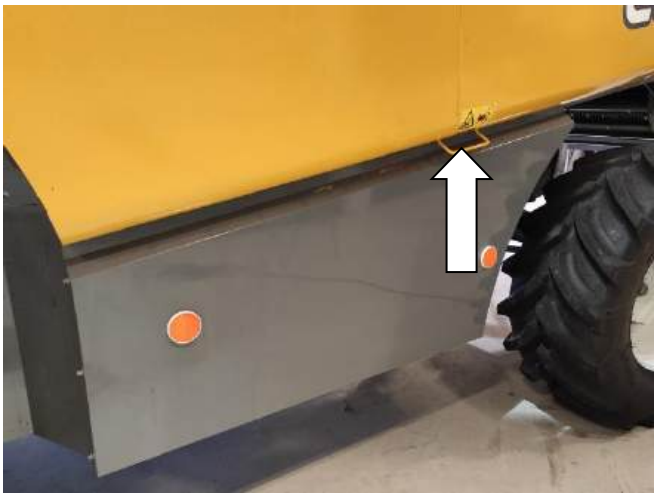
Unlock the guard at the left end of the cutting header by opening two locking devices.

To open the guard, lift upwards. Guard is gas-spring loaded. The guard gets locked automatically when closed.

The side guards are released by placing the opening tool in the hole at the lower part of the guard and turning counterclockwise. The guard opens when the lower edge is pulled outwards. The guard rests on the gas springs. The guard is locked automatically when closed

The lower guards on the combine can be opened. The front and rear of the guard can be opened separately. The front of the lower guard is opened by unlocking the front of the guard using the tool. To open the rear, slack screws on both sides of the rear guard and remove guard.

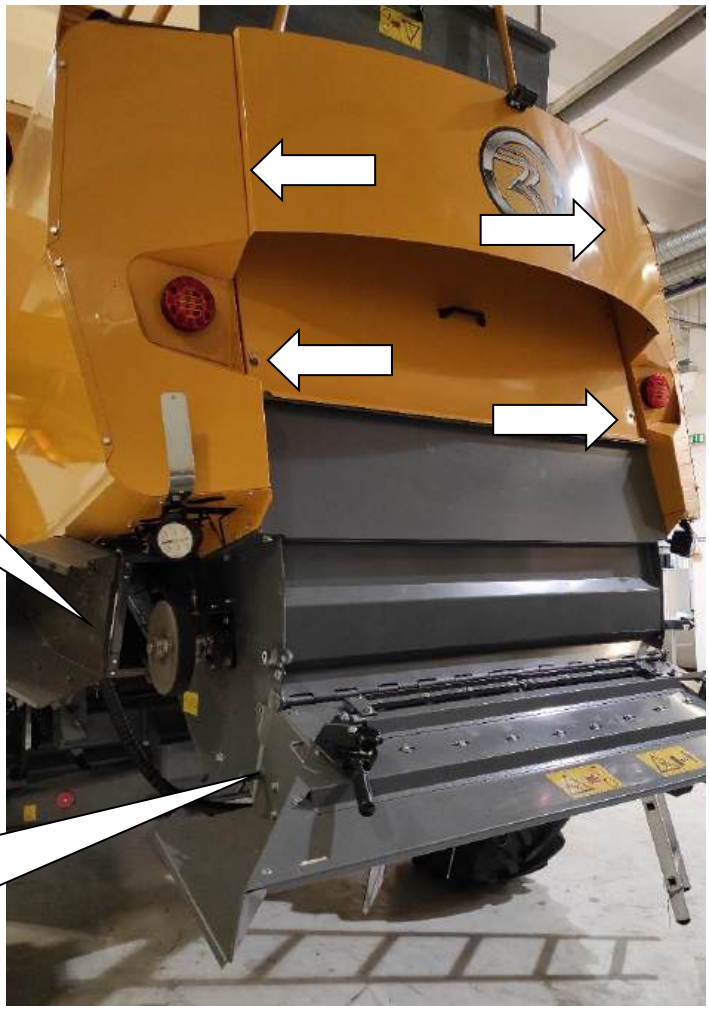
There is space for a tool kit on the left behind the front guard.



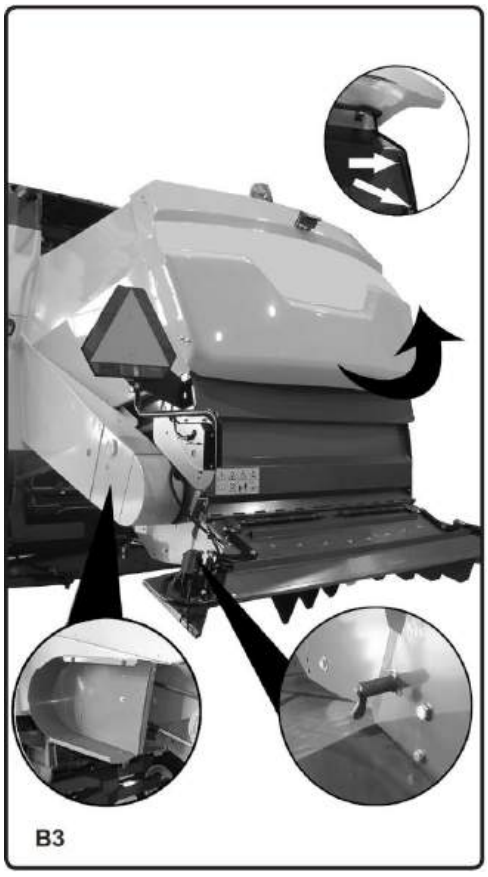
Straw hood service door is opened by opening four bolts and lifting door from handle. Models C20, C22 and C24.

Choppers belt guard is opened by loosening the bolt on the guard and turning the cover open. Guard is secured in the upper position with a rubber strip.

The rear guard of the chopper (straw spreader) is released by opening the side locks on both sides of the combine. The guard gets locked in the upper position. When the guard is lowered, make sure the guard gets locked at the required height on both sides.

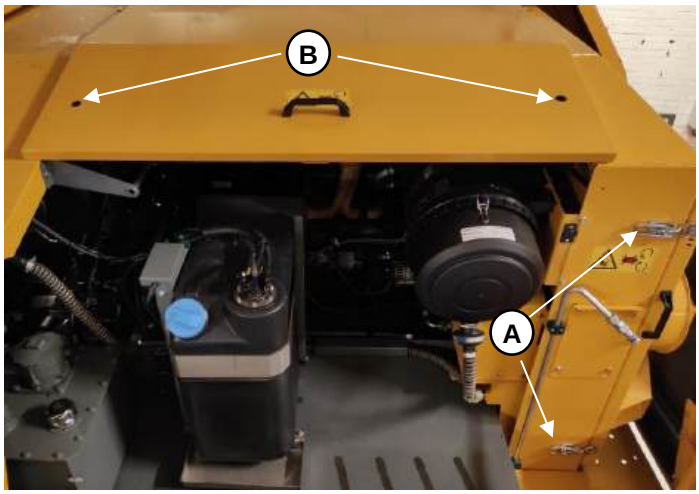


Straw hoods plastic cover is opened by lifting the bottom upwards, then loose the bolts of the inner guard and remove inner guard. Models C10 and C12.



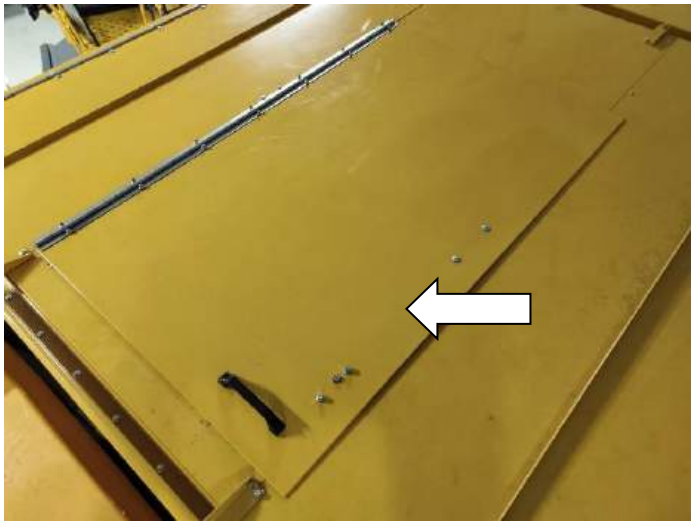
To clean the equipment, the fan unit in front of the radiator may be turned open by opening latches (A).

Open the cover above by unlock the locks (B) on both sides of the cover using a tool and lift upwards.



The top door on the rear hood to the straw walker or rotor compartment is locked with a hexagonal screw.

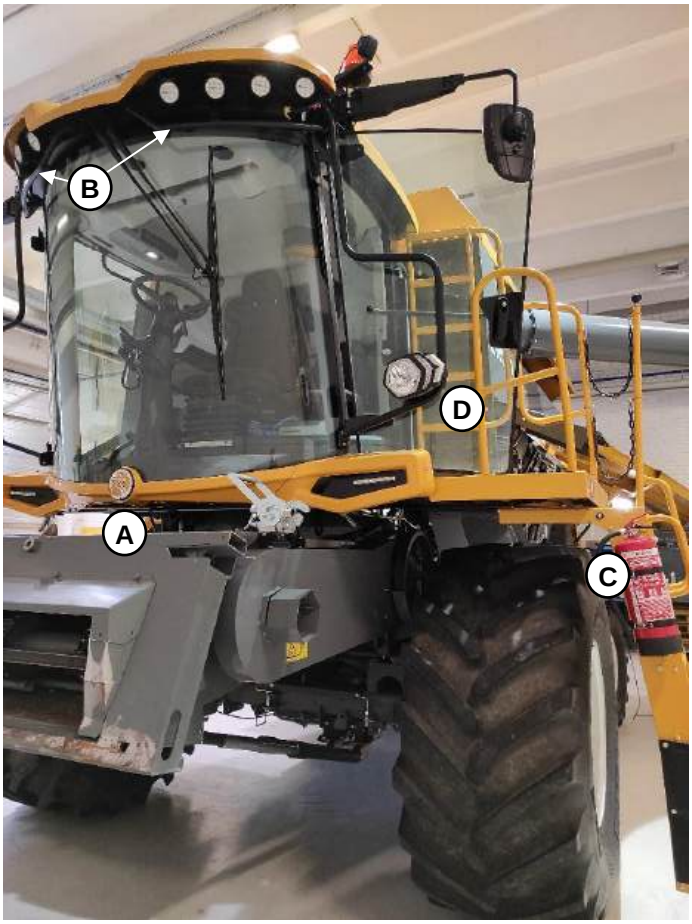
Open the locking on the grain tank cover by opening lock. This concerns grain tanks with volumes of 6,00 and 7,60 m³.



Wind screen cleaning

When cleaning windscreen, climb on top of the crop elevator (A) and hold on of the top arms (B).

Fire extinguisher is placed in the stairs (C).



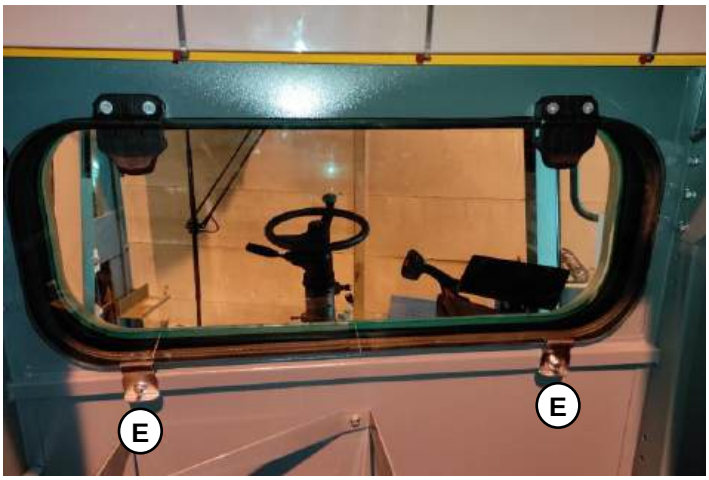
Access ladder, grain tank

CAUTION: Shut off the engine and set the park brake.

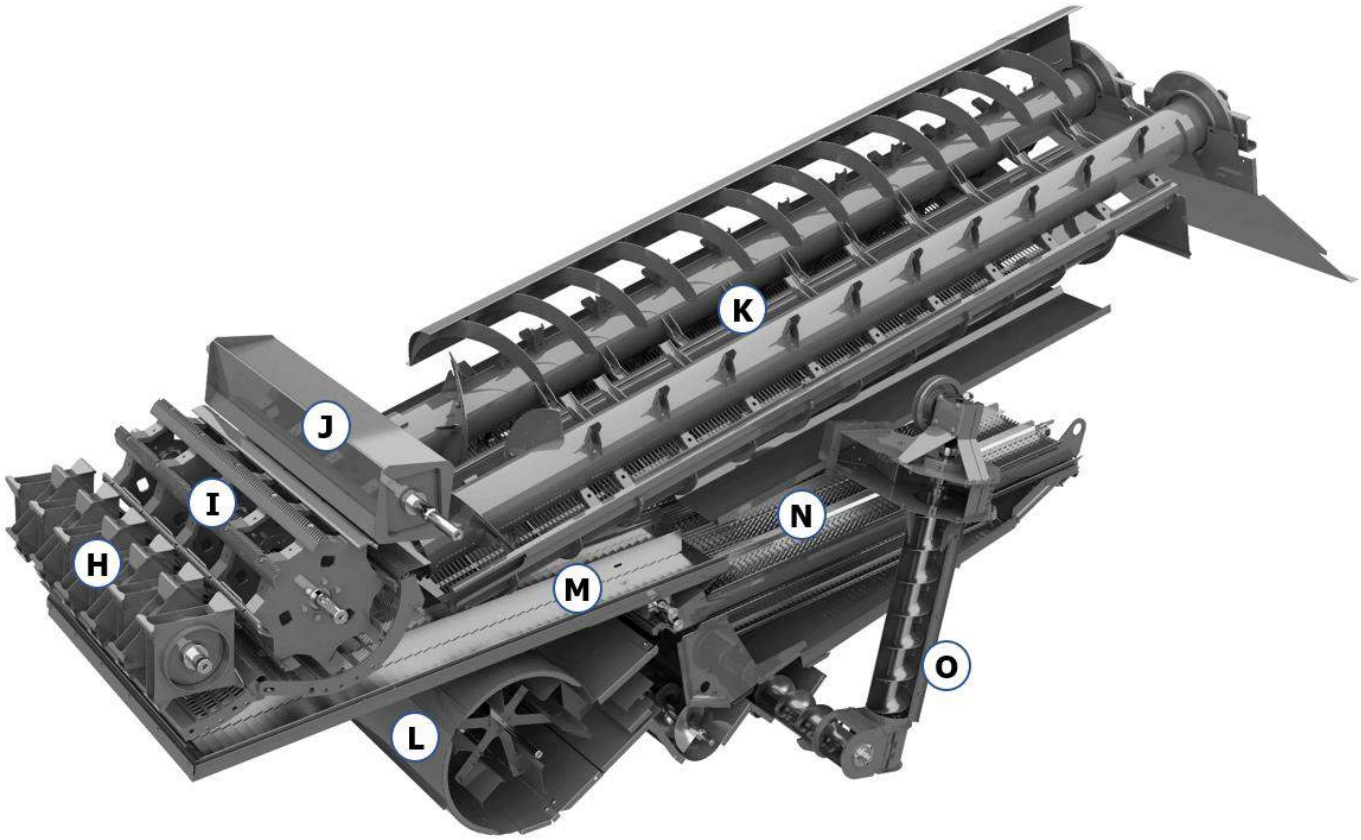
Use ladder to get into grain tank (D).

Grain tank window cleaning

Grain tank window can be opened from inside of the grain tank. Open holders (E) to open window.

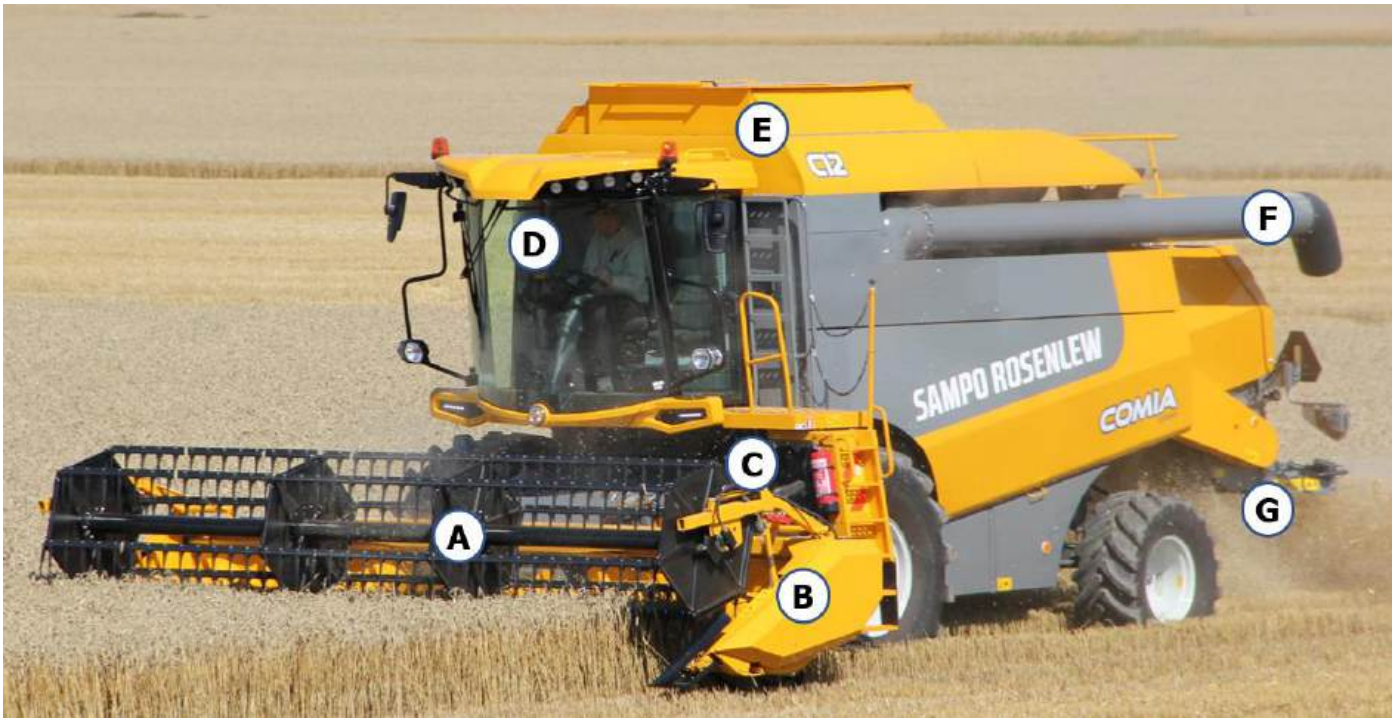


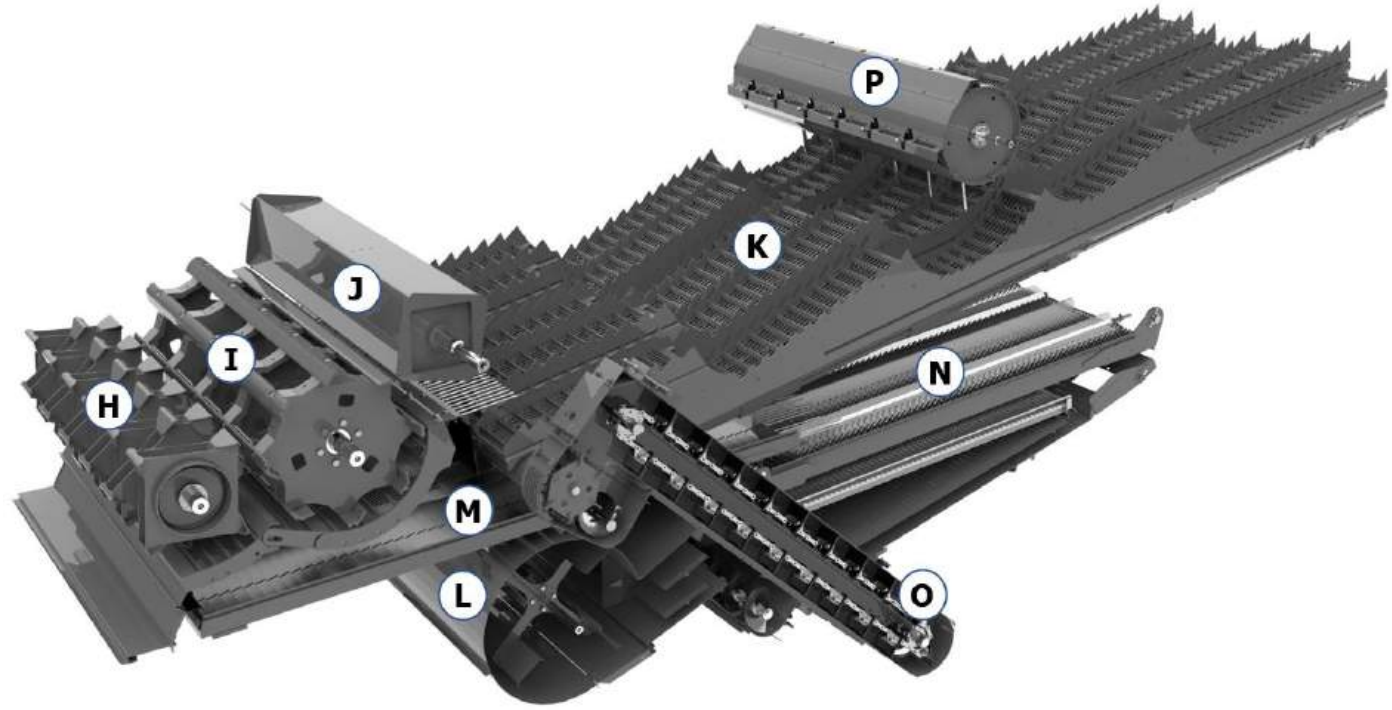
Structure of combines with rotors



A Pick-up-reel	E Grain tank	H Pre-threshing cylinder and pre-concave (C22, C24)		
B Header	F Unloading pipe	I Threshing cylinder and concave		M Grain pans
C Feeder elevator	G Chopper	J Rear beater		N Sieves
D Cabin		K Rotors	L Fan	O Return system

Structure of combines with straw walkers





A Pick-up-reel

B Header

C Feeder elevator

D Cabin

E Grain tank

F Unloading pipe

G Chopper

H Pre-threshing cylinder and pre-concave (C12)

I Threshing cylinder and concave

J Rear beater

K Straw walkers

L Fan

M Grain pans

N Sieves

O Return system

P CSP (option)

STRUCTURE AND FUNCTIONS OF THE COMBINE

Threshing Mechanism

The cutting and feeding equipment take the crops in for threshing.

The straw dividers limit the crop to be cut and bring it within reach of the reel.

The reel, together with the crop lifters, lifts laid-down crop up and take it from the cutting knife onto the feeding auger.

The feeding auger gathers the cut crop and feeds it onto the crop elevator, which takes the crop forward to be threshed. Stones and other heavy objects are pushed to the stone trap thus preventing damage to the threshing mechanism.

The threshing mechanism separates the grains from the straw.

The cut crop first comes onto the pre-cylinder, which gently separates the most easily threshable grains and ejects them through the pre-concave to the front of the grain pan. The pre-cylinder also evens out the feed onto the main cylinder.

The rest of the grains are threshed off by the main cylinder and concave. Most of the threshed grain and chaff go through the concave into the grain pan.

The rear beater and the concave extension take the threshed straw onto the straw walkers.

The separating and cleaning equipment sieves the grains.

The rotors the grains from the straw and eject the straw out to the field from the rear of the combine. The grains run along the bottom grooves to the grain pan. The grain pan takes the threshed material to the shaker shoe. The chaff and any light remains are sorted topmost in the grain pan with the grain at the bottom.

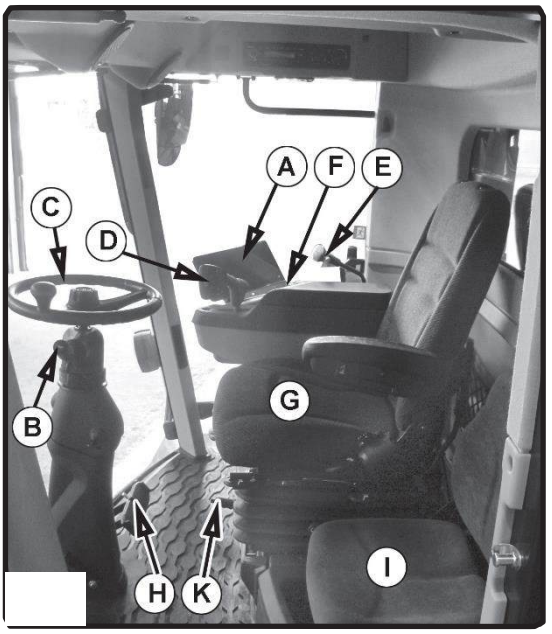
The air stream from the fan lifts the light chaff in the air and transports it over the shaker shoe and out of the machine. Heavier grains and any partly threshed material fall through the chaff sieve. Any larger remains move out along the sieve. Clean grain falls onto the grain auger through the grain sieve and is transported from there by the grain elevator and filling auger to the grain tank.

The grains and occasional straw bits, which lie on the shaker shoe extension, fall to the returns course to be re-threshed.

Operator´s controls

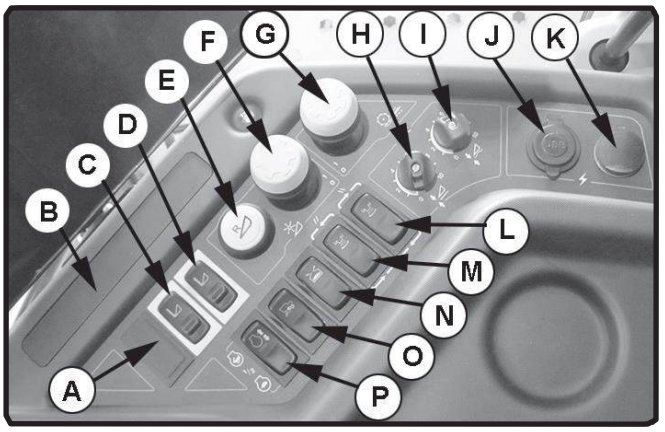
Operator's Platform / Cab

A Comvision- display
B Multi-function Lever
C Steering Wheel
D Traction Speed Control Lever
E Gear Lever
F Instrument Panel
G Seat
H Brake Pedals
I Buddy Seat
K Parking brake, mechanical



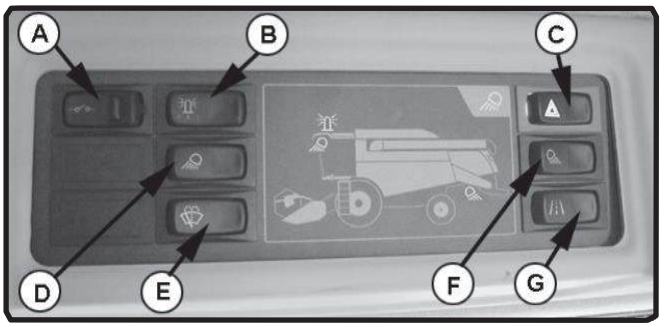
Instrument Panel

A Cover (Parking brake, electrical, option)
B Instruction light panel
C Vertical Knife, left (optional)
D Vertical Knife, right (optional)
E Reverse cutting header and feeding
F Cutting header start/stop
G Threshing start/stop
H AHC pre-setting height
I AHC automatic height
J USB
K Electric Outlet
L Direction of Straw Chopper Spray (option)
M Direction of Straw Chopper Spray (option)
N Grain tank cover up/down
O 4WD Switch (optional)
P Electric engine rpm



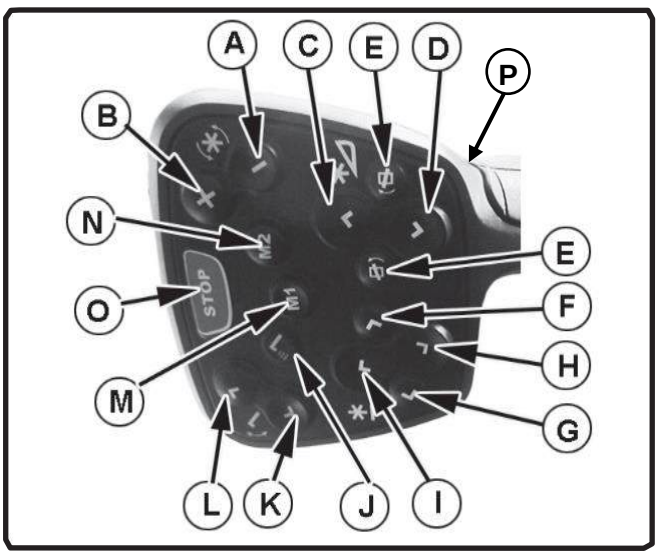
Switches

A Main switch (option)
B Beacon light
C Emergency Flasher
D Working Lights
E Windscreen Wiper/Washer
F Working Lights
G Safety Switch, driving in traffic



Multi-Function lever switches

A Decrease pick-up reel RPM
B Increase pick-up reel RPM
C Cutting header up
D Cutting header down
E Cutting header tilt
F Pick-up reel backward
G Pick-up reel onward
H Pick-up reel down
I Pick-up reel up
J Grain tank unloading start/stop
K Unloading tube out
L Unloading tube in
M Memory slot 1 (AHC, DHC)
N Memory slot 2 (AHC, DHC)
O Emergency stop (header and unloading)
P SHIFT button (behind the lever)



Signs and symbols

 Ignition lock

 Electric master switch

 Pre-glow

Engine revolutions, electric control

Gear change diagram

 Horn

 Flasher

 Dip switch

 High beams

 Working lights

 Windscreen wiper

 Air conditioning

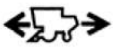
Hand brake

 Cutting header height

 Cutting header tilt

 Pick up reel height

 Threshing mechanism switch

 Speed control lever

Cutting header switch

 Threshing cylinder speed

 Concave clearance adjustment

 Reel fore & alt control

 Reel speed control

 Air volume speed control

Air direction control lever

Reversing switch of header

 Beacon light

 Emergency flasher

 Unloading pipe open/close

 Grain tank cover lift

Emergency exit

 Straw guide for chopper on

 Straw guide for chopper off

 Safety switch, road-mode

Warnings and alarms

 Oil warning light

 Alternator warning light

 Engine malfunction light

 Adblue system malfunction

 DPF blocked

 Regeneration in process

 Grain tank ½ full

 Grain tank full

 Maintenance due

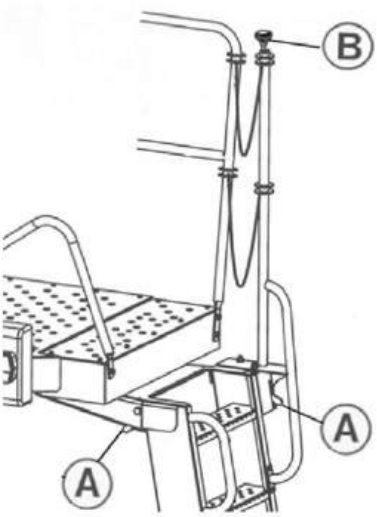
Height over 4 meters

Operation and adjustments

Stairs

The stairs can be turned forward to the front of the wheel to reduce combine width. They can be turned standing on the ground by lifting locking lever A. The turn can also be done standing on the cab landing by lifting knob B to release the locking.

The stairs shall always be turned forward when the combine is driven on the road without the cutting table.

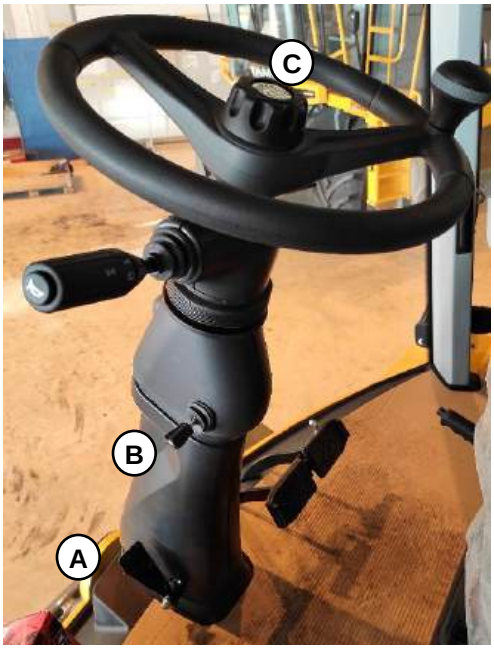


Steering wheel

To adjust the steering column angle, press pedal (A) and tilt the whole column forward or backward.

The steering column folds in the middle. Lift the lever (B) up and adjust the steering wheel to the desired position.

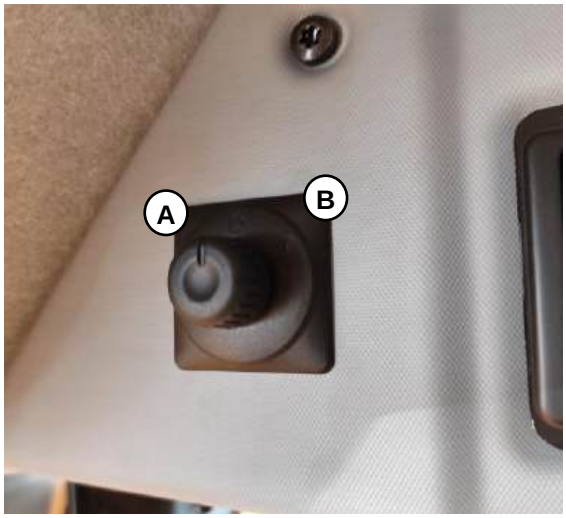
To adjust the height of the steering wheel, loosen the knob (C) and adjust the steering wheel to the desired position. Tighten knob to lock in desired height.



Electrically adjustable mirrors

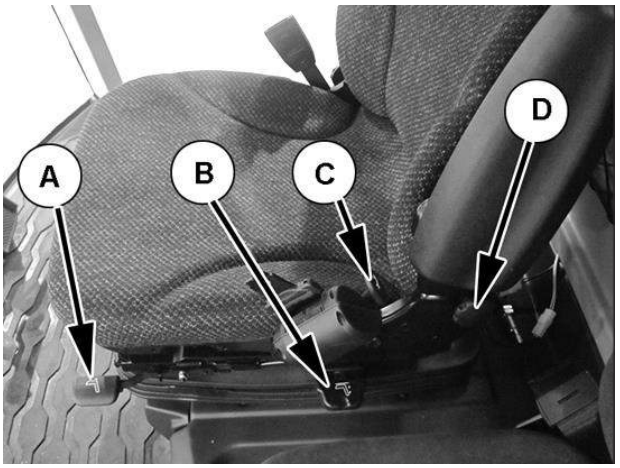
Twist the switch to position A when adjusting left mirror.

Twist the switch to position B when adjusting right mirror.



Operator’s seat

Seat Type 1

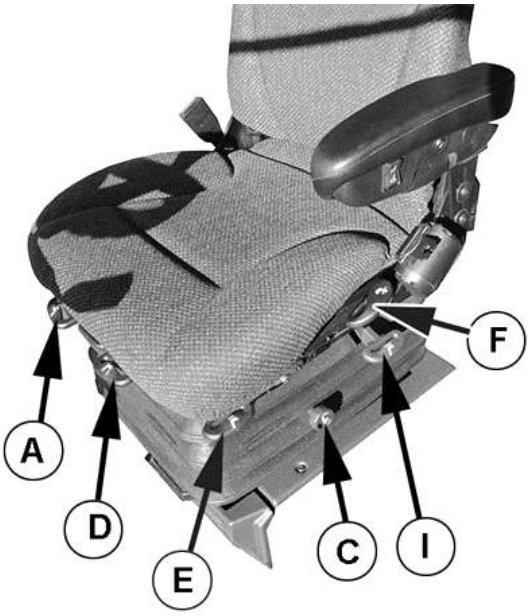


To adjust the fore and aft position, release lever A under the seat and move the seat to the required position.

Adjust the height by raising or lowering lever B. Adjust the backrest angle by releasing lever C and turning the backrest.

Adjust the armrest height by loosening hand wheel D. The height of the armrest can be adjusted by moving its fixing point. Remember tightening the hand wheel D.

Seat Type 2



To adjust the fore and aft position, release lever A under the seat and move the seat to the required position.

To adjust the height, push adjustment switch B briefly after being seated. The seat will be automatically adjusted to suit the driver´s weight. From this position the seat can be moved up

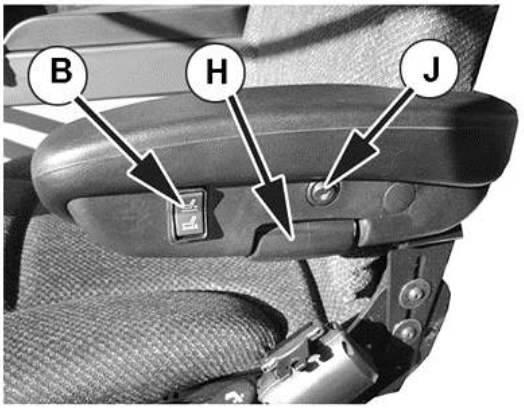
and down by using the adjustment switch in the required direction.

Adjust the suspension to suit the weight of the operator by turning screw C.

To adjust the backrest angle, release lever F and turn the backrest.

To adjust the lumbar support, push adjustment switch G behind the backrest.

Adjust the armrest angle by turning hand wheel H. To adjust height of the front part of the seat, release lever D.



To switch on seat heating, use switch J.

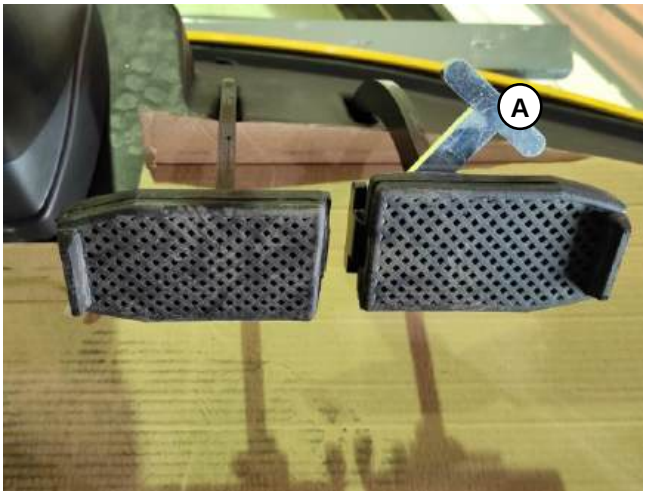
To adjust the seat in relation to the backrest, use lever E.

Movements of the seat backward and forward is enabled or disabled using lever I.

Brakes

While driving and turning

The brakes operate on the front wheels through the drive shafts. They may be used separately as steering brakes by releasing locking pin A. When driving on the road, the brake pedals must be latched together.



Parking brake (C10, C12, C20 and C22)

Parking brake operates on the intermediate shaft of the gears. Use the brake only when parking, and fully release it before driving. A symbol light alarms of an unreleased parking brake when driving.

Parking brake (C24)

This switch activates and releases the parking brake with model C24. A light diode shines in the button when the parking brake is engaged. Use the brake only when parking, and fully release it before driving.

Drive Lever

Combine speed and direction is controlled with a drive lever when gear in engaged.

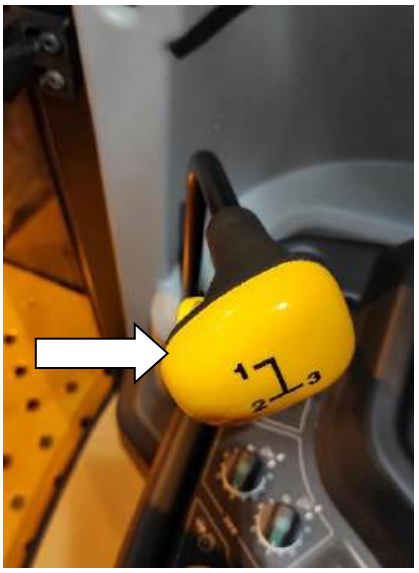
Gears

Hydrostatic transmission has three speed ranges.

Engine power is transmitted to the hydraulic pump through transfer gear box. Pump rotates drive motor attached to gear box in front axle. Pump output is adjusted stepless on a drive lever between position 0 and the maximum output.

There are three gear speed ranges, which are selected using gear lever. Ranges 1 and 2 are for threshing and range 3 for driving on the road. Never use range 3 on the field. Gears should be changed on level ground with drive lever in its mid position.

Gear shifting is hydraulically locked. The gear lever has a switch, which is pressed to open the gear lock. When pushing button, wait few seconds before changing the gear. The engine must be running to provide pressure in hydraulics and combine must stand still!



The speed and direction of the combine are controlled using lever. With the lever in its mid position the combine is stationary if the gear is on and the engine running.

The combine will move forward when the drive lever is pushed forward from its mid position. The further the lever is pushed the higher the speed.

To reverse the combine, pull the lever backward from the mid position.

A combine must never be parked using only the gear. The parking brake must always be engaged.

Shift the gear into neutral to enable towing.

Starting the engine with ignition key

The combine is equipped with a safety ignition system, which prevents the combine from moving when the engine is being started. It allows the start-up to take place only with the traction speed control lever in neutral.

It is advised to start the engine throttle on idle.

The power is switched on by turning the ignition key to I. The alternator and oil pressure warning lights will come on.

Do not start until the lights have come on. It takes some time to activate the control unit.

To start turn the key to position  and hold until engine is running.

The ignition lock allows only one start-up function. Turn the key to the “0” position before restarting.

Throttle switch

Engine has three electrically controlled speed ranges. Idle, half, and full speed.

It is advised to start the engine and engage functions when engine is on idle.

Cold weather starting at below +5 °C

The engines are equipped with a pre-heating resistance controlled by the engine control unit. In cold weather it functions automatically. When pre-glow switches itself on, control light comes on. Start the engine as soon as the control light goes off. After the engine has started, the heater switches itself on again for some time.

Combine must not be started in temperatures below –15 °C as the oil is too stiff and the system may get damaged.

Fault Codes on Electrically Controlled Engines

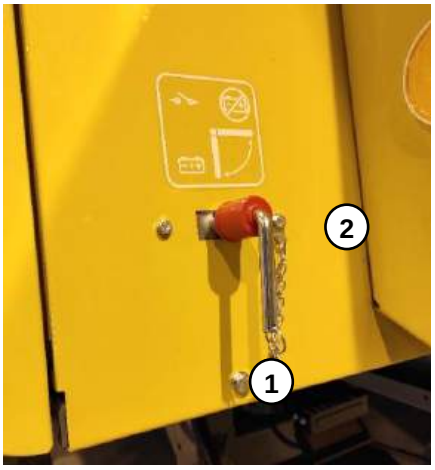
Fault codes are shown by the Comvision II- display. For more details, see Comvision II- chapter and engine manual.

Stopping the engine

Before stopping the engine, move the throttle into the idle position and disengage the threshing mechanism.

Turn the ignition key to the 0- position.

Master switch



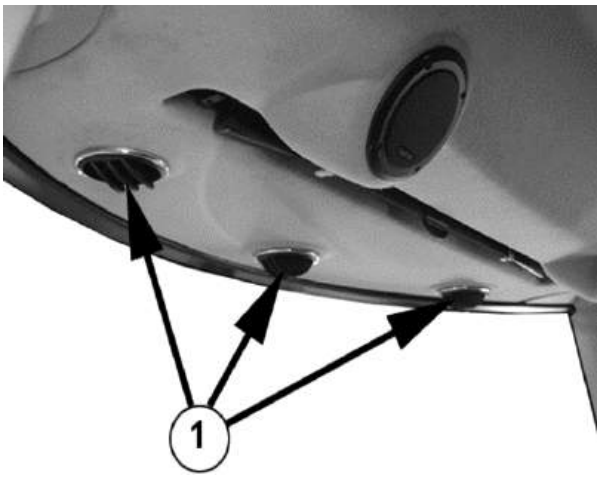
Master switch to controls the electrical equipment of the combine. It is located on the left-hand side, on the rear guard. The current is connected in position 2. To disconnect the current, turn the switch to position 1, in which position the key may be removed.

It is advised to turn main switch off when combine is not in use.

Electrical master switch (option)

Switch may also be electrically controlled from cabin. Rear switch is replaced by electrical switch.

Cab ventilation

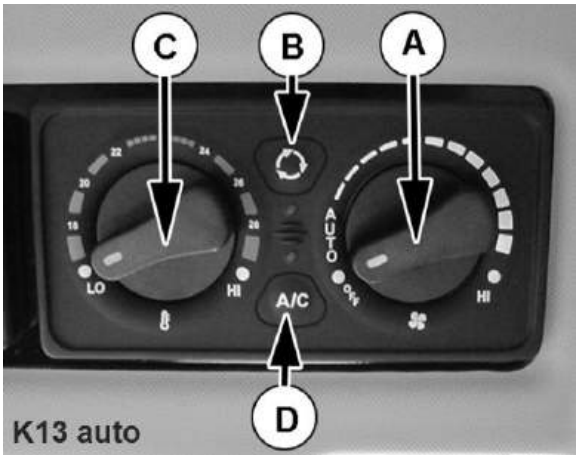


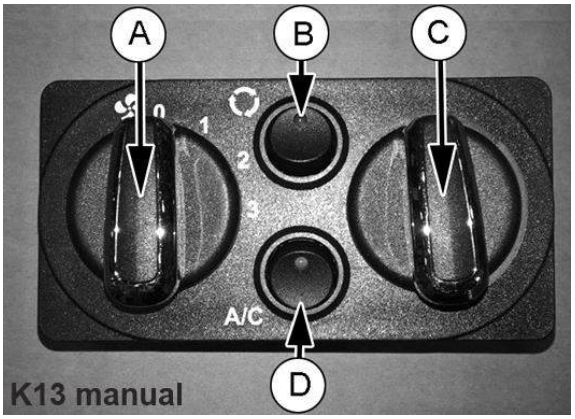
The fan is started using switch A. To change the airflow direction, turn nozzles 1 at the front top of the cab. Air coming into the fan is taken through detachable coarse mesh and fine filters.

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

By pushing button B, cab indoor air can be circulated through the fan, which reduces the need for outdoor air and thus reduces the risk of blocked filters.

When circulating indoor air, it is circulated through inner filter in the left side of the cabin.





Heater

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

Air conditioner

The cab can be equipped with an air conditioner system.

Push switch D to switch on air conditioning. Push switch B to re-circulate the cooled cab air, which will further cool down the cab.

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.

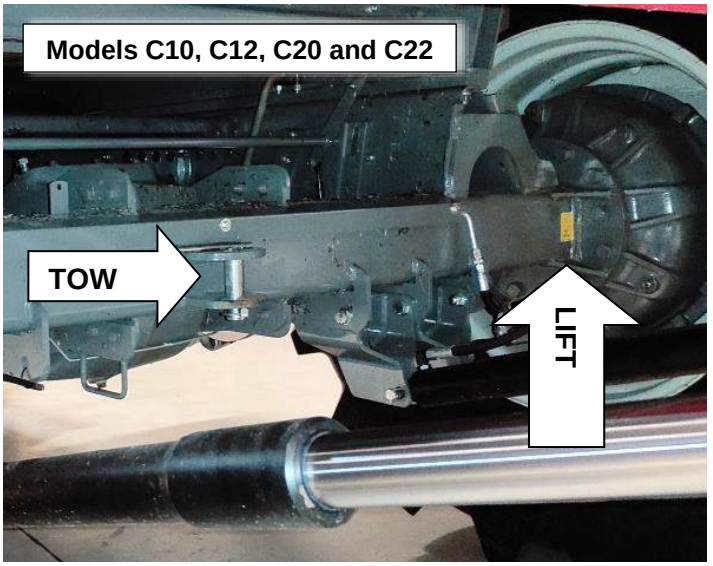
Towing and lifting

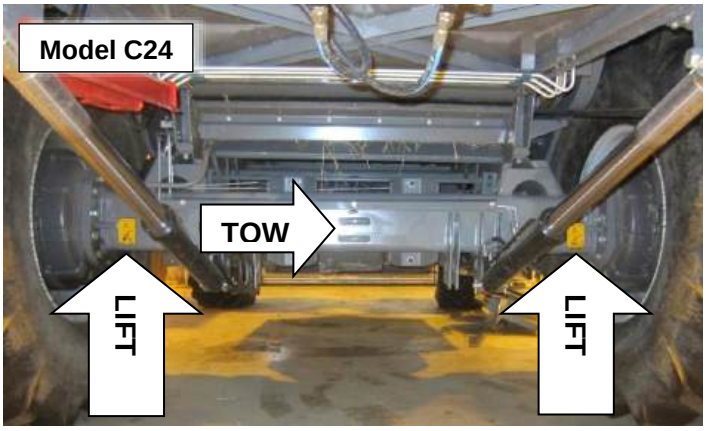
The combine may be towed from designated points only. When towing forward, the towline is hooked to the link on the front axle. When towing backward, wind the towline round the rear carrier. The towline must not be wound round the rear axle.

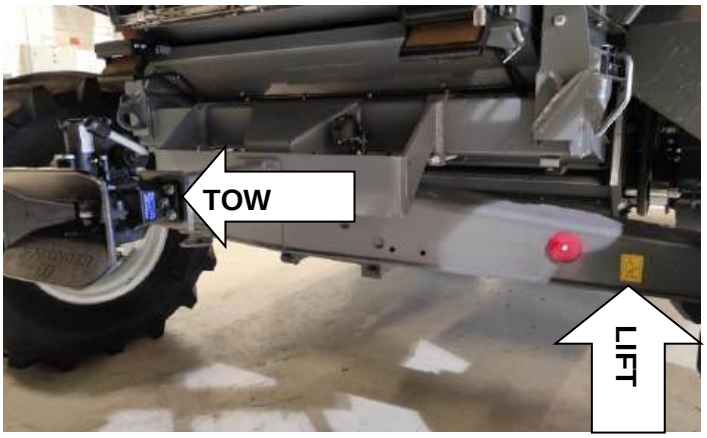
With the combine on tow, the operator must be in the cab and the engine running to enable steering. The brakes must be latched together and the gears in neutral. Four-wheel drive must be off.

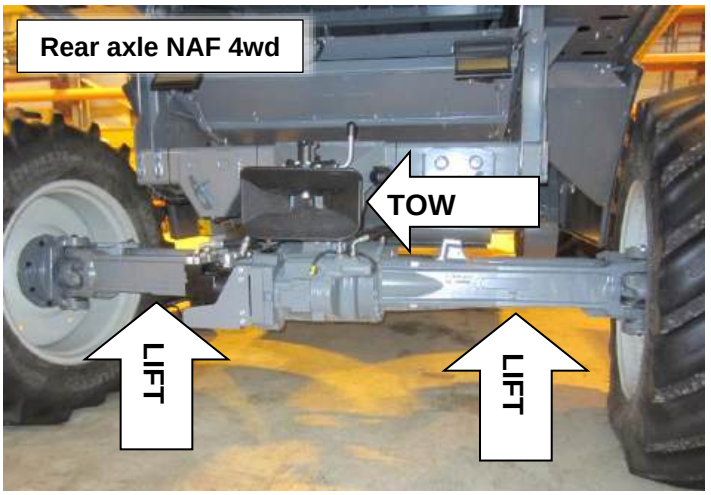
Unless the engine can be started, the combine must be towed with great care; without power steering engaged, the combine is slow and heavy to handle.

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









Correct lifting of the combine

The combine may be lifted using the designated points only. It shall be lifted on level, sturdy ground. Grain tank must be empty. Lifting capacity of the jack shall be a minimum of 10 tons. If an ordinary jack is used to raise the combine, a sufficiently high and firm, one-piece platform with an area of a minimum of 300 x 300 mm is to be placed underneath the jack.

Before the lift, the combine must be immobilized by placing wedges in front of and behind the wheels on the ground.

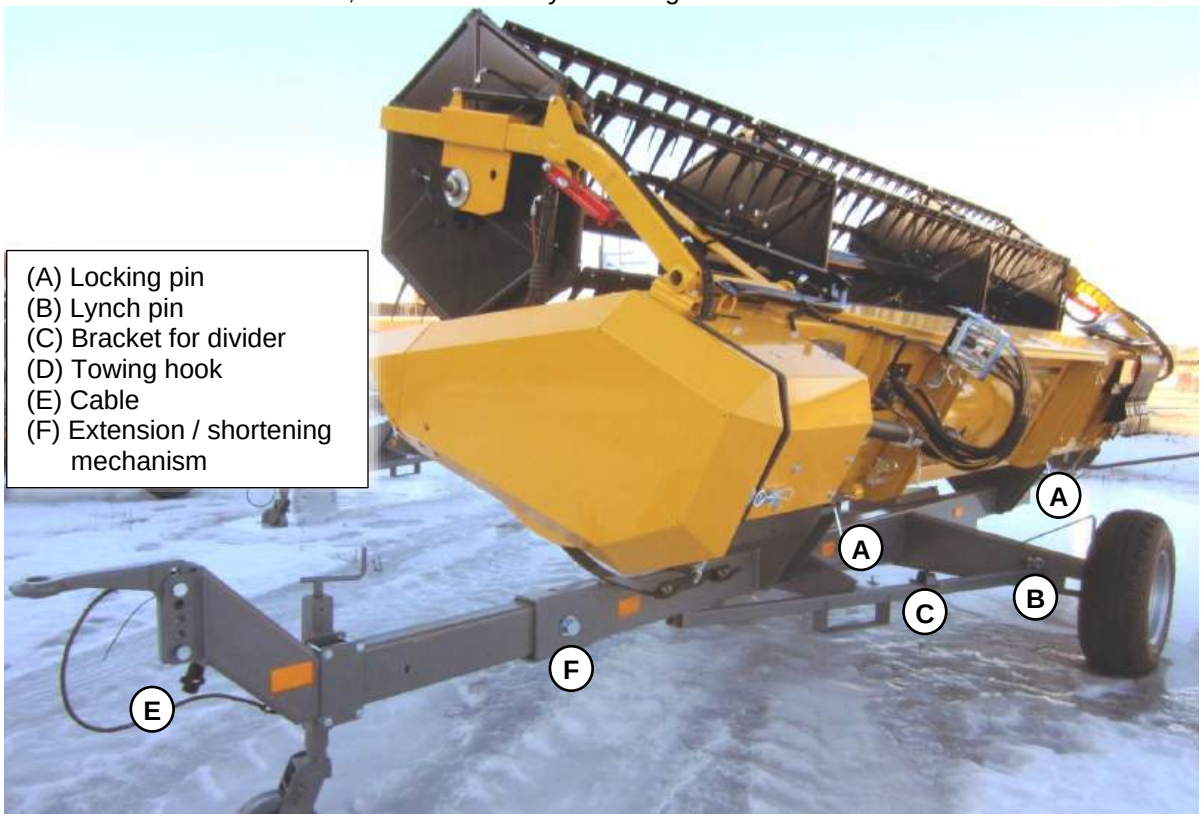
Use a sturdy trestle to secure the combine in its raised position.

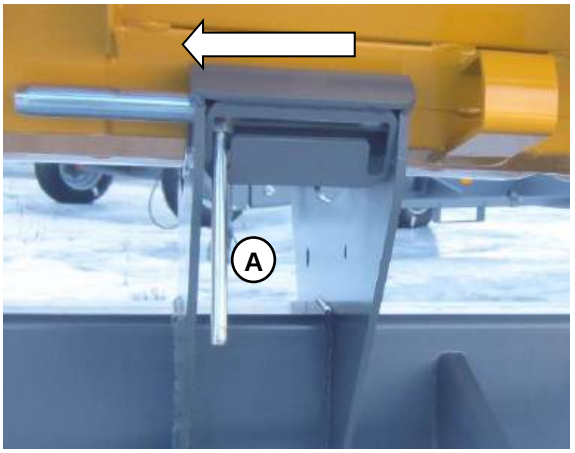
If several wheels are to be removed at the same time, the ground surface of the trestles is to be a minimum of 600 x 600 mm.

Header trailer for road transport

Cutting headers should always be transported on a trailer in order not to inconvenience traffic and risk the safety of road users.

The trailer has no traction unit but shall be towed attached to the combine. No other cargo except for a cutting table must be transported on the trailer, nor must any other attachment except for the trailer be hooked to the combine towing hook. In case the trailer is attached to another traction unit, a tractor, for example, the attachment shall be made in accordance with the instructions, and the statutory traffic regulations shall be followed.

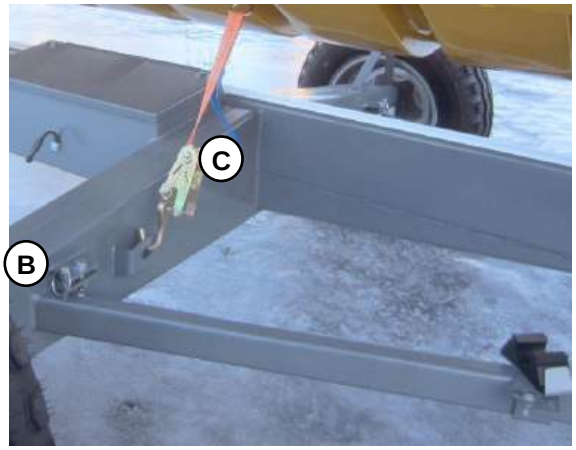




Preparing the trailer

Place the trailer on level ground and align its frame with the ground by adjusting the cam wheel. Pull locking pins (A) into their open position. Make sure that strap (C) is available.

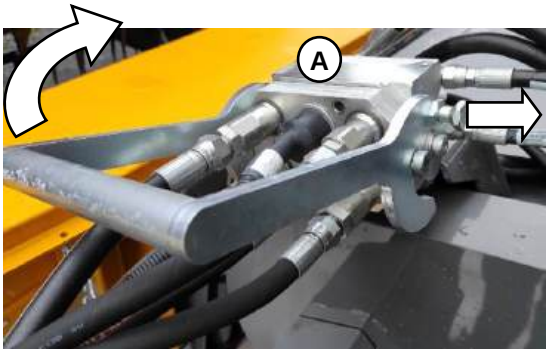
Remove the straw dividers from the header and place them on the brackets on the trailer. Depending on the type of dividers, the brackets are either at the front or the back of the axle. Lock the dividers with ring cotter, lynch pin or locking pivot (B). When needed, adjust the guides of the adjustable divider in a narrower position so that the header bottom does not touch the divider.



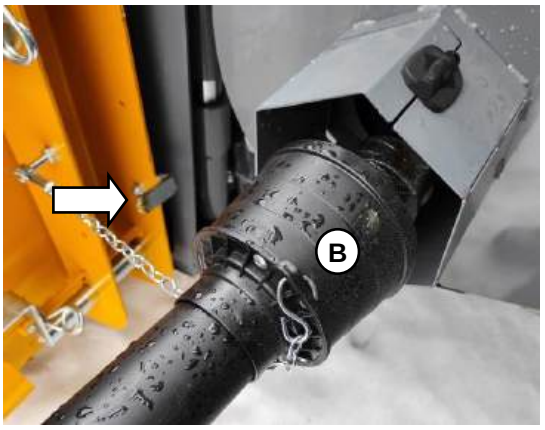
Removing header

Disengage the header from the combine by removing:

1. hydraulic connector (A) with locking pin pulled and lifting handle up. Place connector on rack in header and lock.



2. PTO shaft (B) on left side of feeder elevator. Open cover and push locking pin out and pull shaft out. Place it on holder in the header.



3. Remove four locking pins and slide locking rods (C) open and place pins to hold rods open position. Header is now attached only with upper tip. Proceed with caution and preferably only with 1st gear.

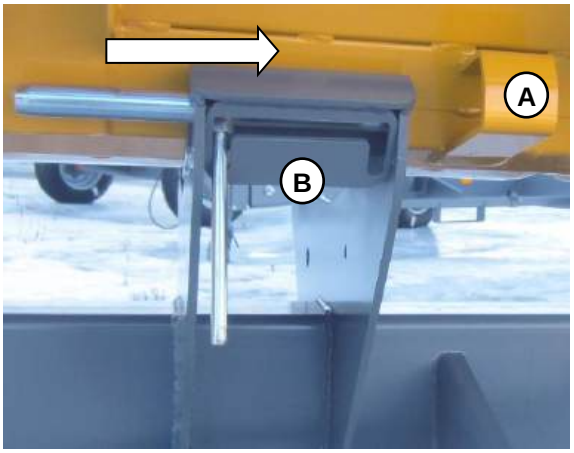
4. If there are AHC skids in the header, put them to transport position.

Drive the header above the trailer from the left-hand side so that the knife is level with the trailer marking sticks and brackets A at the rear of the header, are between carriers B. Lower the header slowly.

Make sure the header is positioned correctly: Reverse slowly so that the rear end of the header is against both the carrier limiters.

Lower the crop elevator further so that it becomes disengaged from the cutting header and back up the combine with caution. Raise the crop elevator as soon as possible.

Push the rear locking pins into their locking position. If the trailer is equipped with a winch, it can be used to pull the trailer to the combine hook after the combine has been reversed near the trailer.



Hook the header with strap and tighten. The strap will be found in storage box (C).

Hook the trailer to the combine and plug in the electric cable.

Trailer on tow

Extreme caution shall be exercised when towing the trailer.

The total length of the vehicle is approx. 16 m, so turning the vehicle requires space.

Do not turn the rear wheels to their extreme position as the trailer arm may touch the rear wheel and the vehicle will get stuck.

Reverse very carefully. Watch the trailer movements in the mirror.

Attaching of the cutting header to the combine

is done in reverse order (see removing header). In case the trailer must be left on the road temporarily, place appropriate warning signs.

Connect hydraulic connector and the PTO shaft. Lock the cutting header to the feeder elevator. Two locks on both sides.

Threshing equipment

Safety switch

There is safety switch (A) on the instrument panel. It must be switched off before any mechanisms can be switched on.

When the safety switch is pressed, all engaged mechanisms (threshing, chopper, cutting header and unloading) stop.

The safety switch also stops the reversing of the feeding equipment.

The unloading pipe cannot be turned with the safety switch pressed.

The switch must always be ON when driving on the road!

Warning lights and control lights

There are control lights on the instrument panel to indicate the mode of combine functions.

A Engine oil pressure too low

B Charging not working

C Pre-glow

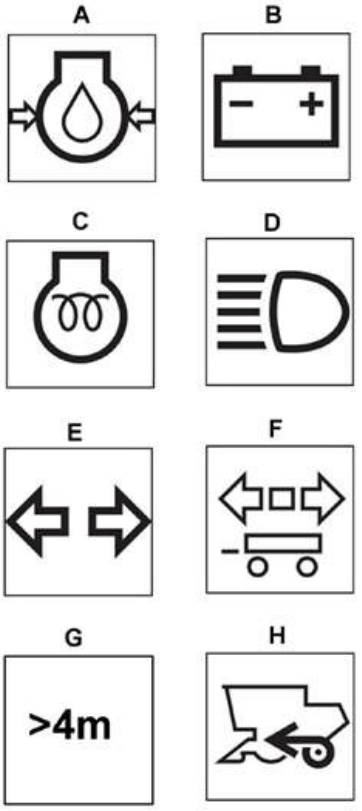
D Head lights

E Flasher

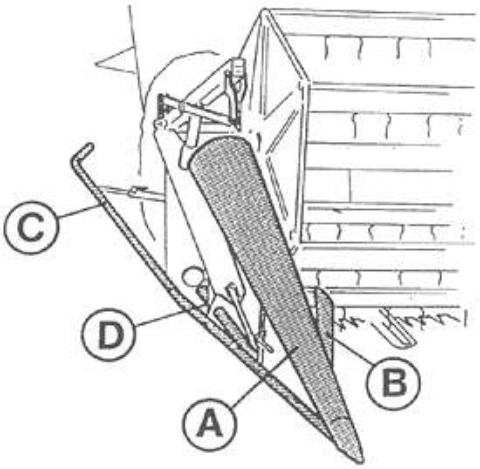
F Trailer flasher

G Max. height exceeds 4 m

H 4WD switched on



Straw dividers



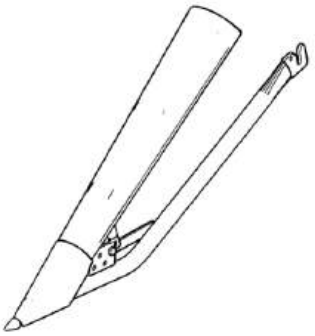
The straw dividers are fitted on both sides of the cutting header. Height is adjusted by means of slide pieces D with holes.

Adjust guide plates A and B to suit the threshing conditions.

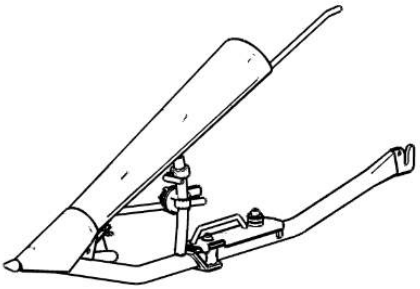
The outside guide tube is attached to the divider at the front and to the header side at the rear. The adjuster for the tube is at the rear. Always attach the tube on the side of the uncut crop.

Depending on the specification the dividers can be of the following types:

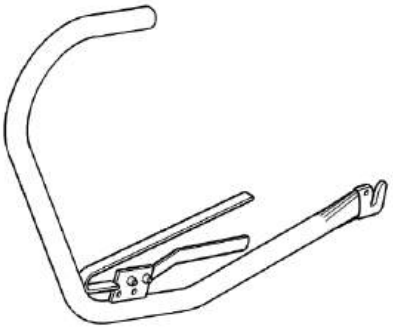
Short dividers are used to thresh short-strawed crops such as barley and wheat.



Dividers with foldable frames are suited for different crops. They do not need to be removed but can be turned to their transport position.



Arc-type dividers are suited for short-strawed crops and crops that do not need dividing but are pressed down in a narrow section, such as turnip rape and flax.

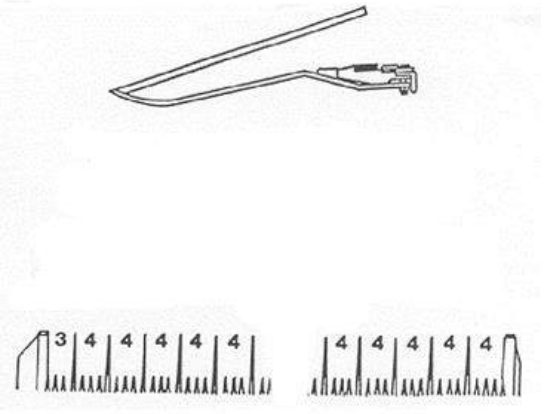


The straw divider can be replaced with a vertical knife. It is particularly efficient when threshing oil plants.

Crop lifters (option)

Below you can see the appropriate number of crop lifters for different header widths:

3.9 m	12
4.2 m	13
4.5 m	14
4.8 m	15
5.1 m	16
5.7 m	18
6.3 m	20
6.9 m	22



Attach the crop lifters with the knife finger fixing screw as shown in the figure. The numbers in the figure indicate the number of finger spaces. The crop lifters operate well if clearance to the ground is 8…10 cm, which clearance also prevents stone pick.

In some cases, for example, when threshing peas, it may be advisable to install more lifters, maybe even in every other knife finger.

Quick-detachable crop lifters could be attached and height adjusted without tools. These crop lifters are designed to follow contour of uneven ground. They allow tangled crop to be picked up and cut evenly.

(A) Hold-down clip

Reel adjustments

[location]

Four Adjustable Settings

Reel height is controlled by switches A

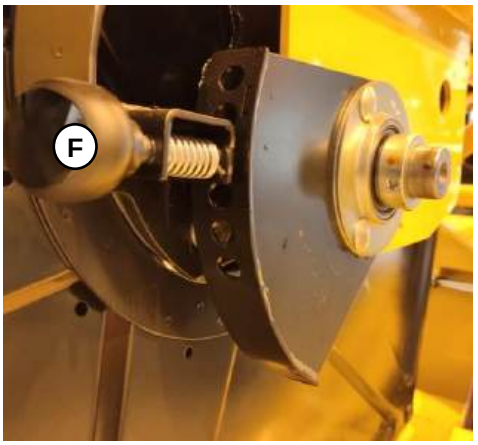
Reel speed is controlled by switches B

Speed can only be adjusted with the reel rotating.

The fore and aft adjustment is made by switches C.

The tine angles are adjusted by pulling at lever F and turning the adjustment lever in the required direction. When harvesting laid-down crops, the tines shall be adjusted to gather the crops efficiently. The torque of the reel is restricted by means of a relief valve in the control valve.

Do not adjust the reel in its rear-most position if the tine angle is adjusted rearwards. The tines may reach the feeding drum and get damaged.

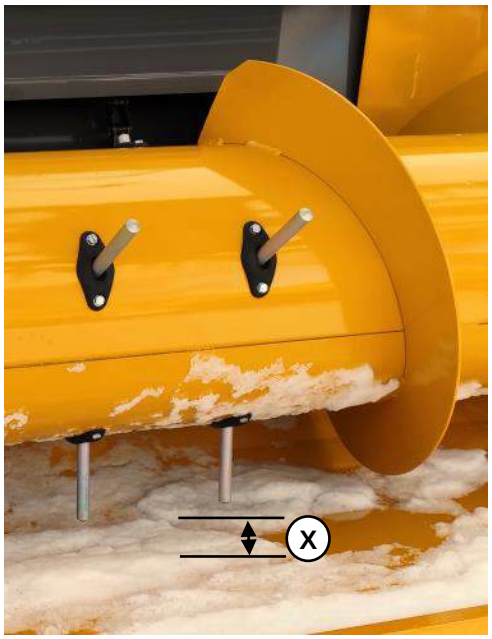


Place locking on the reel in the support position if working beneath a raised reel.

Cutting knife

[location]

No actual knife adjustments can be made during threshing. The knife must be in perfect condition to produce good cutting results. For more precise service and adjustment instructions, see under Maintenance. A spare knife is stored in the case at the top of the table.



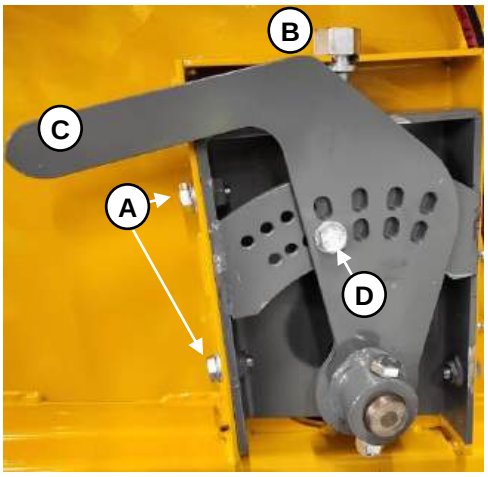
Feeding auger height and finger position

[location]

Adjust the feed auger vertically to suit the amount of straw in the crop being threshed.

Average clearance X is 10 – 15 mm. When threshing e.g., heavy rye or turnip rape, adjust clearance X between the auger and cutting table wider, approx. 30…40 mm. In special conditions even a 5 mm

clearance can be used. To adjust, loosen screws A at both ends of the cutting header. Now the feeding auger can be lifted or lowered as required using adjustment screws B. Clearance between the feed auger and the bottom must be equal at both ends of the header. After moving the feed auger, check the drive belt tension. Loosen screw D to adjust the feed finger position with lever C at the right-hand end of the cutting table. A minimum clearance of 10 mm is required between the feed fingers and the header bottom. The fingers must recede into the auger sufficiently early to allow the crop to be transported forward. Otherwise, tall and damp crops in particular may wrap around the auger.

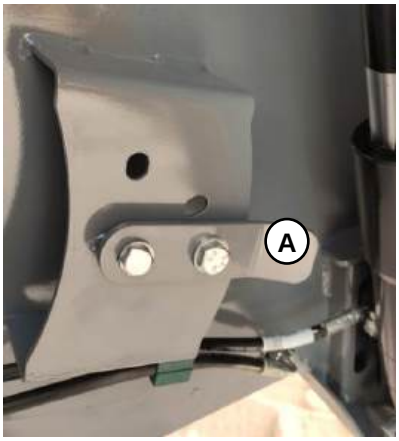


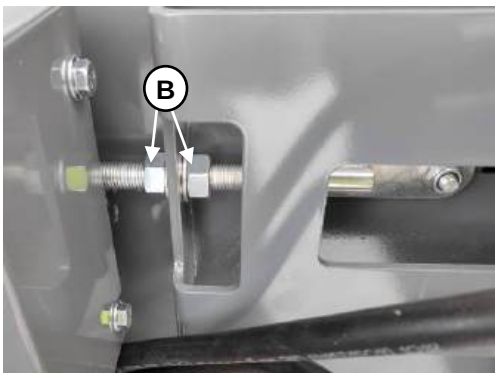
Feeder House Conveyor Chain

[location]

IMPORTANT: Make sure that height and tension are always correctly adjusted.

The feeder house has a fixed top roller and a floating bottom roller to enable the feeder house to oscillate according to the flow of the crop on it. Adjust the clearance between the bottom roller and the bottom of the feeder house by changing the position of lever (A). Adjust the feeder house conveyor chain tension with nuts (B). To check the tension, open the inspection door at the top of the feeder house. The tension is correct when the deflection midway between the top and bottom roller is approximately 80 mm. If the chain is assembled too tight, it wears out quickly and in some cases it can even break.





Feeding auger and feeder elevator reverse drive

Eliminate blockage from the header. Blockage in crop feed may stop the feeding auger and feeding elevator as the safety switches slide. The blockage can be cleared by turning the feed equipment backwards. To do this, disengage the drive to the header and press reverse switch. The feeding auger and elevator will rotate in reverse direction and clear the blockage.

NOTE! The reverse drive will only operate with the engine running and header drive off.

Engaging and Disengaging of the cutting header

The cutting header is engaged and disengaged using switch. Pull up yellow switch to engage the

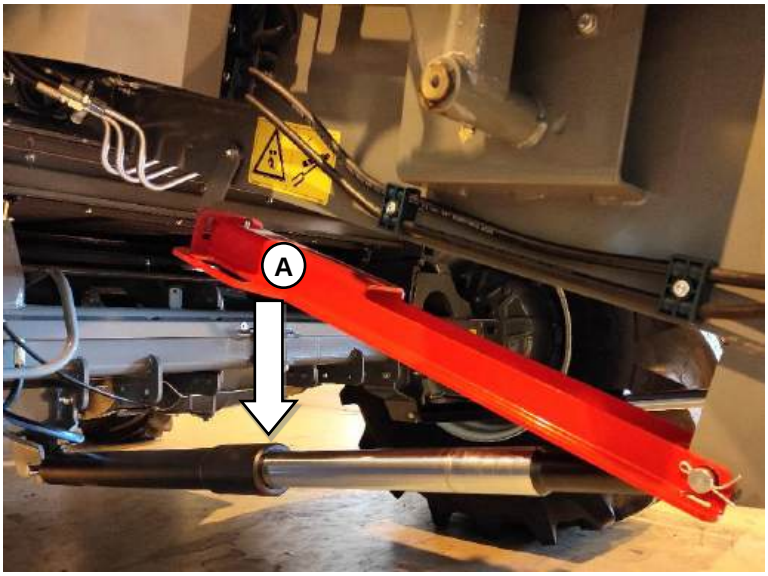
header. The actual engagement is done by means of a hydraulic cylinder pressing header drive belt.

NOTE! Threshing system must be engaged before header engage is possible,

Caution! The cutting and feeding mechanism disengaged using the switch can start running when, for instance feeding disorders are eliminated from the header. Therefore, always stop the engine before any work is carried out on the header.

Supporting of the cutting header and feeding elevator

Before doing repairs and maintenance beneath the header, raise it to its full height and lock the support over the ram by means of lever A, on the right-hand side of the feeding elevator. Do not use the cutting header support while driving on the road.



Height of the cutting header

Header height is controlled using switches A.

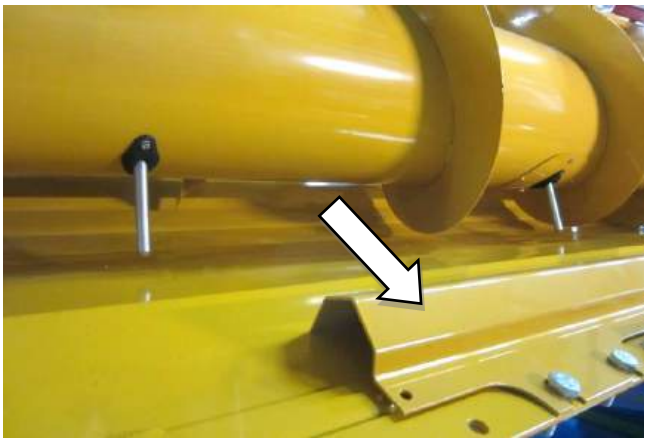
Cutting height is shown on the Comvision II display.

Side Tilt of the cutting header

The transverse position of the cutting header to the ground can be adjusted hydraulically using switches B on the control lever. Side tilt may be needed on a sloping field when the combine tends to tilt downhill.

Stone Guard Behind the Knife

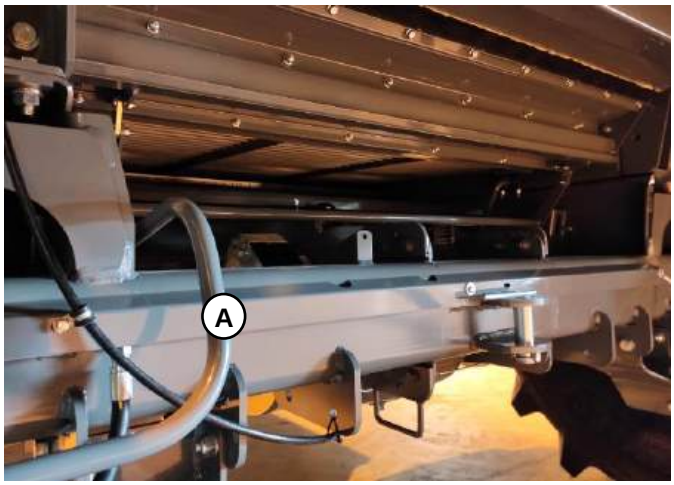
An optional stone block can be fitted on the cutting header behind the knife. It has proved extremely useful on fields with a lot of small stones. They are stopped by the stone block and can be removed from there. Always stop the combine and the engine and fit the supports for the header and the pick-up reel before carrying out any work on the cutting header.



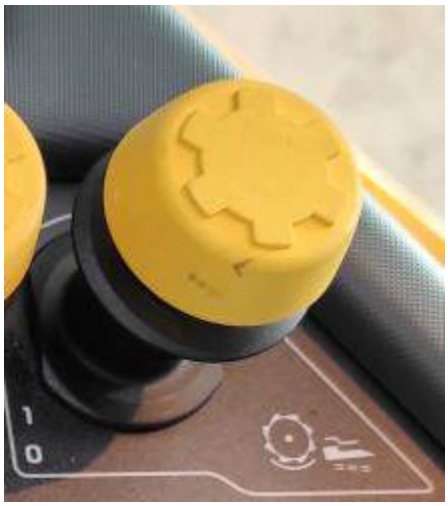
Stone trap
[location]

The stone trap prevents stones from getting onto the concave. It is located between the feeding elevator and concave. The hinged bottom can be opened and locked using lever A.

The stone trap must be emptied daily; the contents of it must be of soft nature. When harvesting short stubble on stony fields, empty the stone trap more often.



Threshing mechanism



Engage and disengage the threshing mechanism using switch. Engage the threshing mechanism by pulling up yellow switch. The function is electro-hydraulic. The levers in the belt coupling are turned hydraulically. The chopper starts simultaneously if the chaff guide plate is for the chopper.

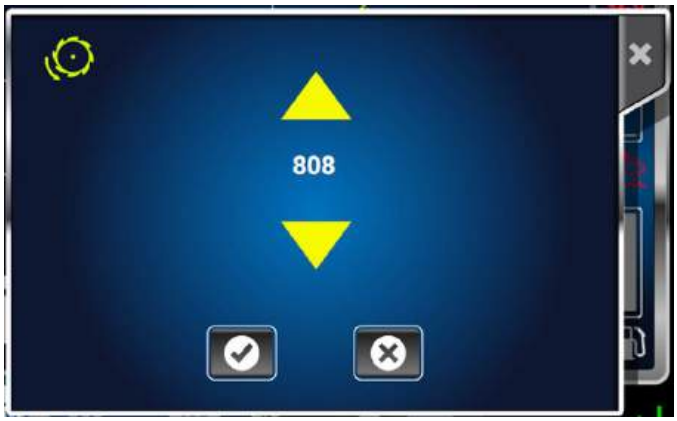
NOTE! ENGAGE AND DISENGAGE THE THRESHING MECHANISM AT ENGINE IDLING SPEED ONLY.

DO NOT INCREASE THE ENGINE SPEED BEFORE THE WHOLE THRESHING MECHANISM HAS BEEN SWITCHED ON!

Threshing cylinder
[location]

The speed of the threshing cylinder is controlled using Comvision II -display.

The rotation speed may be changed with the threshing mechanism running only. The threshing cylinder speed is displayed in Comvision II-display. Settings for various crops are given in the adjustment table on the cab window.



Concave clearance adjustment
[location]

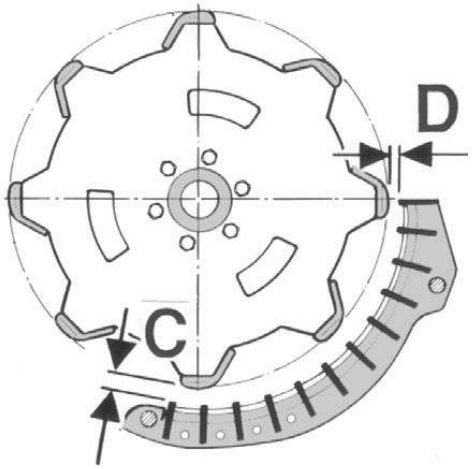
Clearance between the concave and the threshing cylinder is adjusted using Comvision II - display.

Clearance is also displayed in Comvision II -display.

The adjusting mechanism has been designed to maintain the ratio between the front and rear clearances. The factory set ratio is 2:1; front clearance C is double rear clearance D

Concave clearance should be checked at the beginning of each harvest season.

See the settings for various crops in the adjustment table on the cab window.



Concave clearance ratio

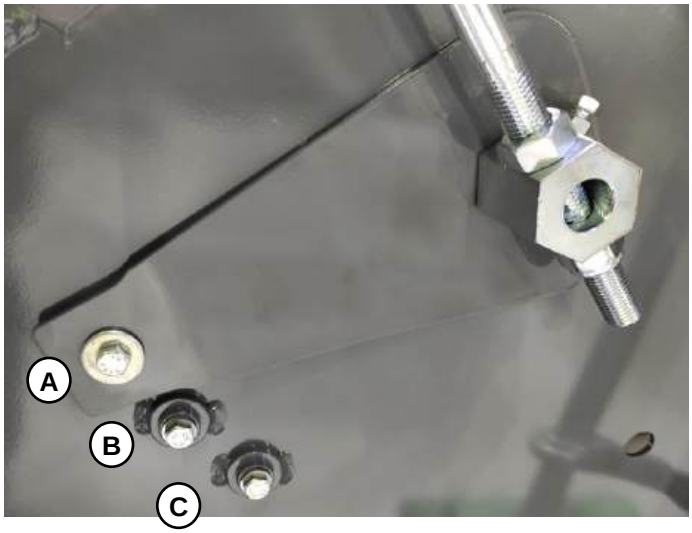
The adjustment ratio between the concave and the cylinder can be changed so that instead of the factory set 2:1 ratio, ratios 1.5:1 or 1:1 are used. When changing the ratio, move the ratio lever on both sides of the machine to position A, B or C.

A = 2:1

B = 1.5:1

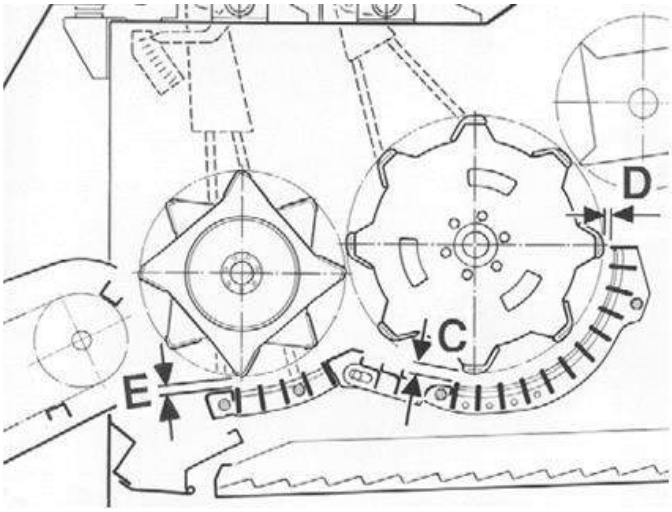
C = 1:1

Adjustment A is best suited for damp and adjustment C for extremely dry conditions when it is important to prevent the straw from breaking on the threshing cylinder.



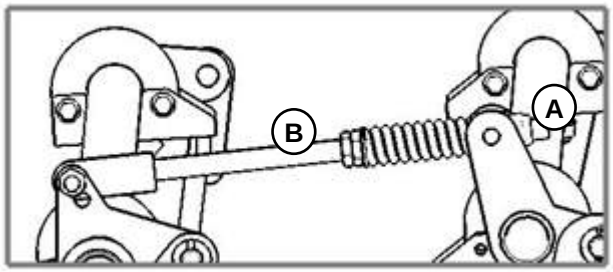
Pre-threshing cylinder (C12, C22 and C24)
[location]

Cylinder speed is adjusted along with main threshing cylinder speed. Pre-cylinder is 80% of main cylinder speed.



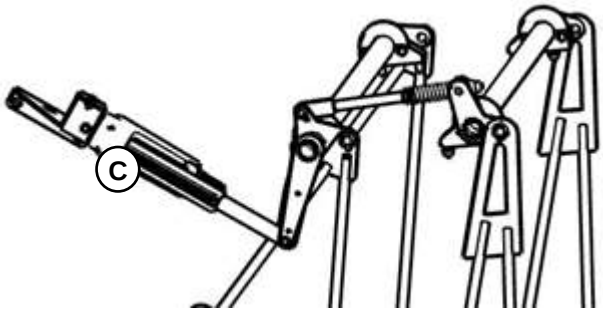
Adjusting of pre-concave

When main concave is adjusted from cabin with electrical motor C, pre-concave is adjusted along with it.



Clearance between the pre-concave and pre-cylinder is adjusted simultaneously with main concave. Ratio between main- and pre-concave can be adjusted with nut A in the connecting rod B.

Factory set pre-concave is 9 mm more open than main concave.

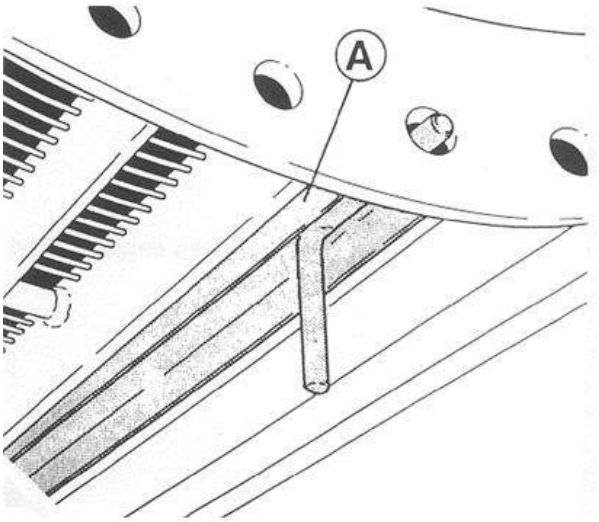


CONCAVE FILLER PLATES, Remove the Barbs

The threshing effect of the concave can be improved by fitting filler plates A under the first concave beaters. Pass the filler plates through the holes at both ends of the concave where the springs keep them fixed. The same filler plates fit the main concave and the pre-concave.

Plates are attached to grain elevator when not in use.

NOTE! Using filler plates reduces combine capacity.

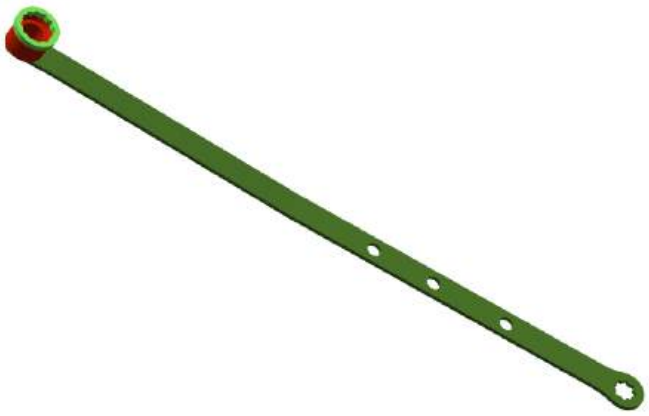


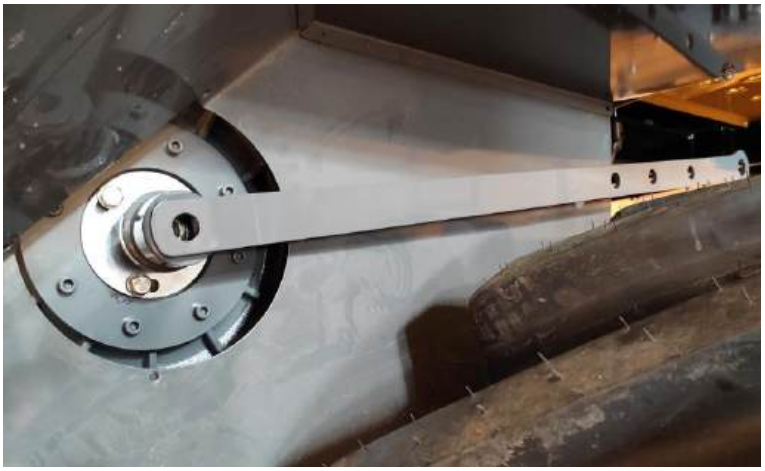
REVERSING THE CYLINDER with tool

To remove a blockage from the threshing cylinder, a tool (under the right-hand side guard) is supplied by means of which the cylinder may be turned manually. Open end is for PTC.

Open the cover plate on the mudguard to reveal the shaft end.

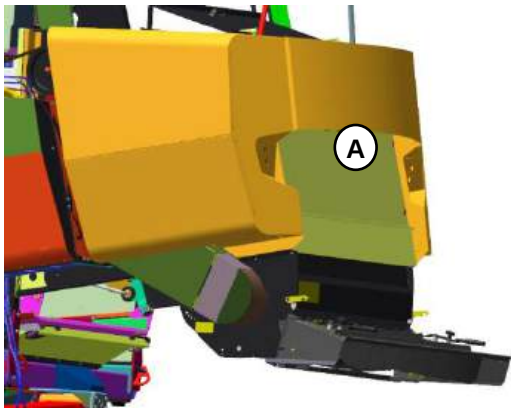
The engine and the threshing mechanism coupling must be off. The concave should be in its bottom position. If necessary, the blockage may also be cleared through the service openings.



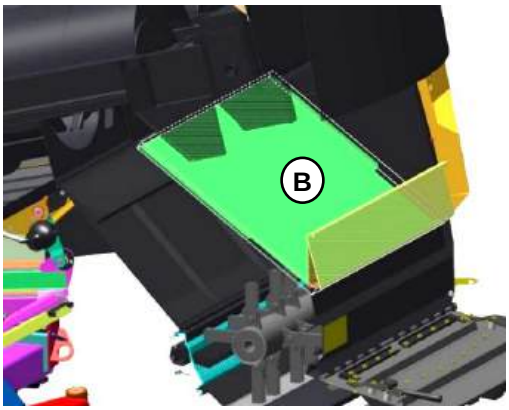


Removing blockage from hybrid combine

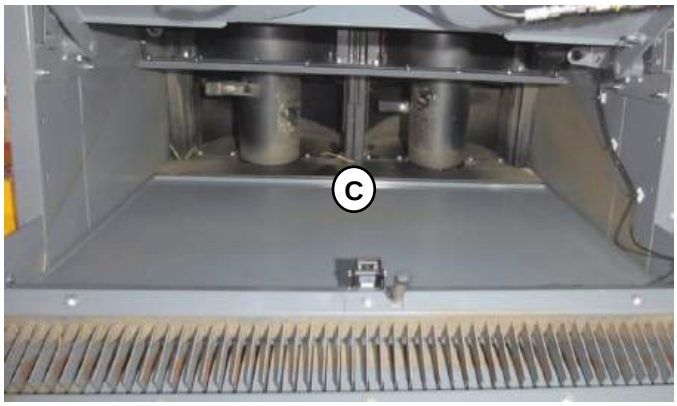
First clean the chopper.
Open the hatch A of the chaff hood.

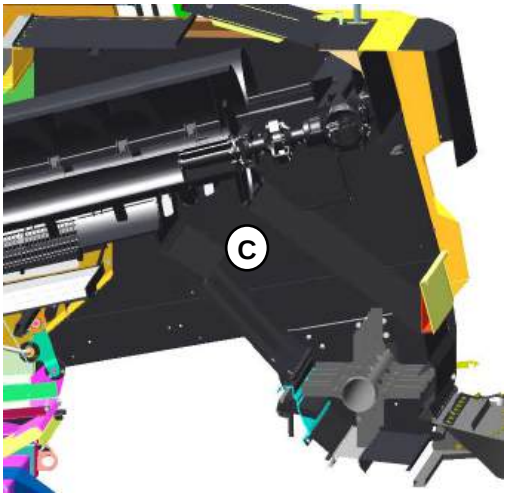


Remove inner cover B.

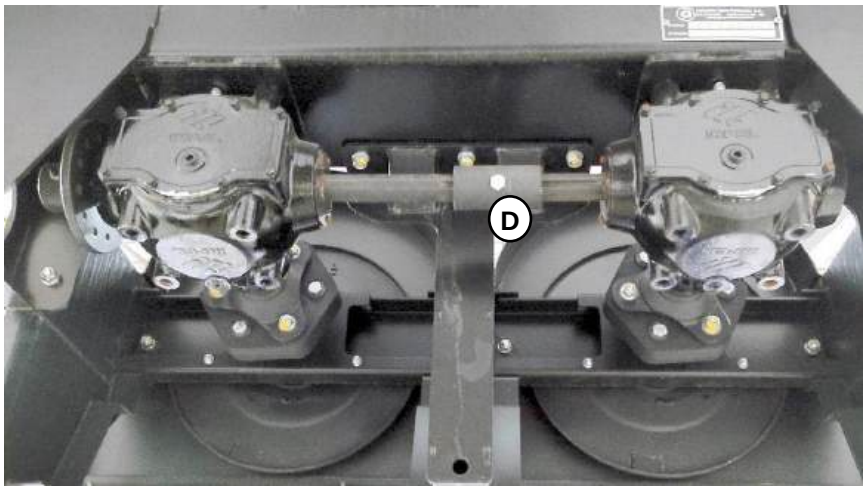


Remove the blockage from area C

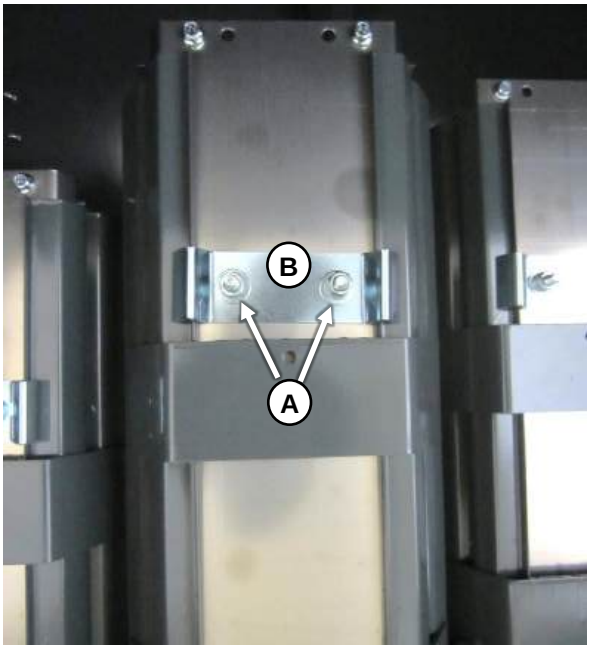




To disconnect twin drive of the rotors, open tightening screw and slide the ferrule D to the right. Now rotors can be turned separately. Remove the blockage. Use manual instruments to take out all loose material. Re-install the ferrule and tighten its screw and replace the hatch and cover.



Straw walkers (C10 and C12)

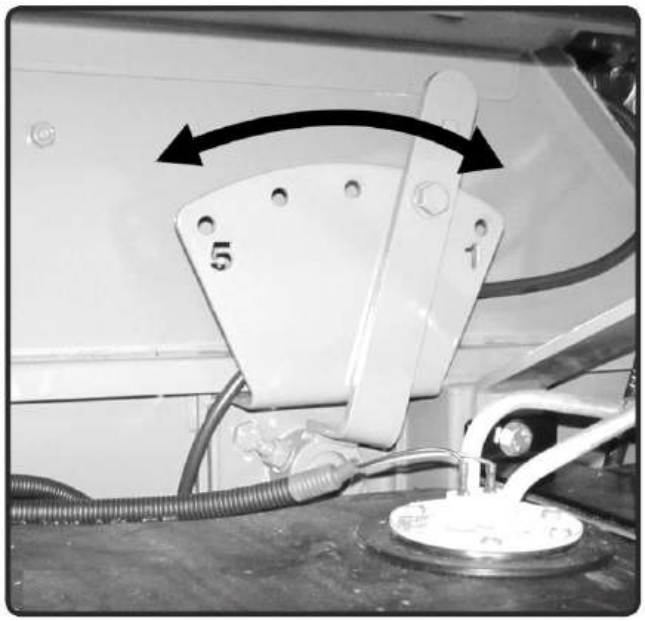


Keep the bottoms clean. The bottom cassettes of the straw walkers can be removed for cleaning by opening nuts (A), releasing clamp (B) and pulling the cassettes out from the rear door to the chaff hood.
The switch on the chaff hood top lights an alarm lamp if an excessive accumulation of straw causes a blockage. Immediately disengage the threshing mechanism, clear the blockage and find out the cause for the trouble before continuing working.
Note! Always check the operation of the warning device before starting to harvest.

Loss sensors on straw walkers

Loss sensors (A) require regular service. Their surfaces must be kept clean. In damp conditions dirt may accumulate
on the sensor surfaces. Remove the dirt while still damp. Do not use a sharp tool, as the surface is a microphone
cover

CSP Straw Ruffler



Depending on the specification, there may be a belt-driven ruffling drum above the straw walkers to fluff up the mass of straw to improve grain separation. The ruffler finger angle can be adjusted by changing the position of the adjustment lever on the right side of the combine. The normal position is the middle of the adjustment range.

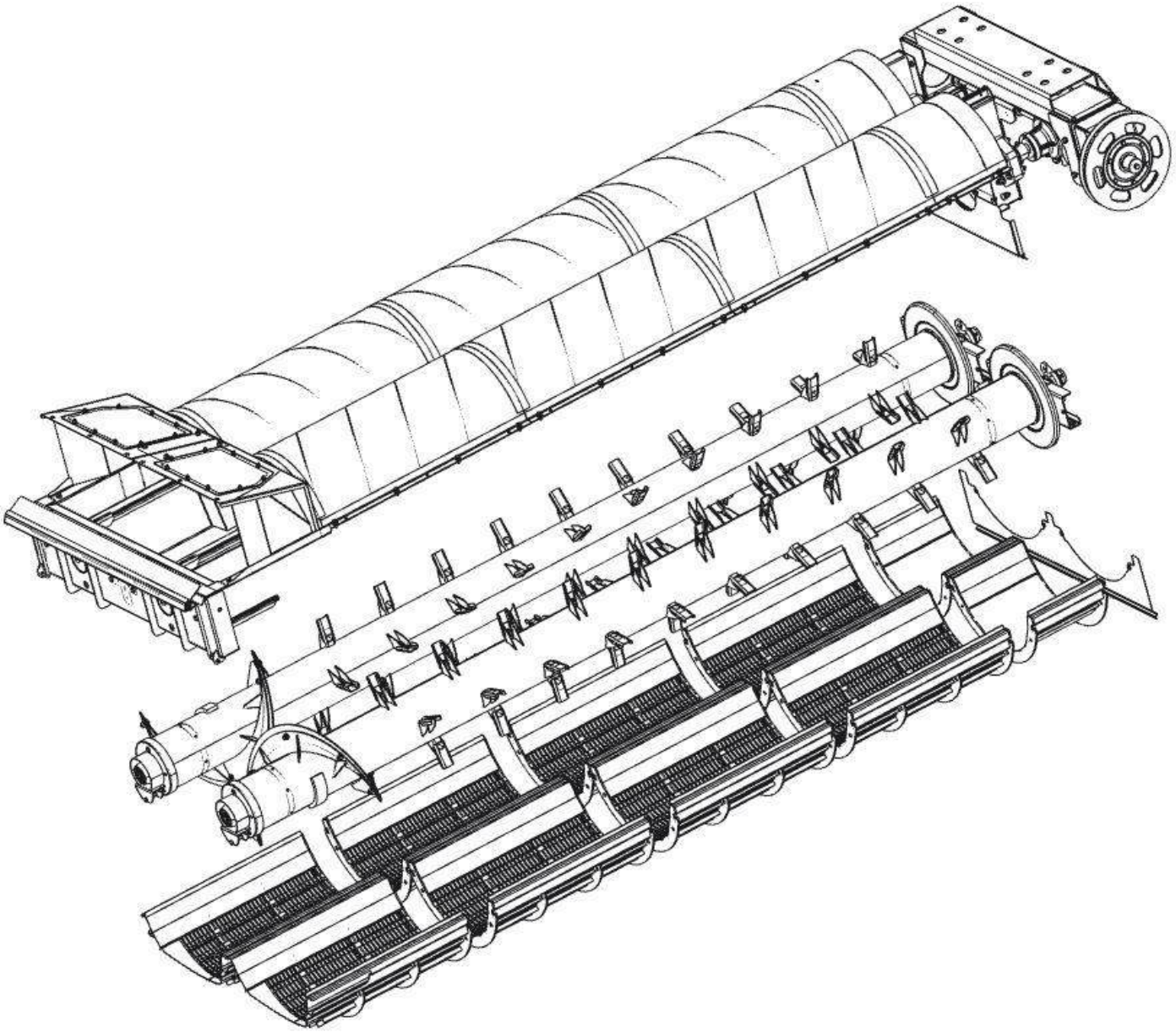
When the lever is moved backwards (to the left), the fingers will retract earlier in the direction of rotation and vice versa. This should be done when threshing turnip rape of flax.

A speed monitors the ruffler rotation. Activated alarm indicates a speed drop in the CSP drum.

Check the drive belt tension regularly.

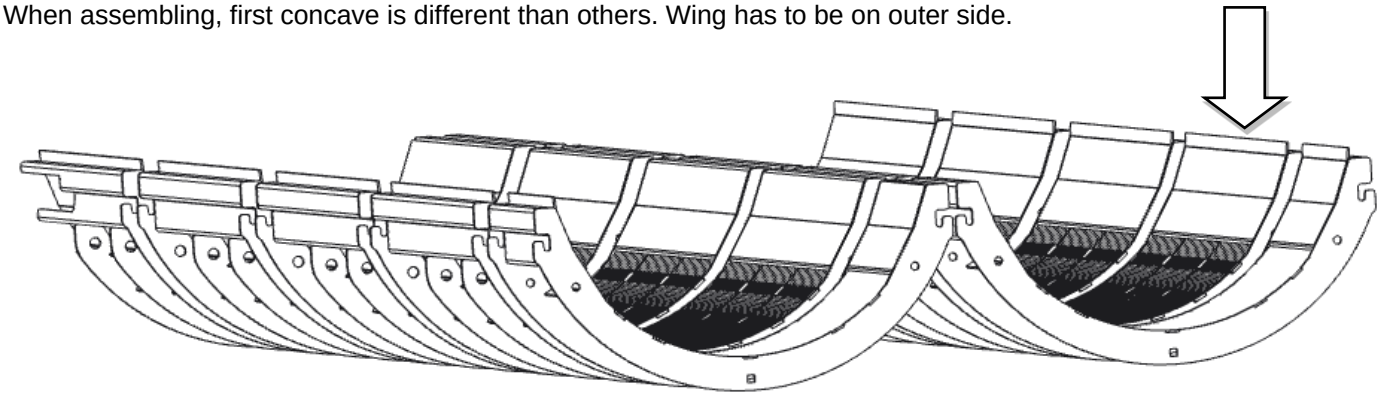
Rotor separation with C20, C22 and C24
[location]

Bottom concaves of rotor can be removed for cleaning pulling concaves out from the rear end. Requires two persons to lift concaves. Changing to different pulley size, rpm of separation can be adjusted (option).



End plate and grooves are bolt attached. When bolts are removed, rest of the concaves slide from rear of the combine.

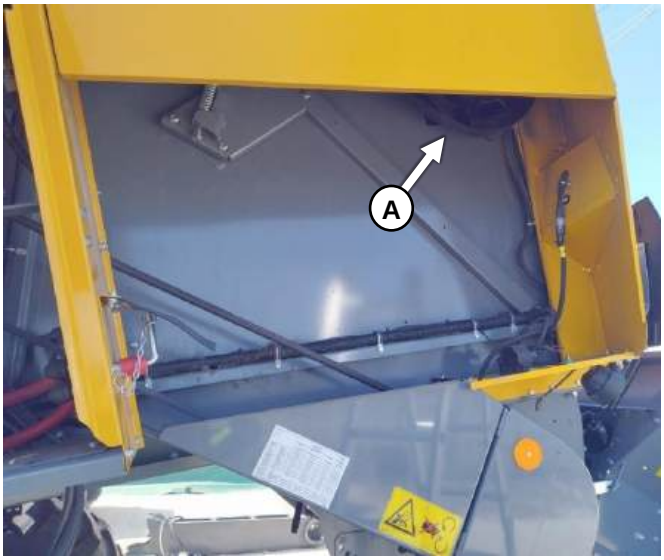
When assembling, first concave is different than others. Wing has to be on outer side.



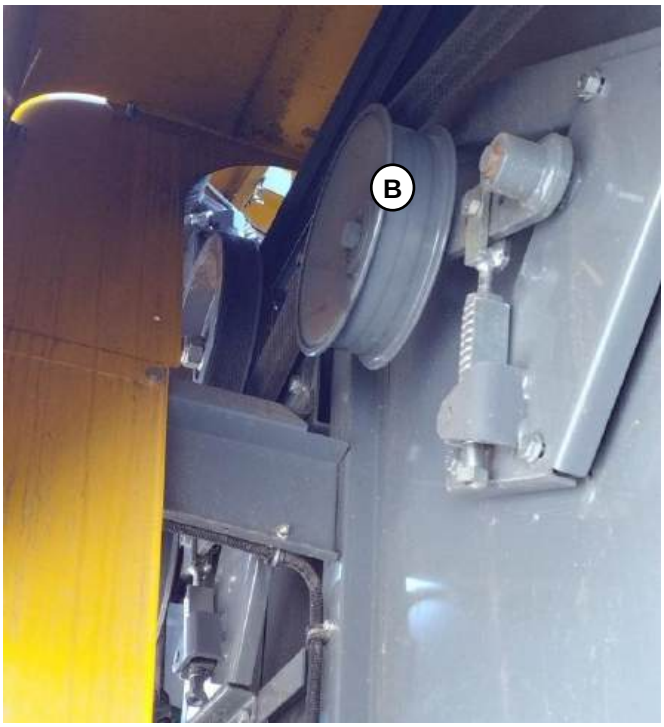
Changing rpm of rotors in hybrid combines

Separation speed of rotors is changeable by changing the drive pulley and belt. With bigger pulley the speed is 480 rpm/min and with smaller 700 rpm/min. The speed of 700 rpm/min is used with cereals.

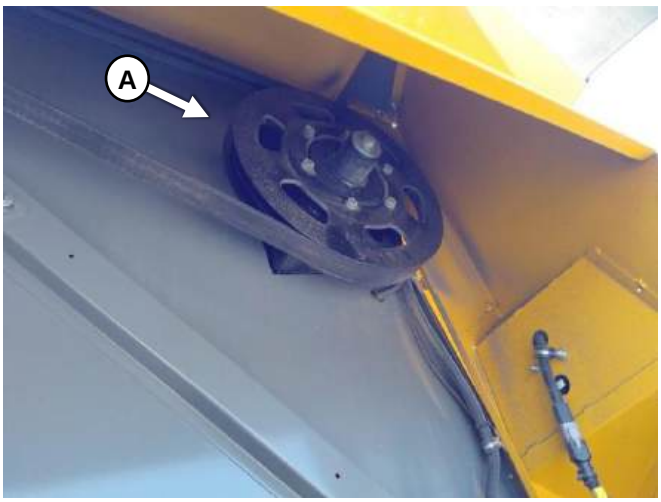
To get access to the drive pulley, remove left side guard of the chaff hood. The guard is already removed in this picture. Drive pulley (A).



Start change procedure with loosening rotor drive belt with tension pulley (B).



Remove belt. Change pulley (A) and its belt.



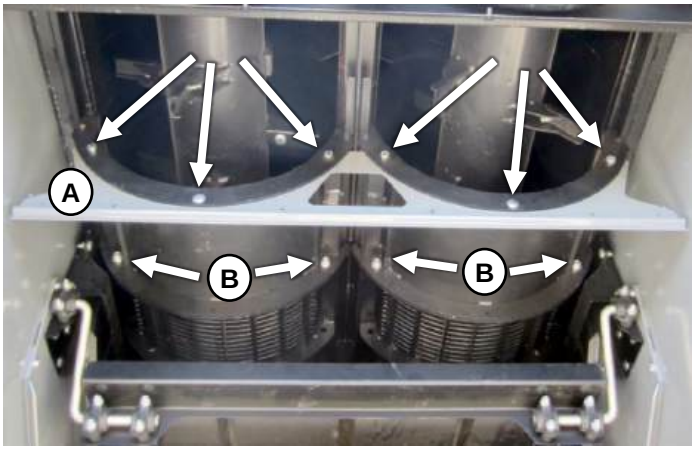
Changing concaves of rotors in hybrid combines

Different concaves are available for small grain and corn. Concaves are assembled in four sections. Three concaves from the rear side are changeable on each side. The first ones from the front side are fixed.

End plate and grooves are bolt attached. When bolts are removed, rest of the concaves slide from rear of the combine.

Open and remove arrow pointed screws, six pcs. Remove plate (A).

Open and remove four screws (B).



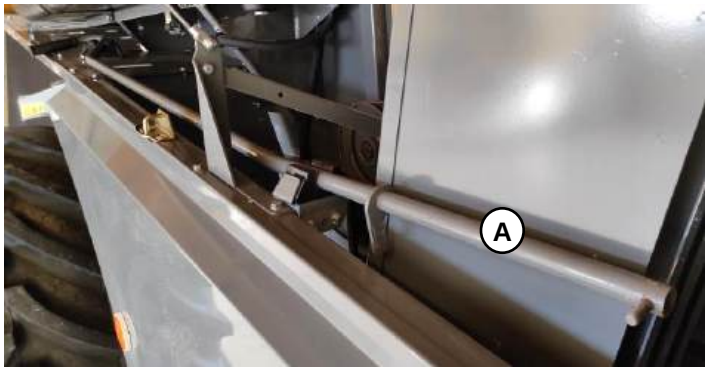
Now three concave sections can be pulled out. Sections are mounted on rails. Be very careful. Sections are heavy.

Grain pan

[location]

The grain pan can be removed in three segments for cleaning. A removal tool (A) is supplied under the right-side guard. Pass the flat end of the tool into the hole at the mid-plate of the segment. Press with the side of the tool to unlock the segment and pull backwards out of the machine.

When harvesting in damp conditions, check daily that the segment surfaces are clean, and remove any sticking dirt. A dirty surface will reduce the transporting ability and cause uneven burden on sieves and increase threshing losses. Moreover, the dirt will cause extra weight, burden the grain pan, and may even lead to damage.

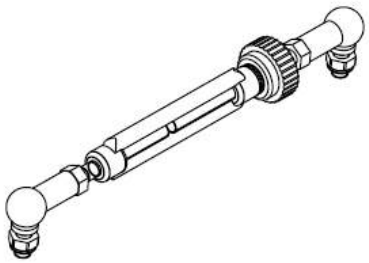


Sieves - mechanical adjustment

[location]

The shaker shoe has been divided in two lateral sections. Both the top and the bottom sieves are of the adjustable lamella type.

The adjustment is made using the adjustment screws at the rear of the shaker shoe. The threshing mechanism and the engine shall be stopped before any adjustments are made. Open the back door to the shaker shoe to adjust the lower sieve. The sieve openings may be read on the scale on the connecting rod of the adjustment levers. When adjustments are made, adjust always at a smaller value first and after that at the required value.



Settings for various crops are given in the adjustments table.

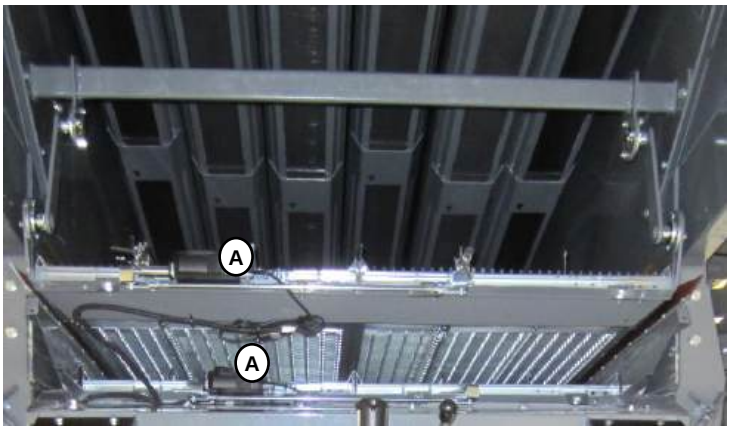
At regular intervals, check that the reading on the scale and the sieve opening are consistent.

Sieves - electric adjustment

The shaker shoe has been divided in two lateral sections. Both the top and the bottom sieves are of the adjustable lamella type.

The adjustment is made using Comvision II -display. Adjustments can be made while threshing. Make sure the sieves are clean.

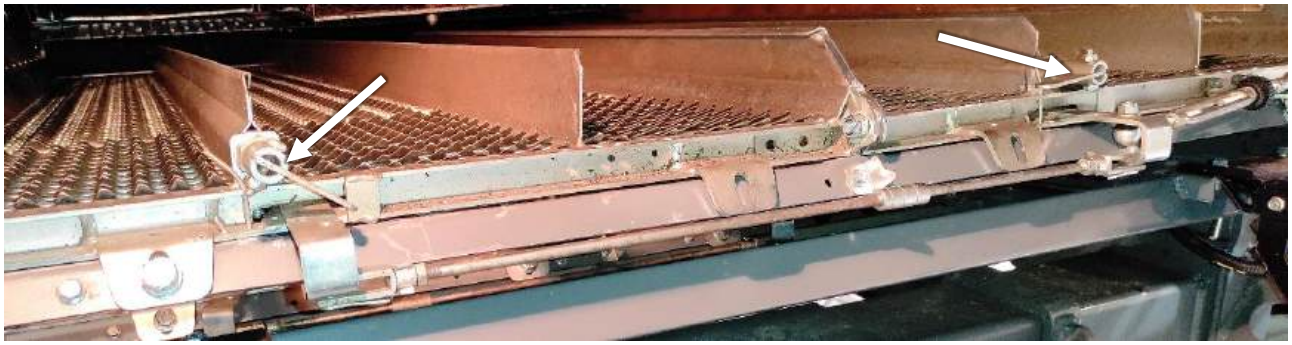
Settings for various crops are given in the adjustment table. At regular intervals, check that the reading on the scale and the sieve opening are consistent. Calibrate if necessary.



There are linear actuators (A) which takes care of actual adjustment procedure according to settings made in Comvision II. Both the top and bottom sieves have their own linear actuator.

Chaffer sieve extension

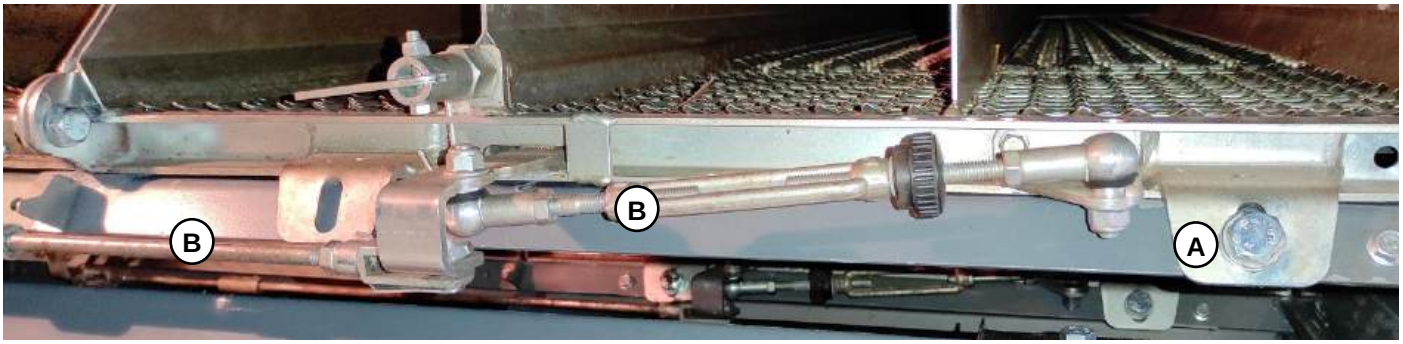
Each chaffer sieve has a separately adjustable extension. It is adjusted using the adjustment screw at the rear of the extension. The threshing mechanism and the engine shall be switched off before any adjustments are made.



Removal and refitting of chaffer sieves

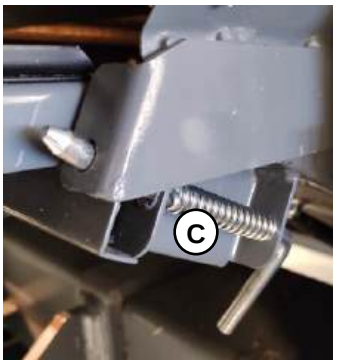
The sieves must be removed for cleaning. The rears of the sieves are fixed to the shaker shoe frame with hexagonal screws (A). Remove the adjustment device and connecting rod (B) between the sieves. Refitting is done in the opposite order. Do not make any changes in the adjustment devices.

After refitting make sure that the adjustment scale and the actual adjustment value are consistent.



Removal and refitting of seed sieves

To reach seed sieves for adjusting or cleaning the rear door of the shaker shoe is needed to open. Pull backward the locking rod (C) on both sides to get the door opened.



The rears of the sieves are fixed to the shaker shoe frame with hexagonal screws (A).

Before the sieves are removed, remove adjustment device and connecting rod (B) between the sieves. Refitting is done in the opposite order. Do not make any changes in the adjustment devices.

After refitting make sure that the adjustment scale and the actual adjustment value are consistent.

Cleaning fan

[location]

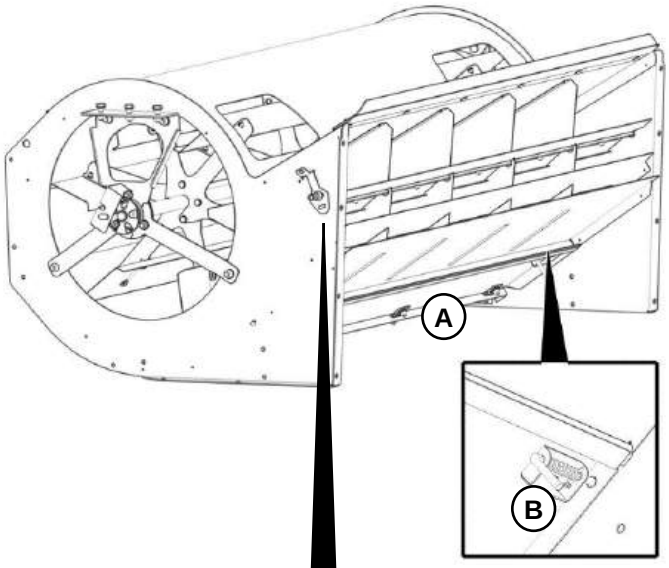
The airflow is adjusted sleeplessly by changing the variator speed. The cleaning fan speed is adjusted in Comvision II -display.

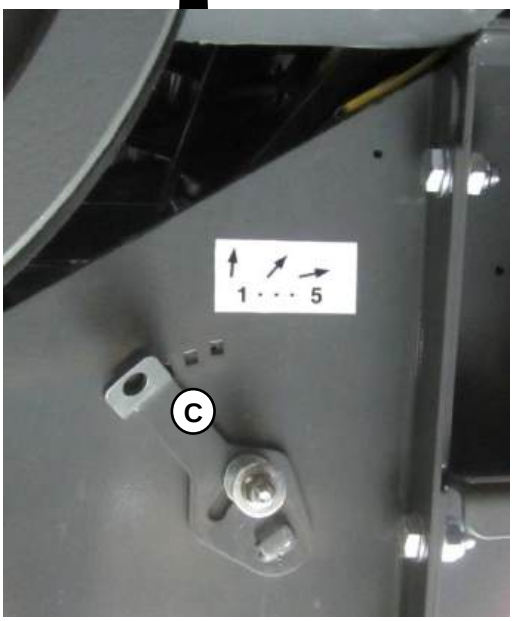
NOTE! Adjustments can only be made with the threshing system engaged.

With smaller seeds requiring a weaker airflow, open door (A) beneath the fan by opening latch (B) on both sides and find the correct air flow by adjusting the variator with the door open.

Adjust the airflow direction using regulating lever (C). With the lever in its front position the air is directed forward and up. By moving the lever backwards, the air direction turns down and rearwards.

Suggested air speed and direction settings for various crops are given in the adjustment table.

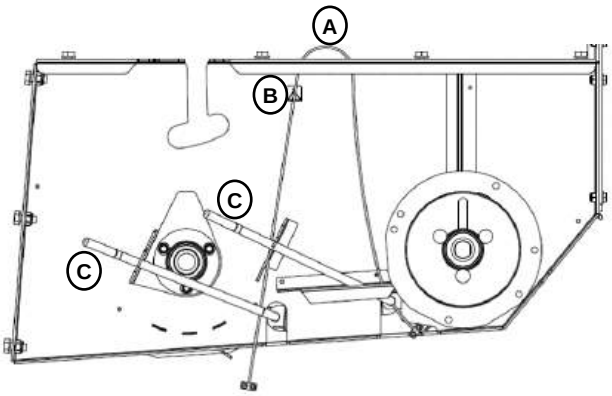




Auger housing

[location]

From the shaker shoe, the clean grains fall to the front transport auger and the returns to the rear transport auger. The bottom troughs in the transport augers can be opened by lifting wire (A) from groove (B) and letting locking levers (C) go down, which will open the doors. To close the doors, lift the wire back to groove (B) and turn up the locking levers. A warning message will pop up if the bottom auger of the returns is blocked. Immediately stop the machine, clear the blockage, and find the cause for the trouble.



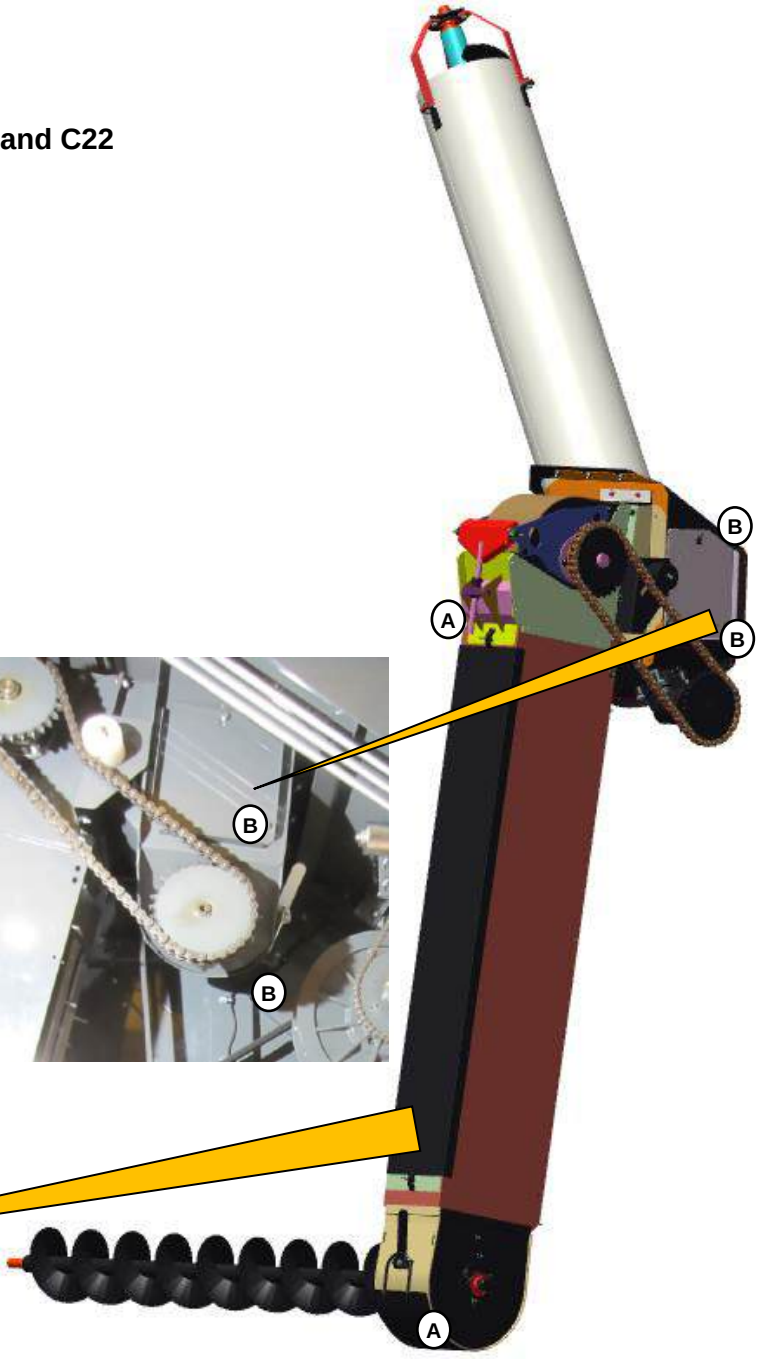
Grain elevator and filling auger with C10, C12 and C22

[location]

The grain elevator and the auger attached to it are on the right-hand side of the combine. The elevator doors (A) enable the operator to check the tension of the chains and clean the elevator. An alarm will indicate a drop in the elevator speed. Any blockage can be cleared through the elevator service doors. After having cleared a blockage, operate the threshing machinery at low speed for some time before continuing threshing.

The auger next to the elevator fills the grain tank. Doors at the lower end of the auger (B) can be opened to clean the auger. Especially when harvesting in damp conditions, the grain transport system must be cleaned often to maintain its transporting capacity.

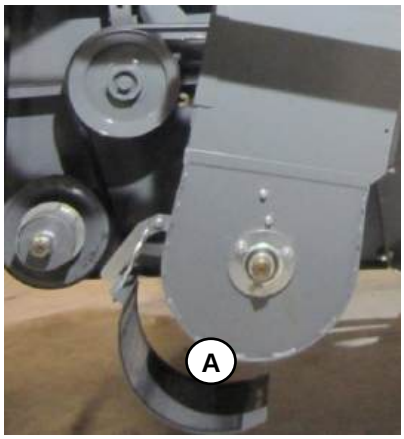
At the lower end of the filling auger inside the housing there is a grease nipple for periodic lubrication.



Service instructions are located in chapter: Belt and chain tensioning.

Grain elevator and filling auger with C20 and C24

The grain elevator and the auger attached to it are on the right-hand side of the combine. The elevator doors (A) enable the operator to check the tension of the chains and clean the elevator. An alarm will indicate a drop in the elevator speed. Any blockage can be cleared through the elevator service doors. After having cleared a blockage, operate the threshing machinery at low speed for some time before continuing threshing. Service instructions are located in chapter: Belt and chain tensioning.

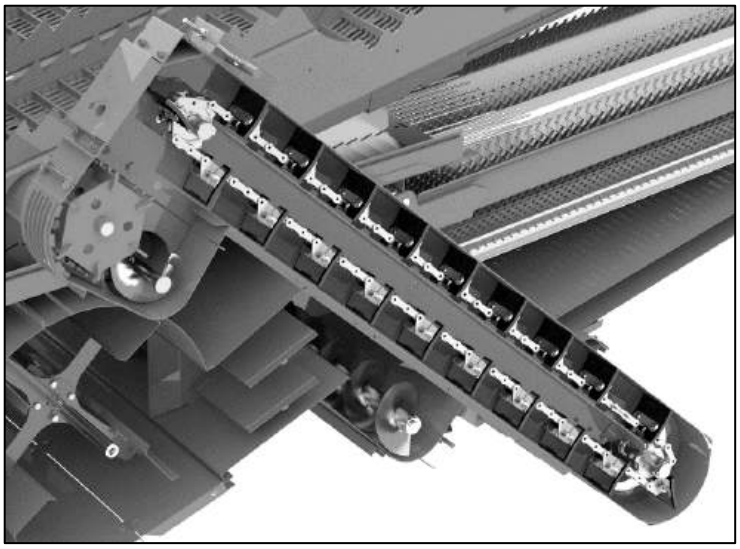


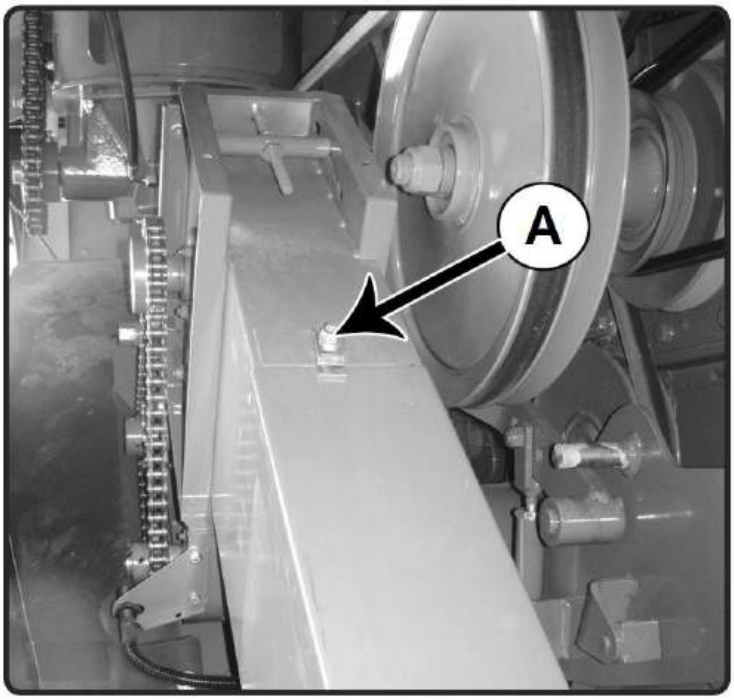
The filling auger is connected to opening/closing mechanism of grain tank covers. It rises up and lowers down with the movement of the covers. The filling auger can be lowered to down position manually by hand. Remove rod (A) from bracket of filling auger. Lower the filling auger carefully down.

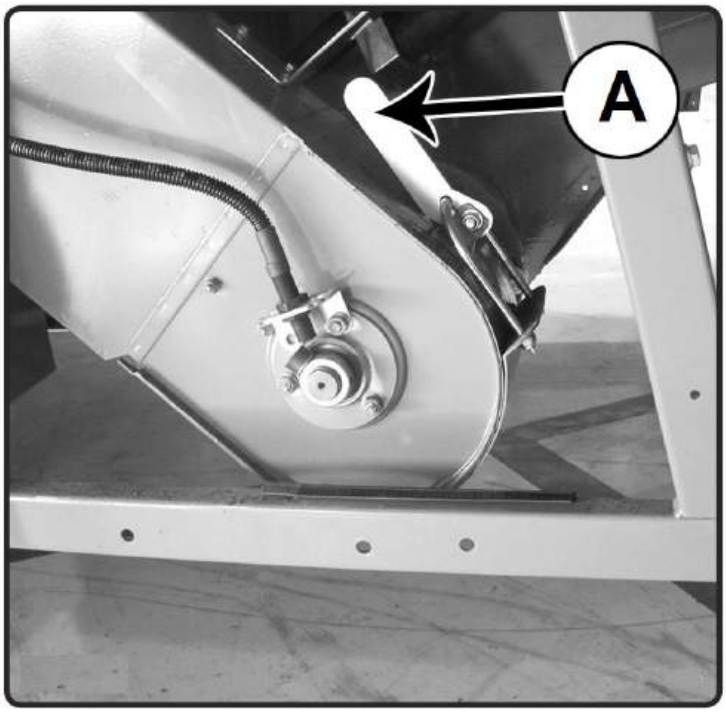
Upper cover (B) for check of the grain elevator pulley, shear bolt, belt and chain. Lower cover (C) for check of the filling auger drive and angle gears.

Return system with combines C10 and C12

The re-thresher is located on the left-hand side of the combine. A warning light will flash when there is a blockage in the return system. There are doors (A) in the elevator housing for cleaning and clearing any blockage.

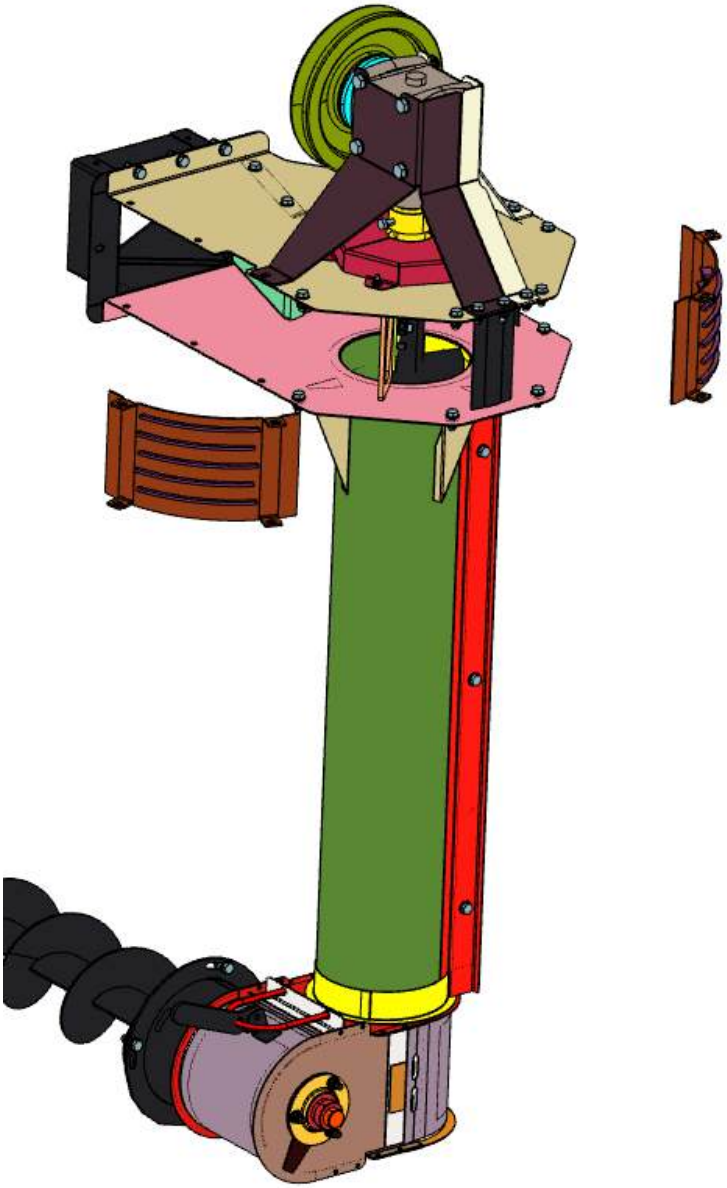




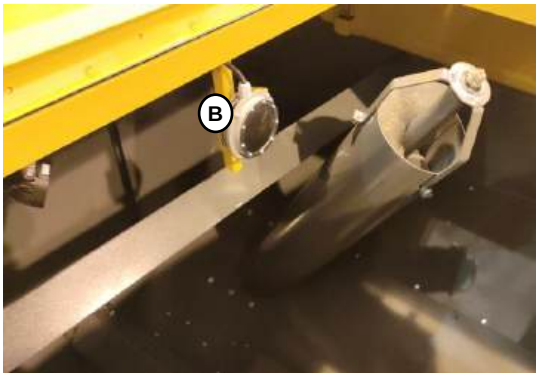


Return system with hybrid combines
[location]

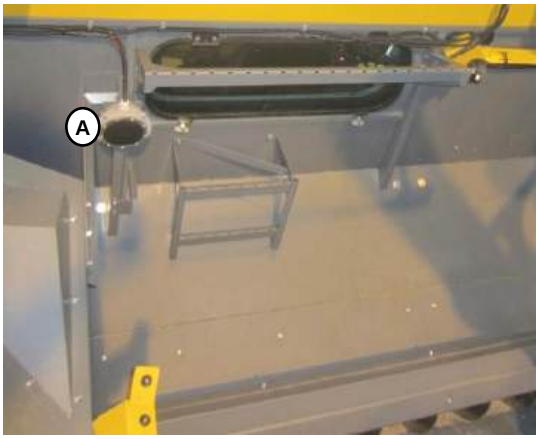
The re-thresher is located on the left-hand side of the combine. A warning light will flash when there is a blockage in the return system or too much flow. There are doors in the auger housing for cleaning and removing any blockage.



Grain tank 6,00 m³ and 7,60 m³
[location]



The grain tank is filled by the filling auger. Filling up is indicated by a two-sensor alarm. The alarm sensor height can be adjusted by moving the sensor to a different hole. This will either advance or delay the alarm. The lower one turns on the tank ¾ signal light, and the top one turns on the tank full signal light and the alarm. The lower sensor (A) is to be adjusted at the height at which a signal of approaching unloading is required. The top sensor (B) is to be adjusted at the height at which threshing needs to be stopped.



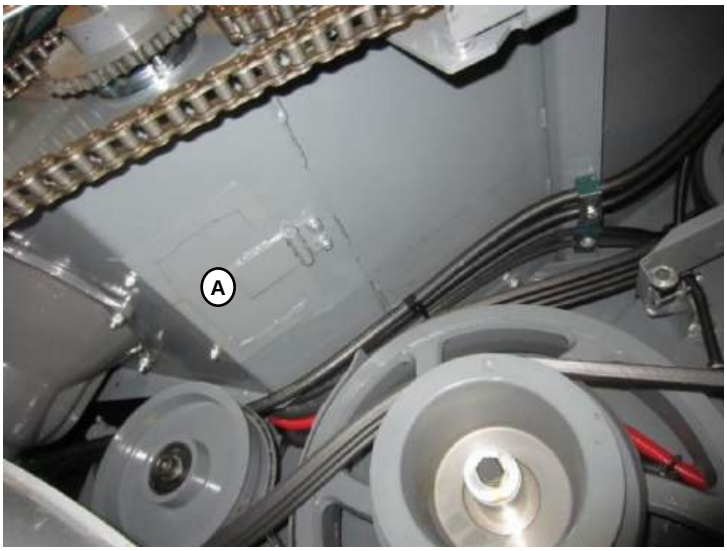
The tank cover can be lifted up to utilize the whole capacity. Threshing can also be done with the cover down. The cover is raised with switch on the instrument panel. The cover will rise with the engine running when the outer end of the switch is pressed down, and it will lower when the inner end is pressed down.

The “>4m” signal light is on in the cab when the cover is up.

On top of the tank bottom auger there is a cover. Its right-end height and the opening of the side plates can be adjusted.

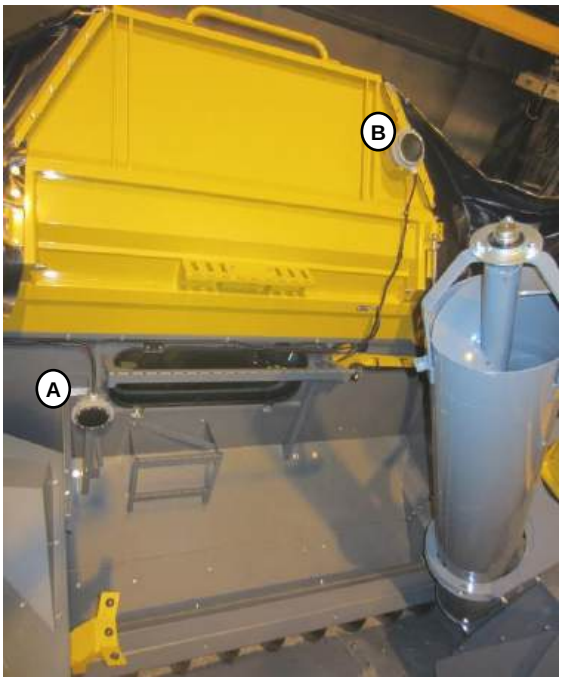
To facilitate cleaning of the tank, the cover on the bottom auger can be removed.

The grain tank has a bottom hatch (A) at the left-hand end of the tank. There are two nuts to open the hatch. If cleaning or service jobs require entry into the tank, the engine must be switched off and the ignition key removed from the lock to ensure the engine cannot be started.



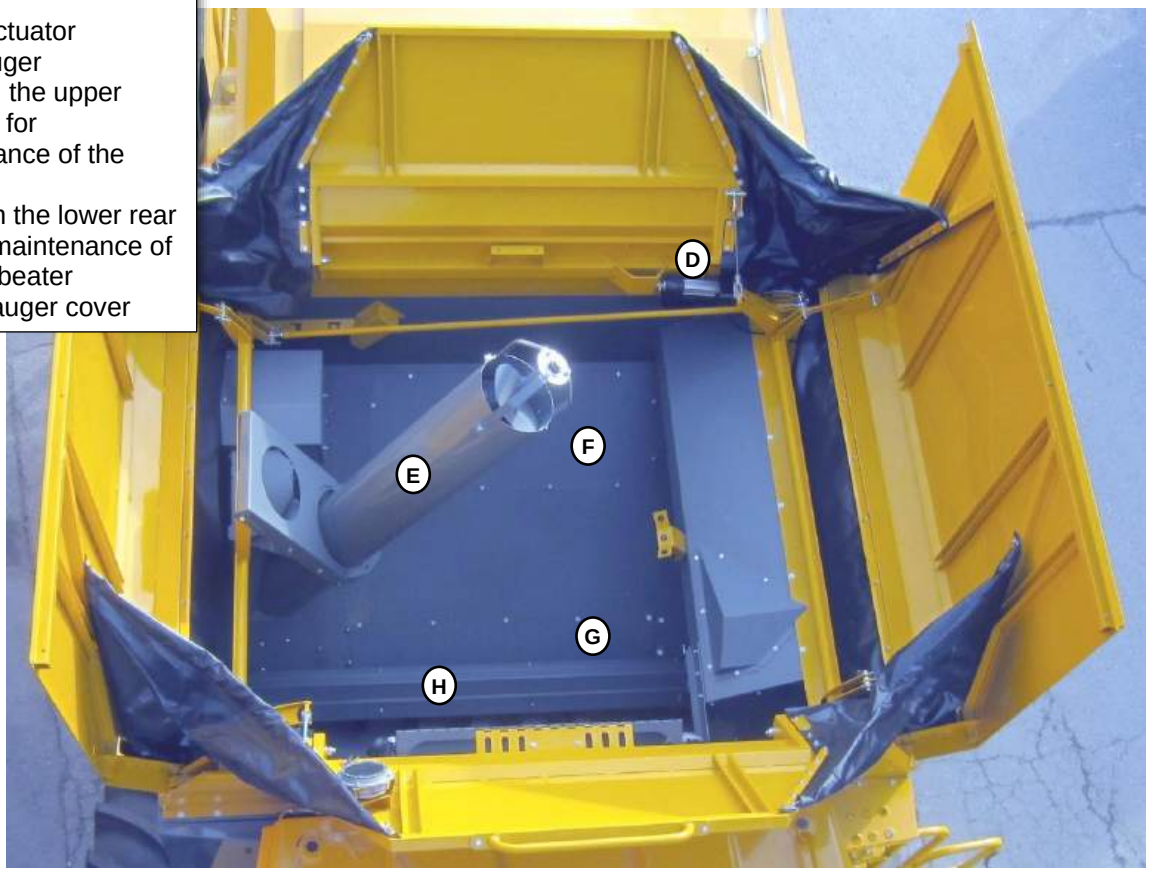
The grain tank has also two hatches for check and service on the rear wall. Upper hatch (B) is for engine and lower hatch (C) is for rear beater.

Grain tank 9,00 m³ and 10,00 m³



The grain tank is filled by the filling auger. Filling up is indicated by a two-sensor alarm. The alarm sensor height can be adjusted by moving the sensor to a different hole. This will either advance or delay the alarm. The lower one turns on the tank ¾ signal light, and the top one turns on the tank full signal light and the alarm. The lower sensor (A) is to be adjusted at the height at which a signal of approaching unloading is required. The top sensor (B) is to be adjusted at the height at which threshing needs to be stopped.

(C) Grain tank covers up/down
(D) Linear actuator
(E) Filling auger
(F) Hatch on the upper rear wall for maintenance of the engine
(G) Hatch on the lower rear wall for maintenance of the rear beater
(H) Bottom auger cover

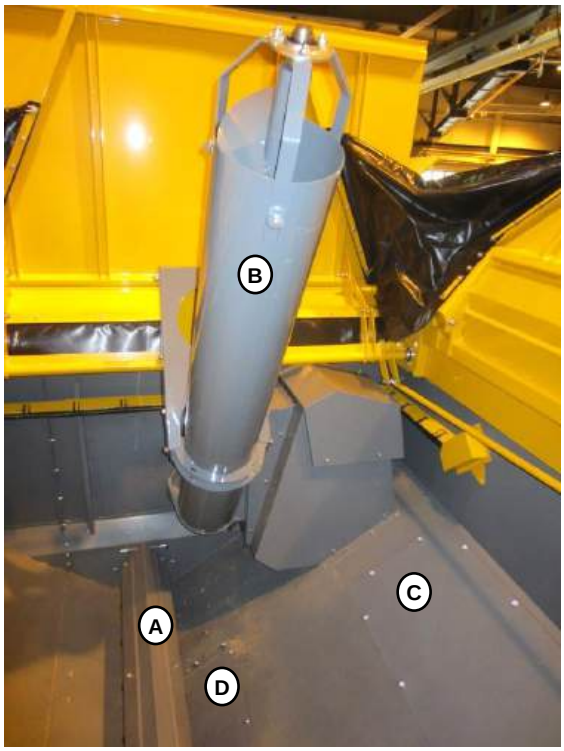


The grain tank covers must be lifted wholly up before to start threshing. The covers are raised by pushing a switch (C) on the instrument panel. The covers will raise with the engine running when the outer end of the switch is pressed down, and it will lower when the inner end is pressed down. The “>4m” signal light is on in the cab when the covers are up. The linear actuator (D) raises and lowers the tank covers. The filling auger (E) moves up and down with the covers.

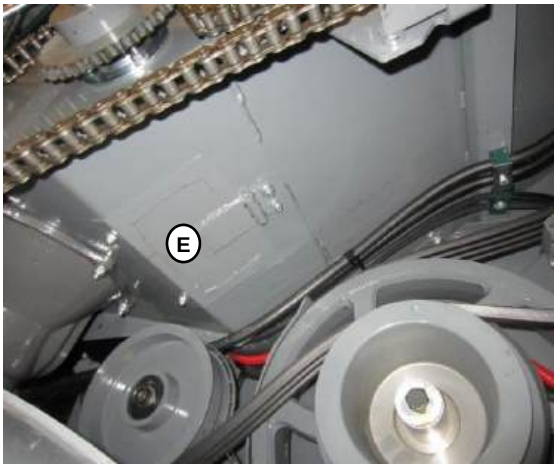
On top of the tank bottom auger there is a cover (A). Its right-end height and the opening of the side plates can be adjusted.

To facilitate cleaning of the tank, the cover on the bottom auger can be removed. The grain tank has also two hatches on the rear wall for check and service of the engine (C) and rear beater (D).

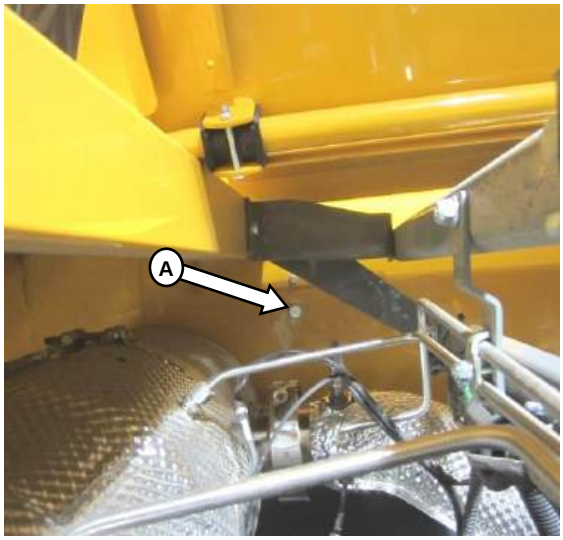
(A) Bottom auger cover
(B) Filling auger
(C) Hatch on the upper rear wall for maintenance of the engine
(D) Hatch on the lower rear wall for maintenance of the rear beater



The grain tank has a bottom hatch (E) at the left-hand end of the tank. There are two nuts to open the hatch. If cleaning or service tasks require entry into the tank, the engine must be switched off and the ignition key removed from the lock to ensure the engine cannot be started.



The grain tank covers can be lifted up or lowered down manually if malfunction would appear with linear actuator or electrical system. Go to engine compartment. On the left side, opposite to grain tank, there is a screw (A) on the wall. Open and pull it wholly out. It will release holder (B) to linear actuator. Now with extreme caution can the tank covers be handled manually.



Grain sample

Behind the ladders to grain tank, on the left side of the cabin, there is a sampling scoop. Turn its knob counterclockwise to ON position and pull it out with the sample. After taking the needed samples put the sampling scoop back to its holder.

Unloading pipe

[location]

The unloading pipe is turned with switches C on the traction lever. The safety switch must be in its off position before swinging of the unloading pipe is possible.

There is a rapid motion, which turns the pipe to its extreme position (in a designated time) at the push of a button. The movement will stop if either button is pressed during the movement. A new push will turn the pipe in the selected direction.

The movement can also be stopped by pressing down the SAFETY SWITCH. The switch must always be on when driving on the road.

Unloading can be done in any pipe position.

Unloading is switched on by pressing the operating switch B twice. Unloading will stop when the switch is pressed again.

During unloading it is important to ensure that there is enough space beneath the pipe spout for the unloading grain. The auger and transmission may get damaged if the grain cannot unload unhindered.

The “>4m” signal light is on in the cab when the pipe is up.

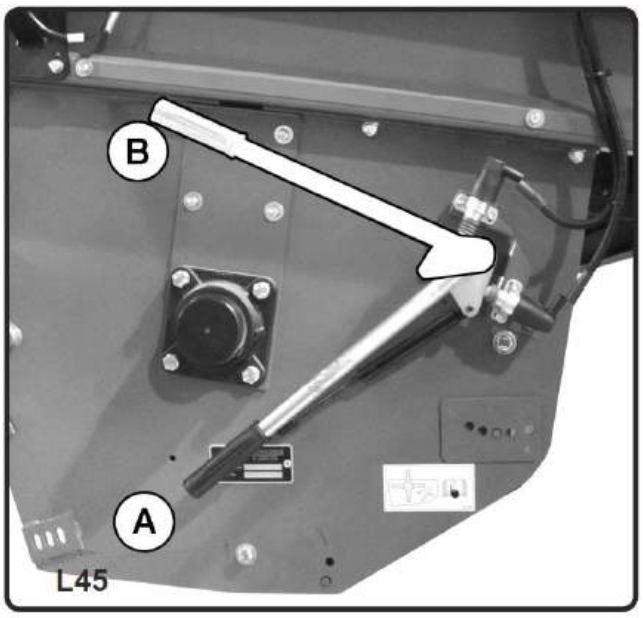
Straw chopper C10 and C12

Beware of the rotating straw chopper knife!

Never adjust or clean the chopper while the engine is running!

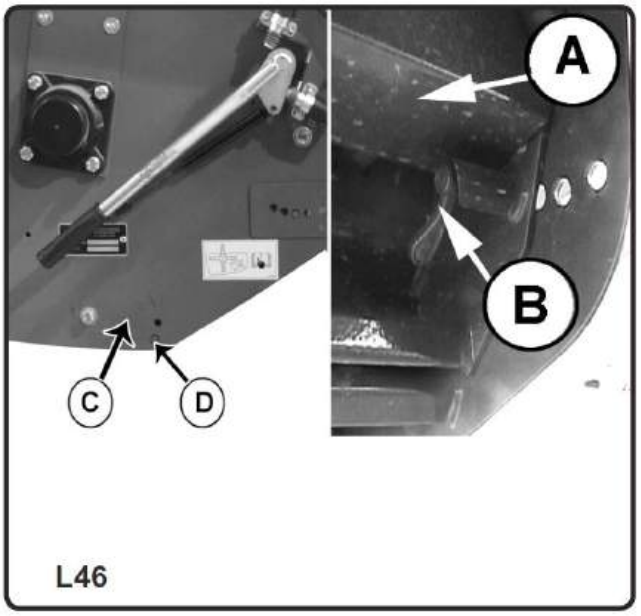
Never stand in the no-access danger zone behind the rotating chopper!

The straw chopper is powered directly by the engine by means of a separate belt drive. It also has its own clutch. The chopper will always switch on as the threshing mechanism is started if the straw guide plate is in its “to the chopper” position. The control lever is on the rear right. The straw is guided to the chopper with the plate in position B. In position A unchopped straw is guided onto the field. Figure 45. A control light in the cab will indicate the guide plate position when the safety switch in the threshing mechanism is activated.



The degree of chopping can be varied by turning counter knife beam A, figure 46. To do this, slacken screws B on both sides of the chopper, and turn the counter knife beam into the required position.

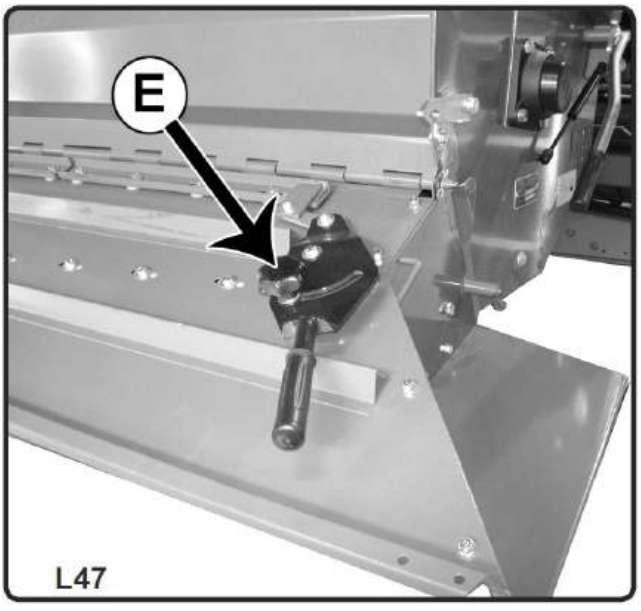
With the counter knives at right angles to the rotor center, the straw is chopped short and chopping absorbs more power. With the counter knives down from the rotor center, the chaff is cut longer, and the power demand decreases. In their lowest position, the chopping action is minimal, but for turnip rape and flax still sufficient and recommended. When extremely short chaff is required, turn stop plate C on the bottom of the chamber up by undoing clasps D.



The chaff distribution pattern is varied by changing the vane position in the spray hood after slackening screws E in the holes on both sides of the chopper, figure 47. A lever is used to adjust the front of the vanes. The rear of the vanes can be adjusted by slackening the sectional screws.

NOTE! Avoid adjusting the spray hood in such positions that the chaff is spread onto uncut crop, as this can block the knife, overload the sieves and result in poor grain in the tank.

When servicing the knife, the spray hood may be raised to rest on a support. It shall, however, always be lowered as soon as the service job has been completed.



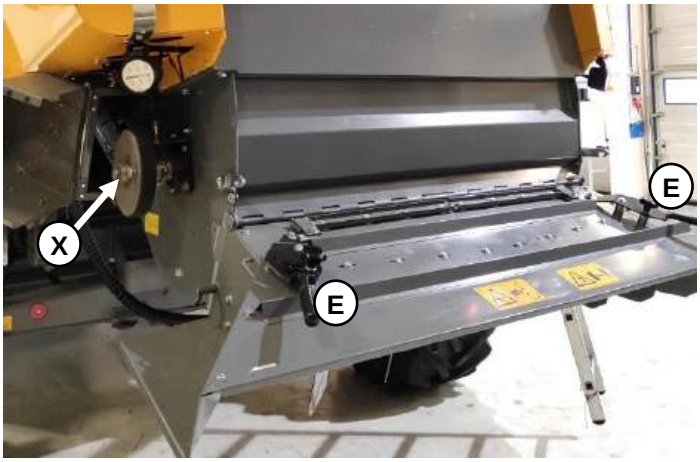
Straw chopper C20, C22 and C24

[location]

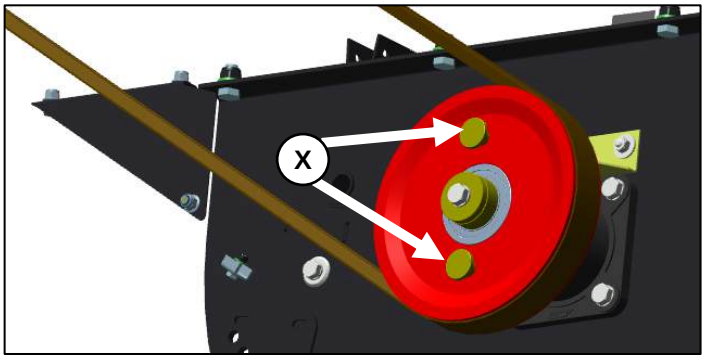
Beware of the rotating straw chopper knife!

Never adjust or clean the chopper while the engine is running!

Never stand in the no-access danger zone behind the rotating chopper!

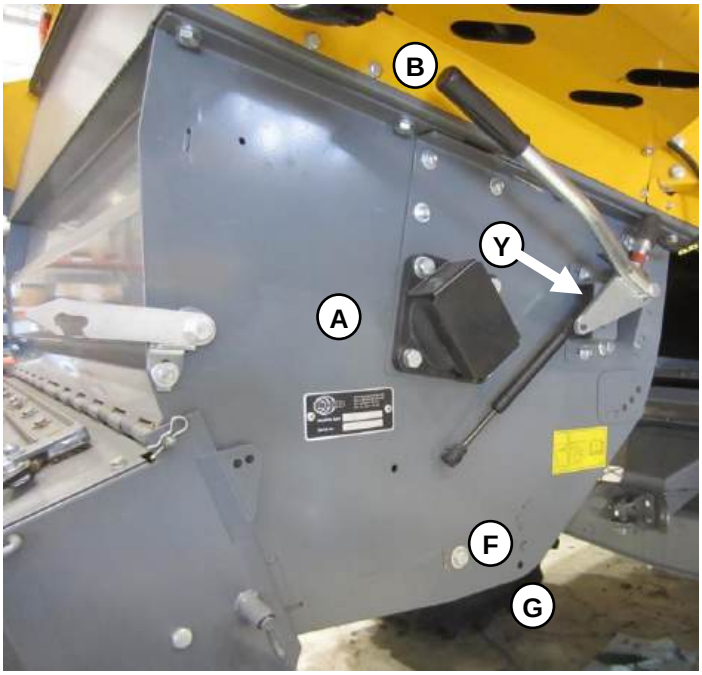


The straw chopper is powered directly by the engine by means of a common belt drive with rotors. The chopper will always switch on as the threshing mechanism is started. The control lever is on the rear right. When turning the control lever, push locking pin Y. After changing the position, make sure that lever will be locked properly. The straw is guided to the chopper with the plate in position B. In position A long straw is guided onto the field. Control light in the cab will indicate the guide plate position. If you are harvesting to collect long straw longer time, you can stop the chopper by clutch (X). NOTE! When you will start to use chopper, make sure that clutch (X) is engaged. Empty running chopper does not cause any fault.



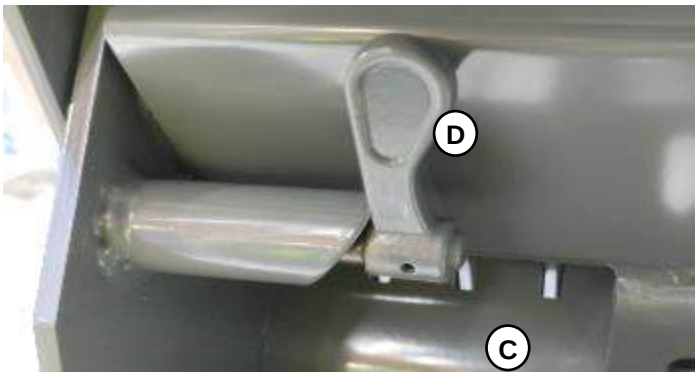
The degree of chopping can be varied by turning counter knife beam C. To do this, slacken screws D on both sides of the chopper, and turn the counter knife beam into the required position.

With the counter knives at right angles to the rotor center, the straw is chopped short and chopping absorbs more power. With the counter knives down from the rotor center, the chaff is cut longer, and the power demand decreases. In their lowest position, the chopping action is minimal, but for turnip rape and flax still sufficient and recommended. When extremely short chaff is required, turn stop plate F on the bottom of the chamber up by undoing clasps G.



The chaff distribution pattern is varied by changing the vane position in the spray hood after slackening screws E in the holes on both sides of the chopper lever is used to adjust the front of the vanes. The rear of the vanes can be adjusted by slackening the sectional screws. NOTE! Avoid adjusting the spray hood in such positions that the chaff is spread onto uncut crop, as this can block the knife, overload the sieves and result in poor grain in the tank.

When servicing the knife, the spray hood may be raised to rest on a support. It shall, however, always be lowered as soon as the service job has been completed.



Electrical adjustment of the chopper spread

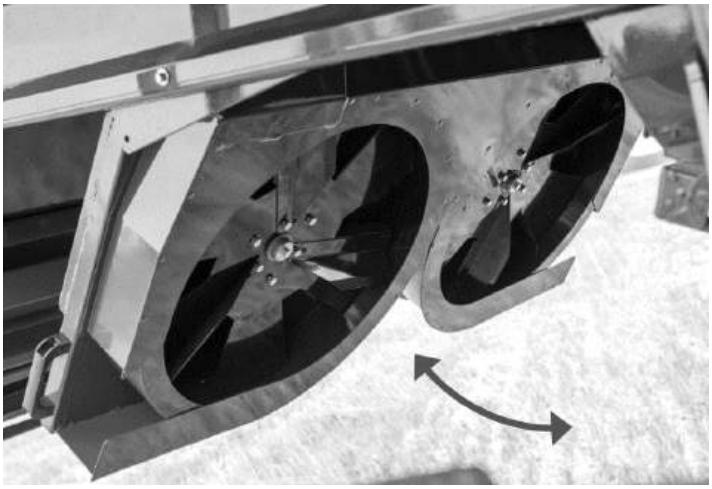
The combine can be equipped with a remote- controlled electrical chop guide.

The controls are located on the instrument panel.

The left-hand switch controls the left-hand guide vane and the right-hand switch the right-hand vane. The vanes spread out when the front of the switch is pressed and become narrower when the rear of the switch is pressed.

Chaff spreader

The specification of the combine may include a chaff spreader. It is powered by the same hydraulic circuit as the pick-up reel. The spreader will switch on whenever the threshing mechanism is running.



The spreader is fastened behind the shaker shoe with joints. It is turned to the front in its working position. The rear position is needed while servicing the sieves. If necessary, the spreader may be removed from the combine. In this case thick hydraulic hoses are to be connected to each other using fast couplings as the whole oil flow for the reel drive pump flows through here.

Chaff spreader is recommended with header widths over 6,3 m.

Engine

Agco Power 74LFTN, 300 hp

The engine is a water-cooled, four-stroke, six-cylinder, direct-injection diesel. For a more detailed description of the engine, see the engine manual.

The power is transmitted from the rear of the engine to the threshing mechanism, grain tank unloading and the hydraulic pump. At the front of the engine there are belt drives for the fan and alternator and the compressor of the cab cooling system.

Air Filters

The engine suction air is cleaned by a rotating air screen and a two-stage filter. There is a control light to indicate a blockage in the filter system. See cleaning instructions. Filter housing is being emptied continuously by means of the suction ejector.

Fuel Tank

The fuel tank is on right hand side of the combine. Use pure and water-free fuel. Before refueling, remove all impurities from around filler A. Be sure to clean the step above the filler, too. The filler is equipped with a refuse strainer. Clean the strainer at regular intervals. Tank is equipped with breather B.

Pre-filter and water separator

The fuel pre-filter with primer pump D is located below fuel tank.

There is a tap C at the tank end.

Extra water separator as option.

SCR

5th generation AGCO SISU POWER engines has exhaust gas treatment with SCR technology (Selective Catalytic Reduction). In SCR technology a liquid called DEF (Diesel Exhaust Fluid) is injected into exhaust gases. Most known trademarks of DEF are AdBlue, Air1 and Greenox.

For the DEF requirements, see engine manual. DEF tank (60 liters) is located in the engine compartment, and the filler neck shown in Figure.

Be careful when handling DEF. DEF is aggressive to some materials and corrosive to some metals. DEF becomes crystalline when in contact with air. In case of a spillage rinse with plenty of water and dry with a clean cloth.

Even small amounts of diesel fuel in DEF tank may damage the gaskets of the SCR system!

Combine is not equipped with a heating system for DEF, so use of combine below -10 ° C temperature is prohibited. Start up and short-term transfer is possible.

AGCO SISU POWER SCR system is durable and almost maintenance free. Only main filter change for supply module is required in normal use. AGCO SISU POWER SCR is equipped with on-board diagnostic, which will warn the operator or limit the usage of the machine if any problems (e.g., leakages or blocking of lines) occur in the system.

For the maintenance and adjustment of SCR, see engine manual.

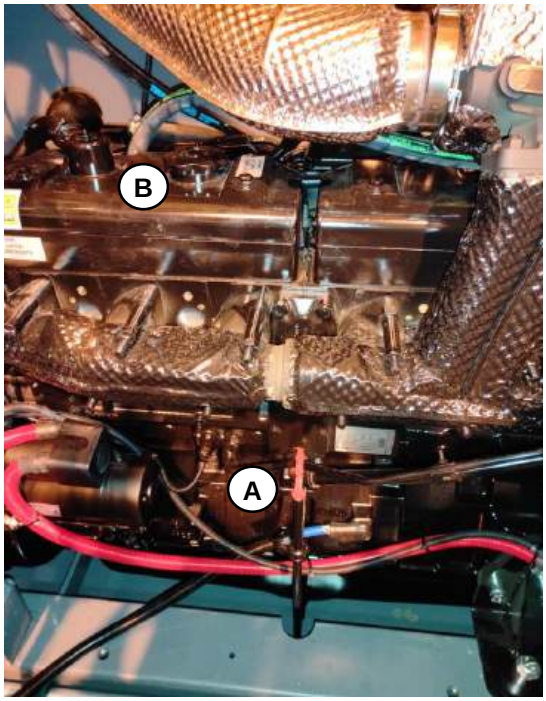
Daily Checks of the Engine

Lubrication System

It is of utmost importance to use correct lubricating oil, in accordance with the load placed on the engine. See Lubrication table.

Check the oil level daily before starting; it shall be between the minimum and maximum marks on dipstick (A), preferably near the maximum.

Oil is refilled through filler (B). Control light 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.



Engine cooling

The engine cooling air is purified by a rotating screen. The cooling fan is located inside the rotating screen in front of the radiator.

When the combine leaves the factory, the engine cooling system has antifreeze added. Do not use ordinary water as coolant because of the risk of freeze and corrosion.

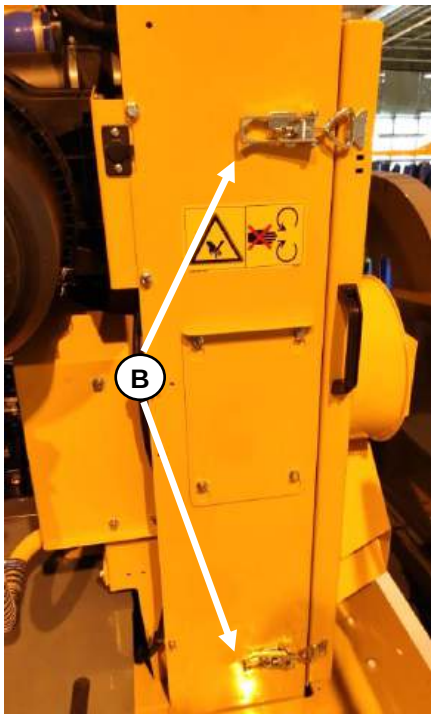
Check the radiator coolant level daily before starting. It must be in the middle line of the expansion tank when the engine is cold.

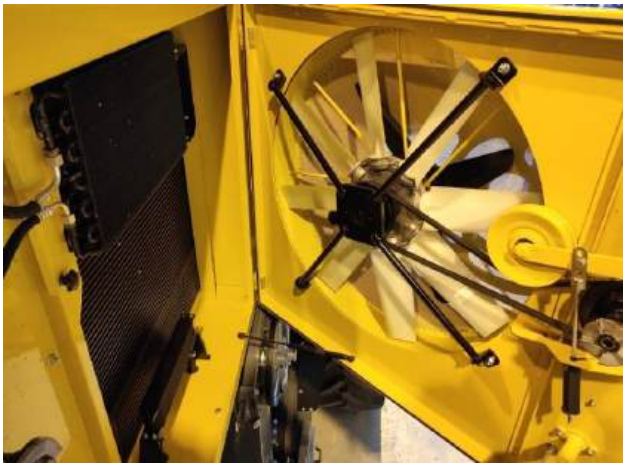
The coolant temperature gauge indicates the temperature of the engine coolant. In normal working conditions the needle must be between 75 – 95 °C.

Comvision II -display indicates engine overheating. The alarm temperature is approx. 100 °C.

If the temperature starts to rise, check that the outside of the radiator is not clogged. To remove any blockage, direct compressed air from the side of the fan through the radiator or use a brush. Always be careful not to damage the lamellas.

To clean the equipment, the fan unit in front of the radiator may be turned open by opening latches B.





Comvision II

This section deals with the use of the COMVISION II monitor. In addition to grain losses the monitor also measures the threshed area, the threshing time used, it estimates the finishing time for the section, monitors and alarms the rotation speeds of certain shafts, adjusts reel speed, controls the grain tank filling up and measures the amount and quality of the returns. Comvision II shows also engine information.

Harvesting adjustments are controlled in Comvision II.

The equipment consists of a touchscreen main unit, loss sensors, pulse sensors and limiter switches. The equipment is connected to the forward speed sensor, the threshing cylinder, CSP and fan speed sensors, the grain tank sensors and the straw alarm sensor. There is a sensor on the return auger to measure the amount of returns.

There is no separate power switch in the equipment, but it gets switched on when the engine is started. Starting up takes a while. The basic factory settings can be adjusted to suit the conditions.

The figure below shows the home view, from which you can select the required function by pressing the icon.

① Signal light area

Shows engaged functions, maintenance needs and active fault codes.

② Page change

Change right side screen view. Available revolutions, threshing adjustments and camera view.

③ Options menu

④ Coolant temperature

⑤ Header height percent, timer and working width

⑥ Loss sensors area

⑦ Pick-up reel automation

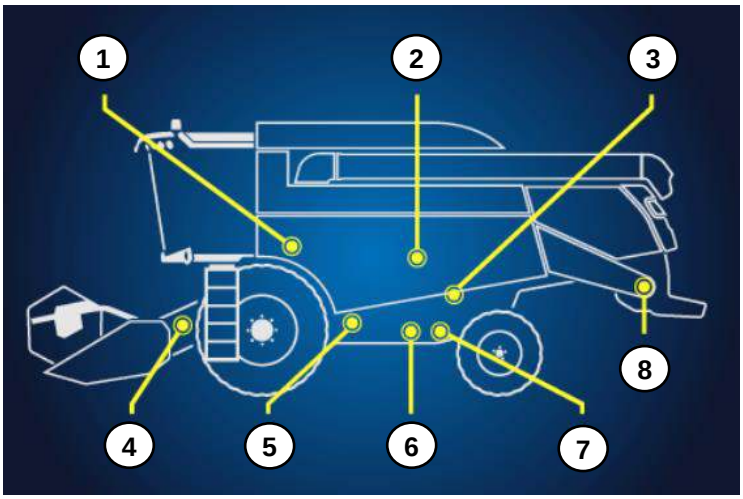
⑧ Fuel and adblue gauges

⑨ Information panel

Shaft revolutions

Shows overview of rpm values.
Press value to see low limit.

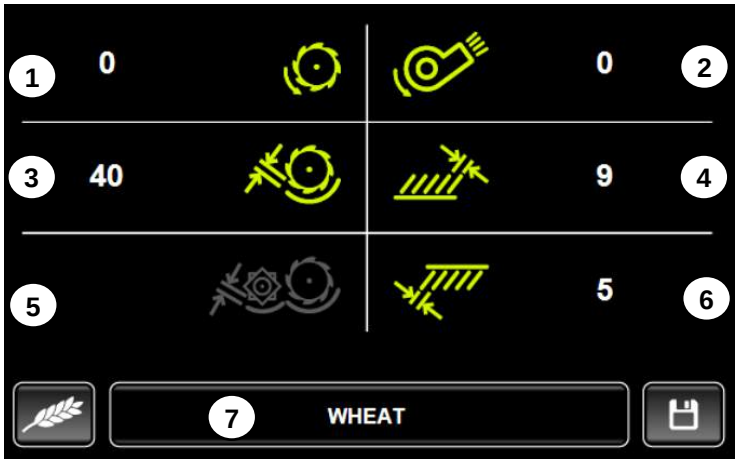
① Threshing cylinder
② Rotor
③ Return system 1
④ Feeder elevator
⑤ Fan
⑥ Grain elevator
⑦ Return system 2
⑧ Chopper



Harvesting adjustments

When pressing page change button at home page, new window will pop up on the right side of the monitor.
On this window you can adjust:

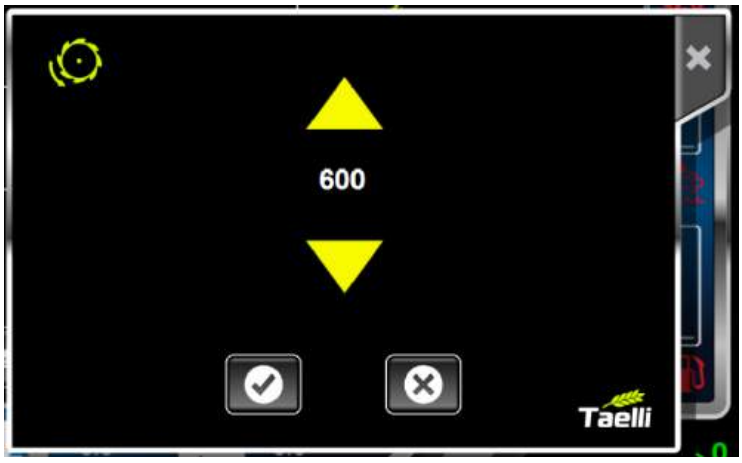
① Threshing rpm
② Fan rpm
③ Concave gap
④ upper electric sieve (optional)
⑤ Pre-concave gap (not in this model)
⑥ Lower electric sieve (optional)
⑦ CAA functions (optional)



When pressing the value, new window will pop up.

On this window selected value can be adjusted with arrow UP to increase or arrow DOWN to decrease current value.

Notice that threshing system must be running before adjusting threshing cylinder or fan rpm.



CAA a.k.a. Taelli

When pressing grain crop symbol at harvesting adjustment window, CAA-control system will pop up. On this window adjustments can be made for different crops.

CAA present base harvesting values for different crops. Current harvesting settings can be saved for reserved page 2 using save button in harvesting adjustment window. Those values can be restored later when needed.

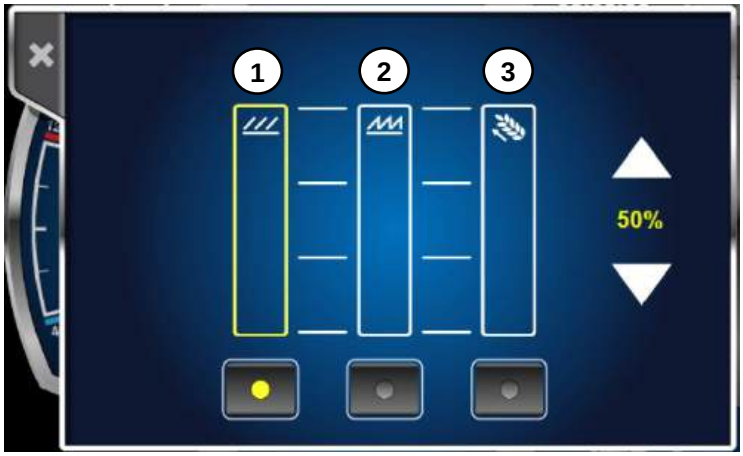
Grain loss meters

When pressing grain loss monitor at home page, new window will pop up to adjust sensitivity of separate loss sensor area. Sensitivity 0…100%.

① Sieves area

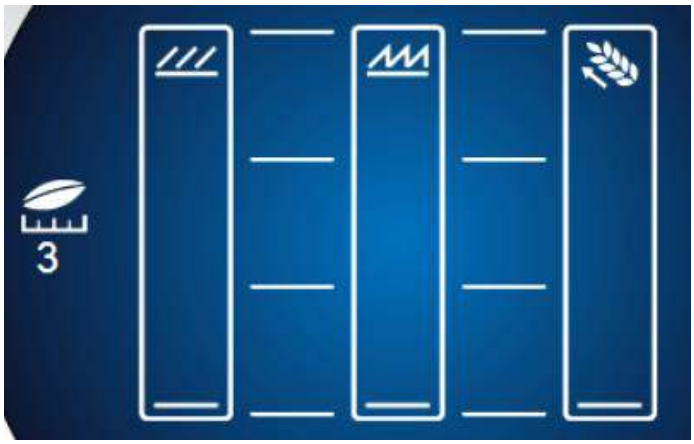
② Rotor area

③ Return system



Set grain size according to harvested grain for sensors to perform optimally.

Grain size	examples for harvested grain
1	Rice
2	Wheat
3	Sunflower
4	Soybean
5	Corn



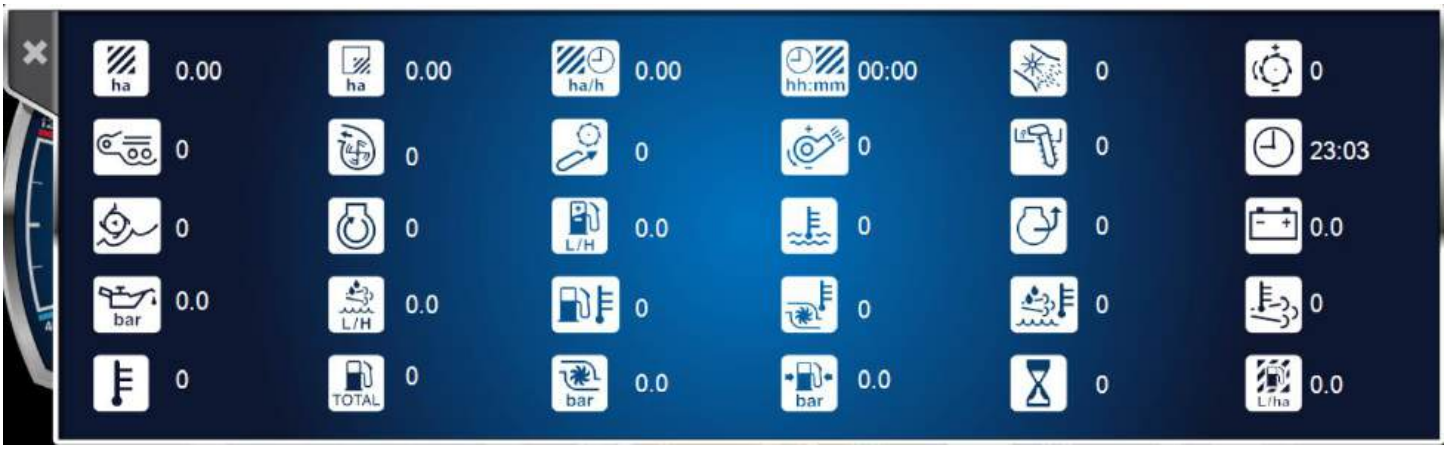
When loss pillar exceed set alarm rate, pop-up window and alarm sound will appear.

Pick up reel automation

Possibility to set pick up reel to rotate according to drive speed. Press reel icon to engage. Press plus to set more aggressive and minus to less aggressive. When combine is still, there is base rpm in reel and adjustment is happening when combine is moving. When choosing “A+” pick up reel will automatically stop if header is rised up and machine is working out of hectare counter area.

Information panel

Pressing any meter on bottom of the home view will open a window which displays all meters. You can choose three meters to be displayed in home view simply by pressing desired meter.



From top to right value explanations are:

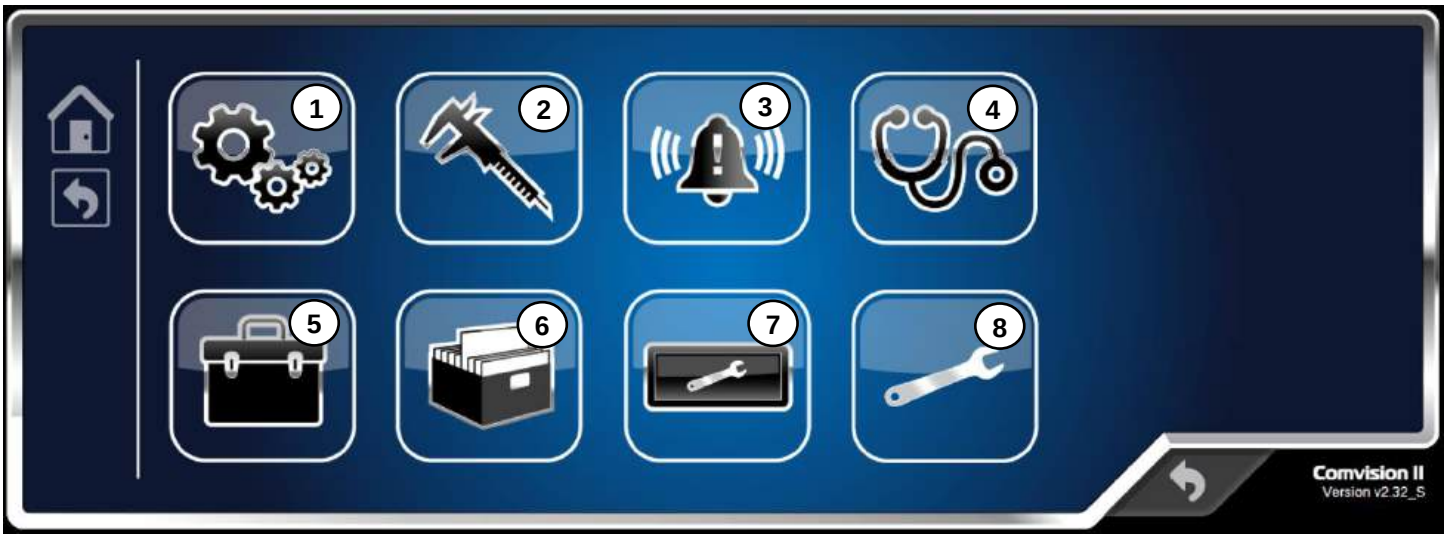
Ha threshed	Hectares left	Hectares per hour	Time est. for area	Chopper rpm	Threshing rpm
Bot auger rpm	Return rpm	Feeder elevator rpm	Fan rpm	Grain elev rpm	Time
CSP rpm (N/A)	Engine rpm	Fuel cons. l/h	Coolant temp	Engine load %	Battery voltage
Oil pressure	DEF cons. l/h	Fuel temp	Charge air temp	DEF temp	Exhaust temp
Outdoor temp	Total fuel cons.	Charge pressure	Fuel feed pressure	Engine hours	Fuel cons. l/ha

Driving on road

Engaging 3rd gear or pressing safety switch A (driving in traffic switch) will switch on driving mode in Comvision II display.

Driving speed meter with trip meter shows on the left side of the monitor. When switch is on, unloading pipe and threshing system does not work.

Comvision II menu structure



① Combine settings

- Threshing width
- Cutting heater width
- Pre-threshing cylinder Y/N
- Electrical adjusted sieves Y/N

② Calibrations

- Cutting header
- Fan RPM
- Threshing cylinder RPM
- Concave gap
- Pre concave gap
- Upper sieves
- Bottom sieves

③ Alarms

- Chopper
- Threshing cylinder
- Fan
- Grain elevator
- Returns system 1
- Retuns system 2
- Rotors
- Feeder elevator
- Grain tank level
- Grain loss

④ Diagnostic

- I/O
- Value
- Description

⑤ Tools

- Calculator
- Performance calculator
- Job1/Job2

⑥ Data

- Job
- Working hours
- Engagements
- Engine
- Alarm log

⑦ Settings

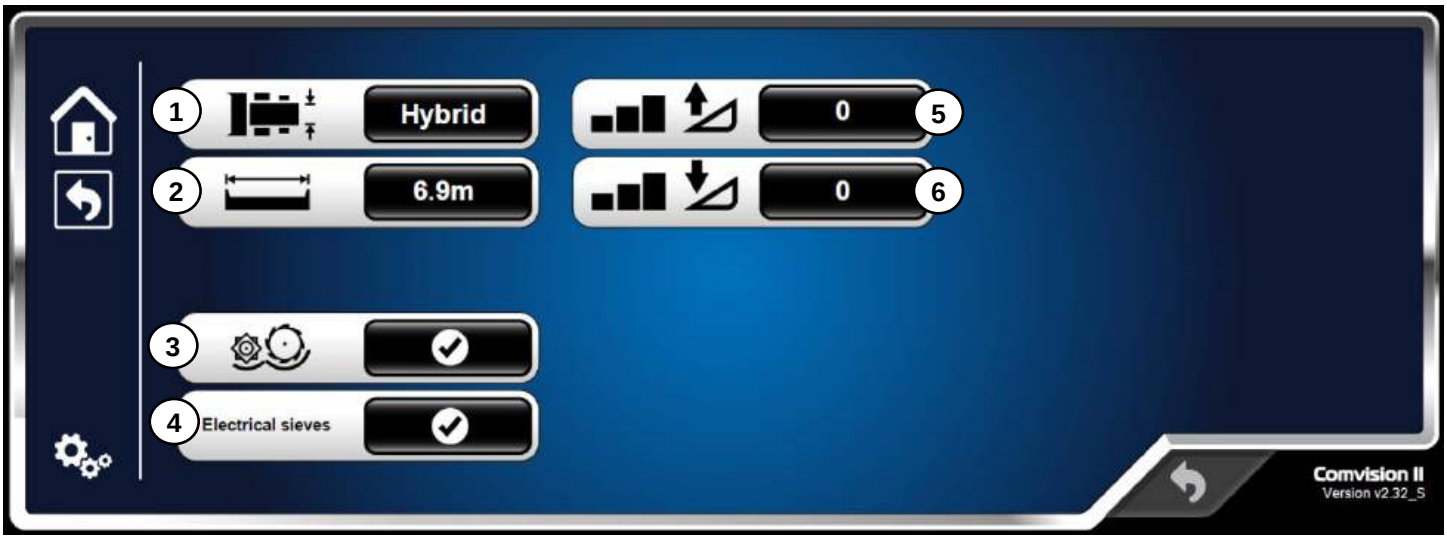
- Date
- Time
- Language
- Software versions

⑧ Service menu

- Service history
- DPF regeneration
- Service intervals reset

Combine settings

Combine Settings button allows you to set the combine's basic settings:



① Threshing system width
- Hybrid option should be selected with C20-C24.

② Header width
- Has effect on hectare calculation.

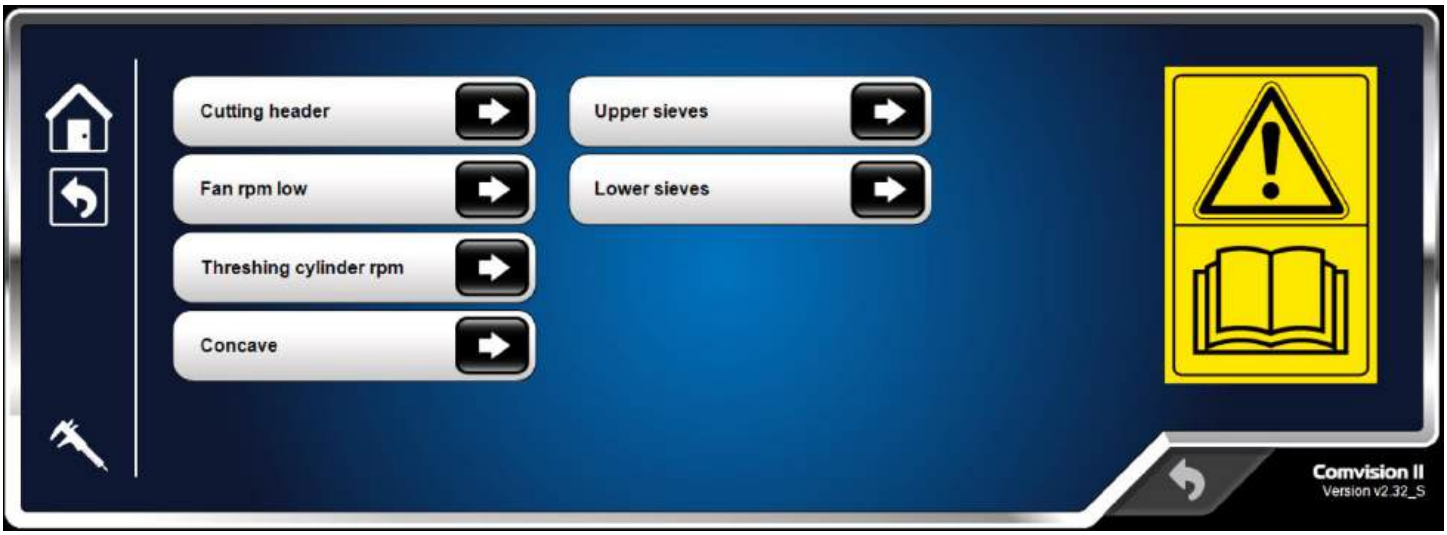
③ Pre-threshing cylinder Y/N
- C22 – on
- C20 – off

④ Electrical sieves (option)

⑤ Header ascending speed
- Give value between 0-100. 0 = minimum speed, 100 = maximum speed.

⑥ Header descending speed
- Give value between 0-100. 0 = minimum speed, 100 = maximum speed.

Calibrations



Cutting header calibration

Cutting header calibration. This calibration calibrates header height sensor which is on the right hand side on top of feeder house. This calibrates also AHC header automatic sensors (OPTION) which are on the cutting header.

When to do this calibration:

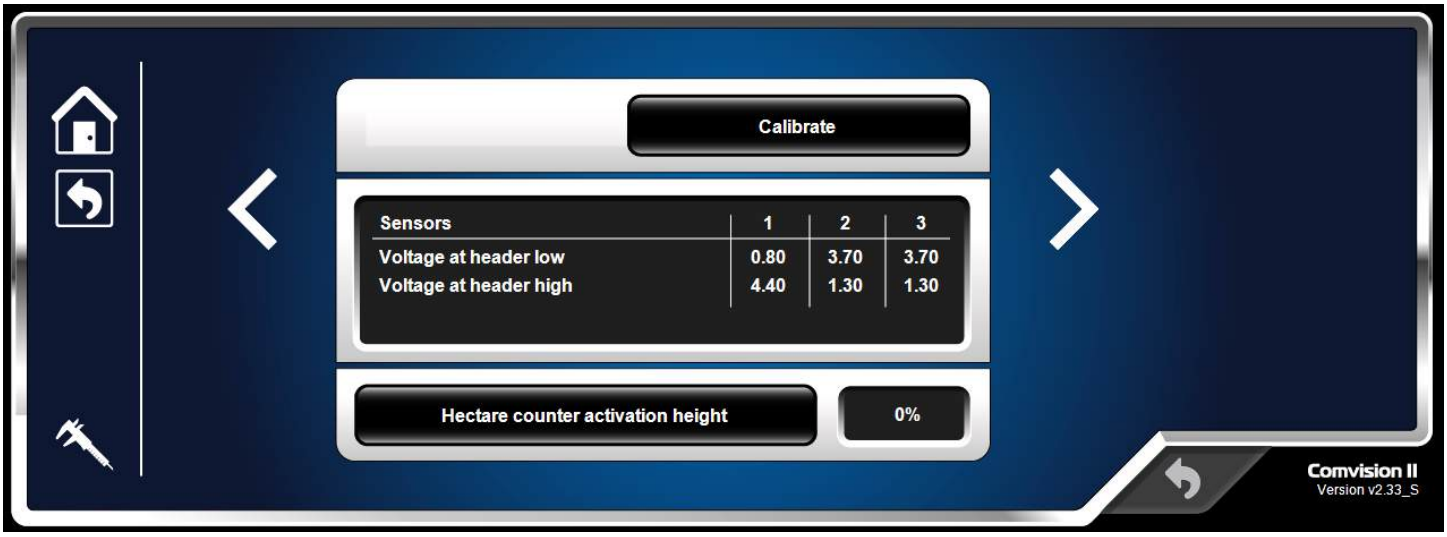
- If you replace header height or AHC sensor
- If you replace cabin control unit
- If header height indicator in Comvision II is not logic.
- If AHC reaction is not logic.

Calibration steps:

Engine running and combine must be on flat surface.

BE CAREFUL: Cutting header moves up and down during the calibration

Make sure combine and cutting header are on flat surface. Lower cutting header down on the ground. Push and hold down cutting header lowering button together with rising button. Hold buttons on the bottom until calibration starts and header begins to rise. Release buttons and wait until cutting header stops moving and calibration ends.



After header calibration, set **Hectare counter activation height.** Set header to preferred height and press save-icon. When header is below that height, hectare counter is calculating. Above that point, hectares are not calculated when driving.

Fan and threshing calibration

Fan and threshing variator are calibrated in same way. Calibration sets fan/threshing variator it's maximum and minimum speed values. If these calibration values are incorrect, it is possible that adjusting automatic tries to run adjusting motor, even after it has already reached maximum or minimum position. It can break down the adjusting motor or belt.

When to do this calibration:

- After replacing variator belt
- After tightening variator belt
- After replacing or updating Comvision II
- If for some reason minimum and maximum speed has changed e.g., belt normal wear.

Calibration steps:

Engine runs with operating RPM.

Press Set max rpm

Press up arrow to increase rpm to maximum until value is not changing and save. Approximate values:

Threshing 1200 rpm

Fan 1100 rpm

Press Set min rpm

Press down arrow to decrease rpm to minimum until value is not changing and save. Approximate values:

Threshing 420 rpm

Fan 515 rpm

Concave calibration

Set concave maximum and minimum values.

Set max value to 40.

Set min value to 6.

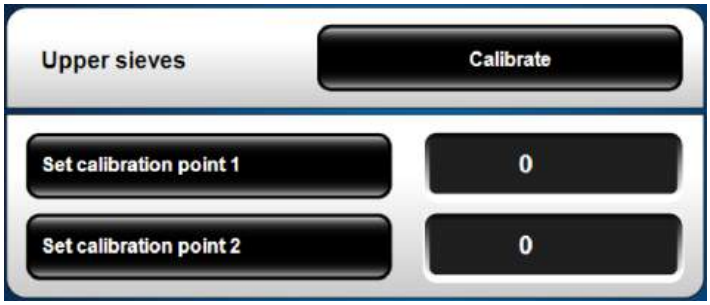
Note! Set values need to correspond measured values for machine to work properly.

Sieve calibrations

This option is only for electrically adjusted sieves.

Note! Upper and lower sieves adjusting motors work differently and must be calibrated according to instruction.

Note! Set values need to correspond measured values for machine to work properly.



Calibration steps:

Upper sieve

Power on

Press Calibrate button on upper/ sieves section.

Set calibration point 1, set sieves to closed position, 4500 mV.

Set calibration point 2, set sieves to middle position, 2500 mV. Measure sieve opening and input opening in mm's to system.

Set calibration point 3, set sieves to fully open position 500 mV. Measure sieve opening and input opening in mm's to system.

Lower sieve

Press Calibrate button on lower sieves section.

Set calibration point 1, set sieves to closed position, 500 mV.

Set calibration point 2, set sieves to middle position, 2500 mV. Measure sieve opening and input opening in mm's to system.

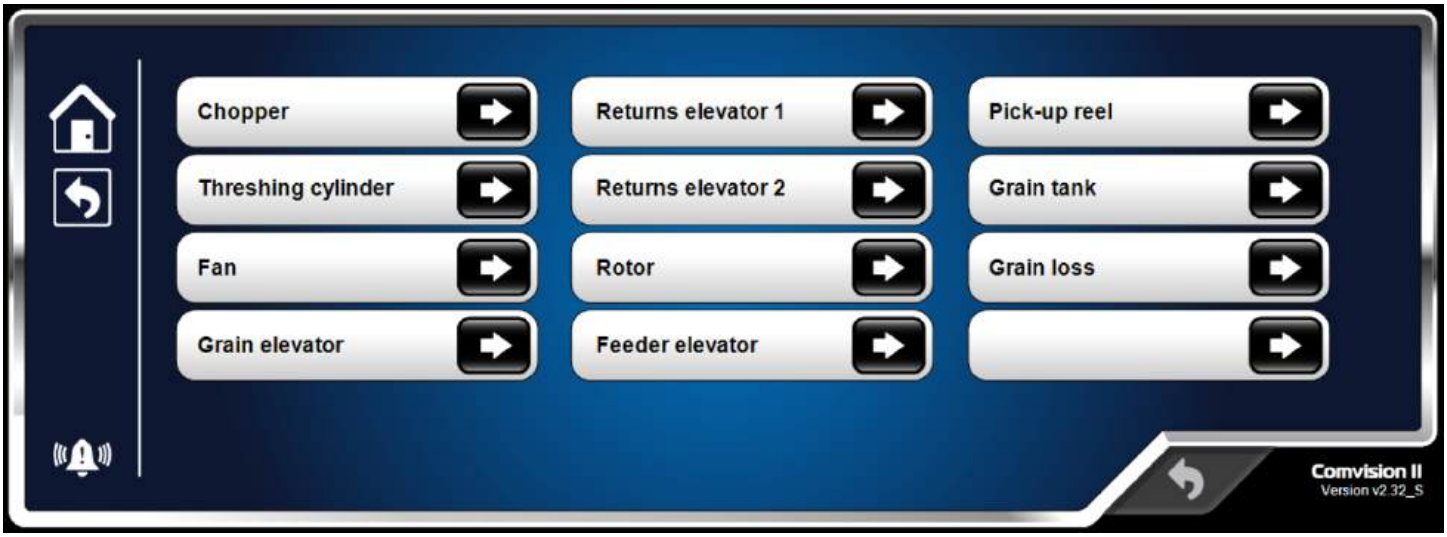
Set calibration point 3, set sieves to fully open position 4500 mV. Measure sieve opening and input opening in mm's to system.

Note! Boot Comvision II after sieve calibrations.

Alarms

Alarm limits have been set on shaft rotation control. These limits can be adjusted if necessary. The fan and cylinder limits depend on the variator adjustment. An advisable alarm limit is 8-20% below normal speed. Alarm can be switched off if so required.

Alarms button allows you to set the combine's alarm settings.



Chopper	Set lower limit 3000 rpm.
Threshing cylinder	Set lower limit 450 rpm.
Fan	Set lower limit 380 rpm.
Grain elevator	Set lower limit 480 rpm.
Returns elevator 1	Set lower limit 500 rpm.
Returns elevator 2	Set lower limit 360 rpm.
Rotor	Set lower limit 170 rpm.
Feeder elevator	Set lower limit 390 rpm.
Pick-up reel	Set off, sensor not in use with current headers.
Grain tank	Set on.
Grain loss	Set on, upper limit 70%.

When rpm sensor reading go below set point in specific location, audible and visual alarm will pop up in Comvision II.

Note! Presented values are factory settings. Always keep alarm on to prevent accidents to happen.

Service

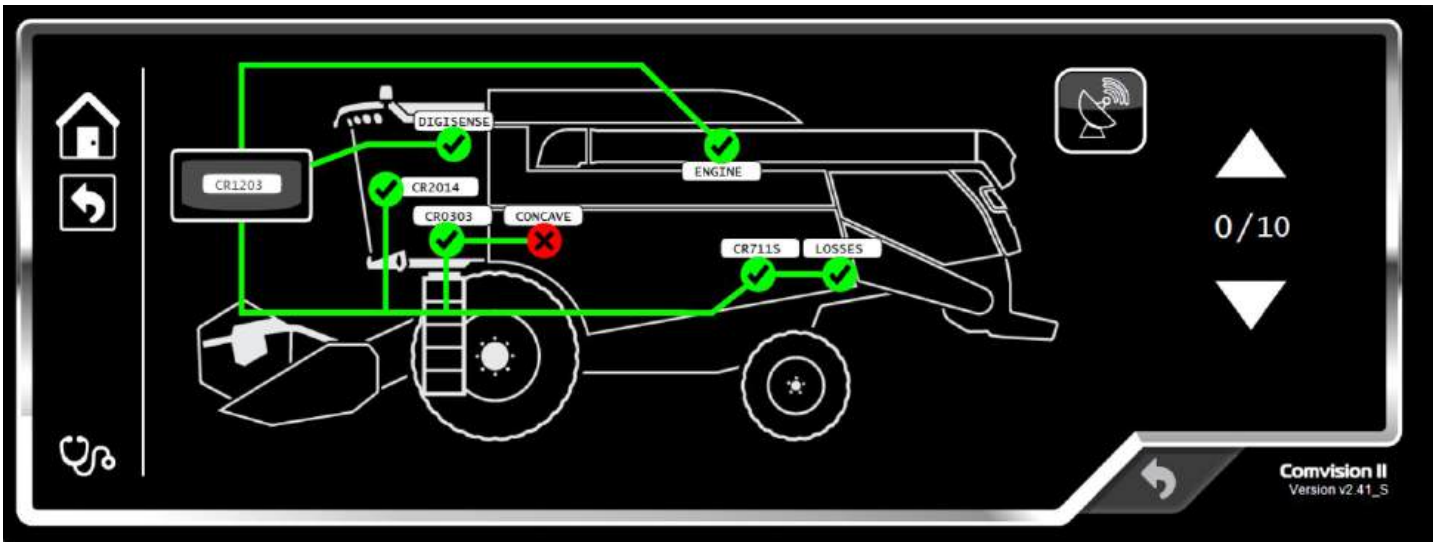
Loss sensors require regular service. Their surfaces must be kept clean. In damp conditions dirt may accumulate on the sensor surfaces. Remove the dirt while still damp. Do not use a sharp tool, as the surface is a microphone cover.

Check the condition of the pulse sensors from time to time.

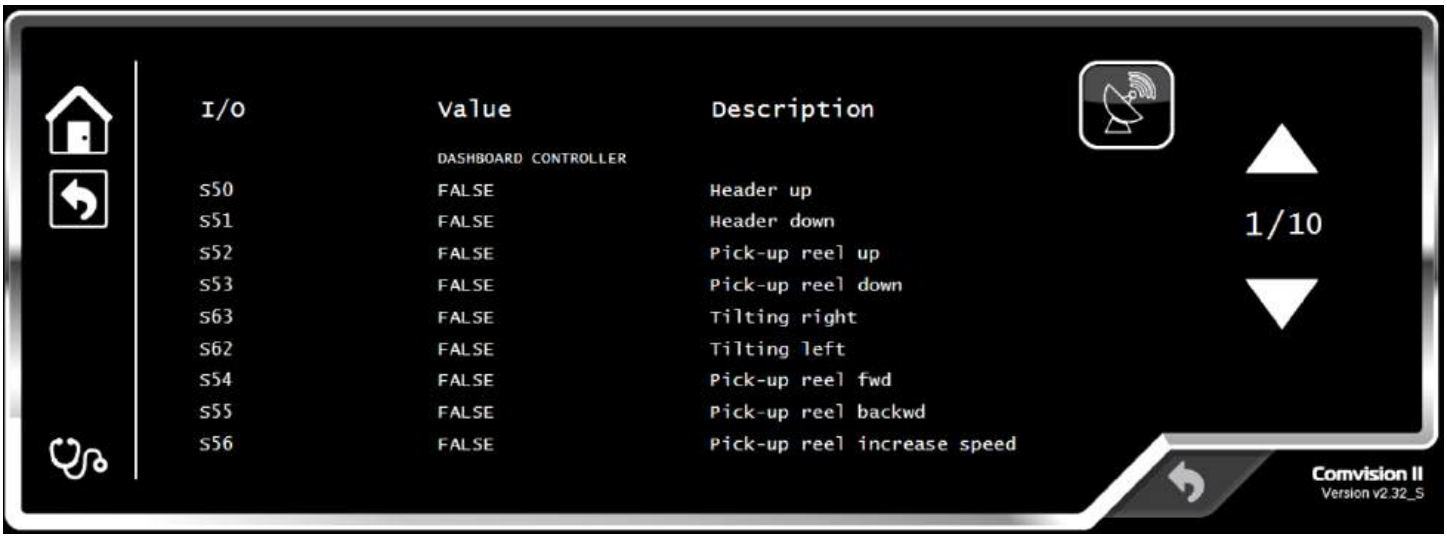
The sensor for the amount of returns may also get dirty. It can be cleaned through the service door on the housing of the returns threshing machinery.

Diagnostics

Diagnostics button allows to see controllers, all inputs and outputs, values and descriptions. Page 0 tells current state of main units with colors, green is working, blinking is error in gateway and red means error in unit or short circuit.



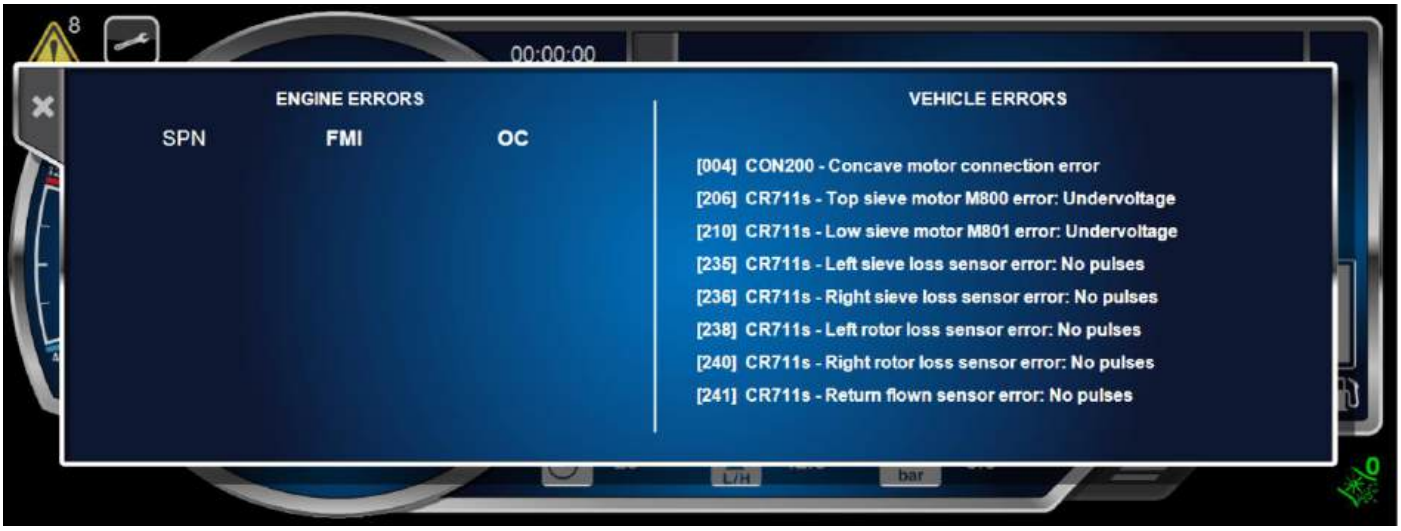
It is a troubleshooting tool and contains ten pages of information.



Errors

Yellow symbol in home view signal light area tells active fault codes and number next to is quantity of codes.

Pressing the symbol opens error page, there can be found separately engine and vehicle errors. Error code, control unit and explanation are listed.



Tools

Menu contains basic calculator, performance calculator, calculator for harvested area.

Performance calculator is tool for calculating how many losses are allowed.

Weight / 1000 grains	program gives example values for different crops.
Estimated yield	Amount of yield kg/ha
Allowed loss level	How many losses are allowed. Normally 2%.

Example:

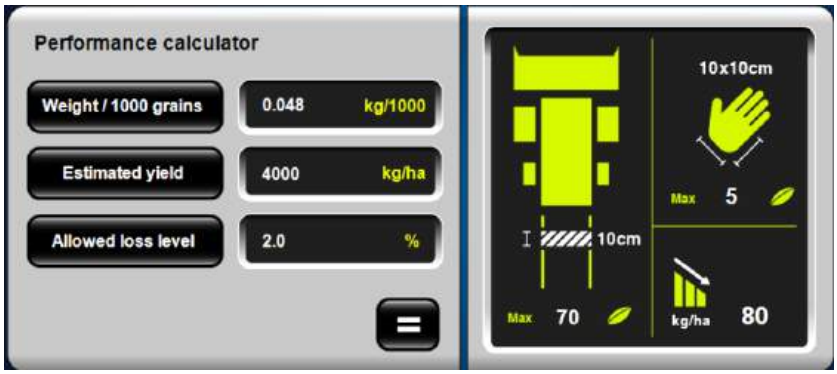
Wheat

0,048 kg/1000 grains

4000 kg/ha yield

2% losses allowed

Press equals button to calculate allowed losses.



5 grains allowed in palm area behind of combine.

10 cm travel length after combine 70 grains allowed.

If 2% losses happen, grain is lost 80kg/ha.

Harvesting calculators

Consists two different calculators to operate.

Job 1

Set field area in hectares. When harvesting, total time and harvested area is calculated here.

Area is calculated only if:

- Counter is on
- Header is on
- Header is below calibrated counter activation value

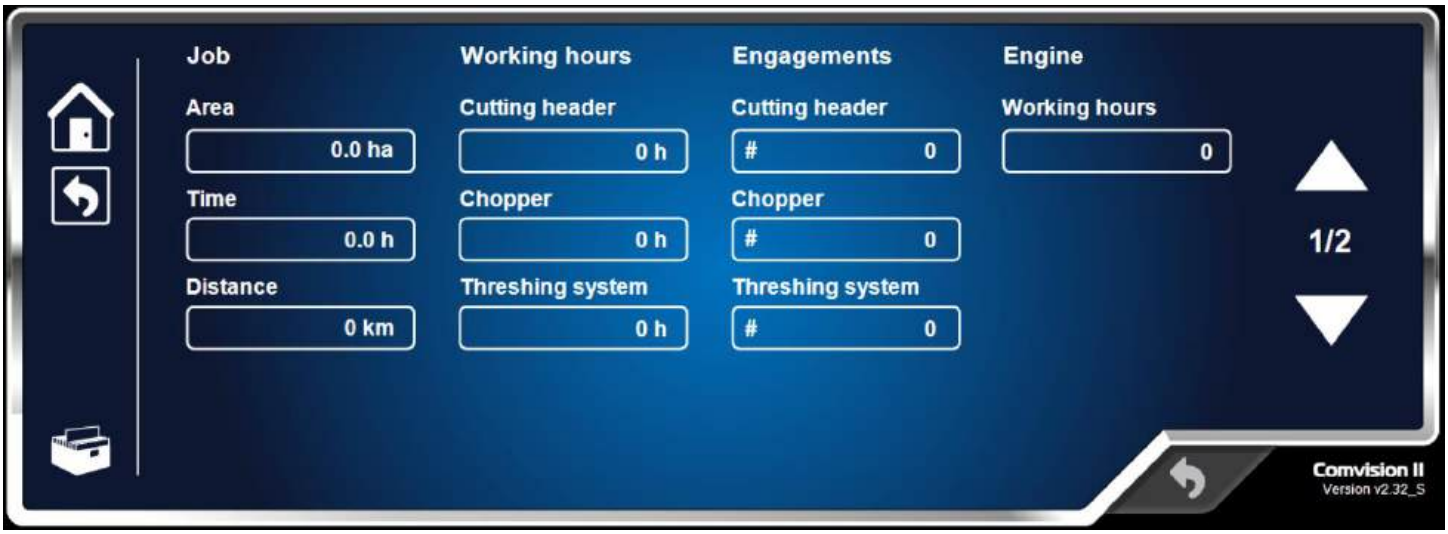
When hectares are calculated, there are icon in the loss pillar area in main screen.

Calculations are affected in information panel area and can be set to main screen values.

Job 2

Calculates total hectares and total time used when harvesting.

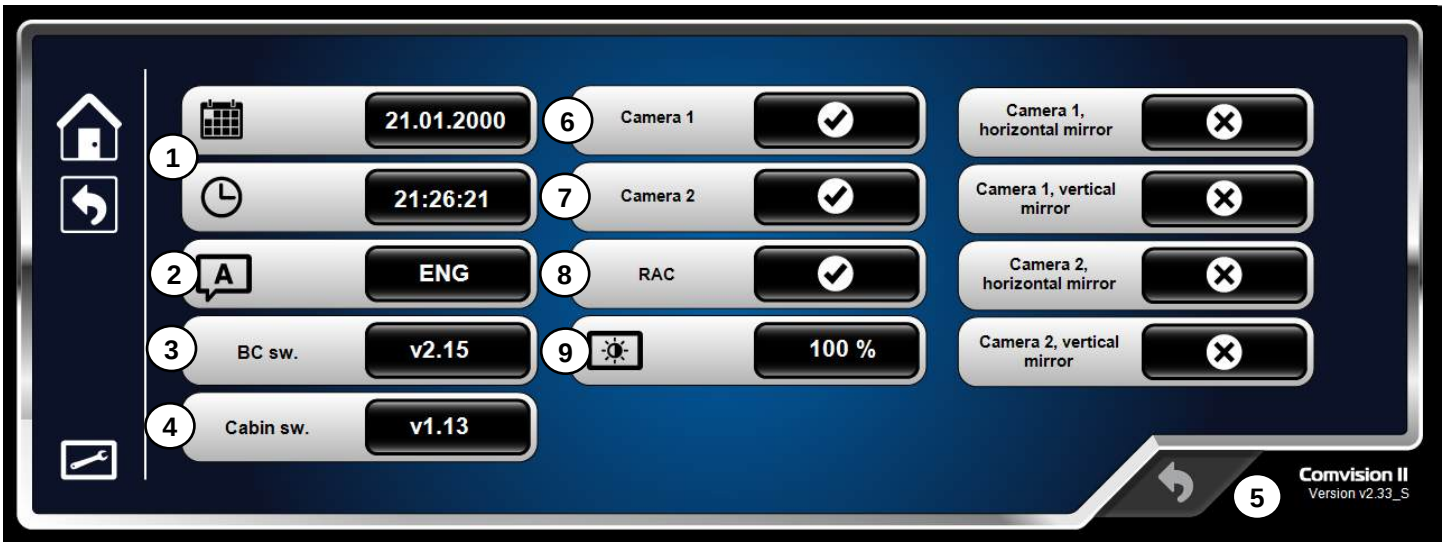
Data



Shows combine related data.

- Job
- working hours
- engagements
- engine hours
- Alarms (2nd page)

Settings



① Date and time

② Language

③ Back controller software version. If v0.00, connection is lost.

④ Cabin controller software version. If v0.00, connection is lost.

⑤ Comvision II -screen software version.

⑥ Enable camera 1 and mirroring options.

⑦ Enable camera 2 and mirroring options (option).

⑧ RAC – turn camera on when reversing or driving mode on.

⑨ Screen brightness. MY 18 combines do not have this option.

Service menu

Allows driver to keep up with service tasks to be done. When daily and weekly service task occur, appears pop-up window in main screen telling which service is due. Refer maintenance section to see summary of periodical maintenance procedures.

This is new function from Comvision II software version 2.33s.

① Service history show past service tasks with date and engine hours at that point.

② DPF regeneration (see next page)

③ Daily service 10 h or 1 day

④ Weekly service 50 h or 7 days.

⑤ Yearly service 400h or 1 year.

When service tasks are done, counter must be reset to start counter from start. Only service person can reset yearly service counter.

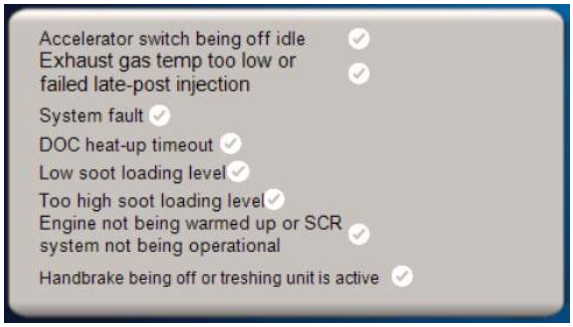
Only yearly service information is stored in service history.

DPF regeneration

Possibility to run DPF (diesel particulate filter) regeneration. This is recommended task during annual service and before engine oil change.

There are some conditions to fill before regeneration is possible to run.

These conditions are coming from engine and exhaust side, except handbrake sensor information.



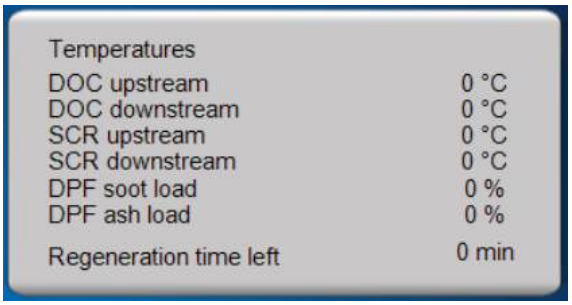
Warning! Exhaust gases will be very hot during the regeneration process (over 600 °C).

High risk of fire, injury, and damage! Clean engine and exhaust pipe department of burning material.

If there are immediate need to stop regeneration. Press STOP DPF regeneration in the screen.

Regeneration takes about 30-50 min.

Execution state and temperatures are shown in Comvision II during regeneration.



AHC - Automatic cutting height control

The AHC system includes the following functions:
Presetting of the table height to allow the cutting header to be lowered to a preset height in relation to the combine frame at the touch of a button.
Automatic height control of the cutting header to adjust the header height and angle in relation to the ground. Measurements are taken at both ends of the header and the adjustment tilts the header when necessary in relation to the ground contour.

It is advisable to read first the combine operating manual, particularly chapter "Operator Controls and Instruments" and in chapter "Threshing Equipment" paragraphs dealing with the pick-up reel and the cutting header.

Safety Precautions

Always keep the equipment in good condition. Make sure you repair any defects as soon as they appear. Faulty equipment must not be used.

Keep in mind that when the equipment is switched on, there is an automatic movement.

When using the automatic mode, make sure there are no people or animals within a danger zone.

Before use

Number of Lifting Cylinders

To ensure the proper functioning of the automatic features it is essential that the hydraulic level ranges between 70 – 140 bars with the header raised. The pressure level depends on the weight of the header and the number of lifting cylinders. Two, three or four lifting cylinders may be installed. If three cylinders are used, the third one shall be installed on the left of the combine.

Adjustment of lowering speed

Lowering and lifting speed can be adjusted in Comvision menu.

Fitting a header without AHC sensors

The combine can be fitted with a header that does not have height sensors. If this is the case, there are no automatic adjustments.

Switch Panel

The switch panel of the system is in the cabin. The panel houses two adjustment knobs: B and C.

Adjustment knobs B and C set the desired cutting height separately for presetting and for automatic setting. Knob B on the left adjusts the preset height and knob C on the right the automatic height.

The Comvision- display shows which mode has been selected in top of the header height reading.

Basic adjustment

Activate **pre-lowering height** by pressing button M1 on the drive handle. In this mode you can adjust the pre-lowering height by turning left switch B on the switch panel.

Activate **automatic height** by pressing button M2 on the drive handle. Adjust the cutting height by turning right-side regulating switch C on the switch panel.

While threshing

Buttons M1 and M2 can be pressed to go from any height direct to the pre-selected cutting height.

When either of the automatic modes has been activated and the cutting height is adjusted up or down manually, the system goes to a stand-by position. Automatic features can be re-activated by pressing buttons M1 or M2 to obtain the desired mode.

AHC system can store two values in storage places.

With the automatic height adjustment on, the height sensors guide the lifting of the header in such a way that both header ends stay at the same height in relation to the ground.

DHC-function is included with AHC

To save the current position of the cutting table to storage place, hold SHIFT button in front of the drive lever with tilt buttons A or B for at least 2 seconds. The header height value remains saved until a new value replaces the old one. To use stored header height push SHIFT button with button A or B.

Maintenance

During threshing keep an eye on the runners to see if they accumulate soil between themselves and the header. Accumulated soil can prevent the skid from operating correctly near the ground surface. Remove any soil off the skid.

Check periodically that the sensor skids can move unhindered from one end to the other.

The lever mechanism of the height sensor on the right side of the crop elevator becomes easily bent. When carrying out maintenance work, make sure not to damage the levers and the sensor.

Rear joints in the cutting header sensor skids must be lubricated with grease every 50 hours.

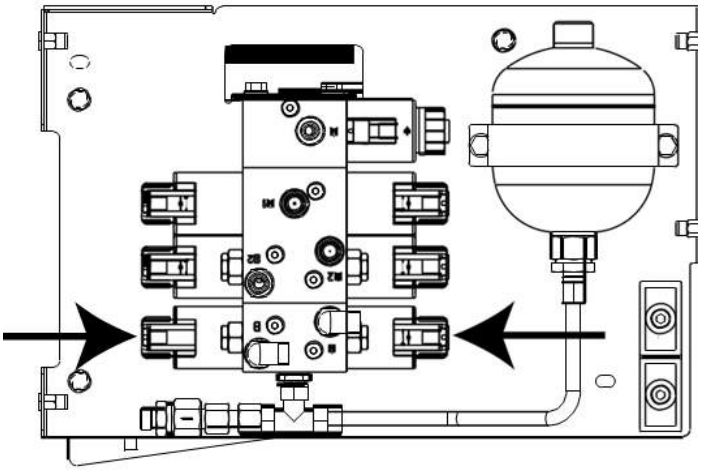
Driving on the road

Attach skids to upper position with support to prevent sensors or skids to break. Release them only when harvesting.

WARNING!

When carrying out service jobs on hydraulics, ensure that the pressure stored in the system is released in a safe manner.

Because of the counter valve and the additional gas accumulator installed in the pipes, there is always some pressure in the hydraulic control valves. This can be released with the engine stopped by pressing the manual control studs at the ends of the solenoids on the table side tilt valve with a pin.



The valve is of double-acting type. Both the solenoids must be pressed alternately as the accumulator holds enough oil for a couple of tilting movements. The tilt bar in front of the crop elevator moves during this function. Make sure nothing gets squeezed by the bar while it moves.

DHC (when no AHC)

It is advisable to read first the combine operating manual, particularly chapter "Operator Controls and Instruments" and in chapter "Threshing Equipment" paragraphs dealing with the pick-up reel and the cutting header.

Safety Precautions

Always keep the equipment in good condition. Make sure you repair any defects as soon as they appear. Faulty equipment must not be used.

Keep in mind that when the equipment is switched on, there is an automatic movement.

When using the automatic mode, make sure there are no people or animals within a danger zone.

Cutting height preset

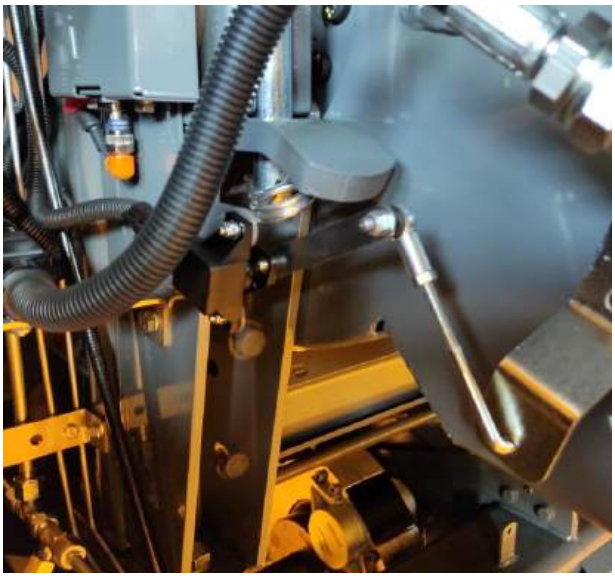
The DHC is a system where cutting header is set to the preset cutting height at a short touch of a button.

DHC system can store two values in storage places.

To save the current position of the header to storage, hold button M1 or M2 for at least 2 seconds. The header height value remains saved until a new value replaces the old one.

To use stored header height push button M1 or M2.

Header height is measured with angle sensor right side of the feeder elevator.



If sensor shows off-readings, calibration is needed.

Driving and threshing instructions

Before Starting the Combine Check

There are no foreign objects inside the combine.

The oil levels are correct (engine, hydraulic tank).

There is enough coolant in the cooling system.

There is enough fuel in the tank.

Always before starting, sound the signal to warn those nearby.

Starting the Engine

Drive handle is in neutral position.

The power is switched on by turning the ignition key to the right. The alternator and oil pressure control lights will come on. Wait for the Comvision II to start up.

By turning the key farther to the right into position HS the starting motor will start to run the diesel engine and the engine will start. Should the control lights not go off after starting the engine, immediately stop the engine.

Stopping the Engine

Engine is stopped by turning the ignition key to the “STOP” position.

Wait 5 seconds before turning main power off, to prevent Comvision II data loss.

Note! Do not stop the engine, especially if turbo-charged, immediately after threshing. Idle the engine for a few minutes to allow it to cool off and the temperature to equalize.

Do not have the ignition on for over 15 minutes on models equipped with distributor pumps unless the engine is running as the injection pump solenoid may overheat.

To listen to the radio, turn the ignition key left from the STOP position while pressing the key down. This turns on the current to the radio only, so there is no risk of the solenoid overheating.

Cold Weather Starting

Engines are equipped with a pre-heating resistance controlled by the engine electronic control unit. In cold weather it functions automatically. When pre-heating switches itself on, control light comes on. Start the engine as soon as the control light goes off. After the engine has started, the heater switches itself on again for some time.

If the engine has not started within 15 seconds, wait for a while, and ignite again as above.

Combines with hydrostatic transmission must not be started in temperatures below -20° C as the oil is too stiff and may damage the mechanism. (In case stiffer grade VG68 oil is used in the driving hydraulics, the lowest temperature to allow starting is -10° C.)

After starting engine do not speed up rpm before oil is warmed up.

When driving

Select the required speed range with the traction speed control lever.

Push the speed lever slowly forward or backward to drive the combine in the required direction. Select the required speed using the speed lever.

Do not drive until the hydraulic oil has warmed up. Stiff oil strains the shaft seals on the traction pump.

Test the brakes.

Note! Speed range 3 is only meant to be used when driving on the road with the grain tank empty. Using it on the field is prohibited.

Changing of Gears

The gears are not synchronized. Therefore, change gears cautiously. Change gears only when combine is not moving.

Need for changing gears is minimal in hydrostatic combines. When getting off the road and starting threshing or vice versa, changing is, however, necessary. Change gears on level ground. If the gear feels stiff, that is because the combine tends to go downhill. In this case, slam the brake and carefully try to “drive” downhill to release the gear.

Driving on the Road

The brake pedals must be latched together. Use safety switch.

Brake smoothly as the rear wheels easily rise from the ground when applying the brakes violently. Never drive downhill with the gear in neutral.

The statutory traffic regulations stipulate that when driving on the road, the grain tank must be empty, the lights correctly aligned and only the headlights on.

Driving on the Field

The brakes may be used independently to reduce the turning radius.

Use only 1st and 2nd gear.

In Soft Field Conditions

To improve the carrying capacity, the air pressure in the front tires may be reduced by approx. 20 kPa (0.2 bar). Do not reduce the air pressure in the rear tires.

With reduced tire pressure, only half-fill the grain tank.

When returning to normal harvesting conditions or on the road, return to recommended pressures.

On Steep Slopes

Increase the tire pressure by approximately 30 kPa (0.3 bar) to improve the stability of the combine. Only half-fill the grain tank to eliminate the risk of overturning.

Front tires must be on wider set range to prevent collision with mud guards.

Choose the Correct Time and Conditions

Before starting the harvest, make sure that the crop to be threshed is ripe and dry enough.

The germinating power of most crops is easily reduced if the threshing moisture exceeds 25%.

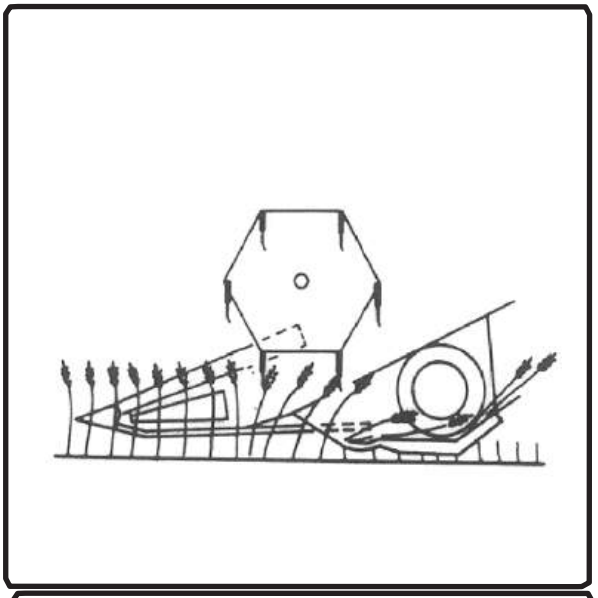
Moist crops easily stick to the separation surfaces and conveyors, in which case the combine needs to be cleaned more often than recommended.

Particularly in dry conditions with moisture below 12%, straw becomes chopped extremely easily. This will hinder the rotor operation and burden the shaker shoe excessively.

Good Threshing Results with Even Feed

Always run the engine at maximum revolutions when threshing. When threshing, it is important to adjust the forward speed, the cutting height and the reel according to crop conditions to achieve as even feed as possible. Do not cut too low. Leafy matter moistens the straw leading to a poor threshing result.

Empty the stone trap at least once a day. Before emptying, stop the engine, apply the parking brake and fit the cutting table support.

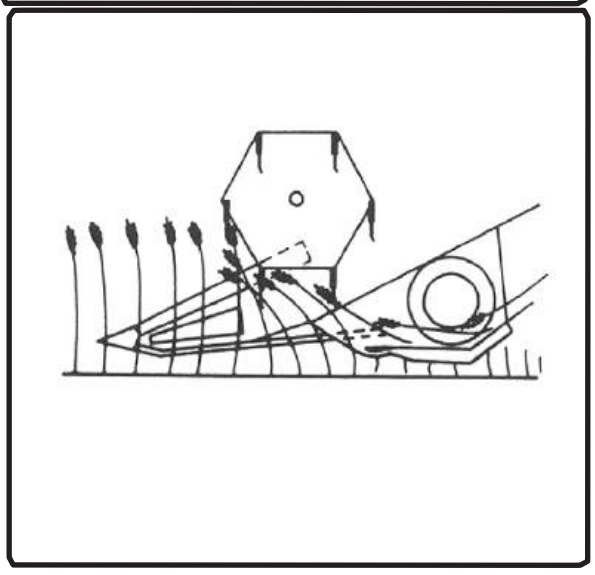


Start with the Recommended Settings

In the table at the end of this chapter you will find settings and adjustments for different crops. After adjusting your combine according to these recommended settings, test run the combine at the speed you will use in harvesting.

Monitor the quality of the sample coming into the tank and the losses in the field.

Note! When threshing heavy strawed crops without the chopper, it is important to make sure that all the straw comes out of the straw walkers/rotors without clogging the chaff hood.



Reel Position in Accordance with Crop

For normal standing crops, set the reel in its rear position at such a height that the reel tines lightly strike

the crop. Reel speed slightly higher than the combine ground speed to ensure the crop is feeding head first.

For short-strawed crops, lower the reel so that the tines strike just above the knife. The reel speed increases the faster you drive and the shorter the straw is cut with the heads. The reel must pull in the heads toward the feeding auger.

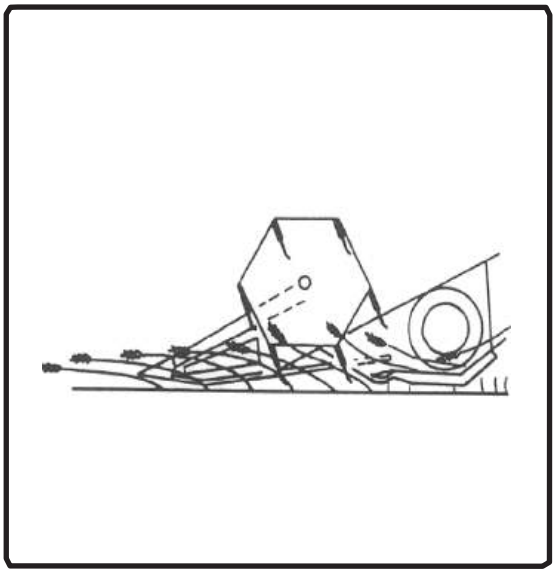
For long-strawed standing crops, set the reel in its forward position, the speed lower than the combine ground speed so that the heads are pushed forward, and the crop is laid butt first onto the feeder auger.

For laid-down crops, set the reel forward, reel speed higher than the combine ground speed and the reel angled to facilitate the gathering of the crop, the knife cutting below the heads.

When using crop lifters, the reel feeds the cut crop onto the feeding auger with the reel tines in the normal position.

Adjust the straw dividers to reduce header losses and improve feeding.

To avoid threshing losses caused by straw dividers, pay special attention to adjusting them according to the conditions and crops.

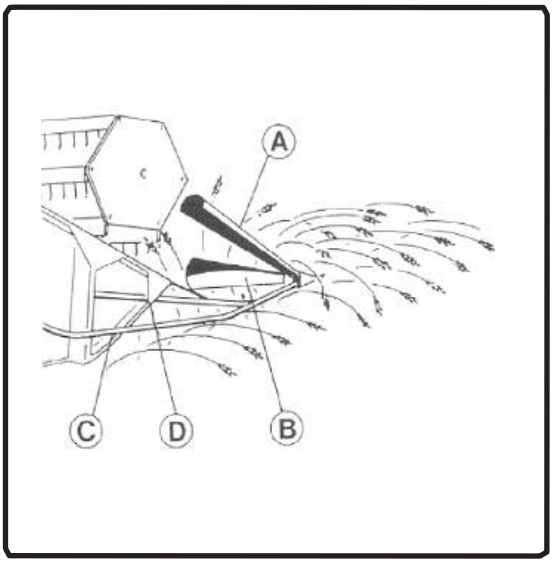


Adjust the height of the dividers with slide piece D, so that in laid-down crops the dividers follow the contours of the field beneath the crop.

In standing crops the head of the divider should be set 10-15 cm above the knife.

Adjust side guide plate B so that it prevents the cut crop from getting between the header end and the reel end. Long-strawed reclining or laid-down crops are lifted by upper guide plate A so that the reel can gather the crop for cutting and convey it further to the feeding auger.

Outside guide tube C is used in long-strawed crops to move the uncut crop aside.



Estimation of Threshing Losses

2% is generally considered to be the maximum acceptable threshing loss. The losses can be calculated as follows:

With an estimated yield of 5000 kg/ha, the weight of 1000 grains 35 g. When monitoring the cutting width of the combine, max. 3 grains may be found in a palm sized area of 1 sq.dm. This is when straw chopper is switched on and its spreading width corresponds header width.

Sources of grain loss

- Shedding in the field before harvesting
- From the header
- Unthreshed grain
- From the shaker shoe
- From the straw walkers/rotors

Before readjusting, make a methodical check in the above order to isolate the cause of the loss. Make one adjustment at a time and check the result with a test run.

Check the crop in front of the combine to ensure that shedding has not occurred before the combine has touched the crops.

To test for the header loss, stop the combine and reverse it one combine length; the grain loss can easily be seen in the field.

Causes of header loss

The reel has threshed the grain onto the field due to too high or low revolutions and too wide a clearance. Local blockage in the knife causes a depressed and uncut section in the field. This may be due to a damaged knife plate or finger.

Remember that uneven feed onto the cylinder causes disturbances in the whole threshing mechanism and machinery and leads to extensive grain losses.

Always aim at even feed when threshing.

Unthreshed Grain

Check that the grain gets threshed off the heads. Check the long straw on the straw walkers / rotors as the chopper also removes the unthreshed grains efficiently.

Cylinder speed should be moderate and concave clearance as wide as possible to obtain unbroken grain.

and straw as well as minimal grain losses. It is not necessary to aim at complete threshing. Particularly when threshing seed grain, the minimal recommended speed setting for the cylinder should be used, as high cylinder speed damages germinability more easily than minimal concave clearance.

If the moisture of the crop to be threshed is low and the straw brittle, the concave fore/aft adjustment ratio can be modified by changing the setting of the “ratio adjustment plate”. The normal factory setting is 2:1. Settings 1,5:1 and 1:1 can also be used, which means a narrower front clearance can be used without unnecessarily shredding the straw.

The threshing effect and breaking of barbs can be improved by fitting filler plates under the front of the concave.

1-2 filler plates are usually enough. NOTE! Filler plates reduce full capacity.

Unthreshed grain loss can be caused by

Check the straw before it is fed into the chopper. Monitor the grain coming into the tank as well as the returns. Reasons for unthreshed grain loss can be:

- Cylinder speed too low
- Cylinder-concave clearance too wide
- Uneven feed
- Crop too green in parts
- Damaged cylinder or concave

Shaker Shoe Losses

If the sample coming from the sieves (taken on a shovel) shows grain being lost, check for the following:

- Excessive or insufficient fan speed.
- Incorrect direction of cleaning fan airflow
- Blocked sieves
- Chaffer sieve not sufficiently open
- Grain sieve holes too small (overloads the return system) Crop too damp
- Excessive weed
- Too high cylinder speed will generate a lot of chaff onto the sieves.

Straw Walker / Rotor Losses

- If the sample coming from the straw walkers shows grain being lost, check for the following:
- Uneven feed
- Blocked concave and/or straw walkers
- Excessive forward speed
- Cylinder-concave clearance too small
- Too much weed
- Crop too damp

Quality of Sample in the Tank

If there is crushed or cracked grain in the sample, the reason could be:

- Cylinder speed too high
- Cylinder-concave clearance too small
- Blocked concave
- Crop too green in parts

If the sample is not clean, the reason could be

- Insufficient fan speed Incorrect direction of fans Chaffer sieve open too much Bottom sieve open too much
- Forward speed too low (insufficient load on the threshing mechanism) Crop sparse in places and weedy
- Cylinder-concave clearance too small
- Too many breaks in threshing (turning, etc.)

Malfunction Problems

The cylinder winds up and gets clogged:

- Crop damp or green
- Forward speed too high
- Cylinder-concave clearance too wide
- Cylinder speed too low
- Cylinder bars damaged or worn
- Rear beater damaged

The grain auger gets clogged:

- Chaffer sieve set too wide open
- Insufficient fan speed

The return auger gets clogged:

- Bottom sieve open too little
- Bottom sieve blocked
- Insufficient fan speed
- Chaffer sieve set too wide open

Cleaning Instructions When Going from One Crop to Another

Drive the combine on level open ground. Change the gear into neutral and lock the parking brake. Remove the ignition key whenever the engine is switched off to certain that no outsider can start the combine.

Do not perform any cleaning operations with the engine running!

Cleaning with compressed air is recommended. An appropriate brush can also be used.

- Support the reel and the cutting header in their top positions.
- Open the stone trap and empty it with a cassette key, for instance. Open all cleaning doors (not those to the grain tank).
- Remove and clean all sieves and grain pan sections.
- Clean the supporting grooves of the sieves in the shaker shoe. Lock the back door in the shaker shoe.
- Remove and clean the bottom grooves in the straw walkers (C10, C12).
- Clean the bottom grooves in the rotor (C20, C22, C24).
- Run the threshing mechanism for 2-3 min. with the cleaning fan at maximum speed.
- Lift and lower the cutting header, but do not start it. Leave the header in its bottom position.
- Stop the threshing machinery.
- Check that the grain pan is empty. If necessary, remove and clean the cassettes.
- Check the spaces between the return and grain augers and remove any remaining grain.
- Clean the filling auger inside and out.
- Clean the cutting header.
- Blow clean the bottom on the grain tank, discharging the grains through the bottom door.
- Clean the unloading auger by turning the auger counterclockwise with the pipe being raised half way up to make the grains run out through the bottom door.
- After cleaning, refit the parts and close the doors.

Approximate settings C20 – C24

This table only gives recommendations for settings. While threshing, adjust the settings according to the harvesting conditions.

Crop	Threshing cylinder	Concave	Shaker shoe			Fan	
	r/min	Main concave (mm)	Chaffer sieve (mm)	Chaffer sieve extension (mm)	Seed sieve (mm)	r/min	Direction notch
Rye	900 - 1200	10 – 16	10 – 18	8 - 10	6 – 13	450 - 600	2 - 3
Barley	900 - 1200	8 – 16	12 – 19	10 - 12	6 – 15	450 - 750	2 - 3
Wheat	900 - 1200	10 – 16	10 – 17	8 - 10	5 – 11	600 - 800	2 - 3
Oats	800 - 1200	10 – 16	12 – 18	10 - 12	6 – 13	450 - 650	2 - 3
Rape	600 - 850	20 – 30	6 – 13	1 - 5	3 – 6	450 – 600*	2 - 3
Turnip rape	600 - 850	15 – 25	5 – 10	1 - 5	3 – 6	450 – 600*	2 - 3
Timothy	700 - 1000	9 – 12	1 – 6	1 - 3	3 – 6	450 – 600*	4
Clover	1100 - 1200	6 – 10	12 – 20	10 - 16	3 – 8	450 – 600*	2 - 3
Pea	500 - 800	20 – 30	12 – 19	10 - 14	11 – 17**	450 - 700	2 - 3
Meadow fescue	700 - 1000	8 – 12	8 – 13	6 - 8	6 – 8	450 – 600*	2 - 3
Sunflower	500 - 700	25 – 30	11 – 17	8 - 12	11 – 17	500 - 650	2 - 3
Buckwheat	700 - 1000	8 – 15	12 – 19	8 - 12	6 – 11	500 - 650	2 - 3
Cumin	700 - 1000	15 – 20	5 – 11	1 - 5	3 – 8	450 – 600*	2 - 3
Honey flower	700 - 1000	10 – 16	1 – 7	1 - 4	3 – 7	450 – 600*	4
Flax	900 - 1200	8 – 12	5 – 11	1 - 5	4 – 8	450 - 600	2 - 3
Corn	1000 - 1200	20 – 30	12 – 20	12 - 16	14 – 19** (Removed)	600 - 900	2 - 3
Sorghum	600 - 1000	8 – 14	4 – 18	4 - 8	5 – 10	500 - 700	2 - 3
Soybean	450 - 600	15 – 20	10 – 20	10 - 13	12 – 17**	500 - 650	2 - 3
Rice	600 - 1100	16 – 28	10 - 17	8 - 10	10 - 17	500 - 650	3 - 4

*) with the bottom door open

**) Returns course closed with blanking plates at the rear of the shaker shoe.

Pre-concave: approximately 1,5 x concave opening. Adjustment in operation and adjustments section.

The normal concave front to rear clearance ratio is 2:1. In dry conditions when the straw is extremely brittle, it is advisable to use concave ratio 1,5:1...1:1, i.e. the clearance at the rear of the concave is bigger than in the normal setting. This will reduce straw damage and losses.

Approximate settings C10 – C12

This table only gives recommendations for settings. While threshing, adjust the settings according to the harvesting conditions.

Crop	Threshing cylinder	Concave	Shaker shoe			Fan	
	r/min	Main concave (mm)	Chaffer sieve (mm)	Chaffer sieve extension (mm)	Seed sieve (mm)	r/min	Direction notch
Rye	900 - 1200	8 – 15	10 – 18	8 - 10	6 – 13	450 - 600	2 - 3
Barley	900 - 1200	6 – 12	12 – 19	10 - 12	6 – 15	450 - 750	2 - 3
Wheat	900 - 1200	8 – 12	10 – 17	8 - 10	5 – 11	600 - 800	2 - 3
Oats	800 - 1200	9 – 16	12 – 18	10 - 12	6 – 13	450 - 650	2 - 3
Rape	600 - 850	20 – 30	6 – 13	1 - 5	3 – 6	450 – 600*	2 - 3
Turnip rape	600 - 850	15 – 25	5 – 10	1 - 5	3 – 6	450 – 600*	2 - 3
Timothy	700 - 1000	9 – 12	1 – 6	1 - 3	3 – 6	450 – 600*	4
Clover	1100 - 1200	6 – 10	12 – 20	10 - 16	3 – 8	450 – 600*	2 - 3
Pea	500 - 800	24 – 30	12 – 19	10 - 14	11 – 17**	450 - 700	2 - 3
Meadow fescue	700 - 1000	8 – 12	8 – 13	6 - 8	6 – 8	450 – 600*	2 - 3
Sunflower	500 - 700	25 – 30	11 – 17	8 - 12	11 – 17	500 - 650	2 - 3
Buckwheat	700 - 1000	8 – 15	12 – 19	8 - 12	6 – 11	500 - 650	2 - 3
Cumin	700 - 1000	15 – 20	5 – 11	1 - 5	3 – 8	450 – 600*	2 - 3
Honey flower	700 - 1000	10 – 16	1 – 7	1 - 4	3 – 7	450 – 600*	4
Flax	900 - 1200	6 – 8	5 – 11	1 - 5	4 – 8	450 - 600	2 - 3
Corn	1000 - 1200	20 – 30	12 – 20	12 - 16	14 – 19** (Removed)	600 - 900	2 - 3
Sorghum	600 - 1000	6 – 12	4 – 18	4 - 8	5 – 10	500 - 700	2 - 3
Soybean	450 - 600	15 – 20	10 – 20	10 - 13	12 – 17**	500 - 650	2 - 3
Rice	600 - 1100	16 – 28	10 - 17	8 - 10	10 - 17	500 - 650	3 - 4

*) with the bottom door open
**) Returns course closed with blanking plates at the rear of the shaker shoe.
Pre-concave: approximately 1,5 x concave opening. Adjustment in operation and adjustments section.

The normal concave front to rear clearance ratio is 2:1. In dry conditions when the straw is extremely brittle, it is advisable to use concave ratio 1,5:1...1:1, i.e. the clearance at the rear of the concave is bigger than in the normal setting. This will reduce straw damage and losses.

Service and maintenance

Safety

Installations and adjustments can only be made by a person with the required skills and qualifications and the necessary knowledge of the machine in question. Installations, adjustments, and repairs must be carried out with the engine switched off and the ignition key removed.
Any moving parts shall be in balance and stopped and, when necessary, locked. Support the cutting table and the pick-up reel in their top-most positions. Make sure there is no pressure in the fluid systems before undoing mechanical or hydraulic joints. (The gas accumulator for the header, the air conditioning system, the radiator, etc.)
Be very careful, when starting the engine during and after service.
To minimize the risks involved in malfunctioning make sure all the periodic service and cleaning measures are carried out on time and in compliance with the instructions.

General Instructions

- Make sure you are skilled enough to service the combine before undertaking any maintenance work. If not sure, contact a qualified service person.
- Get acquainted with the combine structure and the service instructions before undertaking any work.
- Wear appropriate protective clothing.
- Use appropriate tools and other equipment.
- Handle the combine and any work materials in compliance with the instructions in such a manner that there is no risk of injuring yourself, anyone else or damaging the environment.

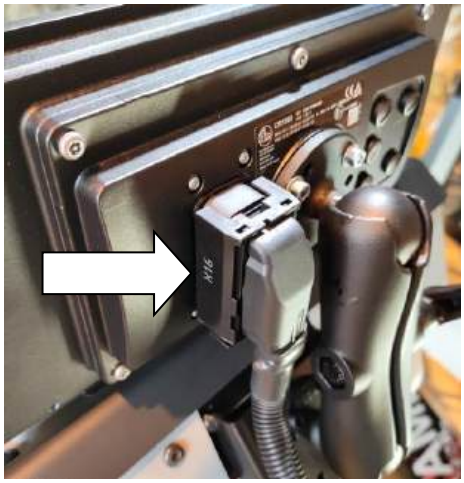
WELDING

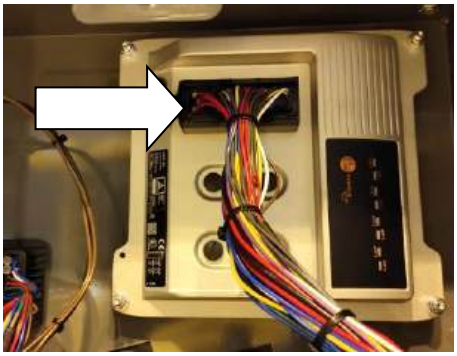
The regular service measures required do not involve welding, but it may sometimes be necessary when doing repairs. Only qualified hot work operators are allowed to weld.
Welding causes a considerable fire risk. Clean the combine carefully before undertaking any welding work and make sure you have a fire extinguisher available. Appropriate fire watch shall be seen to.

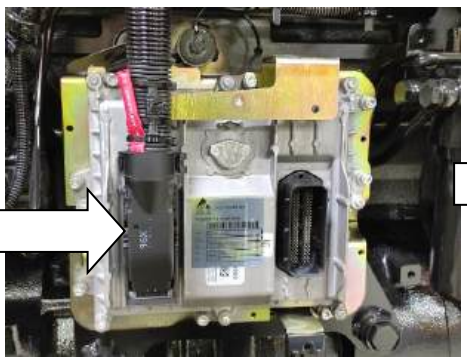
The electrical system of the combine houses several components with semiconductors. They get easily damaged when there are voltage peaks caused by arc welding. The main principle is to detach any structures that require welding. If any fixed combine structures need to be welded, take the following precautions:

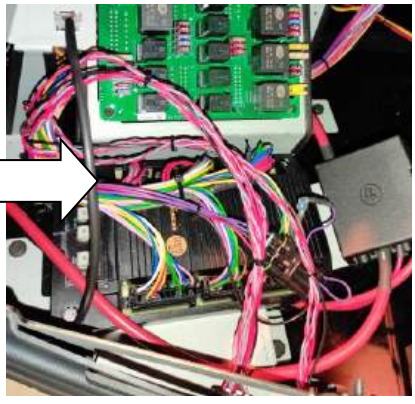
Switch off the master switch or disconnect battery cable.

- Disconnect connector to the Comvision II -display unit.
- Disconnect the feeder cable (left cable) to the control unit of the engine. First remove the protective cover off the unit attached to the engine. Turn the locking clip on the connector up and pull the connector open.
- Disconnect cabin controller power connector P/N1.
- Disconnect rear controller connector.
- Find the grounding spot close as possible to area to be welded.

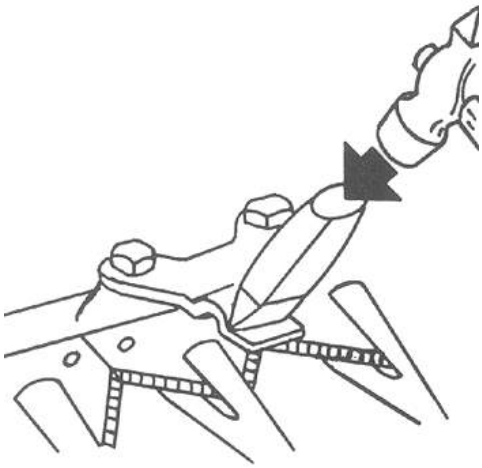






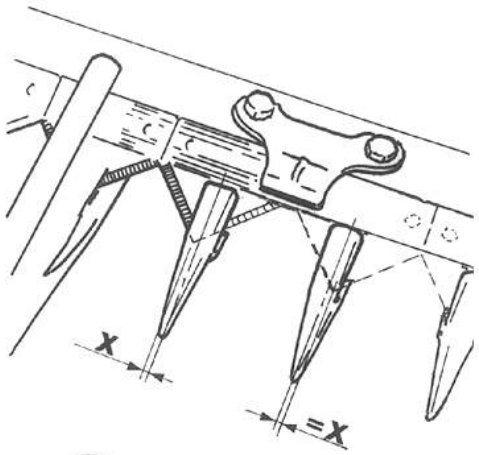


The performance of the cutting header Is Based on the Condition of the KNIFE



Check that each knife holder touches the knife section lightly. Adjust by bending the holder down.

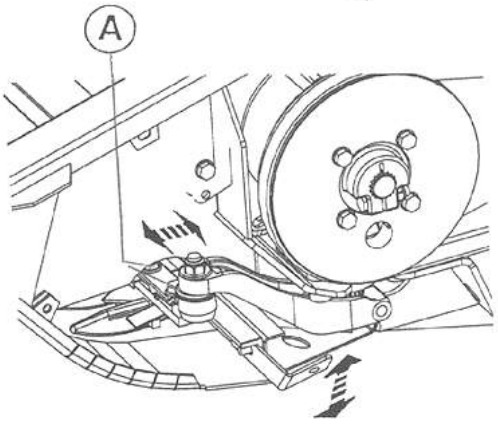
Check that each knife section touches the corresponding finger. If a knife section is bent, resulting in too wide a gap between the finger and knife section, align or replace the section,



Check the reversing points of the knife at both extremities of the stroke the reversing point shall be beyond the finger center line. If this is not the case, check the drive joint and the attachment of the knife drive device.

(In case the knife drive lever is removed for some reason, make sure the slot on the lever is aligned with the marker on the end of the groove shaft when refitting the lever.

Replacing of the KNIFE



First remove the lower guard of the knife drive.

Remove fixing screws A, on the connecting lever and remove the knife.

Check the knife fore/aft and up/down positions.

The fore/aft position is adjusted using screw joint A.

The fore/aft position is correct when the knife tang and the joint fixing piece can move freely for the whole length of the stroke without brushing the edges of the groove or the heads of the locking screws on the knife finger.

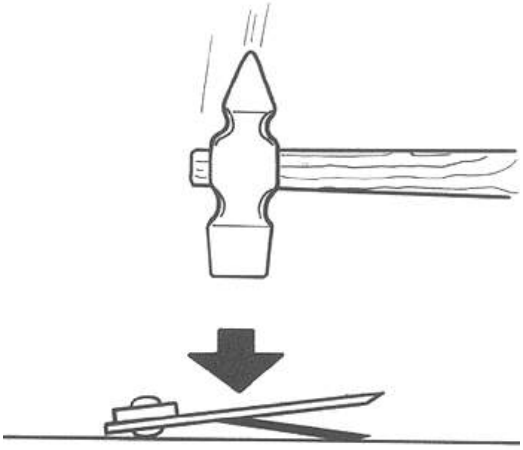
The up/down position is correct when the bottom surface of the first knife section brushes the cutting surface of the knife finger. Normally no adjustments are necessary. Adjust the height by moving the drive lever in its groove connection.

Make sure the knife moves lightly when turning the drive pulley in the knife drive device by hand with the belt disengaged.

Replacing of a KNIFE SECTION

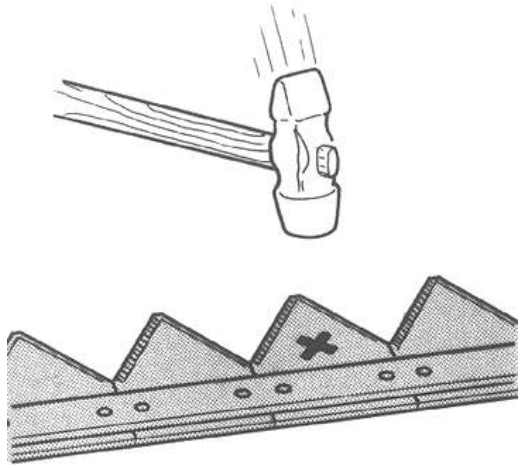
Screw-on knife sections can be replaced without removing the knife from the cutting table. Ensure that adjacent knife sections are aligned with each other.

If necessary, remove the knife and align as shown in or replace bent knife sections.



When replacing the KNIFE FINGERS

it is important to remember that the three pairs of knife fingers on the left differ from the other fingers.

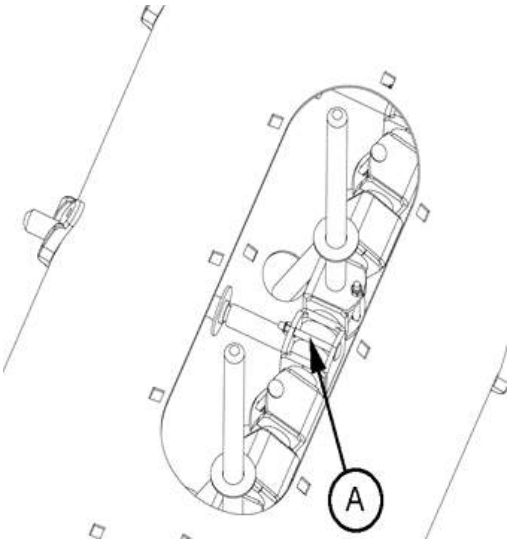


Feeding drum fingers must be straight.

Straighten or replace a bent finger. To remove the finger, which is necessary in both cases, open the door in the feeding drum housing and turn the auger until locking screw A can be unscrewed.

Place the reel supports before undertaking any work! A bent finger will wear the guiding bearing and crankshaft bearing quickly. When replacing a finger, check the bearing condition and replace the bearings, if necessary.

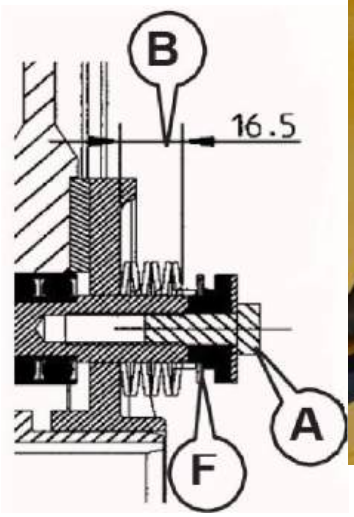
The feed finger has a groove at which the finger will break when it encounters a hard obstacle. The broken finger will fall inside the feeder auger. Replace the finger and remove the broken part from inside the auger.



Special instructions for the cutting header

The overload clutch of the feeding drum must be tested before starting harvest.

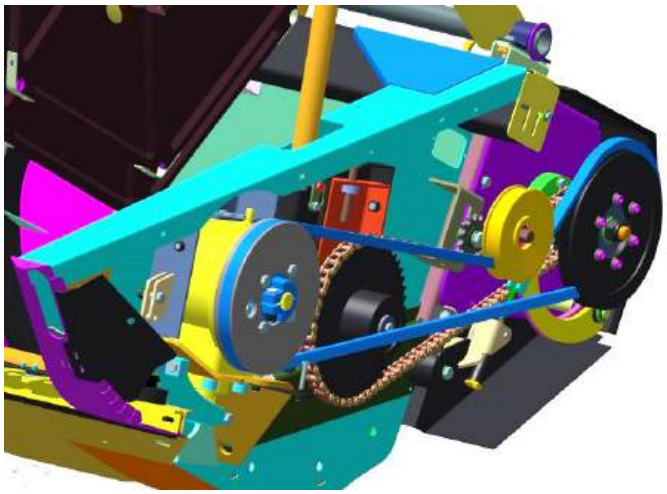
The function of the overload clutch protecting the feeding auger must be tested annually before starting harvest.



To do this, slacken nut A, which tensions the cup spring pack, so that spring packs B will slacken. After this, turn sprocket C to ensure that friction plate D is not stuck. Open the clutch, if necessary, and remove any rust from the friction surfaces.

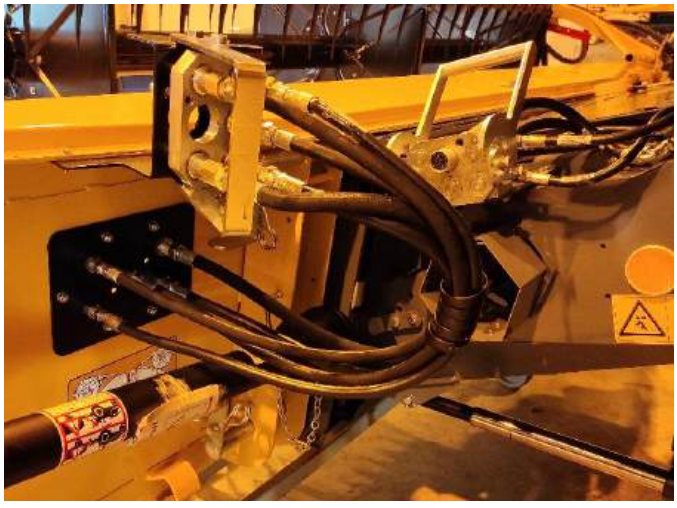
After checking, tension the spring packs to their original measure. If necessary, move adjustment plates F under the springs.

Chain driven cutting header is free of maintenance.



Removing cutting header in correct order

The cutting header may only be removed on hard, level ground.



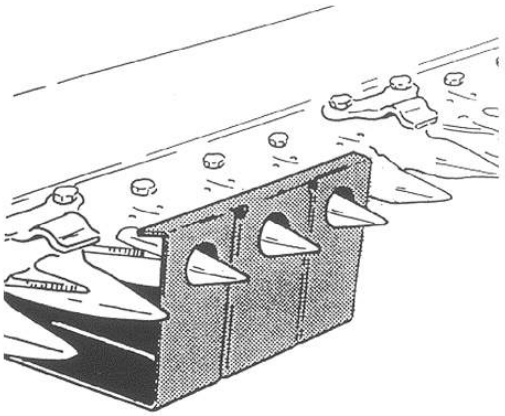
Lower the reel into its lowest position. Stop the engine.

Disconnect the hydraulic piping between the combine and the header. The combine is equipped with a hydraulic quick coupling unit, set the connector on its holder.

Remove the PTO shaft from the feeder elevator and place it on the holder on the header.

Pull the locking pins in the connection between the crop elevator and the header outwards to their extreme positions. There are four pins total. Use cotter pins to secure them open.

Place the header support in between the knife fingers, in the approximate center of the knife, as shown in picture.

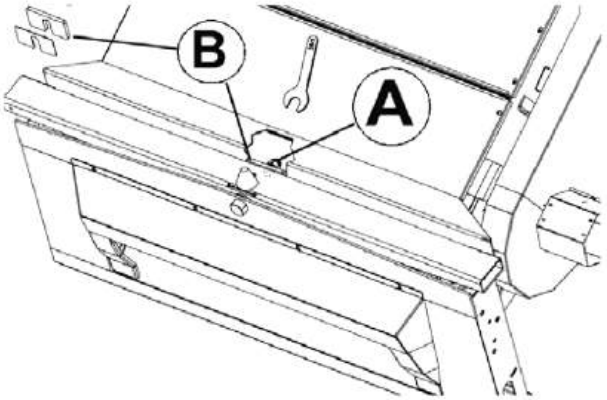


Lower the header onto the support ensuring that the support remains in position and that the crop elevator comes away from the rear of the table.

When the crop elevator is entirely off the table, reverse the combine, checking that the header does not move.

Adjustment of the cutting header angle in soft conditions

The cutting table angle can be adjusted in relation to the ground. This may be necessary due to soil properties.



To make the adjustment loosen locking nut A on the center shaft of the side tilt beam at the front of the crop elevator and add or remove adjustment plates B. After adjustment tighten nut A.

The factory setting is one 12 mm adjustment plate. There are additional plates in the tool kit. With all the plates installed, the knife reaches furthest down to cut laid down crops.

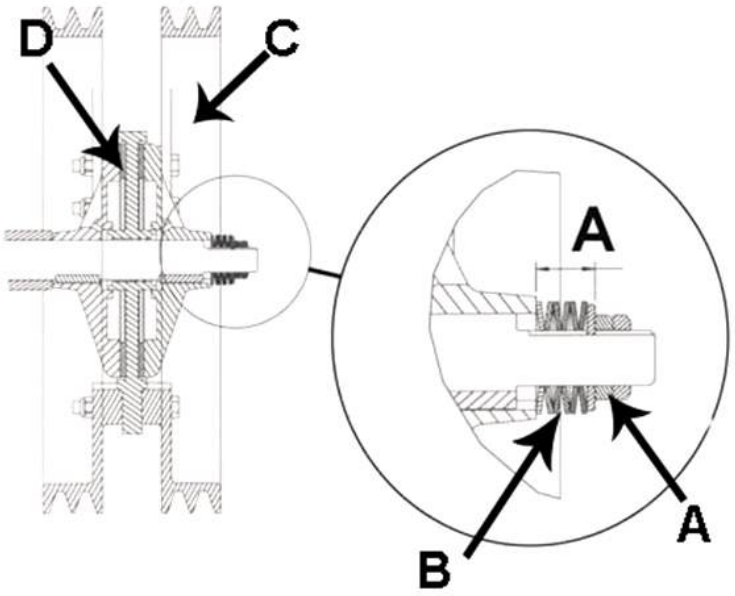
Crop elevator overload clutch

Check the operation of the overload clutch protecting the crop elevator annually before the harvesting season.

Undo nut A on the cup spring pack, fig. P16b, so that spring pack B will slacken. After this rotate belt pulley C to check that friction disc D is not stuck. If necessary, take apart the whole clutch and remove any rust off the friction surfaces. Oil the pulley sliding hub.

After the service adjust the spring pack to its original measurement of **A=15 mm** when measured from the top of the washer.

Ensure that the belleville springs are fitted correctly: always two springs facing in the same direction on top of each other!

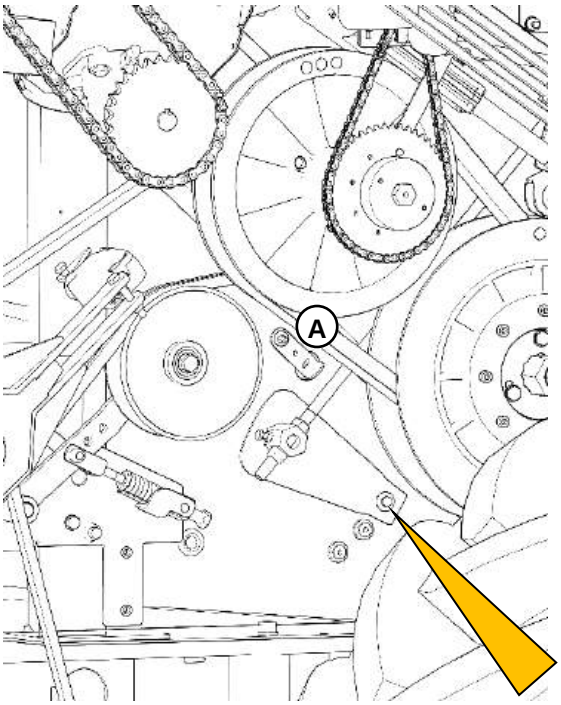


Threshing cylinder and PTC clearance

Setting is done together synchronized, pre- and main concave. Ratio between pre- and main concave can be adjusted mechanically. Periodically, preferably at the beginning of each harvesting season, check the concave position in relation to the threshing cylinder.

Recommended tools: R152308, T712561.

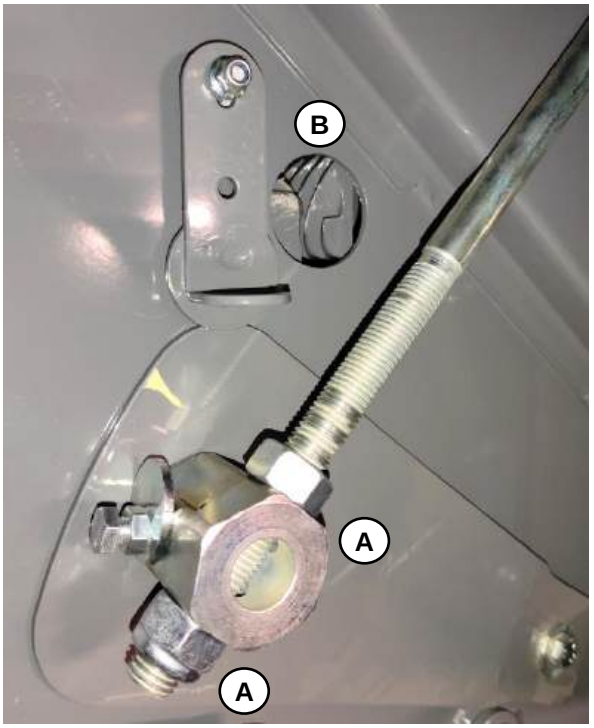
Adjust the concave indicator to position 6 in Comvision II. Now the clearance is 6 mm at the first concave rasp bar. Correspondingly, the clearance at the last concave rasp bar is 3 mm (A) if the ratio is in position 1:2 which is the factory setting (arrow pointed position in illustration). If the ratio is in position 1:1.5, the clearance is 4,5 mm. If the ratio is 1:1, the clearance is 6 mm.



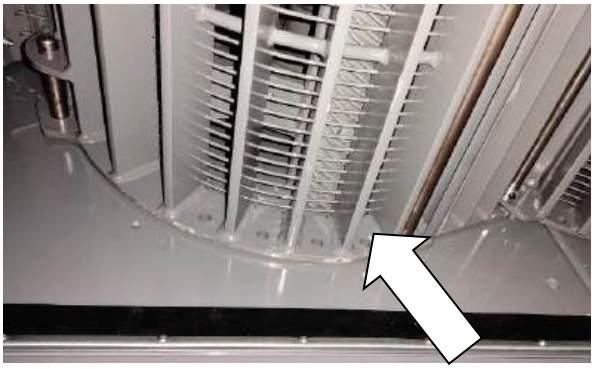
Comvision II

If there is deviation measured from B, using tool R152308, adjust the clearance using nuts (A) at the lower end of concave adjusting arm.

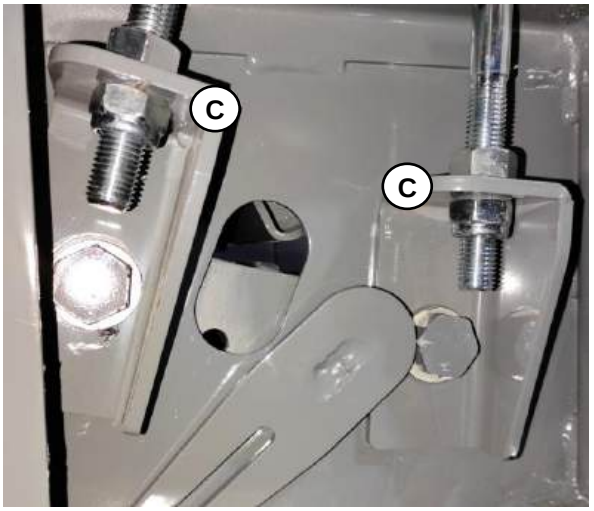
Check the measurements from all the four corners of the concave, front and rear both sides.



Hint! To measure concave front, slide leftmost and rightmost grain pans just to access concave front. Measure using tool T712561.

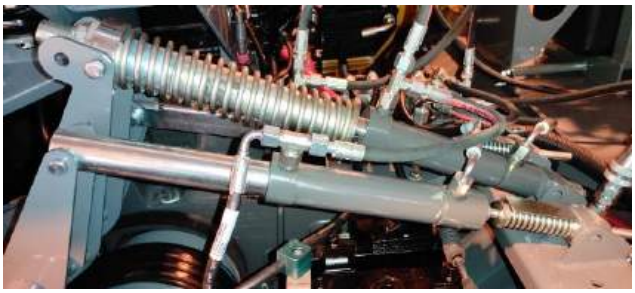


PTC (option) clearance should be 10 mm. Adjust the clearance using nuts (C). Measure both sides.



Belt and chain tensioning

NOTE: Check the tension of all the belts after the first day of harvesting.

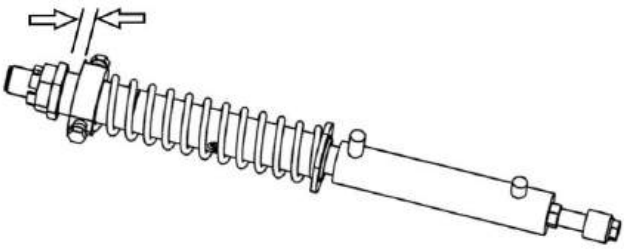


Left side of the combine

Threshing mechanism engage

The threshing mechanism uses a four-row drive belt. The belt and its tensioning device are located behind unloading pipe in the engine compartment.

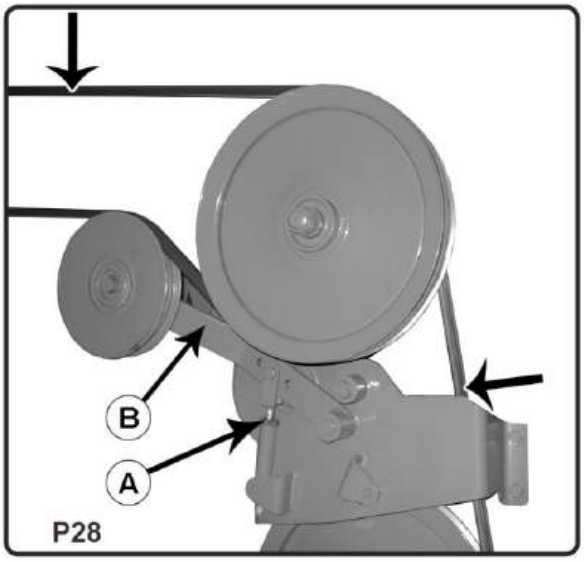
Check the drive belt tension with the threshing mechanism running. Check the tension visually looking from behind the engine compartment. Be very careful when carrying out the check.



There must be a minimum of 8 mm gap A, between the edge of the limiter sleeve and the lever bracket beam. When necessary, the adjustment is made with the engine stopped the ignition key removed.

DRIVE BELT IN CLEANING MECHANISM IN ALL MODELS

The belt is located under the left side guard of the combine. The belt-tensioning device is stiff, without any spring. The belt tension is correct when the deflection midway on the upper span is 10 mm when pressing by thumb (100 N = 10 kg). Fig. P28
If necessary, the tension is adjusted by turning adjuster sleeve B in the required direction.

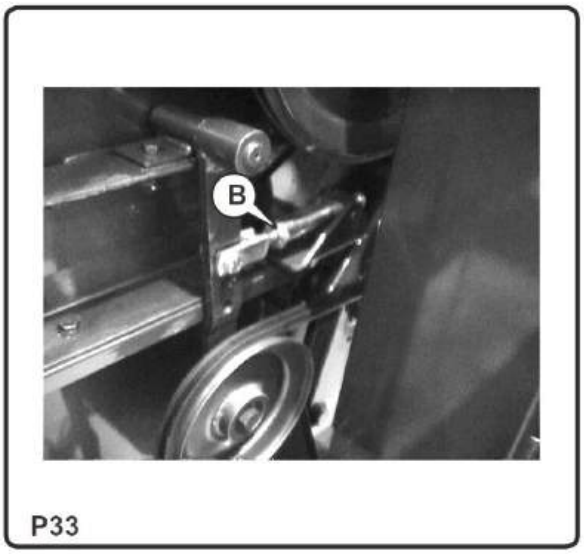


SHAKER SHOE DRIVE BELT IN ALL MODELS

The belt and its tensioning device are located under the left side guard of the combine. The belt-tensioning device is stiff, without any spring. The belt tension is correct when the deflection midway on the lower span is 10 mm when pressing by thumb (100 N = 10 kg). If necessary, the tension is adjusted by turning adjuster sleeve A in the required direction. Fig. P28

STRAW WALKER (C10 AND C12) AND RETURN SYSTEM BELT (ALL MODELS)

The belt and the tensioning device are located under the right side guard of the combine.
The belt-tensioning device is stiff, without any spring.
The belt tension is correct when the deflection midway on the vertical span is 20 mm when pressing by thumb (75 N = 7,5 kg).
Fig. P33. If necessary, tension the belt by turning adjuster sleeve B in the required direction.

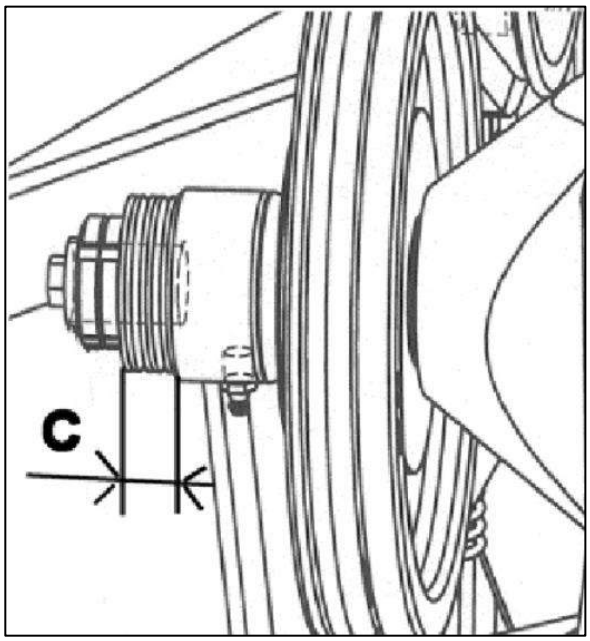


Return system drive in hybrid combines

The belt and its tensioning device are located under the left side guard of the combine.

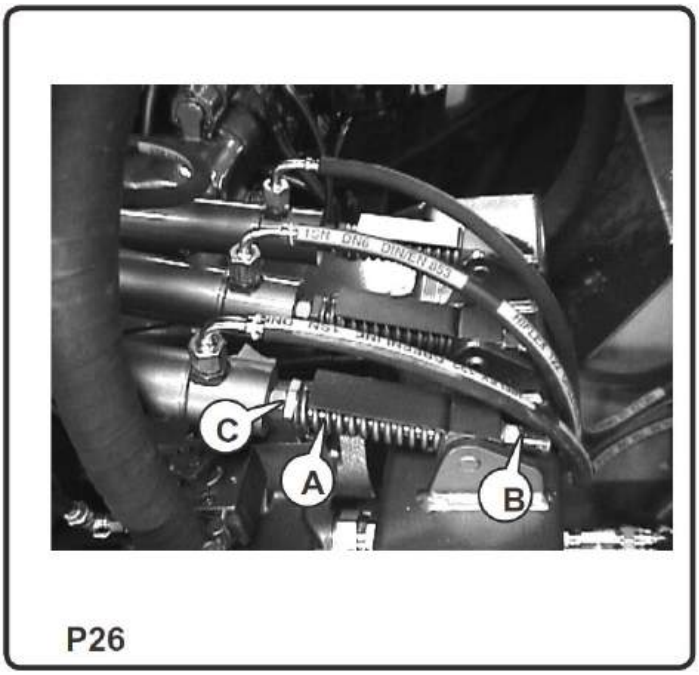
The tension is correct when spring length corresponds with length of the measuring plate (A). If necessary, the tension is adjusted by turning adjuster sleeve in the required direction.

The overload clutch is located by the drive pulley of the gear. It is a friction plate clutch. The function of the clutch shall be checked before every harvesting season. Slacken the spring to ensure that the plate is not stuck. After checking, tension the spring to the required tension. The tension of the clutch is correct when spring pack C is 14 mm thick.



STRAW CHOPPER CLUTCH BELT IN C10 AND C12

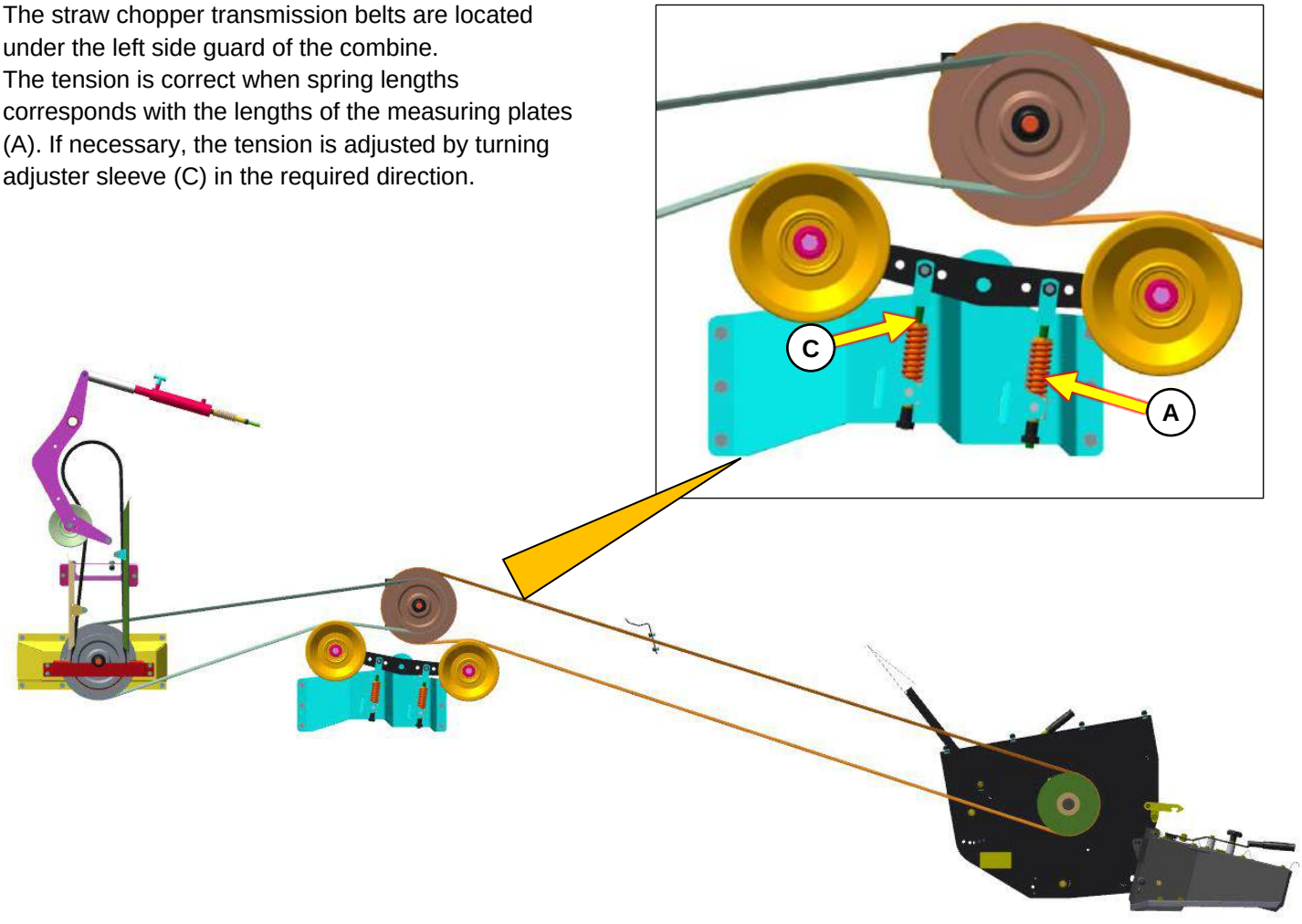
The belt and its tensioning device are located under the left side guard of the combine and in the engine compartment. Check the belt tension with the threshing mechanism and straw chopper running.
Check the tension visually looking from behind the engine compartment. Be very careful when carrying out the check. End of measuring plate (A) shall come up to the outer edge of the hexagonal part of the adjuster sleeve when the threshing mechanism is running at normal speed without any load. Fig. P26.
When necessary, the adjustment is made with the engine stopped and the ignition key removed.
To adjust the belt, loosen locking nut B and turn adjuster sleeve (C) in the required direction as far as needed. Check and readjust if necessary.
Lock locking nut (B).
Note that the jockey pulley can be fitted in two different holes in its lever. Move the pulley if necessary.



P26

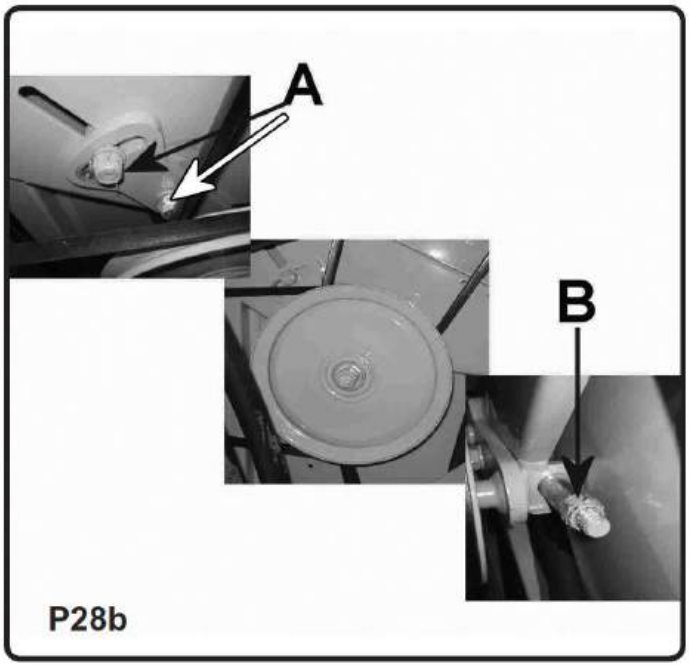
STRAW CHOPPER BELTS IN ALL MODELS

The straw chopper transmission belts are located under the left side guard of the combine.
The tension is correct when spring lengths corresponds with the lengths of the measuring plates (A). If necessary, the tension is adjusted by turning adjuster sleeve (C) in the required direction.



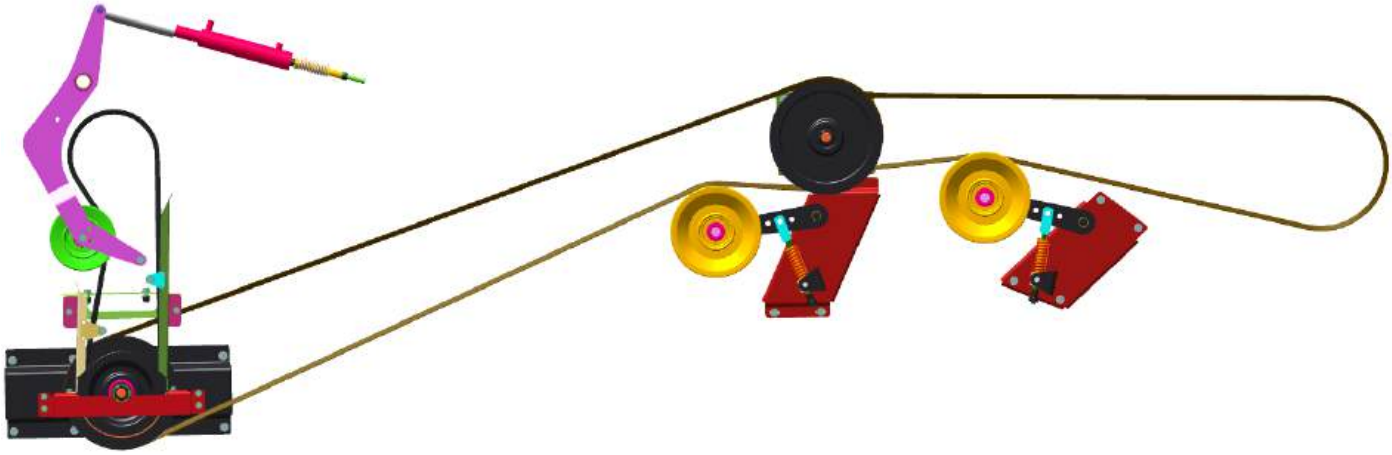
CSP DRIVE (OPTION) BELTS IN C10 AND C12

The CSP drive belts are tensioned by adjusting the intermediate pulleys.
Both the belts become tensioned simultaneously.
Undo pulley locking screws A behind the pulleys.
Adjust the tension with screw B. The tension is correct when the deflection midway when pressed by hand (20-30N = 2-3kg) is 15 mm



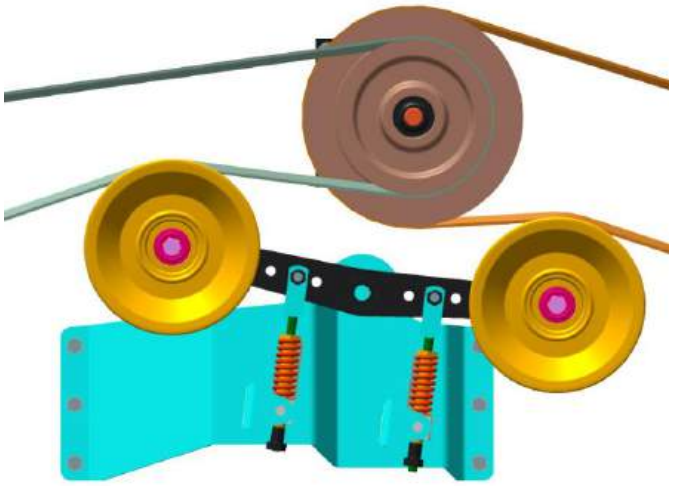
Rotor and chopper engage in hybrid combines

Rotor and chopper engage automatically when threshing system is engaged. Cylinder press arm and starts rotating pulley. Cylinder spring tension is adjusted according to guide plate (78 mm). Tensioner springs are adjusted according to guide plate (75 mm). Both springs can be adjusted without removing hood cover.

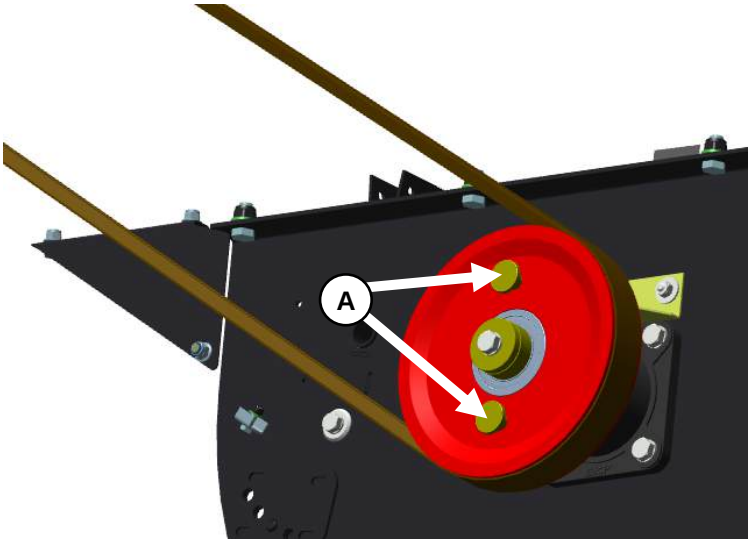


Chopper drive

Chopper drive comes from same pulley than rotor drive. Tension both springs according to guide plate (75 mm).



To disable chopper drive, pull slightly outwards pulley pins (A) in chopper side and turn guide plate to long straw mode.

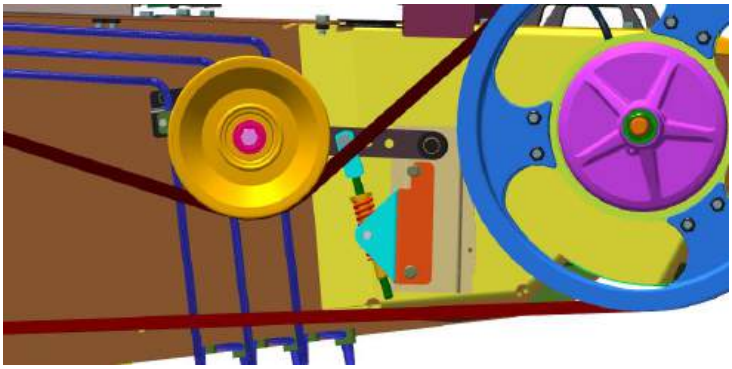


Cutting header engage

The belt and its engaging device is located under the left side guard under the grain tank. Tension is correct when spring is adjusted to same length as guide plate (75 mm).

Feeder elevator

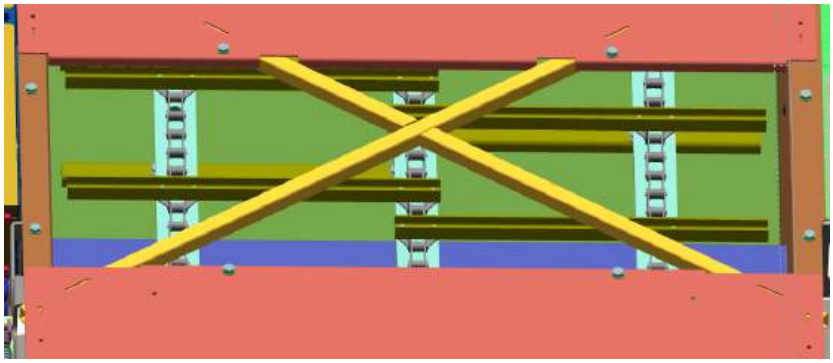
Double belt runs through left side of feeder elevator under cover plate. Belt can be adjusted without removing the cover. Adjust spring length to 72-74 mm.

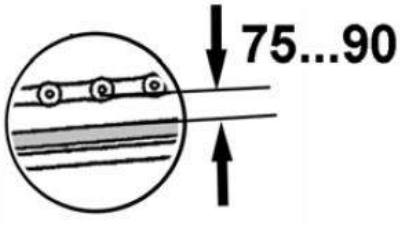


Feeder elevator chain

Remove middle cover of feeder elevator and lift left and right chain with hand. Tension is ok, when chain can be lifted 75-90 mm. Adjust in both side of feeder elevator if needed.

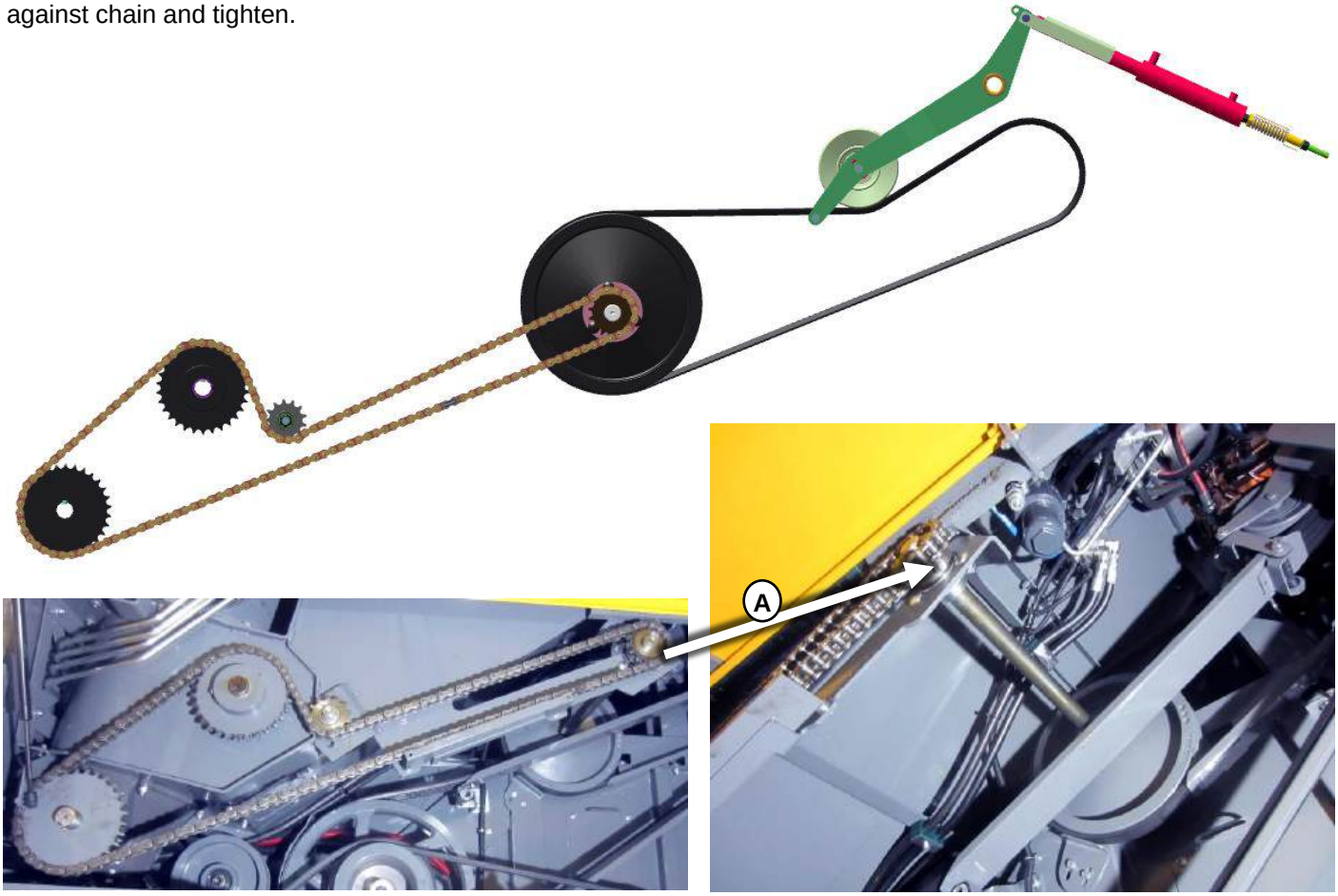
HINT! Third chain bar from the front touches slightly floor.





Grain tank unloading

Unloading is engaged with cylinder pressing belt and transferring drive to pulley and chain driving unloading augers. Cylinder spring tensioned according to the guide plate (78 mm). Chain is tensioned by pressing sprocket down against chain and tighten.



There is a shear bolt A to prevent damage to unloading chain or drive shaft

Header

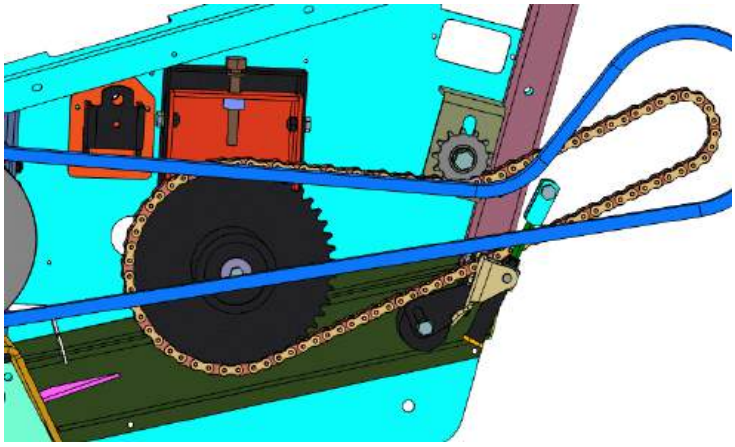
Knife drive and feeding drum

The belt and its tensioning device are located under the left side guard of the cutting header.

The belt tension is correct when the deflection midway on the lower span is 16 mm when pressing by thumb (45 N = 4.5kg).

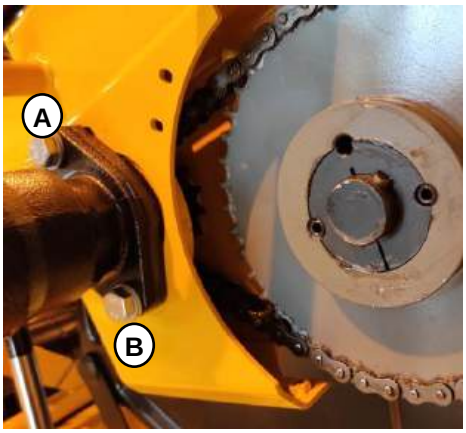
If necessary, the tension is adjusted by turning adjuster sleeve in the required direction.

Feeding drum chain is adjusted by moving sprocket against the chain.



Reel chain

To tension the chain, loosen screws A and B, and turn hydraulic motor. There must not be slackness in the chain, but it must rotate lightly without any jerks.



Right side of the combine

Threshing cylinder variator

Located right side of combine.

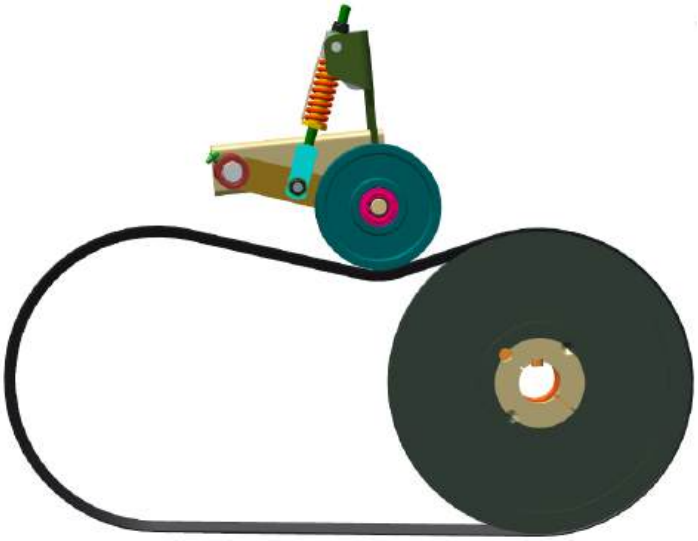
Belt tension is automatically adjusted with spring load in threshing cylinder pulley. RPM is adjusted with rear beater pulley with electric motor through chain.

Threshing variator tension is maintenance free.

Use variator once a week in slow and fast speed, this secure that variator adjustment works smoothly.

Pre-threshing cylinder (C12, C22 and C24)

Spring is tensioned according to guide plate (78 mm).



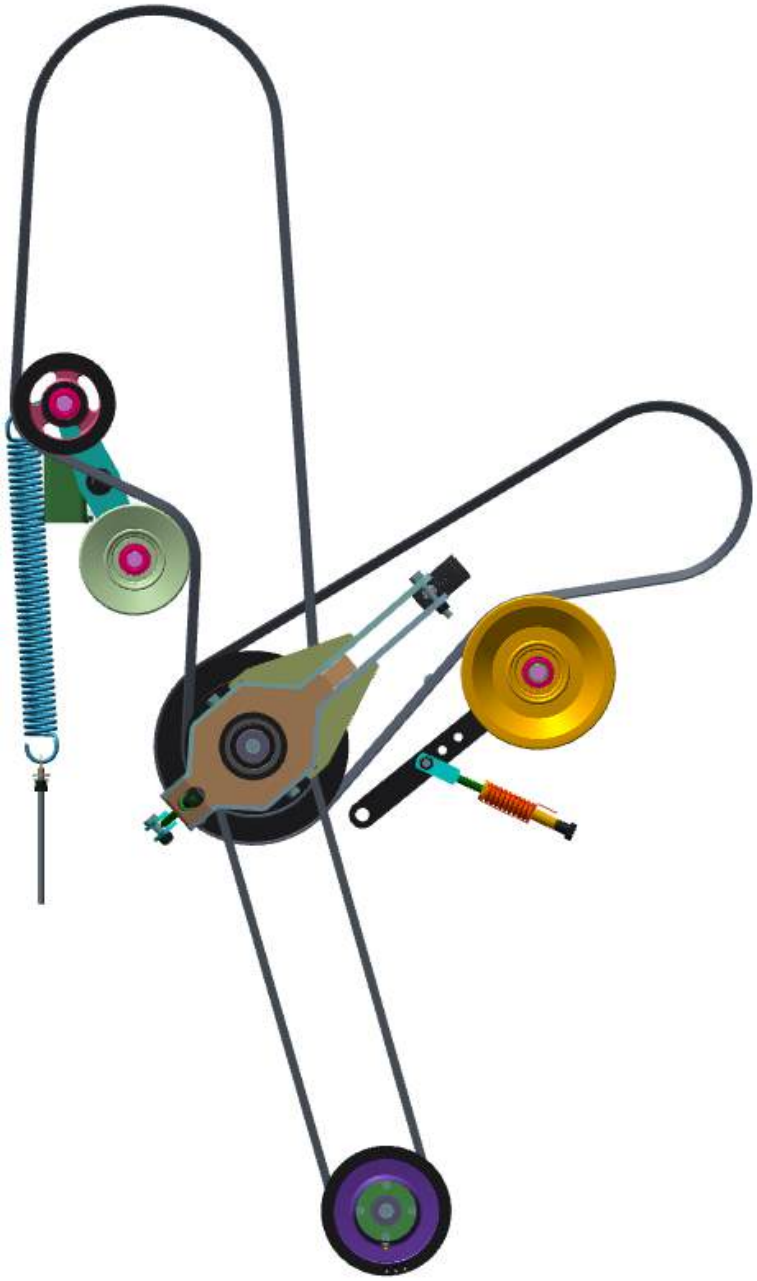
Fan variator and elevator drive

Fan speed is adjusted electrically, and belt tension is spring loaded. Spring is not adjustable.

Drive from rear beater is adjusted according to guide plate (75 mm).

Elevator drive tensioning spring is located behind the grain elevator. Spring length is adjusted to maximum tension position.

Use fan variator once a week in slow and fast speed, this secure that automatic tension works smoothly. Pay attention lower variator greasing.

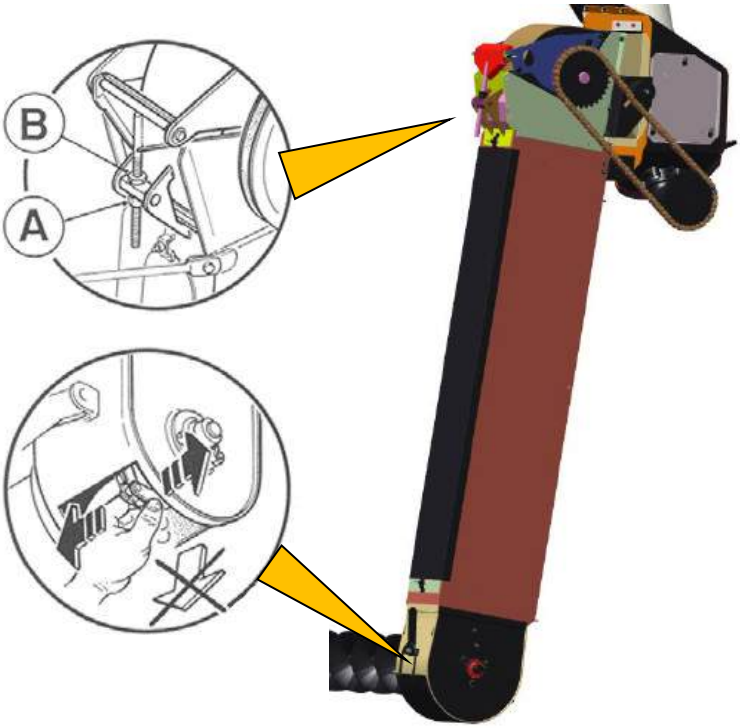


Grain elevator chain in C10, C12 and C22

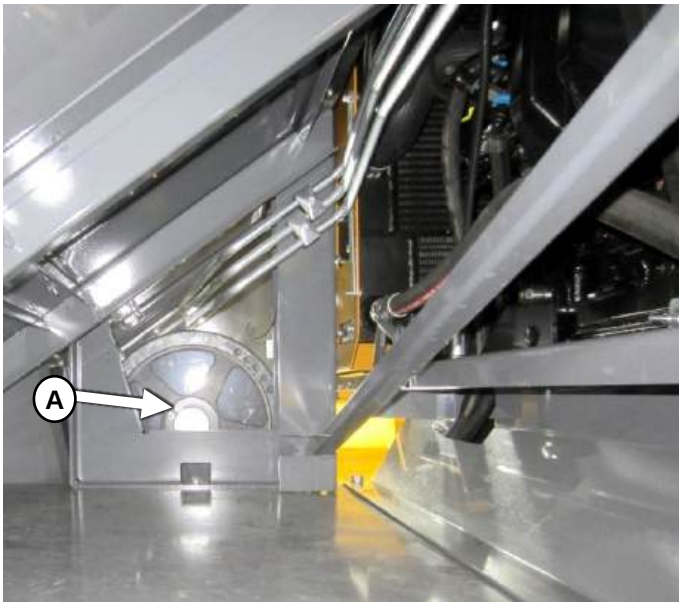
Check the tension of the chain through the cleaning door at the bottom of the elevator. Check the tension with a tooth on the bottom sprocket pointing downwards. The tension is correct when the chain can be moved sideways by hand on the lowest sprocket, but there is no radial play.

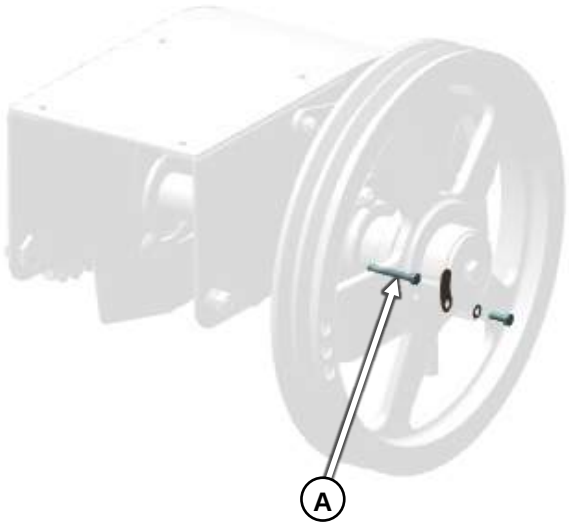
Keep tensioning the chain until when turning the drive pulley with the chain slack, some tension can be felt as the chain goes “beyond a tooth“. Slacken enough not to feel any jerking.

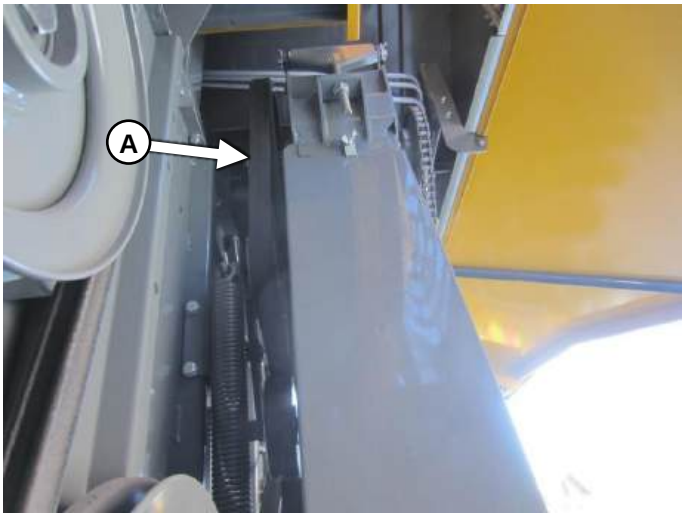
Tighten nut A after the adjustment.



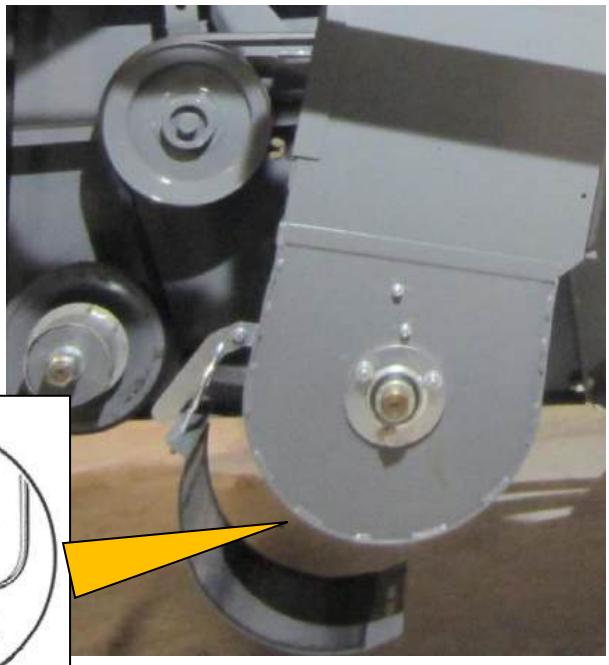
Grain elevator´s drive shaft and pulley are situated at top end of the grain elevator between frame and elevator. The drive pulley is equipped with shear bolt (A) which is situated under a flap. Part code 6212477 (M6x45 DIN 931-8.8). A view from compartment between the engine and grain tank in the upper picture.





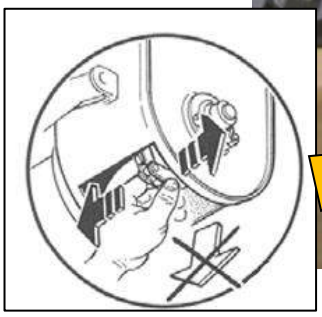


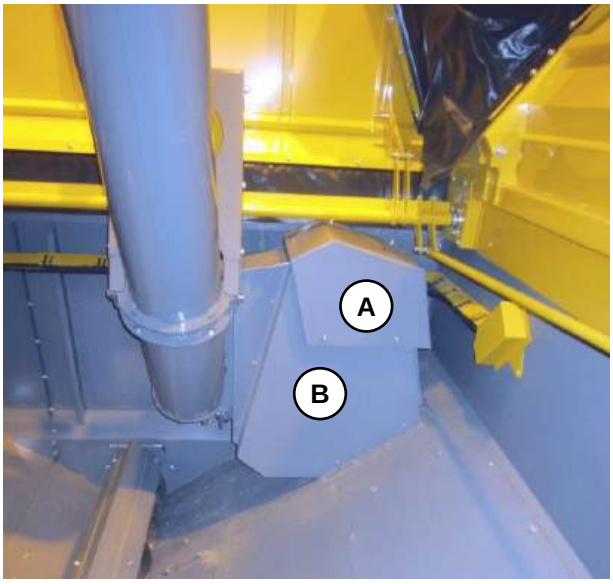
Grain elevator chain in C20 and C24



Check the tension of the chain through the cleaning door at the bottom of the elevator. Check the tension with a tooth on the bottom sprocket pointing downwards. The tension is correct when the chain can be moved sideways by hand on the lowest sprocket, but there is no radial play.

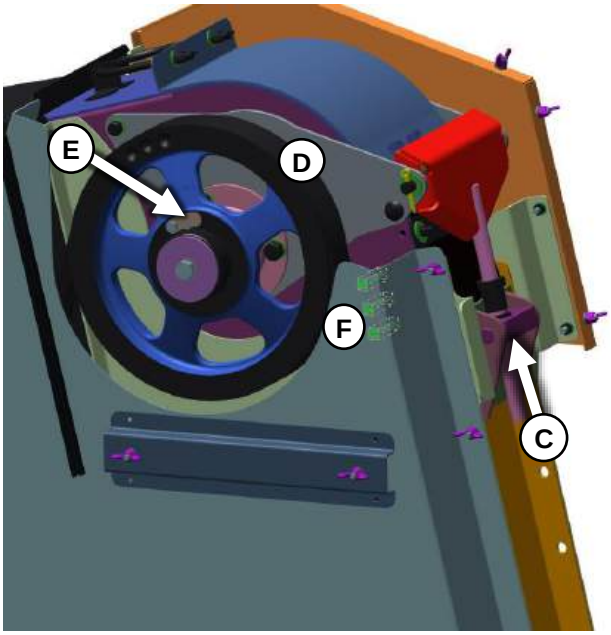
Keep tensioning the chain until when turning the drive pulley with the chain slack, some tension can be felt as the chain goes “beyond a tooth“. Slacken enough not to feel any jerking.





Access to top structure of the elevator and filling auger is situated in grain tank. Upper cover (A) for check of the grain elevator pulley, belt and chain. Lower cover (B) for check of the filling auger drive and angle gears.

Structure under upper cover

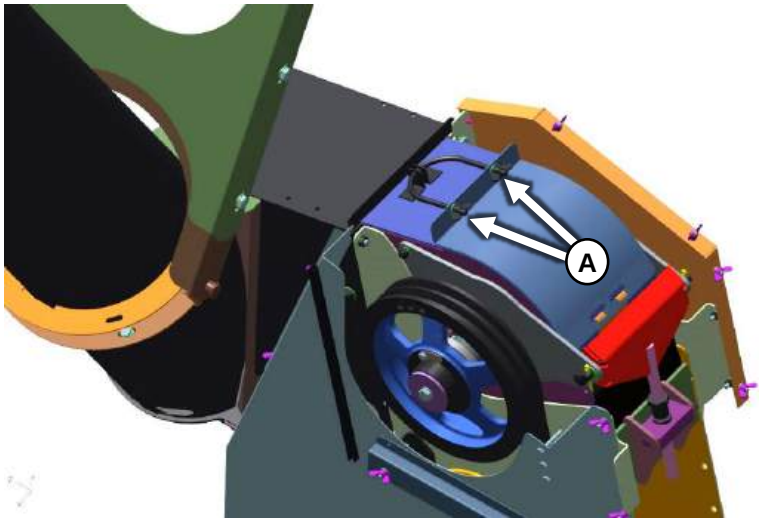


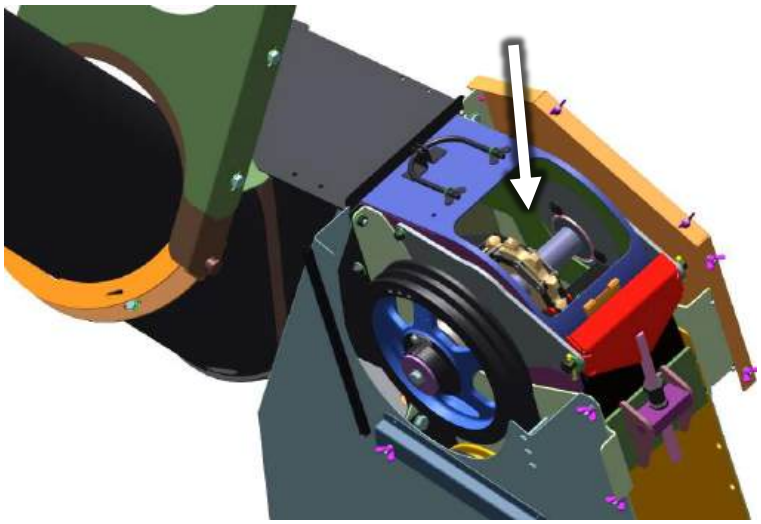
Tighten nut (C) after the adjustment described in first chapter this page.

(D) Grain elevator drive pulley
(E) Shear bolt. Part code 6212477 (M6x45 DIN 931-8.8).
(F) Spare pcs, shear bolt

Under upper cover in the grain tank.

Wing nuts (A) to open a hatch for checking and cleaning the grain elevator chain.





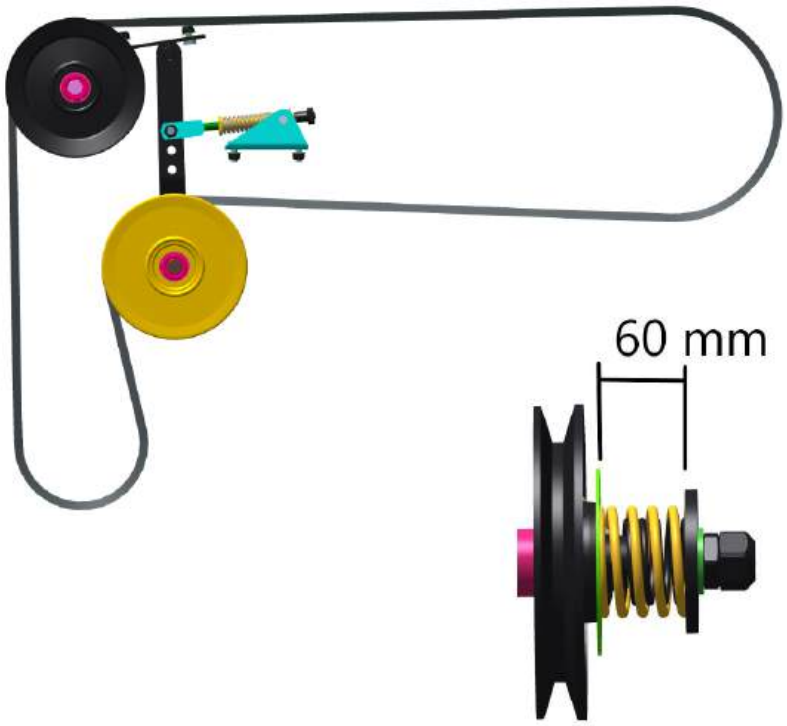
Under lower cover for check of the filling auger drive and angle gears.

(B) Filling auger angle gear drive pulley
(C) Idler pulley

Return system bottom auger in C20, C22 and C24

Tensioning spring is adjusted according to guide plate (78 mm).

Return bottom auger clutch is spring loaded. Correct tension 60 mm.



Return system bottom auger and straw walker drive in C10 and C12

Engine area

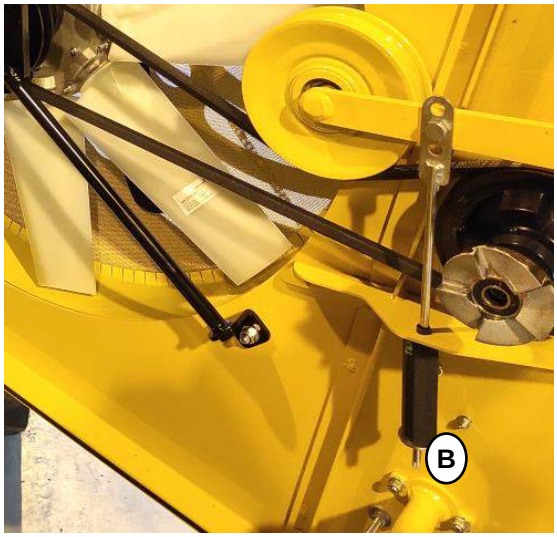
Radiator

Belt tension is correct when length A of the spring is same as length of the tube covering it (105±2 mm).

If necessary, the adjustment is made with nut B.

Cooling fan

The engine-cooling fan is located on the right-hand side of the combine inside the cooling unit, which can be opened. Belt is tensioned with a spring. Belt tension is correct when length A of the spring is same as length of the tube covering it (105±2 mm). If necessary, the adjustment is made with nut B.



Compressor belt in A/C

The refrigeration compressor is located at the front of the engine. It is driven by the water pump disk. The belt tension is correct when the deflection is 10 mm when pressing by thumb (200 N).
To adjust the belt, slacken adjustment screw (under compressor) and sectional screws A. Turn the compressor with a suitable lever and lock the slackened screws.

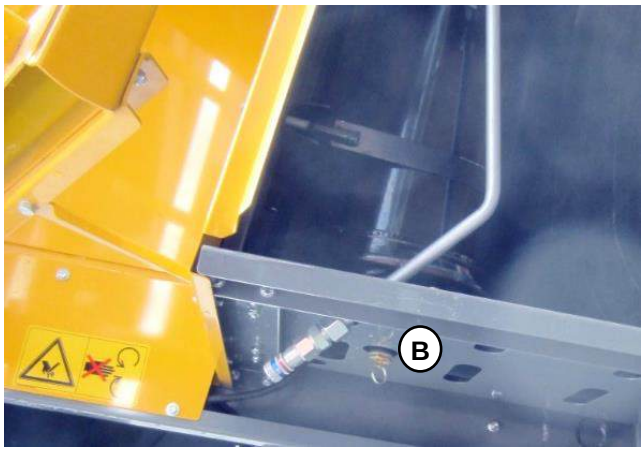
Compressor, pressure air system (option)

When working with pressured air, wear always protective clothes, gloves and eye protection.

Compressor (A) is situated in engine compartment.

Air output plugs are located in many places around the machine.

Air tank is equipped with drain valve (B) to let out condensation. The valve is on the air tank, on the underside. Let out condensation water once in week during the season.



Bypass valve (C) on the right side, close to fuel tank.

When Replacing the BELTS, Return the Bows and Belt Supports to their Original Positions

Particularly when changing the clutch belts in the threshing machinery, grain tank unloading and the chopper, check that the belt support and the bows round the pulleys supporting the belt are refitted correctly. Mark the positions before removing the parts to ensure re-assembly in the same positions. A new belt must be tensioned after a few operating hours. Always check the condition of the pulleys, too. The sides of the pulley shall be straight, smooth, and rust- free. If necessary, clean with fine sandpaper. Replace worn pulleys as a pulley worn rough cannot convey the necessary power, but the belt gets damaged quickly. Always use original belts. They have been tested by the Manufacturer to meet the quality requirements.

Chopper knives

Lift straw spreader to service position to access chopper knives.

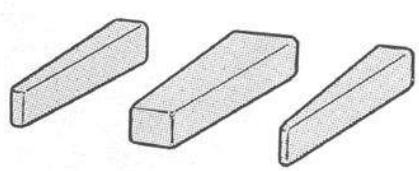
If the rotor knives (or knife) are worn, they can be inverted. Broken or damaged knives must be replaced. To maintain the rotor balance, it is important always to change the opposite knives pair as well.

To remove a knife, unscrew locknut A. Now remove the fixing screw from the joint, which will disassemble the joint.

Counter knives are fastened with a locking rod, which is pulled out before changing the knives.

Removing a gib key with a Tool

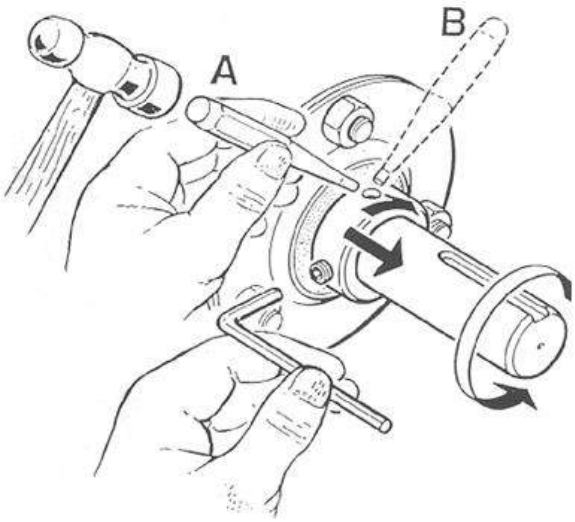
To keep a gib key in good condition for re-use, use tool set R116007 to remove it.



Removing and Refitting of a Bearing Locked with an ECCENTRIC RING

Removing:

Slacken the grub screw in the locking ring and open the eccentric ring by hitting the ring in the opposite direction of shaft rotation with a mandrel. Unscrew the flange locking screws, remove the outer flange and pull the bearing off the shaft.



Refitting:

Fit the inner bearing flange.

Fit the bearing, locking ring and outer bearing flange. Fit the fastening screws of the flanges and tighten by hand.

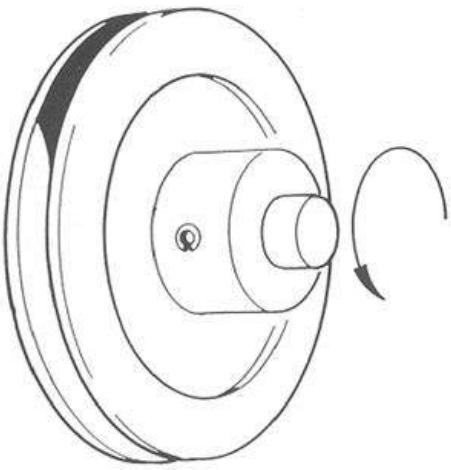
Check the shaft position and tighten the flange screws.

Lock the locking ring in the direction of shaft rotation by hitting it with a mandrel.

Lock the grub screw on the locking ring.

Spring cotter notch

Note the position of the cotter notch regarding the load direction. Some joints have two cotters within each other in which case the notches face each other.



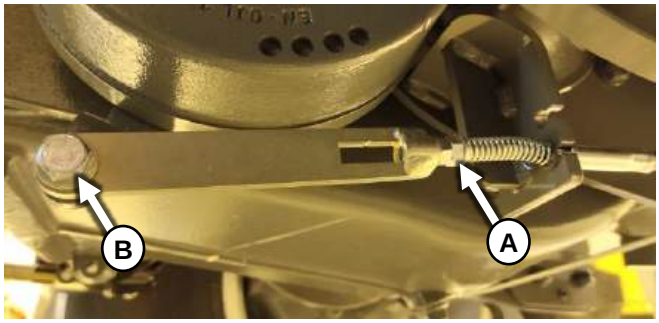
Brakes

The driving brakes are of hydraulic disc brake type. They do not need any adjusting. Monitor the friction plates for wear and replace when necessary. Bleed if necessary.

The brake fluid tank is behind the cab right side of the combine. Check the fluid level on a regular basis. The fluid shall be changed every two years. Adjustment and maintenance tasks of the brakes shall be done by authorized service personnel approved by the manufacturer of the combine.

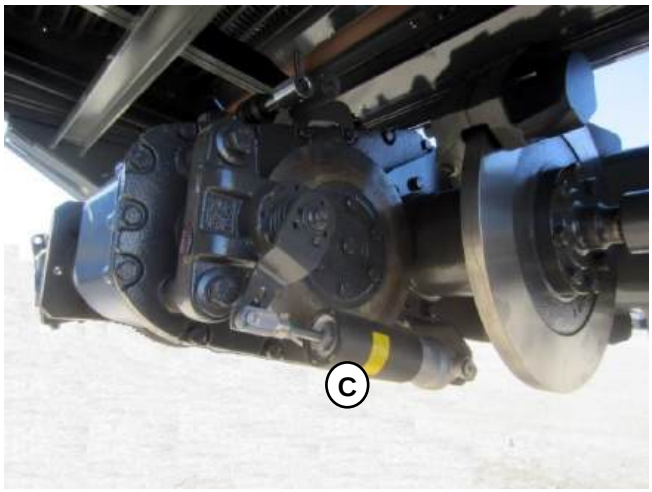
Parking brake

The brakes shall be adjusted on a regular basis due to wear of the brake bands. The free travel of the hand lever on the toothed arc must not exceed 5-6 teeth. The adjustment can be made either at the upper or lower end of the brake wire. The easiest way is to adjust the brake lever at the lower end of the wire. Locking nut A is slackened, pin B of the fork is removed and the fork is turned to shorten the wire as required. After the adjustment, lock the slackened joints.



Electric parking brake (only C24)

This switch activates and releases the parking brake with model C24. A light diode shines in the button when the parking brake is engaged. Use the brake only when parking, and fully release it before driving.



Parking brake rod console (C)

Cabin filters

Regular daily cleaning of the suction air filter is the most important maintenance measure. The filter is of two-stage type. At the front there is a course mesh filter in a frame. Behind it there is a fine filter, a replaceable paper element.

To remove the side filter, unscrew screw A and slacken screw B. To remove the back filter, turn the holder plate.

The best way to clean the filters is with compressed air. The course mesh filter may be washed in washing- up liquid, if necessary. The paper filter must be replaced minimum once a year. Filter inside the cabin on the left side must also be replaced minimum once a year.

The condenser in the air conditioning equipment in front of the engine radiator must be cleaned daily, if necessary, by blowing air into the cell from the engine side.

Take care not to damage the heating cell.

The evaporator and the heating cell as well as the air channels and the fan shall be cleaned minimum once a year, and in dusty conditions more often.

AC system

The check shall be conducted at the beginning of every harvesting season. There may be some leaks, particularly if the cooling system is unused for a long time. Slight leakage is normal.

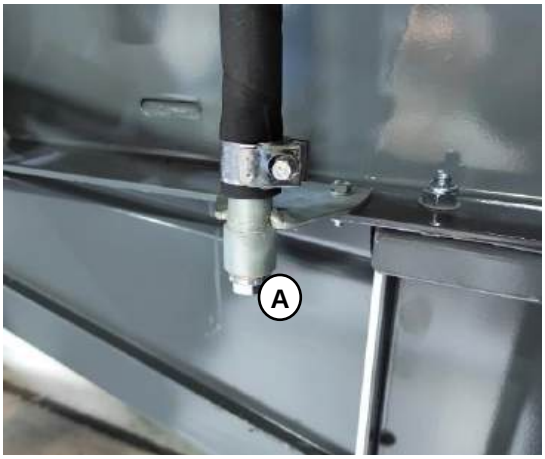
The check is made by running the cooling system at full capacity. Using a small mirror, look through the small inspection window on top of the drying cartridge to make sure there are no gas bubbles, but liquid behind the window. The incidence of gas bubbles is allowed only for a short period after the compressor switches on. The dryer is in the engine compartment in the coolant hose between the condenser and the cab.

Be very careful as the check is made with the engine running. If a refill is needed, it shall be done by an authorized service person.

Engine

Complete service and maintenance instructions for the engine are provided in a separate engine manual

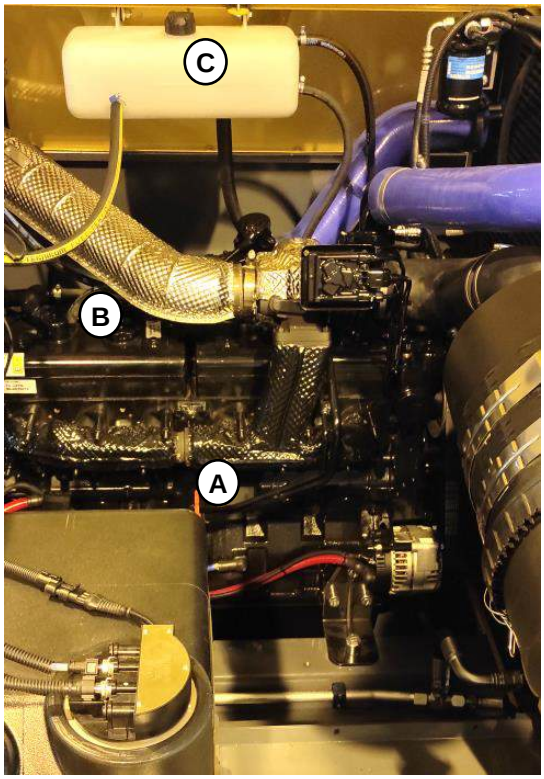
Oil change always after the harvesting season or after DPF regeneration (stage V engines).



The oil is changed every 400 h and always during the winter service.

The old oil is drained from the warm engine by removing plug A off the oil drainpipe on the right side of the combine near fuel tank.

Used oil is problem waste, which shall be disposed of in an appropriate manner.



A Oil Measuring Dipstick

B Oil Filler

C Coolant Filler

Types and quantities of oil to be used are given in the oil table and the engine manual.

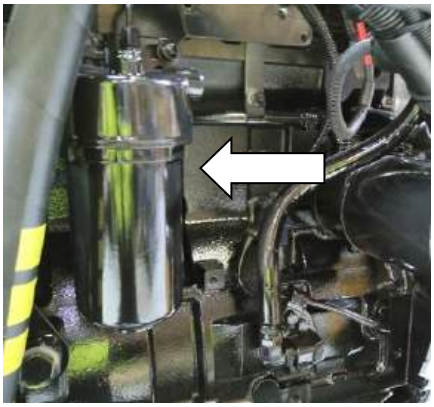
Replacement of the Oil Filter

The oil filter is replaced every time the oil is changed. The filter is replaced through the service door on the back wall of the grain tank. Remove the ignition key before the operation.

Used filters are problem waste, which shall be disposed of in an appropriate manner.

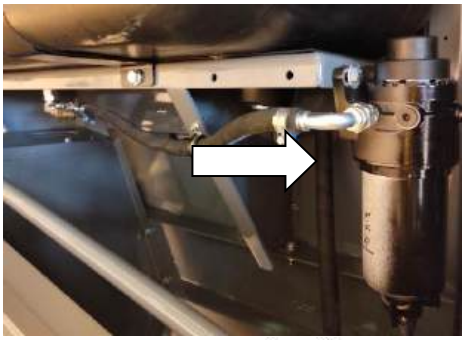
Check the instructions for filter change in the engine manual.

Fuel Filters



Fuel filters is next to oil filter. Pre-filter and extra water separator are located under the fuel tank. Filter is replaced through the service door on the back wall of the grain tank. Remove the ignition key before the operation to ascertain no outsiders can start the engine.

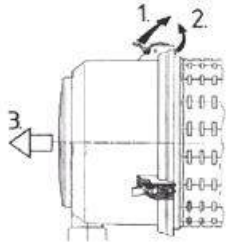
Drain any condensed water into a dish weekly. Replace the filters as instructed in the service table or more often in case of clogged filters. Fault code “LOW FUEL PRESSURE” refers to a clogged pre-filter or air leak in the pipes.



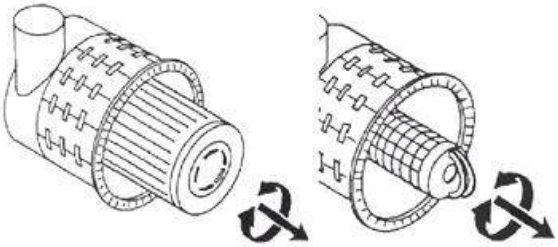
Used filters are problem waste, which shall be disposed of in an appropriate manner.

See instructions for filter replacement in the engine manual.

Engine air filter



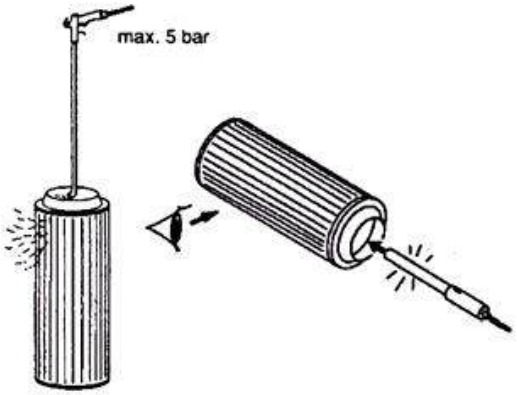
The engine suction air is purified by a pre-filter and a double-element, dry paper filter. Perfect functioning of the filter is an essential prerequisite for long engine life. The filter housing is in the engine compartment. Filter system blockage is indicated in Comvision II -display. The cover of the filter housing is attached with locking brackets and the filter cartridges are under the cover. Both the filters shall always be replaced at the beginning of the harvesting season.



The outer filter cartridge shall be replaced at least once a year. The outer cartridge may also be cleaned. The outer cartridge can be cleaned a maximum of five times.

Open the catches on the filter back 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 exceeding 5 bar) inside the filter. Take care not to damage the filter cartridge nor allow dust inside the cartridge.



After cleaning, the condition of the filter is checked. Direct a strong light to the inside of the filter. 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 services or at least every other year.

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

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

Note! Do not run the engine without filters.

Engine cooling air intake screen

The cooling air intake screen may have to be removed for cleaning or other maintenance purposes. It shall be done in the following manner:

Unlock locking A on the suction screen. Turn the screen open.

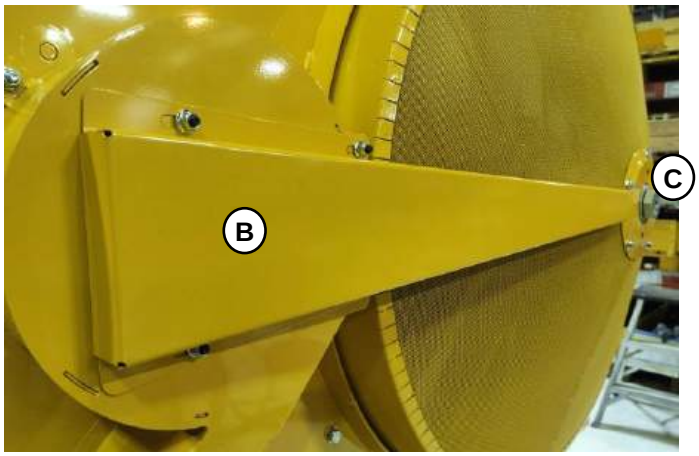
When refitting, keep the following in mind:

Make sure the gear clutch on the fan drive shaft is aligned with its counterpart.

If the rotating screen must be removed when the belt is replaced, for example, take the following measures: Undo the gas spring on the side guard and open the guard all the way.

Remove the top cover off the debris vacuum B.

Unlock fastening C on the rotating screen and pull the screen off its shaft.



You need a ladder to carry out the job.

Cooling system

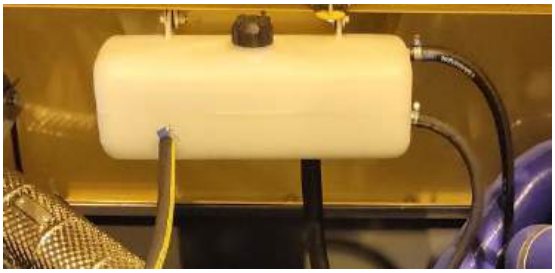
Draining of the System

The coolant shall be changed minimum every other year to maintain its anti-corrosion properties.

The cooling system is drained by opening the plugs in the lower part of the radiator and oil cooler plug as well as the expansion tank cap. To drain the heater cell as well, turn the temperature controller to maximum heating.

Used coolant is problem waste and shall be disposed of in an appropriate manner.

Filling of the Cooling System



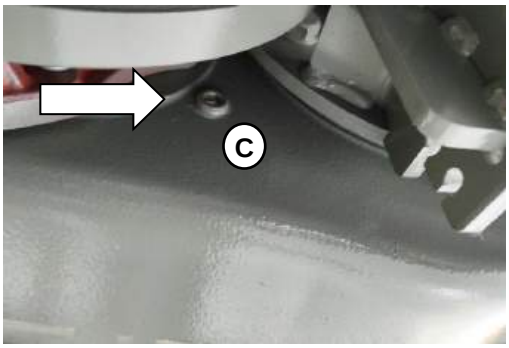
The cooling system is filled with coolant with 40-50 % of ethylene glycol added. Never use plain water as coolant. Before filling the system, the engine must have cooled off entirely. When refilling the cooling system, remember that the coolant expands considerably when getting warm, so the system must not be filled all the way up, but the upper tank shall be left 20-30 mm below the rim. See instructions in the engine manual. After filling, run the engine with the heater in its maximum position for approx. 5 min. to bleed the air from the heater. Check the liquid level after this.

With the Engine Overheating, Idle the Engine before Stopping If the engine is overheated, and the coolant begins to boil, reduce the engine speed immediately to idling, and let the engine idle until the temperature decreases.

Never open the filler plug on a hot radiator. Pressurized hot fluid will spurt out and cause serious injuries.

Transmission in C10, C12, C20 and C22

CIT GEARBOX

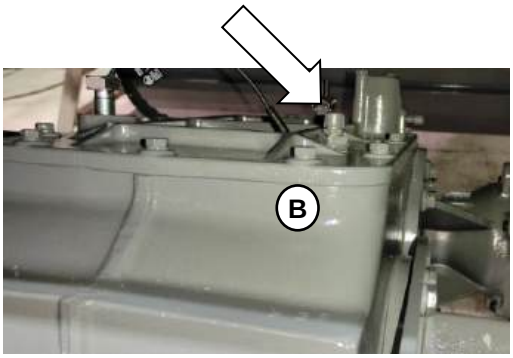


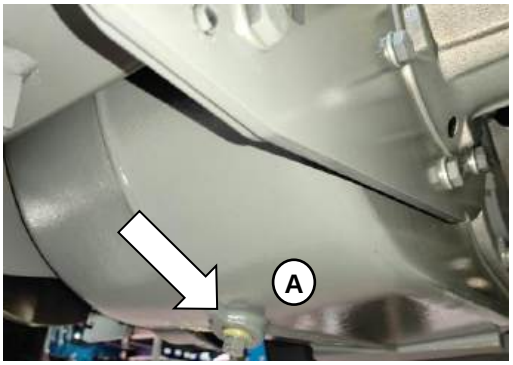
Check in check plug C that the oil level is level with the rim.

Change the oil every 600 h or once a year. Drain the oil by unplugging oil drain A. New oil is poured into filler B. The oil level shall be at the height of check plug C on the right side of the gearbox. Used oil is problem waste, which shall be disposed of in an appropriate manner.

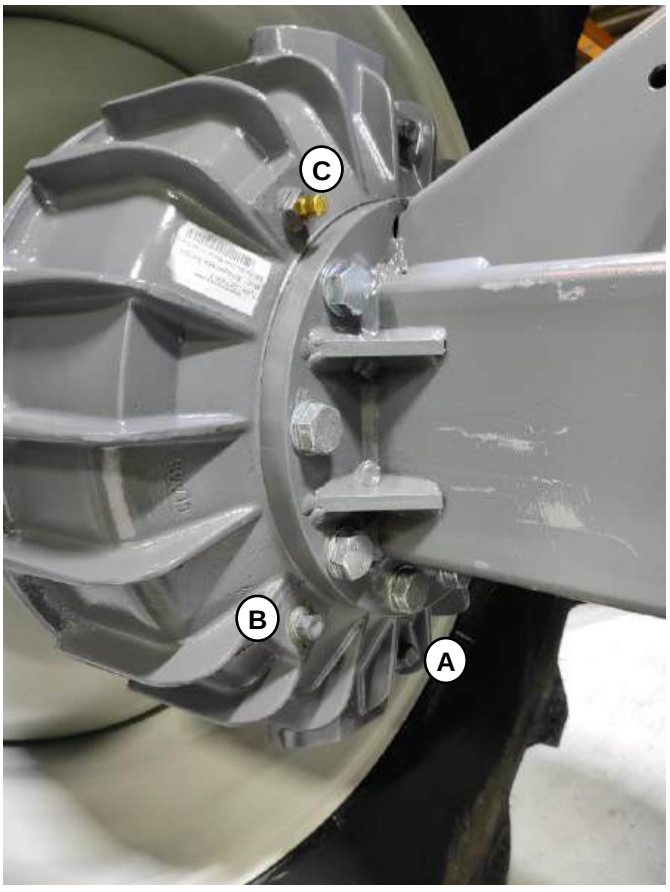
Use an oil type type 80W90 API GL-5. Volume 7 liters.

Check and clean, if necessary, add more from breather on the cover.





FINAL DRIVES



Check in opening B that the oil level is level with the rim.

Change the oil every 1200 h or at least every other year. Drain the oil by unplugging oil drain A. New oil is poured in through a funnel into filler B at level with the rim.

Used oil is problem waste, which shall be disposed of in an appropriate manner.

Use an oil type in accordance with the oil table.

Check and clean, if necessary, breather C in the upper section of the final drive.

Transmission in C24

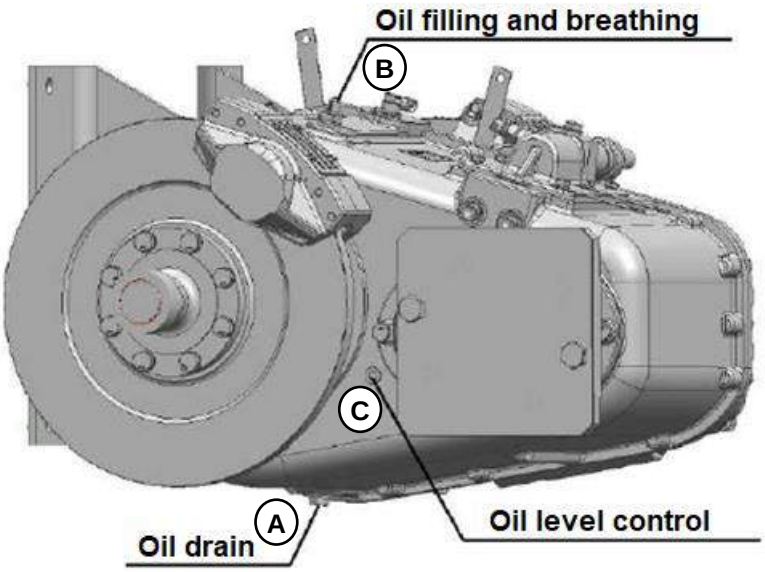
HS GEARBOX

Check in check plug C that the oil level is level with the rim.

Change the oil every 1200 h or once a year. Drain the oil by unplugging oil drain A. New oil is poured into filler B. The oil level shall be at the height of check plug C on the right side of the gearbox. Used oil is problem waste, which shall be disposed of in an appropriate manner.

Use an oil type 80W90 API GL-5. Volume 11 liters.

Check and clean, if necessary, add more from breather on the cover.



FINAL DRIVES

Check in opening B that the oil level is level with the rim.

Change the oil every 1200 h or at least every other year. Drain the oil by unplugging oil drain A. New oil is poured in through a funnel into filler B at level with the rim.

Used oil is problem waste, which shall be disposed of in an appropriate manner.

Use an oil type 80W90 API GL-5. Volume 8 + 8 liters.

Check and clean, if necessary, breather C in the upper section of the final drive.

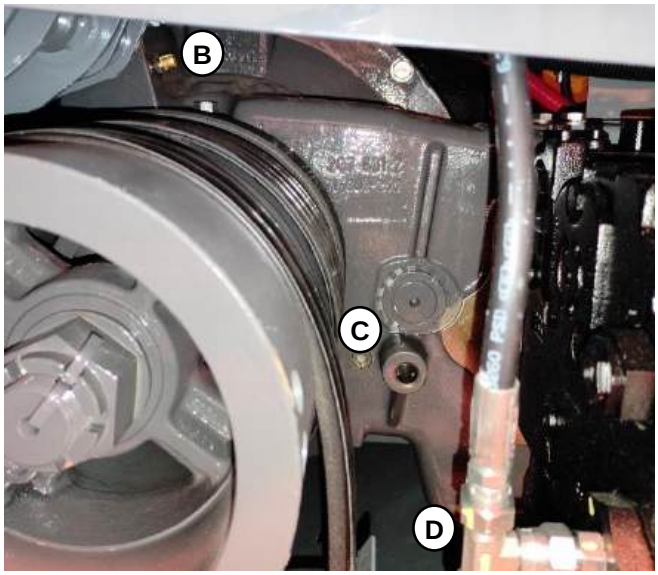
ENGINE SPLIT GEAR

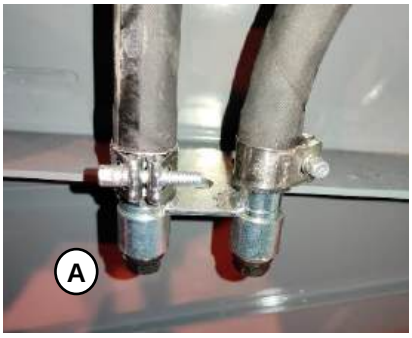
Oil quantity is checked through opening C. Oil level shall come up to the rim.

Oil is changed every 600 h or once a year. Oil is drained through drain plug A, on the left-hand side. (The front-most hose) After the oil has been drained, open and clean magnetic plug D at the bottom of the gear. When opening the plug, a small quantity of oil comes out. With a funnel new oil is poured into opening B up to the rim of monitor opening C.

Used oil is problem waste and shall be handled in an appropriate way.

Use types of oil in accordance with the oil table. Check and clean breather B on the filler when necessary.





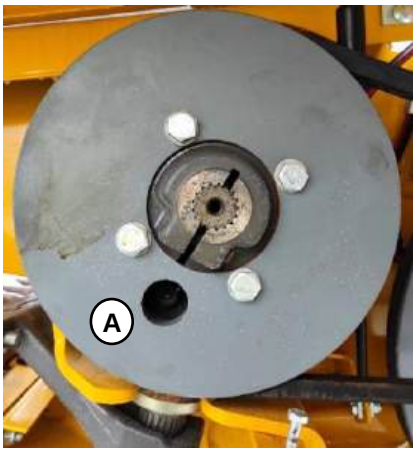
KNIFE DRIVE WOBBLE BOX

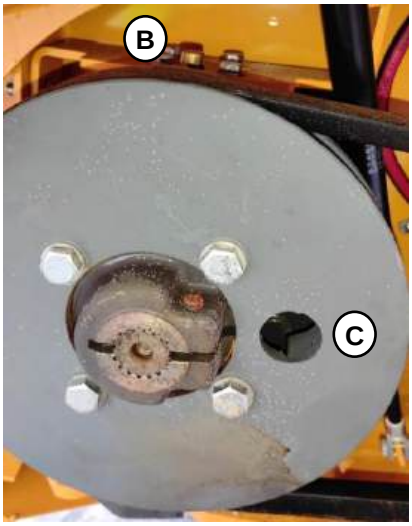
Oil quantity is checked through opening C. Oil level shall come up to the rim. Oil level can be checked through the opening in the drive pulley.

Oil is changed every 600 h or once a year. Oil is drained through drain plug A. Rotate the pulley to a suitable position.

With a funnel new oil is poured into opening B up to the rim of monitor opening C.

Used oil is problem waste and shall be handled in an appropriate way.



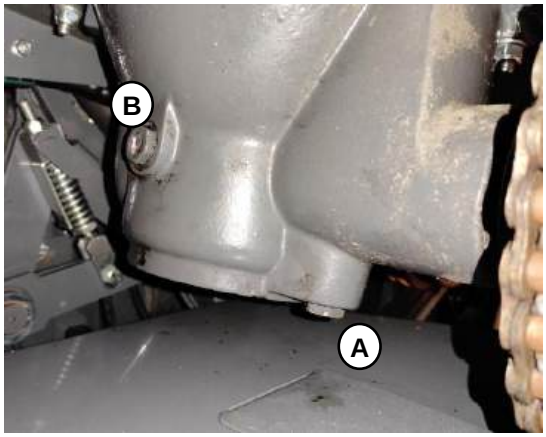


GEARING IN CLOSED UNLOADING

Bottom Gear

The unloading system of the closed grain tank houses two gear assemblies. One is at the bottom end of the vertical knife and is oil lubricated. Oil change once a year or every 600h.

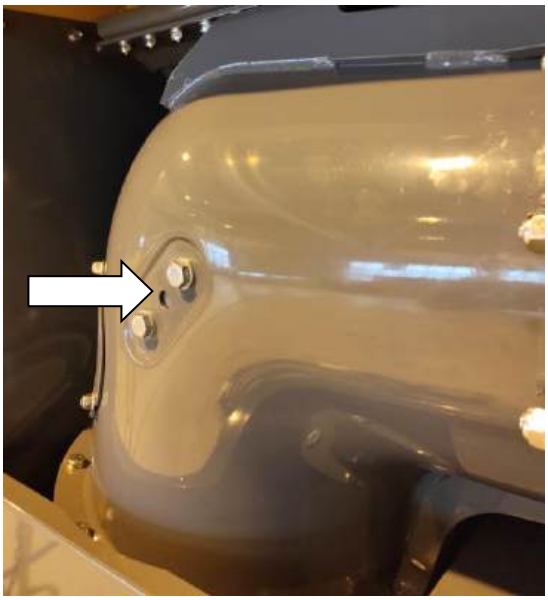
Open drain plug A to drain the oil. Add new oil in filler B level with the rim. There is approx. 1.5 l of oil.



Top gear

Top gear is permanently lubricated if grease point is missing. Older combines may have greasing point here an has to be lubricated once a year.

Augers still has to be lubricated inside of the unloading pipe. See lubrications.

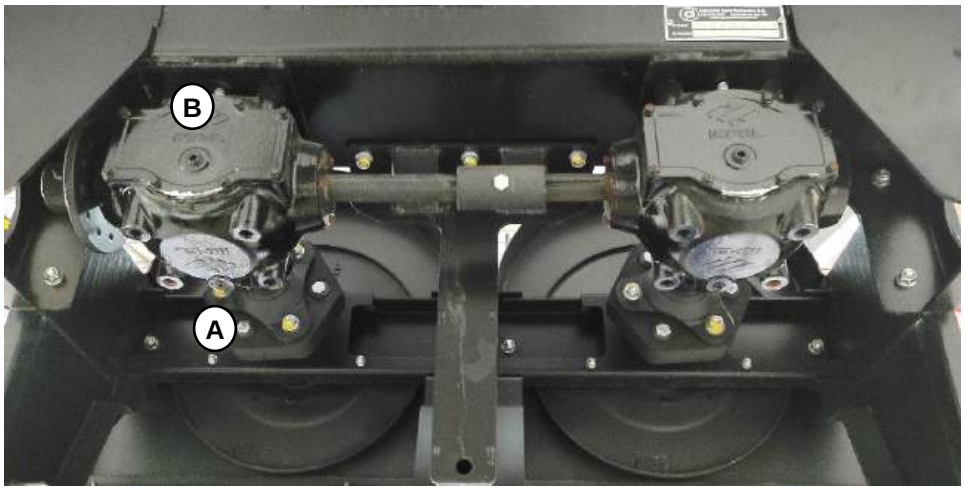


Rotor drive

There are two bevel gears with oil change interval every third year or every 1200 hours. Oil amount is 1,8 l each.

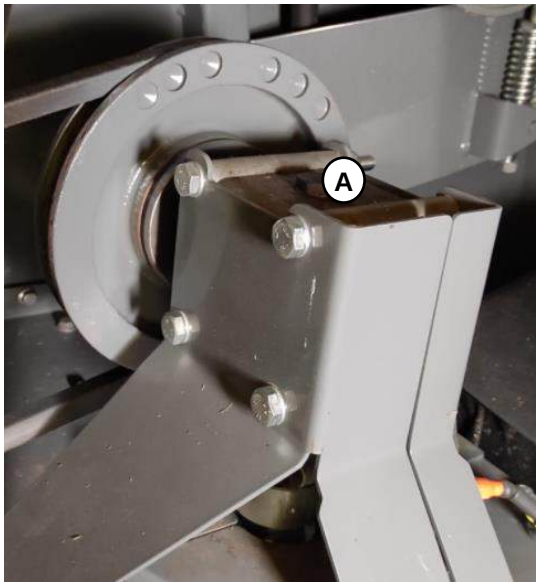
Draining point A

Filling and oil level check B

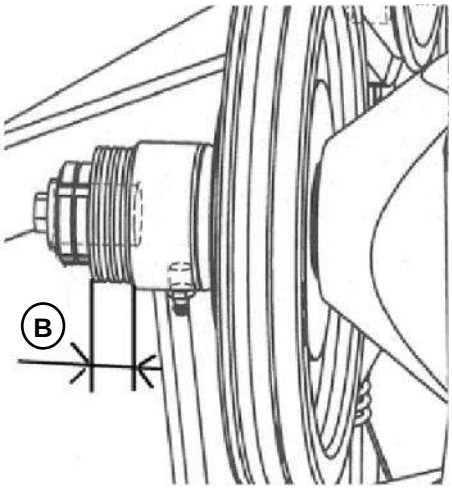


Return system bevel gear

In top of the vertical auger. Must be removed for oil change. Open cap A for oil change and measure 0,35 l oil and fill in. Oil change once in a year or every 600 h.



The tension of the clutch is correct when spring pack B is 14 mm thick.



Hydraulics

General Description

The combine has four separate hydraulic circuits: traction hydraulics, the combined working and steering hydraulics, the combined drive hydraulics for the reel and the chaff spreader and the low-pressure connection hydraulics. All the circuits use the same oil tank and return oil filter.

There are three pumps in the system. They are located at the rear of the engine, in the distribution gear and form an entity.

Hydrostatic steering and working hydraulics use a joint pump. Hydrostatic steering gets its oil by means of a priority valve. The valve always supplies the amount of oil needed in steering and the rest can be used in other working hydraulics.

There is a separate pump for reel rotation, which also drives the optional chaff spreader. The spreader gets switched on when the threshing mechanism is started.

Traction hydraulics works in a closed circuit. Low pressure circuit uses the feed oil in traction hydraulics.

There is also an oil cooler in the system located in the traction hydraulics return line before the filter. The cooler functions are controlled by means of a thermostat valve.

The control valves in working hydraulics are electrically controlled. There are working hydraulics valves location. The valves left rear side of grain tank has control valves of header height, free circulation, and the control valves of the unloading pipe. The one in the side of the feeder elevator houses the control valves of the reel lift and for/aft, the cutting header side tilt and reverse.

Movement speeds are regulated by restrictors at the control valve gates except for the header height speed, which can be electrically adjusted in Comvision II -screen.

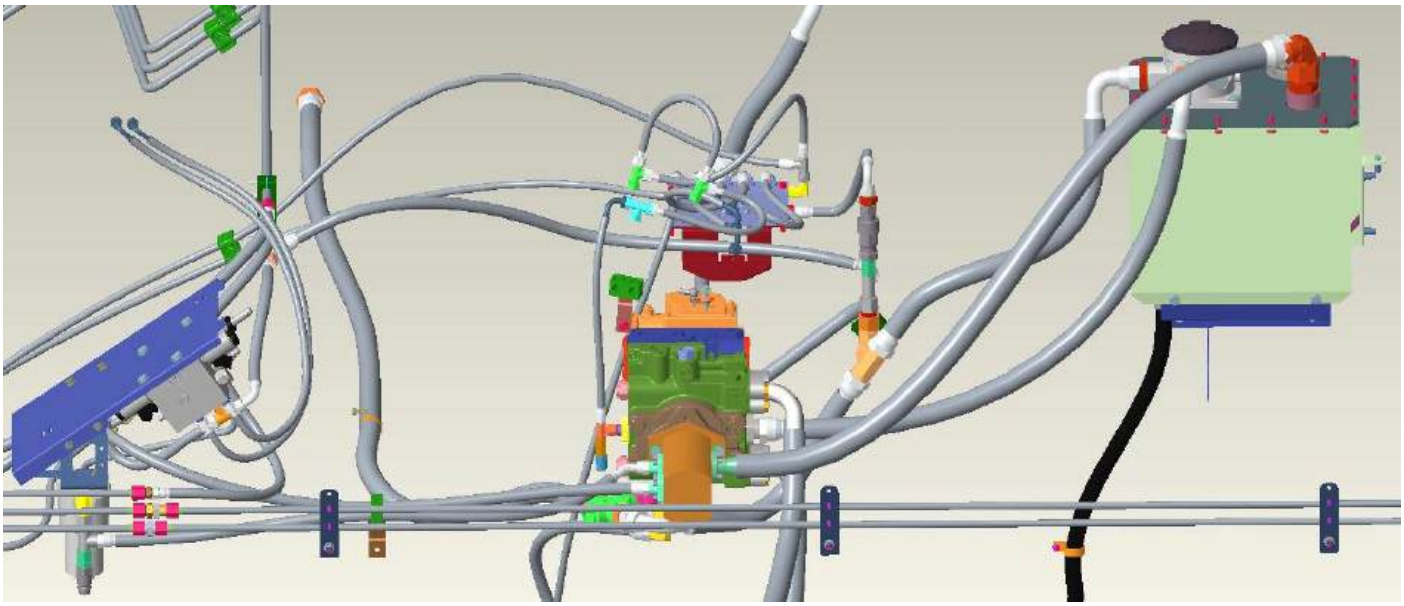
The valve for reel rotation is located under the left-side guard below the engine.

The connection and torque regulator valve for the optional chaff spreader is located below the oil tank. The control valve for low pressure circuit is located next to connection cylinders.

Pump output in working hydraulics is 33 l/min. Working pressure is restricted to 180 Bar.

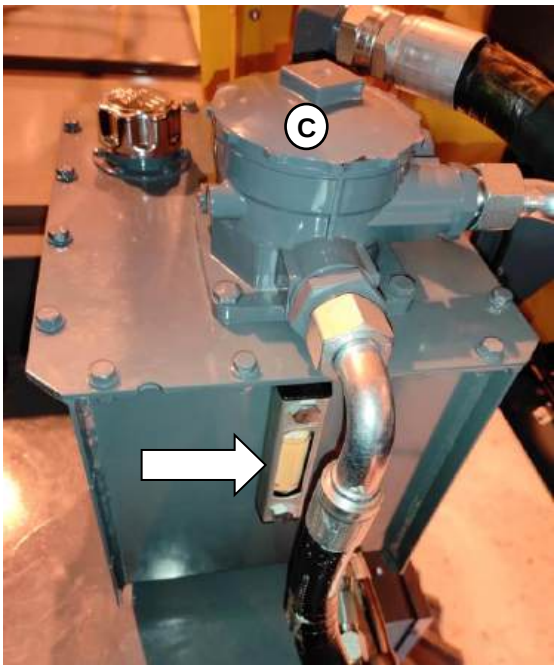
Pump output in reel drive hydraulics is 28 l/min. Maximum working pressure for the reel has a factory setting of 75 Bar. The chaff spreader is connected to the series before the reel regulator valve. Its pressure setting is 125 Bar, which means that there is a minimum of 50 Bar pressure difference for the spreader.

Pump output in traction hydraulics is 240 l/min. Maximum working pressure is 420 Bar. Feed pressure in traction hydraulics is approx. 24 Bar.



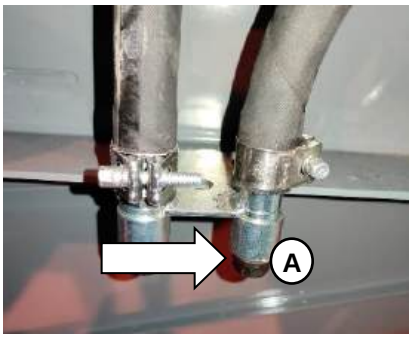
Daily Service

The oil tank is in the engine area left side of combine. Periodic service measures include checking of the oil level and changing of the oil and filters. To check the oil level, there is transparent measuring gauge on the oil tank. The oil level must be between minimum and maximum with the cutting header and the reel lowered. New pure oil is added when necessary. Oil can be added by removing breather cap or using coupling before pressure filter. Before unplugging the breather cap, clean the whole area carefully to prevent any impurities from getting in the tank. Keep the area around the oil tank always clean. Daily service measures also include checking and, if necessary, cleaning of the oil cooler. The hydraulic oil cooler is positioned below of the engine radiator.



Change of Oil and Filter

The oil and filters are changed every 600 h or at least once a year before the beginning of the harvesting season to remove any condensed water from the system after the winter. The oil is drained by opening drain A located behind the return auger, on left hand side of the combine. After draining of the oil, replace filter cartridge C. Clean the area round the filter carefully before removing the filter. Check and, if necessary, change the filter cover gasket before refitting. Use original filters only to ensure perfect functioning of hydraulic system. Fill the filter housing with pure oil before closing the cover.



Used oil and filter are problem waste, which shall be disposed of in an appropriate manner.

Use an oil type in accordance with the oil table. Make sure the oil is free from any impurities. Always use a clean funnel.

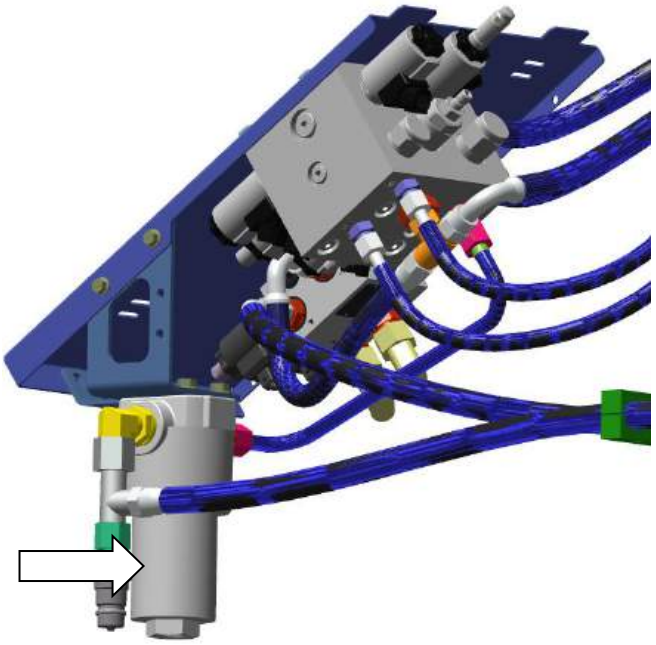
After oil change let the engine idle for some 15 minutes during which time no hydraulics must be used. During this time, the oil circulates through the filters several times and the impurities in the oil are filtered off. Monitor the oil level and check for leaks in the filter. Air is bled from the system by turning the steering wheel several times from one extreme to the other with the engine running. Monitor the oil level in the measuring hose and add oil if necessary.

The breather of oil tank, which functions as a filler, shall be changed every 600 h or every two years.

Check the condition of the hydraulic hoses periodically. Replace damaged hoses immediately with new original ones.

Pressure filter

The pressure filter is located left side behind the grain tank. The pressure filter is replaced by turning the bottom of the filter off, after which the filter can be replaced by hand. The filter is replaced after the first 50 hours, after which the changeover interval in every two years



Chaff Spreader

The optional chaff spreader is located behind the shaker shoe. The spreader has three different quick settings. The two front-most ones are working settings. The rear-most setting is used when the shaker shoe is serviced or when the chaff is not spread.

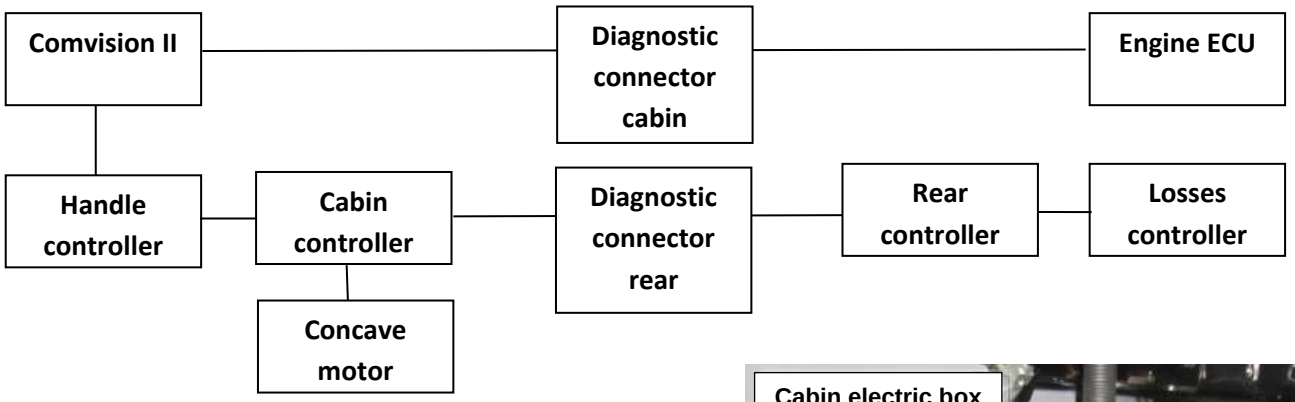
If necessary, the spreader is easy to remove. If removed, the hoses in the working circuit are to be connected and the oil line is to be plugged. Otherwise, the oil does not get to the reel control valve.

There are no features that would require periodic service measures.

Electrical system

The engine is equipped with an alternator. The master switch or the battery cables must not be disconnected with the engine running.

The engine control unit is attached to the engine and is accessible through grain tank service hatch. Other main controllers are cabin and rear controllers. Controllers are connected through CAN bus.

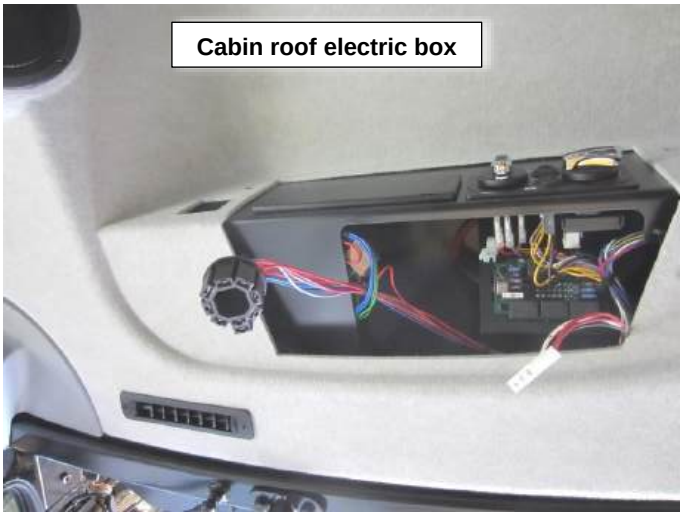


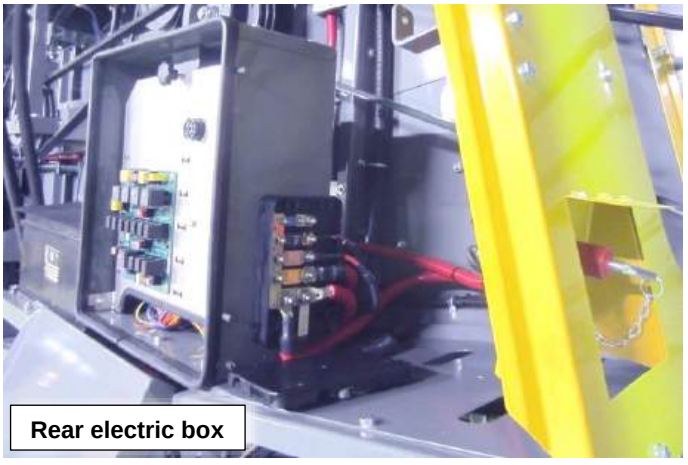
Fuses and Relays

Fuses F1-F40 are located in circuit board under the instrument panel. Fuses 2F1-2F40 are in the rear switchboard under left side guard. Main fuses are also located in circuit board under the instrument panel and on the side of the rear electrical box under left side guard. Diagnostic connector (A).

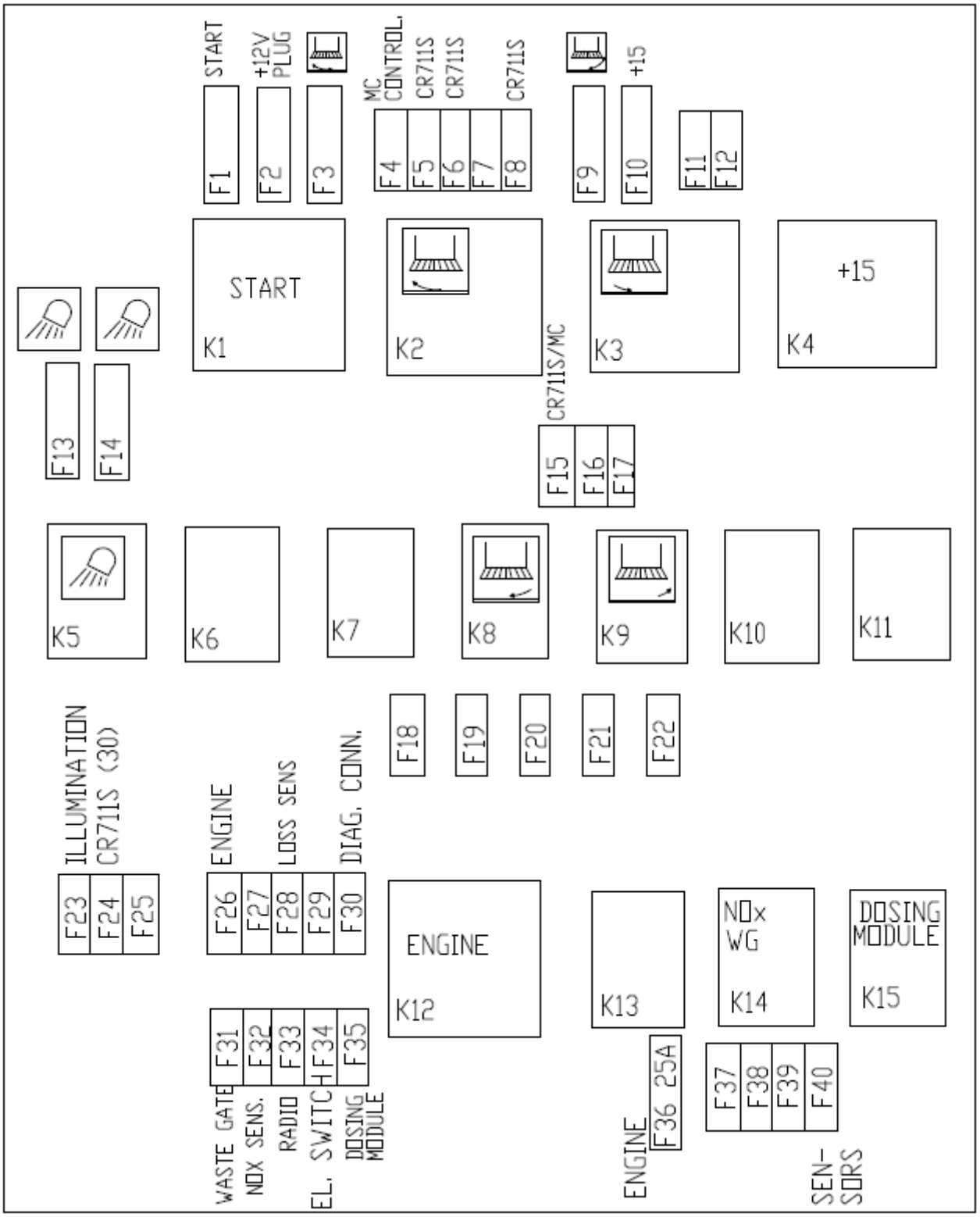
The control relays for different functions are located under the instrument panel and in rear switchboard. The functions and locations of the relays are illustrated on the instruction sticker stuck on the inside of the service door to the rear electrical box.

Note! Do not fit an oversized fuse, as it may damage the cables and the respective electrical devices. If a fuse blows on the same location repeatedly, find the reason for it and resolve it.





Rear electric box



Rear electric box

Main fuses (side of rear electric box)

4F	150A	Main fuse, cabin power supply
5F	40A	Main fuse, circuit board rear
6F	250A	Main fuse, grid heater
7F	100A	Main fuse, vertical knife

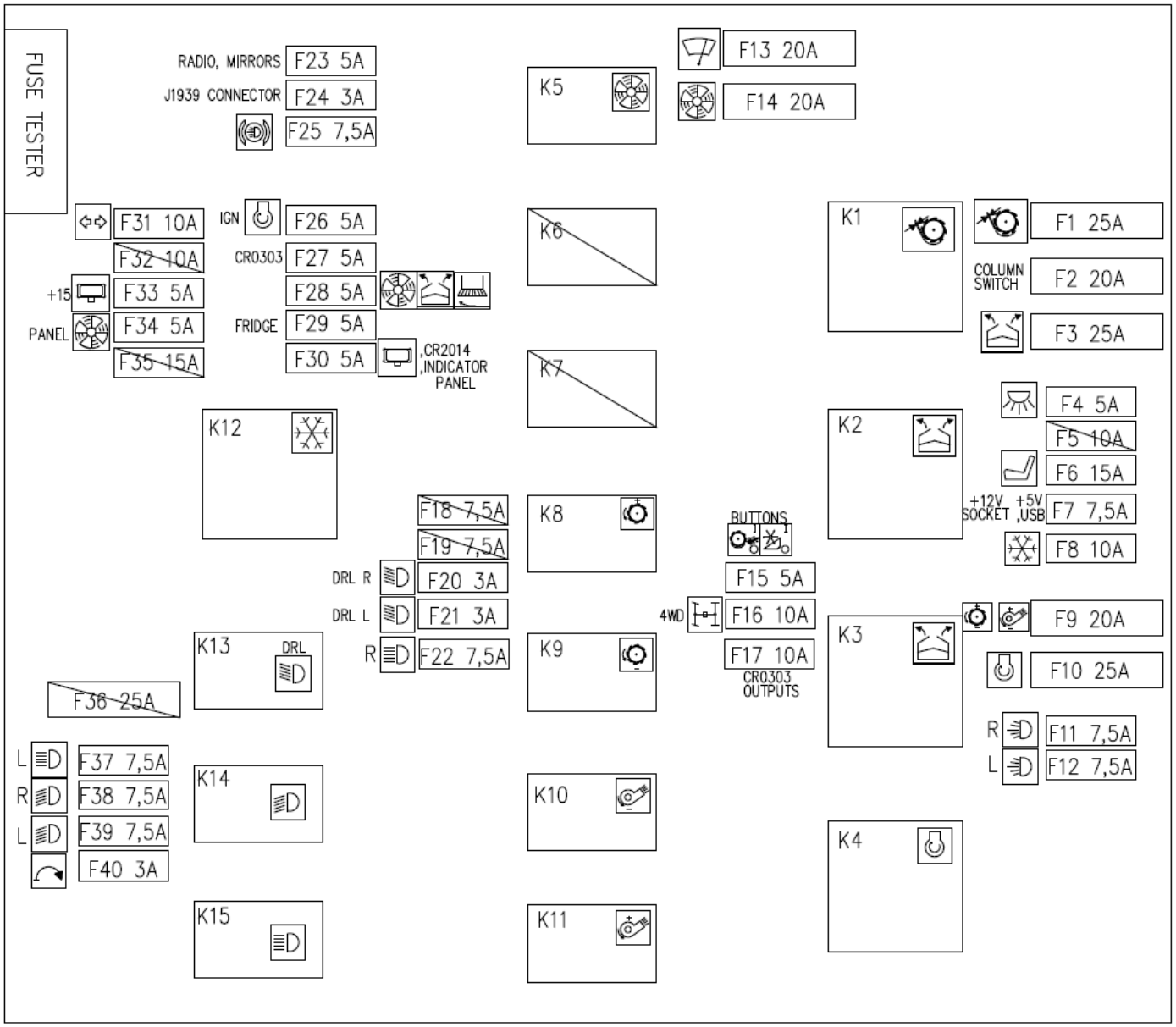
Fuses

2F1	25A	Start
2F2	20A	+12V plug
2F3	25A	Straw spreader adjustment
2F4	5A	Loss monitor controller
2F5	10A	Controller CR711S
2F6	15A	Controller CR711S
2F7	7,5A	Option
2F8	10A	Controller M30711
2F9	20A	Straw spreader
2F10	25A	Controllers
2F11	7,5A	Option
2F12	7,5A	Option
2F13	20A	Work lights side guards, sieve
2F14	20A	Work lights rear
2F15	5A	Controller CR711S, loss monitor
2F16	10A	Option
2F17	10A	Option
2F18	7,5A	Option
2F19	7,5A	Option
2F20	3A	Controller CR711S
2F21	3A	Option
2F22	7,5A	Option
2F23	5A	Light of the electrical main switch
2F24	3A	Controller CR711S
2F25	7,5A	Option
2F26	5A	ECU impulse
2F27	5A	Option
2F28	5A	Loss sensors
2F29	5A	Option
2F30	5A	Diagnostic plug
2F31	10A	Wastegate
2F32	10A	Nox-sensors
2F33	5A	Radio memory (+batt)
2F34	5A	Electrical main switch
2F35	15A	Urea module
2F36	25A	Engine ECU
2F37	7,5A	Option
2F38	7,5A	Option
2F39	7,5A	Option
2F40	3A	Sensors

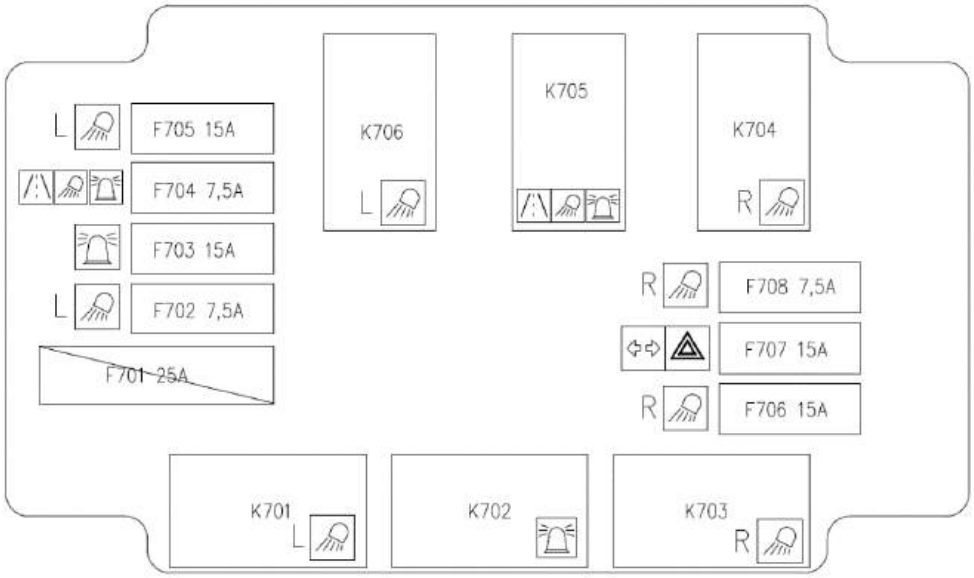
Relays

2K1	Start
2K2	Chopper spreader adjustment, left
2K3	Chopper spreader adjustment, left
2K4	Rear area
2K5	Work lights rear
2K6	Option
2K7	Option
2K8	Chopper spreader adjustment, right
2K9	Chopper spreader adjustment, right
2K10	Option
2K11	Option
2K12	Engine ECU
2K13	Option
2K14	Wategate, Nox-sensors
2K15	Urea module

Cabin electric box



Cabin roof electric box



Cabin electric box

Main fuses

1F	60A	Main fuse, circuit board
2F	30A	Main fuse, ignition
3F	60A	Main fuse, circuit board in the cabin roof

Fuses

F1	25A	Concave adjustment motor
F2	20A	Steering column
F3	25A aut.	Grain tank cover
F4	5A	Indoor light
F5	10A	Option
F6	15A	Seat compressor
F7	7,5A	+12V plug, +5V USB-charging
F8	10A	A/C compressor
F9	20A	Threshing unit and blower adjustment motor
F10	25A	Engine running
F11	7,5A	Parking lights right
F12	7,5A	Parking lights left
F13	20A	Windscreen wiper
F14	20A	Cabin fan
F15	5A	Armrest buttons
F16	10A	Four wheel drive
F17	10A	CR0303 output
F18	7,5A	Option
F19	7,5A	Option
F20	3A	Daytime running lights, right
F21	3A	Daytime running lights, left
F22	7,5A	High beam, right
F23	5A	Radio, electric mirrors
F24	3A	Diagnostic plugs
F25	7,5A	Brake lights
F26	5A	Engine IGN
F27	5A	Controller CR0303
F28	5A	Tank cover, spreader, fan relay
F29	5A	+12V Plug, Cool box
F30	5A	Display, Indicator lights, Controller CR2014
F31	10A	Turn signal lights
F32	10A	Option
F33	5A	Display +30
F34	5A	Cabin fan panel
F35	15A	Option
F36	25A	Option
F37	7,5A	High beam, Left
F38	7,5A	Lowbeam, Right
F39	7,5A	Lowbeam, Left
F40	3A	Start

Relays

K1	Concave adjustment motors
K2	Grain tank cover
K3	Grain tank cover
K4	Engine running
K5	Fan
K8	Threshing drum
K9	Threshing drum
K10	Blower
K11	Blower
K12	A/C compressor
K13	Daytime running lights
K14	Low beam
K15	High beam

Cabin roof electric box

Fuses

In the cabin roof

F100	5A	Internal air circulation, Manual A/C

Behind the radio

F701	25A	Option
F702	7,5A	Work lights, front left
F703	15A	Beacon lights
F704	7,5A	Beacon, work lights, road mode control
F705	15A	Work lights front, left
F706	15A	Work lights front, right
F707	15A	Hazard blinker
F708	7,5A	Work lights front, right

Relays

In the cabin roof

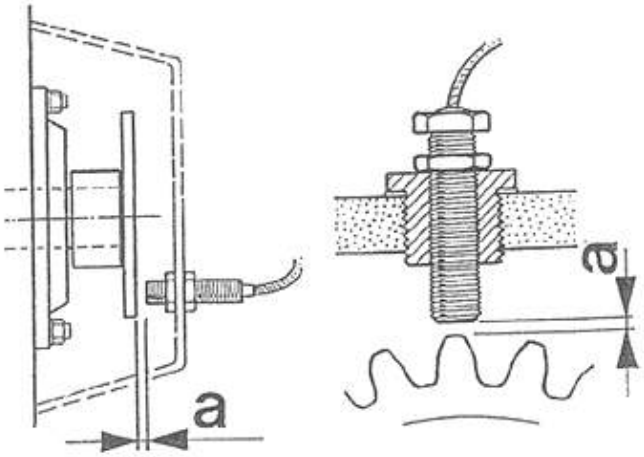
K100	Manual A/C, slow speed
K101	Manual A/C, medium speed
K102	Manual A/C, fast speed
K103	Fan, internal circulation flap
K104	Fan, internal circulation flap

Behind the radio

K701	Work lights, front, left
K702	Beacons
K703	Work lights front, right
K704	Work lights front, right
K705	Beacon, work lights, road mode control
K706	Work lights front, left

Sensors of ELECTRICAL SPEEDOMETERS

The sensor of electrical speedometer (driving speed) is in the gearbox. To guarantee the correct functioning of the sensor, make sure that distance a between the sensor and the gear is 1+/- 0.5 mm. Make any necessary adjustments by turning the sensor fixing nuts. The sensor must not touch the rotating gear. Maximum tightening torque 5 Nm.

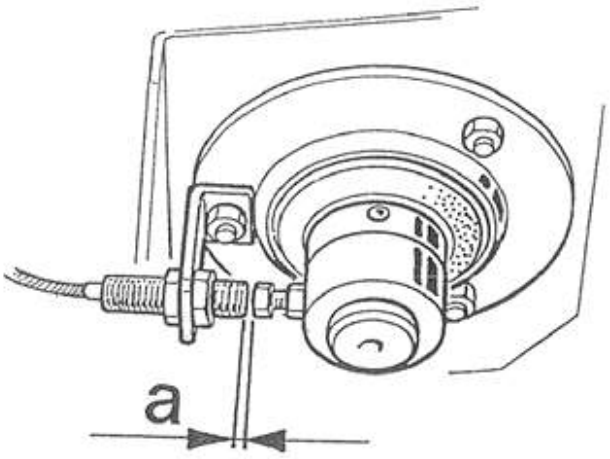


The Rotation Sensors

The threshing monitor have rotation sensors located on several shafts. A suitable distance ranges between 1-4 mm.

The Approaching Sensor

The threshing monitor is equipped with angle sensor to detect the cutting header height. The sensor is located at the top right of the crop elevator.



Battery

The gas generated by the battery is very explosive. Avoid open fire and sparks in the vicinity of the battery. When servicing any electrical equipment, disconnect the negative cable of the battery.

Checking of the Charge State of the Battery

During the harvesting period, 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 Charged state reading:

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.

Check the fluid level.

Use 5-10 % of the Ah of the battery for charging current. For example: A 180 Ah battery may be recharged using 7…14 ampere current. Recommended recharging interval is 6 -10 weeks.

Cleaning of the Battery and Other Maintenance

Clean the battery cover regularly.

Remove any oxidation off the poles and cable lugs. Make sure the cable lugs are properly tightened.

Coat the outer faces of the poles and lugs with Vaseline.

Check the fluid level before the harvesting season and before winter 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.

Using of an Auxiliary Battery

If an auxiliary battery is needed for starting, proceed as follows: Check that the voltage of the auxiliary battery is 12 V.
Make sure the combine battery has not frozen; a flat battery freezes at -10°C.

Follow carefully the connecting sequence given below:

1. Connect the positive poles of the batteries (marked with red paint, a P or a + symbol) with an auxiliary starting cable.
2. Connect the end of one auxiliary starting cable to the negative pole of the auxiliary battery (marked with blue paint, an N or a - symbol) and the last free end to the negative pole of the discharged battery.

Do not lean over the batteries while making the connections. Start the engine.
Disconnect the cables in exactly the opposite order.

Fitting of Electrical Accessories

When fitting electrical accessories to the combine, it must be noted that the capacity of the charging generator is 200A. The total consumption of a standard combine exceeds 100 A when harvesting in dark conditions as following:

Headlights	12 A
Working lights	54 A
Fan in the cab	14 A
Air conditioning	10 A
Electric engine adjustment	30 A

Lubrication

Do not lubricate while the engine is running. Remove the ignition key and lock the parking brake before starting lubricating. The cutting header and reel support shall be locked or lowered when lubricating.
The table below gives recommended lubricants to be used at different temperatures. The table also gives different types of air conditioning liquids, although they do not normally have to be changed.

Recommended lubricant	Oil grade API	SAE grade	SAE grade	Filling quantity litres	Change intervals
		-10…+30 °C	+10…+45 °C		
Engine 74LFTN Stage V	CJ-4	10W30	15W40	26 l	400 h or 1 year
Gearbox, C10 – C22	GL-5	80W90	85W140	7 l	600 h or 1 year
Gearbox, C24	GL-5	80W90	85W140	11 l	1200 or 1 year
Rotor drive, C20, C22 and C24	GL-5	80W90	85W140	1,8 l + 1,8 l	1500h or 3 years
Final drive, C10 – C22	GL-5	80W90	85W140	7,5+7,5 l	1200 h or 2 years
Final drive, C24	GL-5	80W90	85W140	8 + 8 l	1200 h or 2 years
4wd NAF rear axle, C24	GL-5	80W90	85W140	16,4 l	2000 h or 1 year
4wd NAF rear axle planetary gears, C24	GL-5	80W90	85W140	1,1 + 1,1 l	2000 h or 1 year
Return auger gear box, C20, C22 and C24	GL-5	80W90	85W140	0.35 l	600h or 1 year
Hydraulics	Shell Esso	Tellus T 46 Univis 46	Tellus T 68 Univis 68	25 l (change)	600 h or 1 year
Engine split gear	GL-5	80W90	85W140	4 l	600 h or 1 year
Knife drive device (WB)	GL-5	80W90	85W140	1,2 l	600 h or 1 year
Lower gear in closed unloading	GL-5	80W90	85W140	1.5 l	600 h or 1 year
Top gear in closed unloading	Shell	Alvania R3	Alvania R3	0.135 kg	
Grain elevator angle gear	Lithium grease	GLP 00 G	GLP 00 G	0.25 kg	-
Return auger gear box	GL-5	80W90	85W140	0,35 l	600 h or 1 year
Lubrication with oil	CB/CC	10W30	15W40		
Lubrication with grease	Lithium grease	NLG 2	NLG 2		
Brake fluid	ATE Brake Fluid	J 1703	J 1703		2 years
Oil in the air conditioner	PAG	500 SUS	500 SUS	1.6 dl initial fill	
Agent in the AC	HFC R134a			1.8 kg	

When shipped from the factory, the combine is filled with oil suitable for the temperature range of –10…+30 °C. When the oil is changed, make sure the oil used meets the prevailing temperature requirements.

If the combine is used in areas where only biologically decomposable hydraulic oils shall be used, the Manufacturer is to be consulted about the choice of oil.

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

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

The safety clutches and the variator pulleys must be lubricated carefully. Excessive lubrication will cause unnecessary slipping of the clutches and damage to the belts if lubricants encounter belts or friction plates.

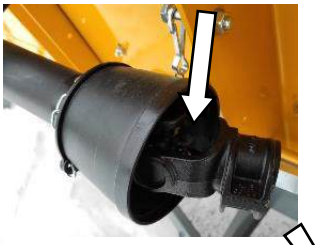
After lubrication, the variator pulleys are adjusted with the threshing mechanism running between different speed ranges, which will spread the lubricants evenly on the surfaces.

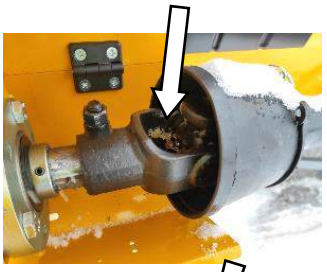
Lubrication points

Every 10 hours or daily

Header

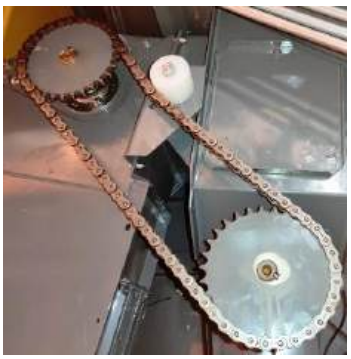
- Cutting blade – spray or oil can
- pick-up reel – spray or oil can, every plate end attachment
- joint shaft, both ends and middle
- Drum chain drive – spray or oil can





Combine right side

- Threshing variator chain – spray or oil can
- Grain elevator chain in C10, C12 and C22 – spray or oil can



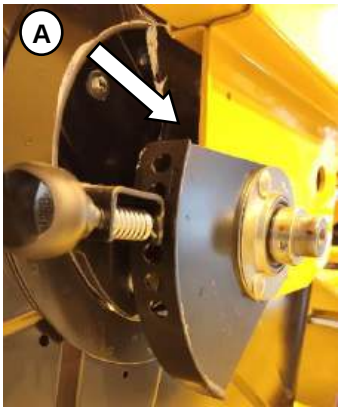
Combine left side

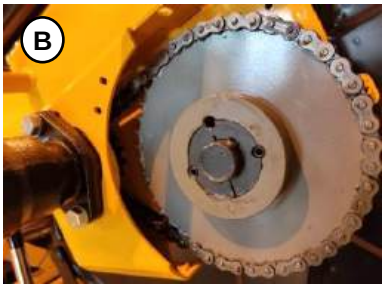
- Unloading chain - spray or oil can

Every 50 hours or weekly

Header

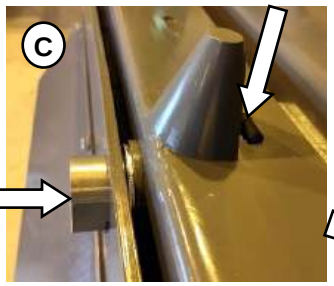
A. Tine adjusting device
B. Pick up reel drive chain – spray or oil can, remove cover.

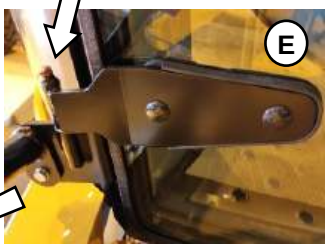


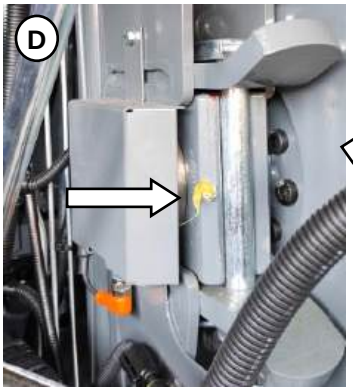


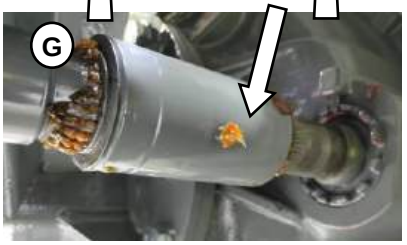
Combine front part

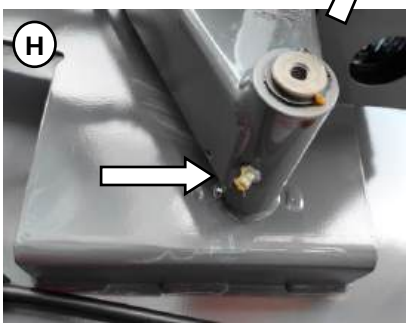
C. Feeder house tilt shaft, two points
D. Feeder house fork, both sides
E. Cabin door hinges, both sides, up and down (one press per point).
F. Ladder, two points.
G. Drive shaft connection, left/right.
H. Reverse shaft

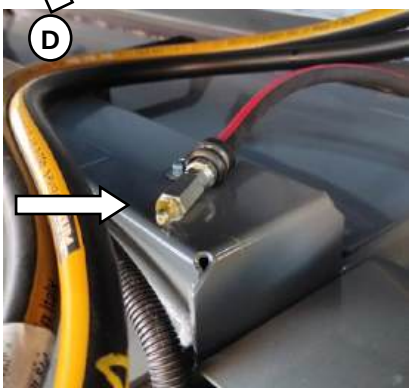








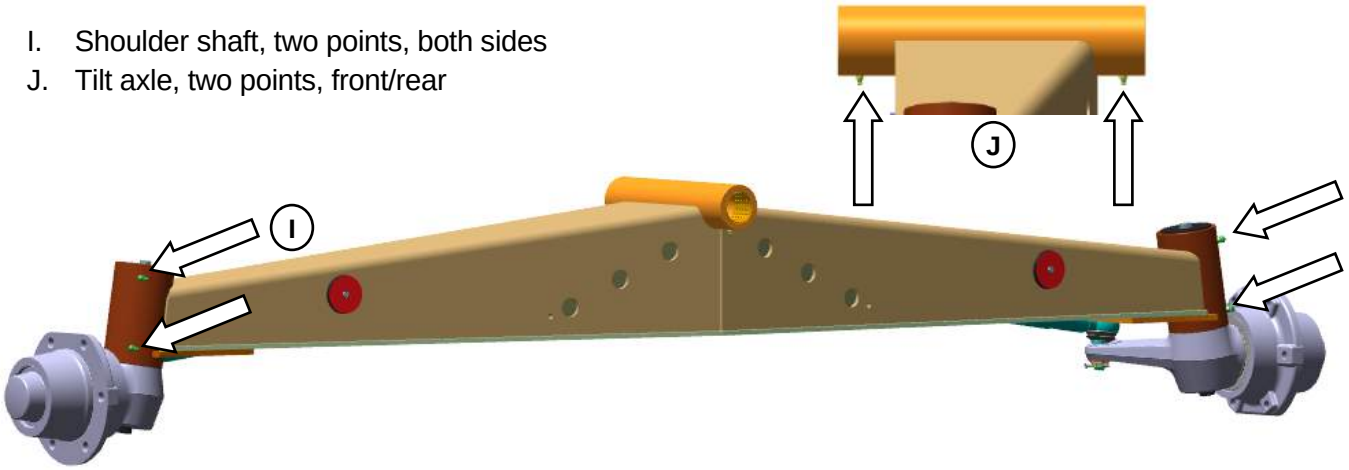




Every 50 hours or weekly

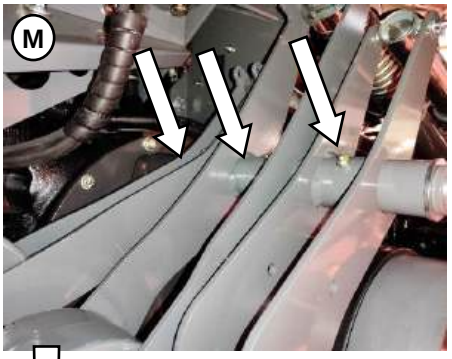
Rear axle

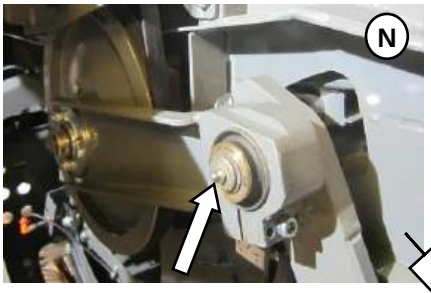
I. Shoulder shaft, two points, both sides
J. Tilt axle, two points, front/rear

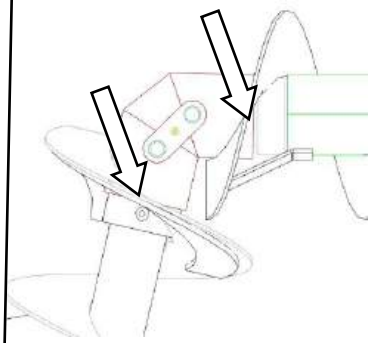


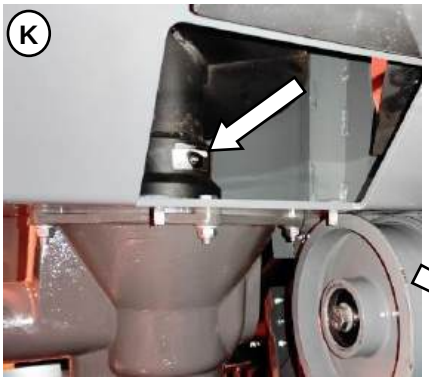
Combine left side

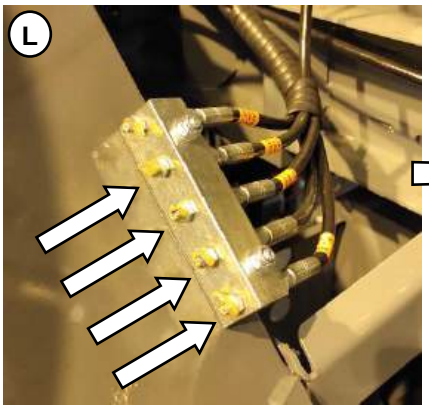
K. Unloading pipe, bevel gear attachments top and bottom part. Service hatch on top and bottom.
L. Rotor and threshing cylinder
M. Engaging arms, threshing, chopper, unloading
N. Shaker shoe drive







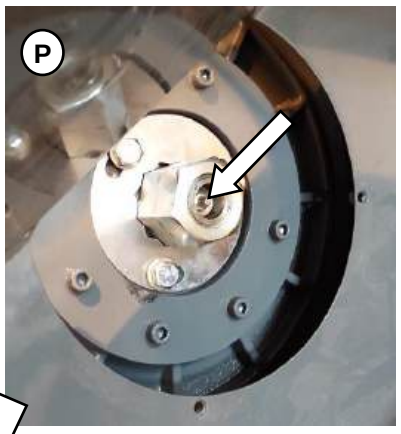


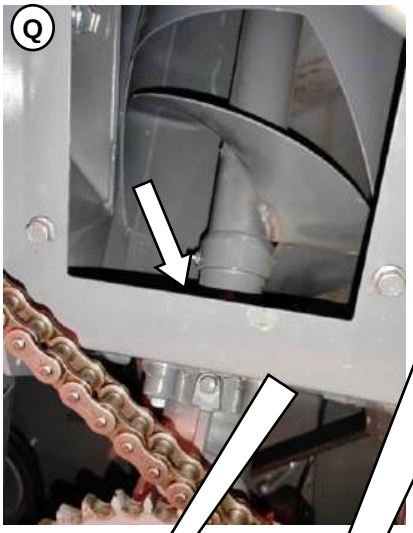


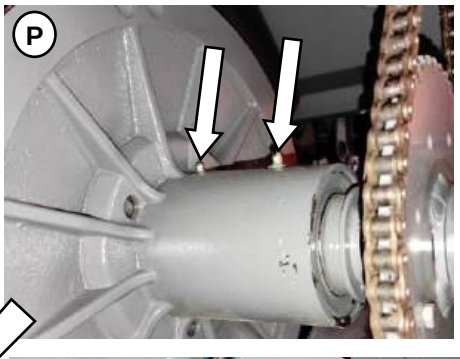
Every 50 hours or weekly

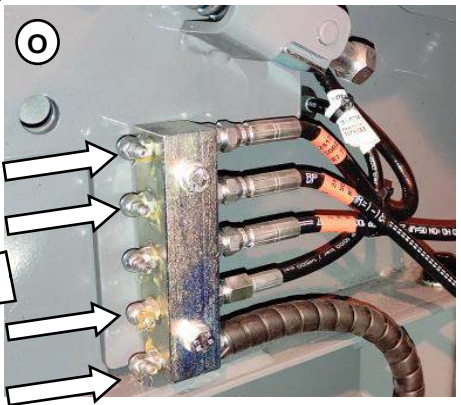
Combine right side

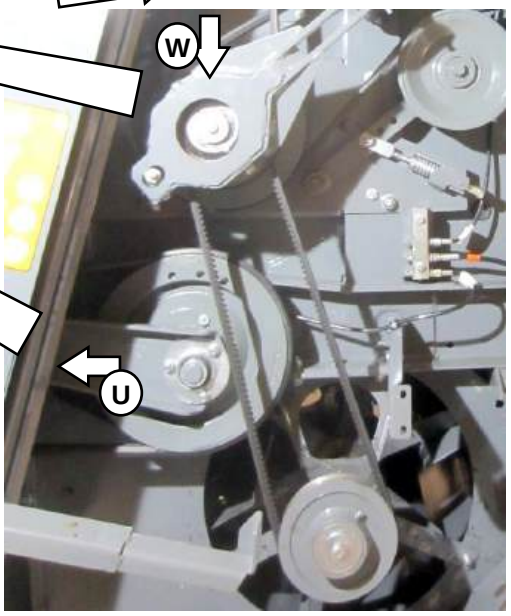
O. Rotor and threshing cylinder
P. Threshing variator (drive to min and max position after greasing to proper spread)
Q. Grain elevator in C10, C12 and C22 (remove hatch)
R. Return auger clutch (only one press)
S. Fan (drive to min and max position after greasing)
T. Rotating screen coupling
U. Shaker shoe drive
V. Hinges to fan unit door
W. Fan variator drive

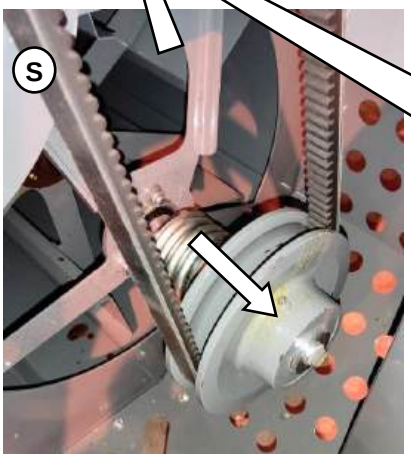






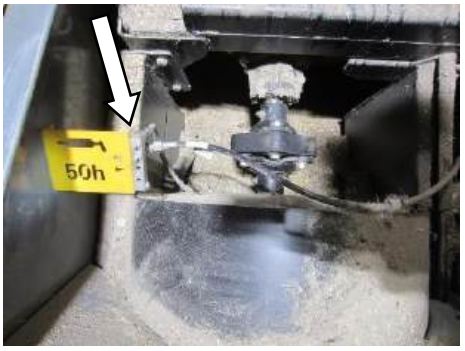






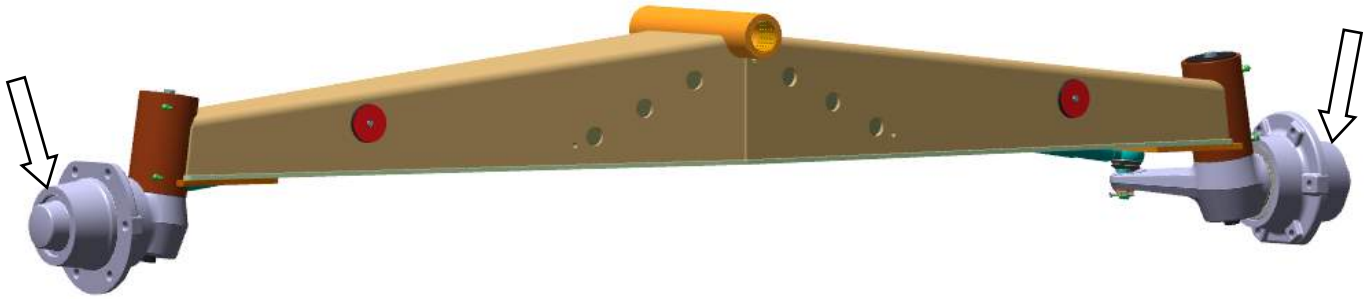
Every 50 hours or weekly

- Rotor bearings in C20, C22 and C24 (under the hatch)



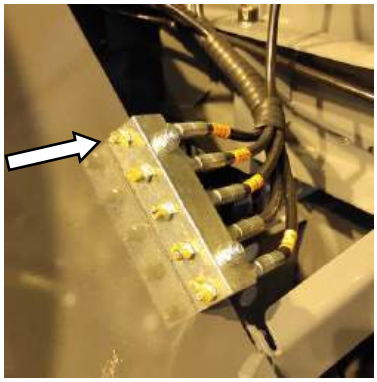
Every 300 hours or yearly

- Rear axle hubs, both sides

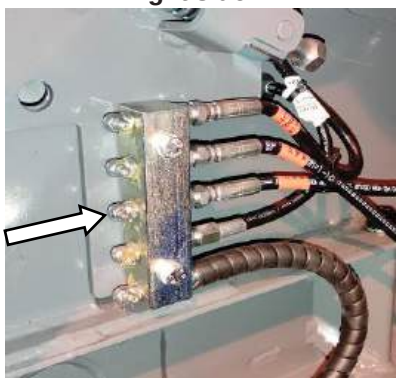


- Pre-threshing drum bearing, both sides (C12, C22 and C24)

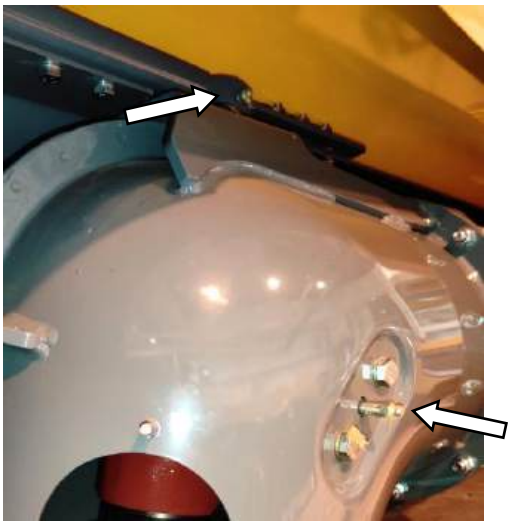
Left side



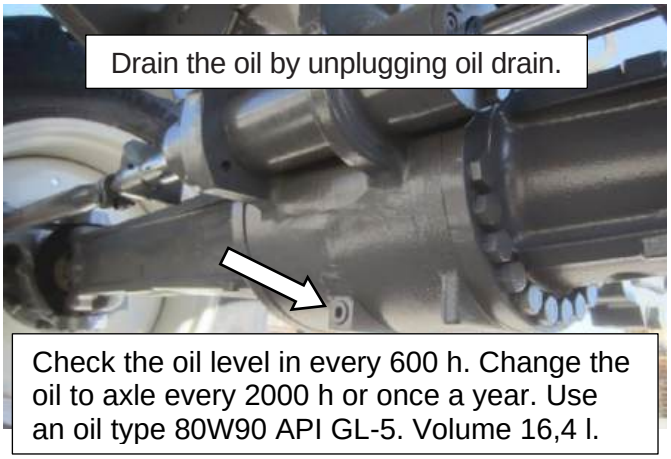
Right side

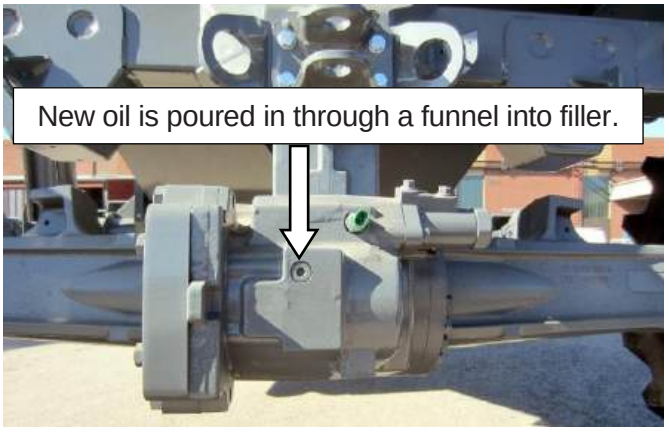


- Closed unloading top and bevel gear (if not permanently greased



Lubrication points, axle and planetary gears in 4wd NAF axle (option)

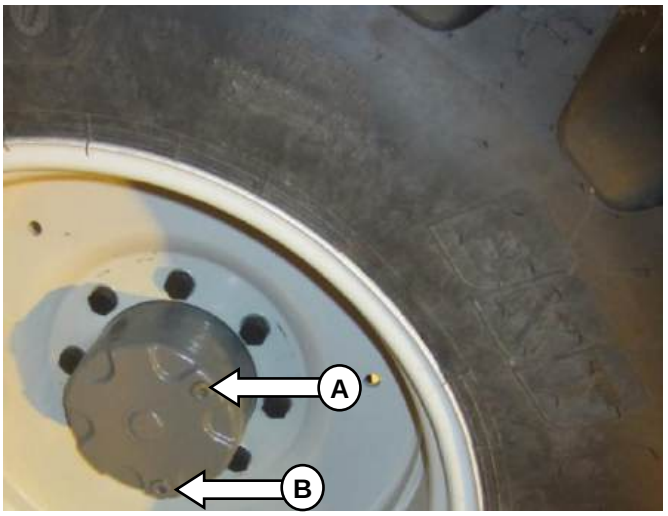




Check in check plug A that the oil level is level with the rim of planetary gears. Check it in every 600 h.

Change the oil every 2000 h or once a year. Drain the oil by unplugging oil drain B. New oil is poured into plug A. The oil level shall be at the same height as its plug. Used oil is problem waste, which shall be disposed of in an appropriate manner.

Use an oil type 80W90 API GL-5. Volume 1,1 liters.



Summary of periodical maintenance procedures

For more detailed instructions on engine adjustments and maintenance, see the engine manual.

Daily*:*

- Lubricate the points to be lubricated daily.
- Clean the engine compartment.
- Check the engine oil level.
- Check the purity of the radiator and the inlet screen.
- Check the radiator coolant level.
- Check the hydraulic oil level.
- Check the fluid and oil connections for leaks.
- Check the brake fluid level.
- Check the brake functions.
- Check the condition of the cab air filter.
- Check the condition and tension of belts visually.
- Check the chopper knives visually.
- Check the header knives visually.
- Check the condition of feeder auger fingers.
- Check the driving lights.

Every 50 working hours:

- Lubricate all the points specified in the table.
- Check the function of the alarm system.
- Clean the outer element of engine air filter.
- Check the knife condition.
- Check and clean the cab air filter.
- Check the tension of the grain elevator chain.
- Check the tension of the return elevator chain.
- Check the tension of the feeding elevator chain.
- Check the light functions.
- Check the tire pressures.
- Change the pressure filter after the first 50 operating hours. (After this, every two years)
- Check the engine intake air hoses and coolant hoses for leaks. Replace at least every 5 years (check date of manufacture on the hose).

Every 300 working hours or yearly:

- Change the engine air filters.
- Check the tension of belts and chains.
- Lubricate the gear lever joints and bearings (Oil).
- Change the cab air filters.
- Check the oil level in the knife drive device.
- Check the oil level in the angle gear of return auger.
- Check the oil level in the angle gear of rotors.
- Check the oil level in the unloading angle gear.
- Check the tightening of the wheel nuts/bolts. (After assembly each 10 h till 50 h.)
- Check the oil level in the engine split gear.
- Check the oil level in the gear box.
- Check the oil level in the final drives.
- Check the function of loss sensors.

Every 600 working hours or yearly:

- Lubricate all the points specified in the table.
- Check the concave basic setting.
- Change the engine oil and filter. Regeneration of DPF filter before the change.
- Check the hydraulic hoses visually.
- Change the oil in the gearbox.
- Check the battery fluid level.
- Change the fuel filters.
- Change the oil in the engine split gear.
- Change the oil in the knife drive device.
- Change the oil in the unloading angle gear.
- Change the hydraulic oil and filter. (Always before the harvesting season.)
- Lubricate the middle shaft of the stairs.
- Lubricate the wheel bearings.
- Check the oil levels in NAF 4wd axle.
- Sensitize the friction plate type of safety clutches always before the harvesting season (crop elevator top shaft and top of the return thresher).
- Change the breather in hydraulics.
- Check the condition of the hydraulic hoses. Replace at least every 10 years. (Check when manufactured on the hose.)
- Replace the main filter of SCR supply module
- Change the breather in fuel tank.

Every 1200 working hours or every other year:

- Change the oil in the final drives.
- Change the radiator fluid in the engine.
- Change the brake fluid.
- Change the oil in the angle gear of rotors.

Storage when not in use

To guarantee the operating reliability of the combine, proper service and storage are of great importance. The service before winter storage can be divided into three parts, in order of performance: cleaning, checking and protection. A dry store or shed is ideal storage for the combine.

Cleaning:

Open the stone trap and all doors. Remove and wash all detachable guards, sieves, the bottom cassettes of the grain pan and rotor concaves as well as the grain tank bottom hatch. Dirt is efficiently removed from a dry combine by compressed air. A high-pressure washer may be used with caution. To reduce drying time use warm water and idle the threshing machinery.
Do not direct water jets at the bearings, as the packing does not hold against a strong spray of water.
In normal seasons, it is not necessary to wash the inner parts of the combine with water; the inside of the combine can be raked clean with a suitable tool. 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 knives.
Draw-in fingers and bearings.
Slip damages and breaks in belts and the remaining tensioning margin.
Condition of and basic settings for the cylinder and concave.
Condition of the grain pan and shaker shoe packing.
Bearing clearances and fastenings.
Wear, corrosion, and dents.
Rotor knives and counter-knives of the chopper as well as rotor bearings.

It is important to have the recorded defects repaired before storage to ensure the efficient functioning of the combine at the beginning of the following harvesting season.

Protection:

Use pure engine oil or special protective oil in a sprayer.
Places to be protected:
Knife (protective oil)
Draw-in fingers (protective oil)
Worn paint (paint)
Electrical connections (special protective spray)
Chains (oil); rotate the mechanism by hand to ensure even lubrication.
Transmission chains (unloading and the reel) shall be disengaged, cleaned with a solvent and lubricated with molybdenum oil.
Lubrication of the rotor knife joints of the chopper.

After protection all the cleaning doors, the grain pan and rotor concaves and sieves are left open to produce a draught inside the combine. This will prevent rodents from nesting in the inner parts of the combine. Also leave the service door to the instrument panel open!

Pre-storage Service of Cab Ventilation:

Filters are cleaned. Air channels on the cab top and the ventilator unit with its cells are also cleaned. This may be done with a vacuum cleaner.

Pre-storage Service of the Air Conditioner:

Use compressed air to clean the cooler condenser and evaporator cells. In case the combine engine is run during storage, the cooler should also be switched on for a few minutes. To operate the cooling system in cold weather, have the heater on at full capacity and the ventilator fan stopped for approx. 15 min. during which time the air conditioning sensor will warm up and enable the switching on of the compressor. After this the ventilator fan is run at its lowest speed and the cooling at full capacity.

Pre-storage Service of the Engine:

Clean the engine on the outside.
Change the fuel filter.
Change the engine oil.
Change the engine oil filter.
Drain and clean the fuel tank.
Check the anti-freezing quality of the coolant. It must be a minimum of - 25°C.
Run the engine min. 10 minutes.
Seal the exhaust pipe, inlet opening of the air filter and the breather with e.g., masking tape or plastic film.

Other Pre-storage Measures:

Change the oil in the gearbox. Clean the magnet in the bottom plug and the breather filter.
Clean the air filter.
Disconnect the battery, the negative pole first, clean the top of the battery with warm water and store it in a dry cool place.
Clean the cable lugs and apply grease to them.
It is not necessary to remove or loosen the V belts for storage.
Check the tire air pressure.
Lubricate all points to be lubricated and run the threshing machinery after that.
Lower the cutting table and the pick-up reel to allow the cylinder pistons to go in.

After-storage Attention

Remove the engine opening covers.
Fit new air filters (engine and cab).
Fasten the fully charged battery, the positive pole first.
Check the coolant level.
Change the hydraulic oil and filters.
Check the oil levels in the engine and the gearbox.
Check the belt and chain tensions.
Make sure the rotor knives of the chopper turn.
Turn the coolant pump by the fan to loosen a possibly stuck sealing.
Open slightly the bottom plug of the fuel tank and drain any condensed water from the tank bottom.
Run the engine on the starter a few revolutions with the stopper in the stop position or with the running solenoid cable disconnected to allow oil pressure into the bearings prior to the actual starting.
Check that there are no foreign objects inside the combine.
Start the engine and let it run on fast idle for about 3 minutes.
Watch the oil pressure and alternator control lights.
Check for any coolant, oil or fuel leaks.
Carefully engage the threshing mechanism.
Gradually raise the RPM to the normal level, simultaneously monitoring the function of the threshing mechanism.
Stop the threshing mechanism and the engine and close all doors.
Set the threshing settings for the first threshing.

Recommended tools and accessories

Recommended Tools

For do-it-yourself maintenance it is necessary to replenish the tools supplied with the combine with the special tools mentioned under Maintenance as well as with the fork, ring, and socket wrench kits, observing the wrench gap table below and the wrench gaps of 16, 18 and 27 mm for the hose and pipe couplings.

Recommended Accessories

For the Knife Device

Knife sections	25 pcs
Knife plate screws	50 ”
Fingers	2 ”
Knife holders	2 ”

For the Feeding drum:

Fingers	8 pcs
Finger bearings	4 ”
Bearing holders	2 ”

For the Reel:

Plastic tines	5 pcs

General Parts

Hexagonal screws M6-M12, the most common lengths of 16-40 mm, strength class minimum 8.8.
Hexagonal nuts M6-M12, strength class 8.
A few locknuts.
Washers and spring washers, 6.5-13 mm.
Plate screws 4.8, lengths 9.5-19 mm.
Split cotters 3x20 and 5x30 mm.
Wire cotters 2.5x50 mm.
Spring cotters, 3-8 mm, lengths 20-50 mm.
Circlip cotters 10 mm.
Grease nipples 6 mm and 1/8”, straight and angled.
Additional loops for chains.
Fuses 7.5, 15, 20, 25 and 50 A.
Shear bolt, part code 6212477 (M6x45 DIN 931-8.8).

SCREW JOINTS

It is important to tighten the screw joints into the correct tightening torque. Wrench gaps and torque for the screws:

Screw size	Wrench gap mm	Torque for screws of 8.8 strength class
M 6	10	11 Nm
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! Torque for fixing screws in the wheels:

Front wheels	M 22	700 Nm
Rear wheels	M 18	400 Nm

Discarding of the combine

Even the best of products will come to the end of its useful lifetime and it is time to discard it. It is important to make sure the discarded combine will not be harmful to the environment. Below you will find a list of things to consider before discarding the combine:

Do not let the discarded combine spoil the scenery. Store it indoors.
Lower all the hydraulically raised parts of the combine. (Cutting header, reel, unloading pipe)
Remove the battery and take it to an appropriate problem waste collection center.
Drain all the fuel into a spare tank.
Drain all the oil from the engine, gearbox, final drives, engine split gear, knife drive device and hydraulic systems into an appropriate collection dish. Drain the oil from all the pipes, cylinders and hydraulic components.
Drain the coolant into a collection dish.
If the combine is equipped with air conditioning, let an authorized service outlet drain the cold gas and oil.

If the combine is to be scrapped, follow the below given procedure:

Disassemble the combine starting from the top.
In case flame cutting or other spark generating measures are used, pay careful attention to fire precautions.
There may be highly flammable dust and grease in the combine structure.
Beware of any moving machine parts.
Most of the combine material is steel.
There is copper in the radiator and electric conductors, start-up motor and alternator.
There is rubber in the tires, belts, and hoses.
There is plastic in the crop elevator tines, cab interior, lamps, and lights. Pay attention to the recyclability of the components.
There is glass in the cab, mirrors, lamps, and lights.
There is no asbestos in the combine structure.
There are minor quantities of heavy metals, such as lead in the slide bearings.
Take all the recyclable parts to a recycling center.