Underhaug

Operator's manual
Mounted 2-row potato planter
UP3720

UH124316

Operator's manual UP3720 EN, issue 2004

CE certificate of conformity

We,
TKS Mekaniske
Torlandsvegen 3,
N-4365 Nærbø
Norway
declare under our sole responsibility that the product:

Potato planter type Underhaug UP3720

to which this declaration relates corresponds to the relevant basic safety and health requirements of the Directives 89/392/EEC, 91/368/EEC, 93/44/EEC and 93/68/EEC.

Nærbø, January 2nd 2004

Finn Gudmestad
Senior engineer R&D

Enter here the serial number of your machine:

_____

TKS, manufacturers of farm machinery reserve the right to change designs and/or specifications without notice. This does not include an obligation to make changes to machines previously supplied.

Guarantee

TKS products are guaranteed for a period of one year from the date of delivery, against defects in material and workmanship.

Components not manufactured by TKS, i.e. electrics and hydraulics, PTO shafts and tyres are guaranteed according to the original manufacturer's recommendation.

The components listed below have limited guarantee due to their function:

Tyres
Pre-stretcher rollers
Belts
Knives
Lamps
Fuses
Oil filter
Hydraulic seals of motors, valves and cylinders.

Weakening due to wear and tear is considered to be normal for these parts. The product guarantees for these components are limited to manufacturing defects, breakage, poor workmanship, transport damage etc on new machines.

Any damage to bearings that are fitted with grease nipples is not covered under the standard product guarantee, if the damage is shown to be caused by rust or due to the ingress of liquids. Such damage is caused by insufficient lubrication or the use of low quality lubricants.

Any damage caused by the use of corrosive additives in or nearby the machine is also not covered.

If a failure is expected to be covered under the guarantee, the owner or its representative should inform the dealer when parts and/or repair work is required. Any guaranty claim should be applied for within the period of guarantee.

The dealer should fill in one guarantee claim form for each matter and forward it to the TKS representative before the 10th of the following month after the claim was raised.

The damaged parts should be marked with the number of the corresponding warranty claim and should be stored for 6 months by the dealer, available for inspection by the TKS representative if required.

Due to the operation of the TKS products being out of the manufacturer's control, the guarantee covers the product quality only. Performance or any consequential losses are not covered.

The guarantee may be invalid if:
a) spurious spare parts are used or the product is repaired or modified without the TKS authorisation.
b) operator's and service instructions given by the manufacturer are not complied with.
c) The machine is used for other purposes than those designed for.

The guarantee does not cover damage caused by normal wear.

Public safety regulations require from the manufacturer of this machine that all safety aspects regarding the use of the machine is thoroughly evaluated. As a result of these obligations TKS and its representative are not responsible for the function of components not shown in the spare parts catalogue covering this product.

TKS reserve the right to change the product with no obligation to previously supplied machines.

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Introduction

We congratulate you on the purchase of your new TKS product. You have chosen a product which will give you satisfaction through a network of efficient dealers where function, finish, after sales service and spare parts are always at hand.

All TKS products are designed and tested in close co-operation with farmers and contractors to ensure optimal function and reliability.

Please read this manual before using your new machine.

We wish you all the best with your TKS product.

Yours faithfully
TKS Mekaniske AS

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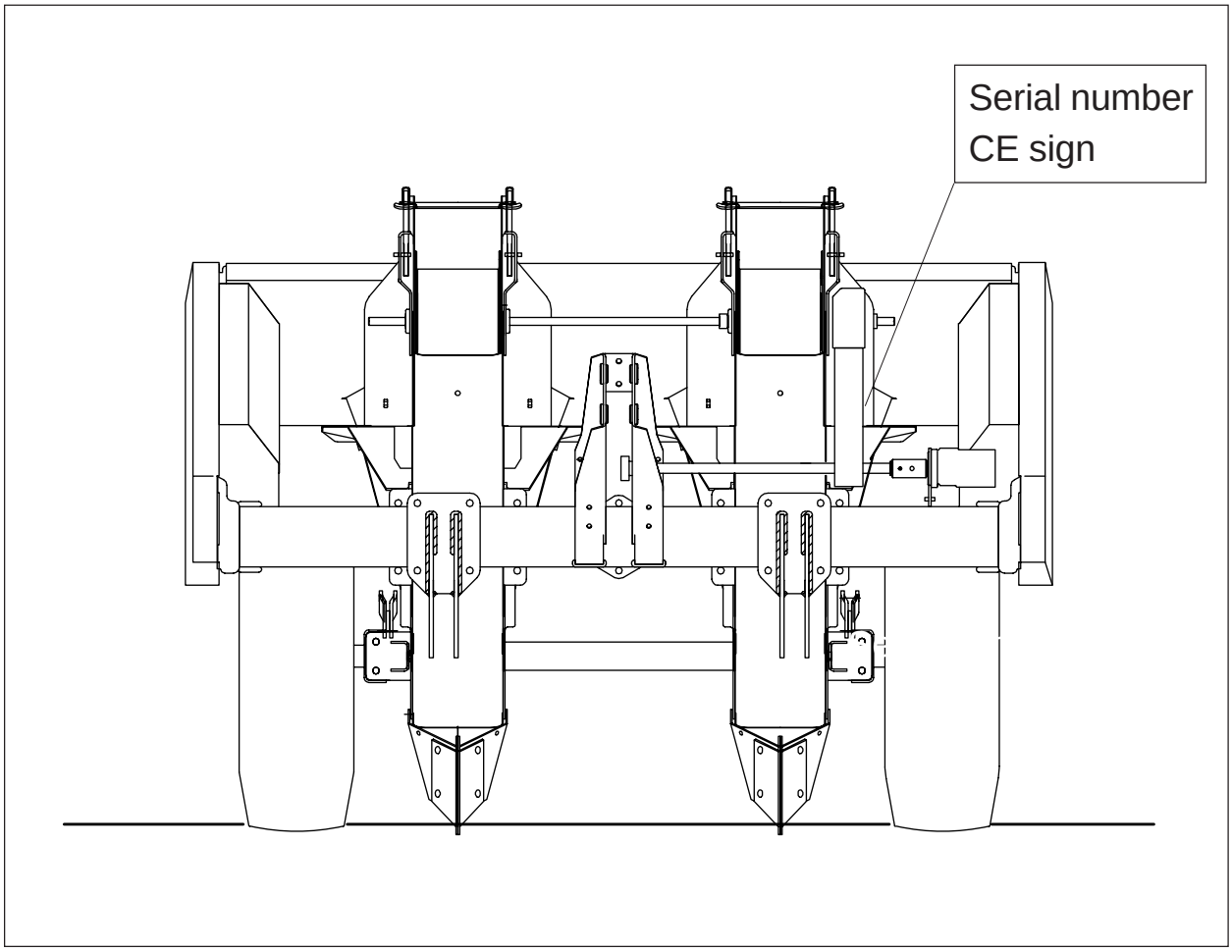
Machine identification

The machine's serial number and the manufacturer's address are found on the number plate of the machine. See illustration below.

The serial number and year of manufacture for this machine is given below. This number is important with regard to service and the correct supply of spare parts.

The machine is marked CE. This marking with appurtenant EU statement of agreement means that the machine complies with substantial health and security demands, and that it is accordance with the directives 89/392/ECC as amended by directive 91/368/EEC, 93/44/EEC and 89/336/EEC.



Serial number : _____

Year of manufacture : _____

Technical specifications

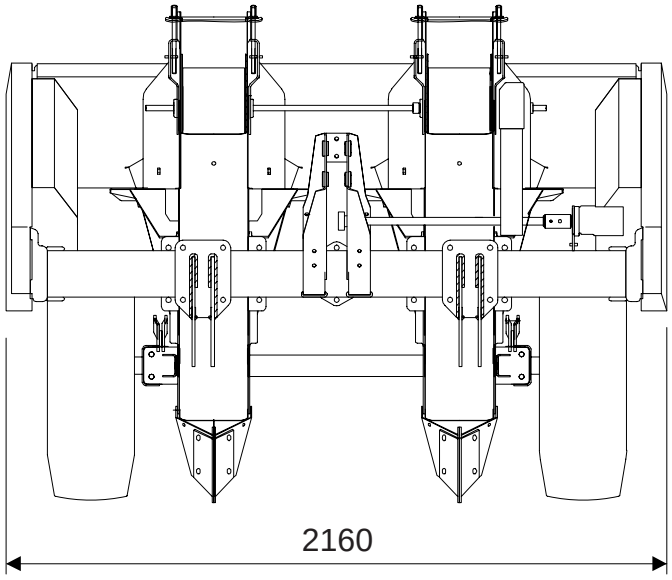
Model	**UP3720**
Number of rows	2
Connection to tractor	Cat. 2 & 3
Row width (intervals of 5 cms)	75 cm - 90 cm (30" - 36")
Planting intevals	infinite variable 10 - 80 cms
Hopper capacity potatoes	2000 kg
Minimum filling height, potatoes	118 cm
Wheel dimension, Regular	11.5/80x15.3"
Track width	150 - 180 cms
Weight empty machine	1050 kgs
Working speed	4-10km/t

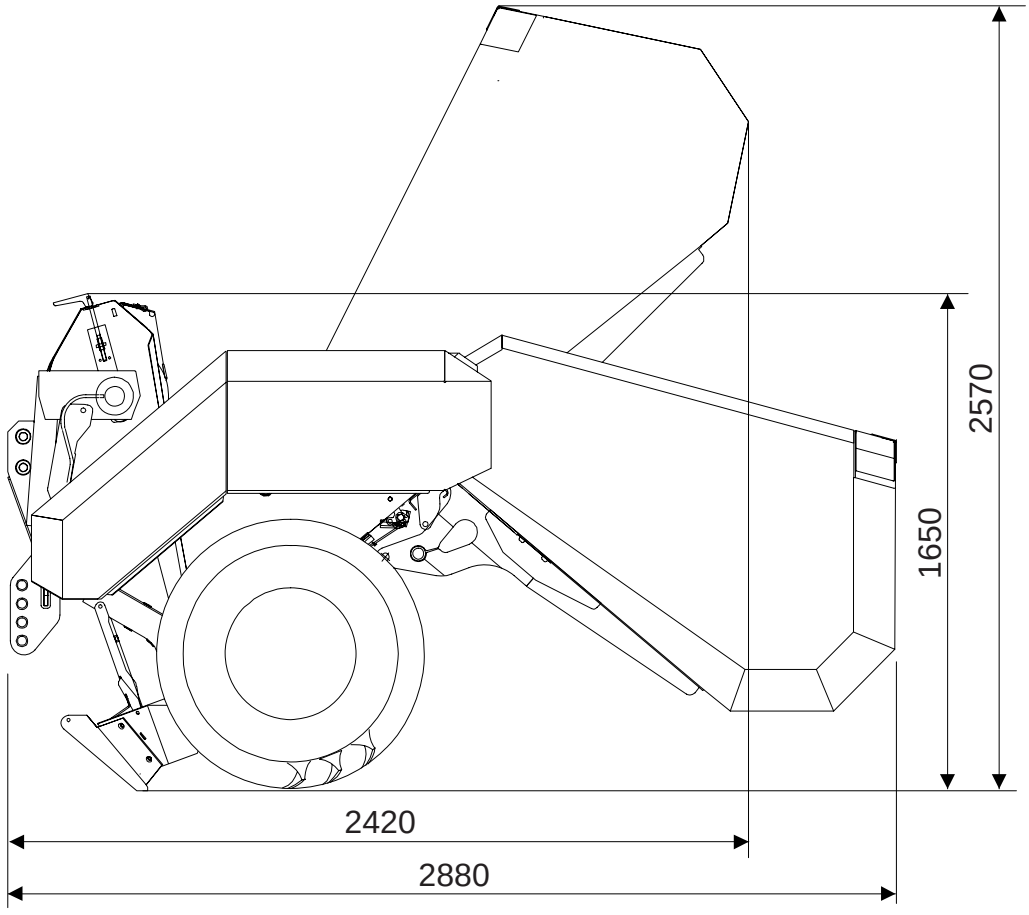
Equipment

Electric cup belt agitators	option
Cup inserts (two different sizes)	option
Rigde support plates	option
Automatic depth control	option
Area meter	standard
Elektronic plantiong monitoring system	standard
Kit for adjusting row width from 75-80 cms to 85-90 cms	standard
Kit for adjusting row width from 85-90 cms to 75-80 cms	standard

Dimensions

Valid for machine with wheel size 11.5/80x15.3"





All dimensions are in mm (1" = 25.4mm)

Model descriptions

The UP3720 automatic potato planter from TKS is a two row mounted machine. The planting units include double cup belts, adjustable gate between hopper and planting unit, adjustable row width, hydraulic drive powered by the hydraulic pump of the tractor, infinite planting distance adjustment, rigid furrow openers and manually or automaticcally controlled planting depth. The machine is available as follows:

two row planter at row width 75cms
two row planter at row width 80cm
two row planter at row width 85cm
two row planter at row width 90cm

The machine is furthermore supplied with the following hopper:

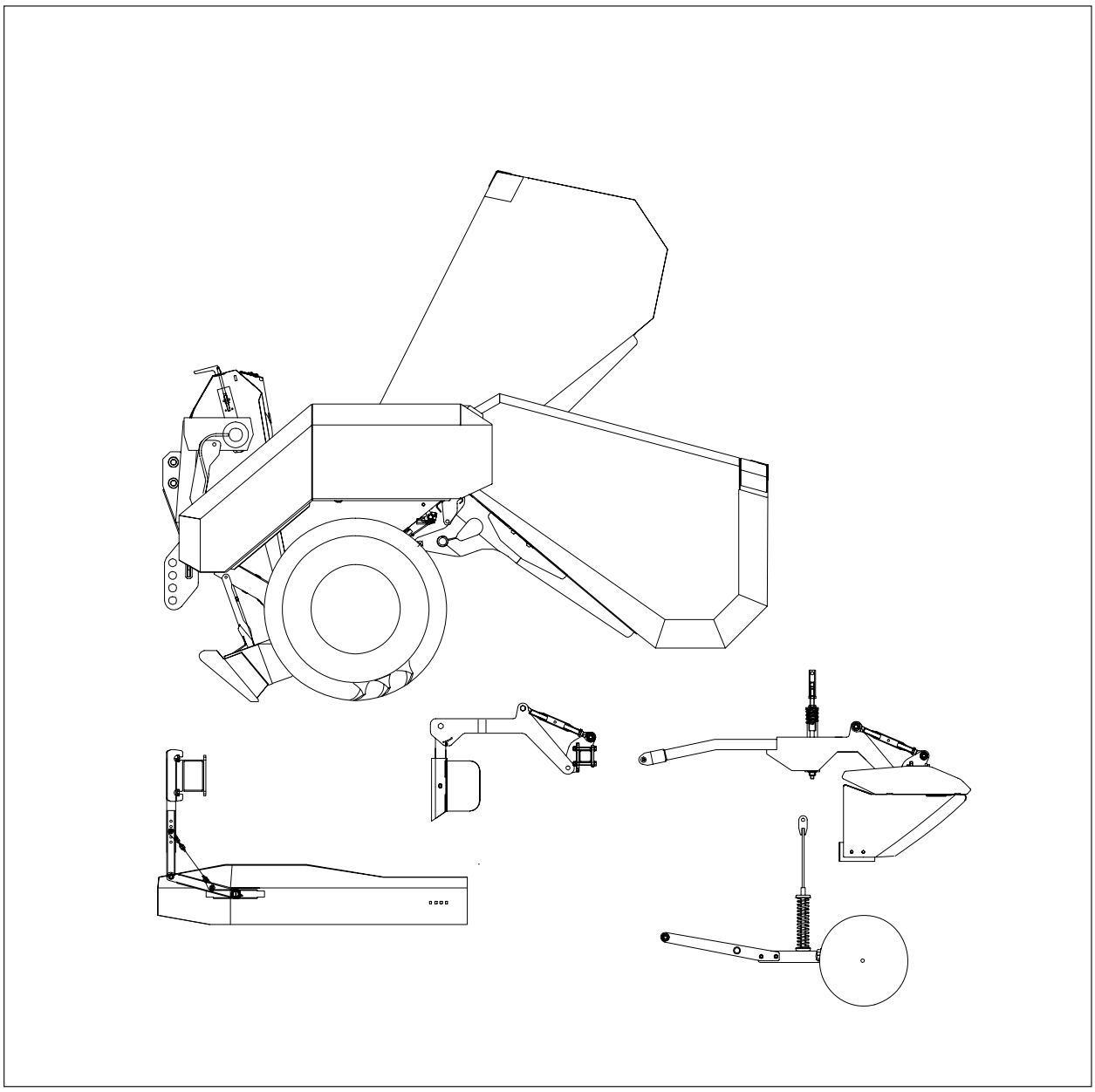
two row hydraulic operated potato hopper 2000kgs

The machine is supplied with Ø74mm planting cups (standard). Two different cup inserts (optional) are available.

The machine is supplied with one of the following covering methods:

roller discs 450mm
ridging hood

The machine is available with following options:
Centre positioned front fitted ridging shovel (combined with ridging hood)
Electric adjustable cup belt agitators.



Safety

Before operating, adjusting or servicing the machine it is important that the safety instructions in this manual are carefully read and understood by those, which are directly concerned. (Fig. 1)

Whilst all care and attention has been taken in the design and production of this machine, as with all machinery there remains a certain amount of risk to personnel whilst the machine is in use. It is strongly recommended that users and operators take all possible precautions to ensure both their own safety and that of the others that may be in the vicinity.

Read and observe the safety instructions in this manual. Safety is your responsibility!

Pay particular attention to this symbol. It means that there could be a serious hazard. It emphasises precautions, which have to be complied with in order to prevent accidents.

This symbol can be found throughout this manual and on the warning signs of the machine. They are for your safety and should be observed at all time.

Be careful when other people or animals are close by!
Never start the machine when people or animals are close by tractor or machine. Never stand between the tractor wheels and machine. (Fig. 2)

Bear in mind regulations regarding the lower age of operators of this kind of machines.

Use of the machine
The machine should be used only for the purpose it has been designed for.

Use personal protection devices
Do not wear loose clothing, which might catch in any of the moving parts. In dusty conditions an approved mask must be used. (Fig. 3)

Take care of excessive noise level. Some tractor/implement combinations, depending on conditions, may cause noise level beyond 85dB at the operator's ears, even in a "Q" cab. In these conditions ear defenders must be worn. Keep cab windows and doors closed to reduce noise level.

The machine must be connected to a correctly sized tractor
The weight of the tractor must correspond to the maximum weight of the machine when operated. Follow domestic law and regulations. (Fig. 4)

Make sure that the tractor has the correct PTO gear engaged. A machine designed for an input speed of 540 rpm. should never be connected to a tractor with 1000 rpm. output speed engaged. The normal PTO speed is given on a label close to the PTO input shaft.

Connecting machine to tractor
must always be carried out as described in this manual. If connection should be carried out with drawbar, one of the parts (tractor or machine's drawbar) must have a clevis. The drawbar pin must be secured with a lock pin. (Fig. 5)

Observe national regulations regarding road transport. Some countries require the use of safety chain when a trailed machine is towed along public roads.

Think of safety while operating the machine
Stop the tractor engine and remove the ignition key prior to carrying out repairs, cleaning, lubrication or maintaining the machine. (Fig. 6)

Safety guards
Make sure all guards are in good order and fitted correctly. Do not attempt to start the machine before ensuring this. (Fig. 7)

Pay particular attention to the plastic guards of the PTO shaft. If damaged they must be replaced. The chain locks of the guards must always be fitted on a suitable place on the tractor and the machine to prevent the outer plastic guards turning.

Hydraulics
Be very careful when dealing with hydraulics. Use eye protection and gloves. Escaping hydraulic oil under pressure might penetrate into the skin and cause serious infection. See a doctor if you have been exposed to injury. (Fig. 8)

Take care that nobody is close to the machine when the hydraulic functions are being operated.

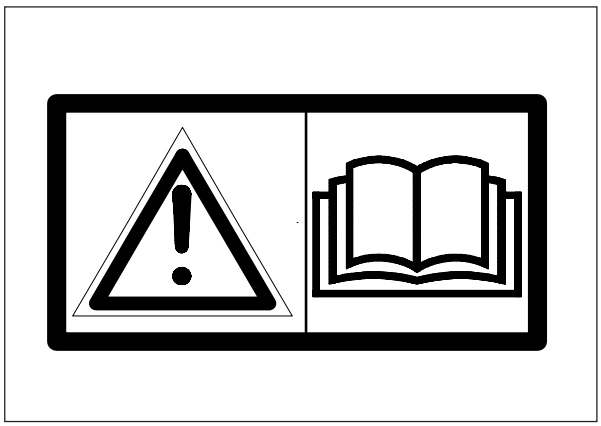


Fig. 1

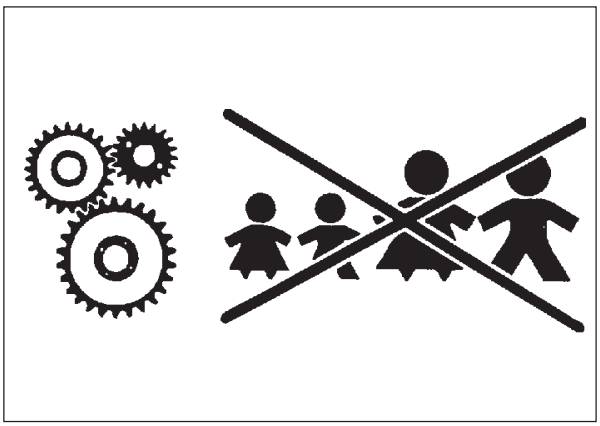


Fig. 2

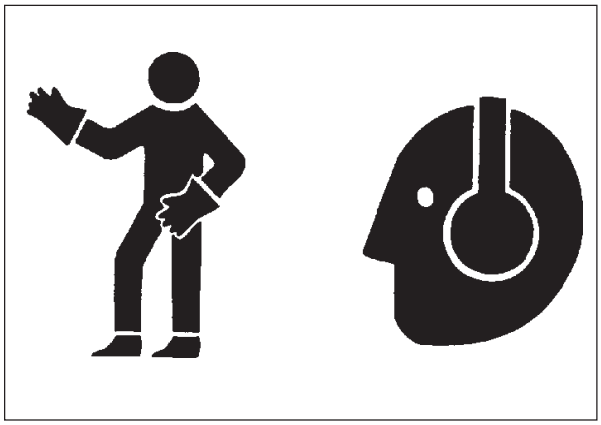


Fig. 3

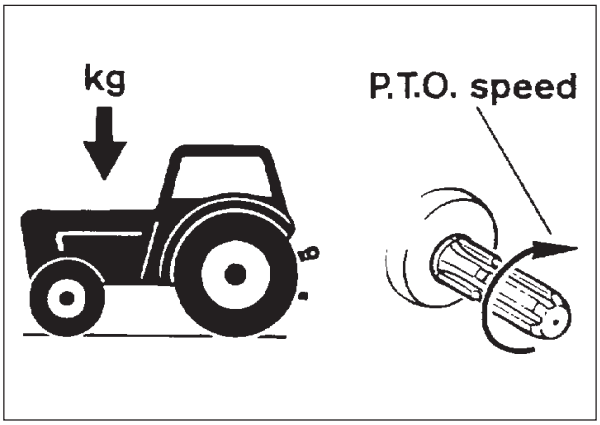


Fig. 4

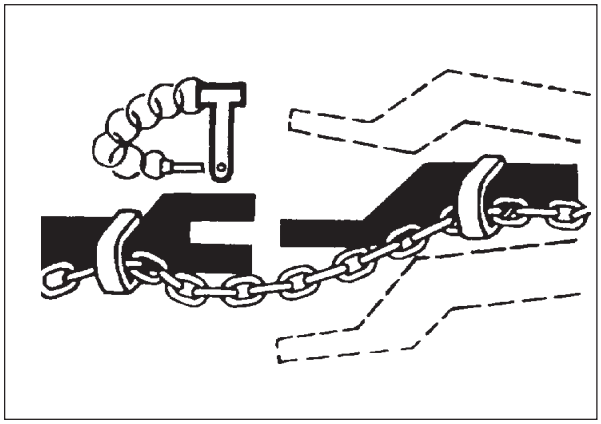


Fig. 5

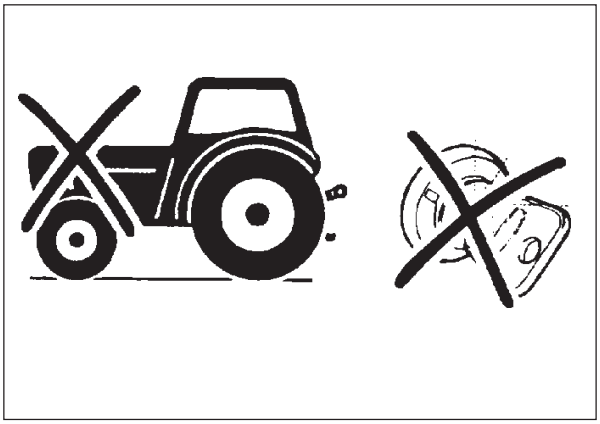


Fig. 6

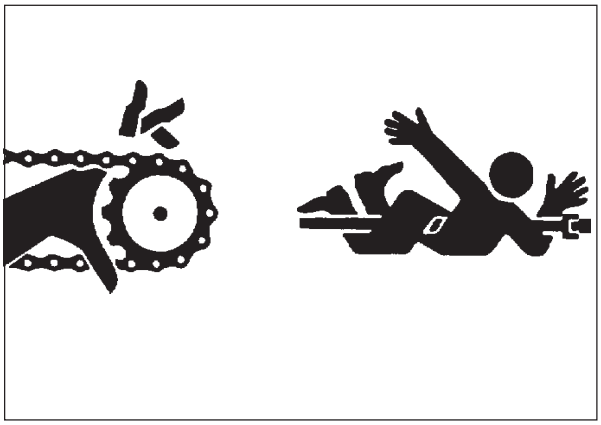


Fig. 7

Fig. 8

When uncoupling machine and when leaving tractor/machine
When uncoupling, all hydraulic functions must be in neutral position. The machine must be lowered to the ground and be safely secured. If the machine has parking chocks they should be used at the wheels. Never allow children to play or stay near agricultural machinery. (Fig. 9)

Drive safely
Beware of your responsibility, - carelessness or negligence may cause serious injury or even death. (Fig. 10)

Prior to transporting the machine along public roads, check wheel bolts and couplings. Disconnect or lock the hydraulic system.

Drive carefully. Reduce speed when turning and driving on uneven ground. Take care that trailed machine does not start swinging or become unstable.

Please be aware of the danger of overturning when working on slopes and in soft ground. Reduce load.

Lights
The owner and operator is responsible of providing correct lamps and reflectors on the machine when transported on public roads. Comply with public regulations. (Fig. 11)

Safety equipment
Always carry first aid equipment on the tractor. Also observe the regulations concerning fire extinguisher. When working with burning materials like hay and straw a fire extinguisher must be available at all times. (Fig. 12)

Spare parts
For safety reasons use only original spare parts. The use of spurious spare parts will cause the Underhaug product guarantee to be invalid. (Fig. 13)

Maintenance
Take care that the machine is properly maintained and kept in good safe working condition. Never change the basic technical construction of the machine.

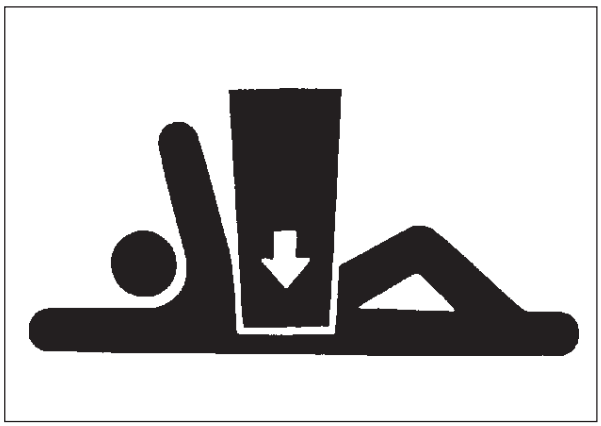


Fig. 9

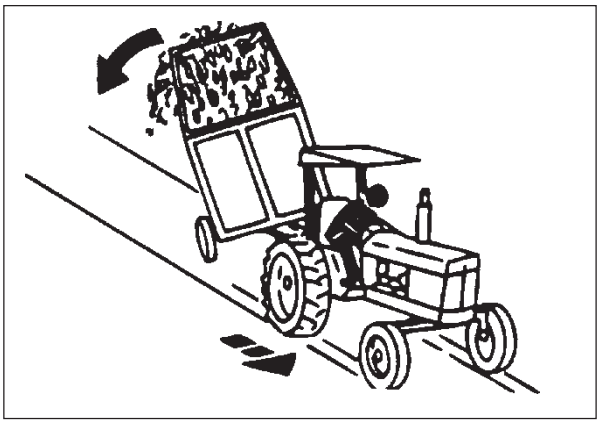


Fig. 10

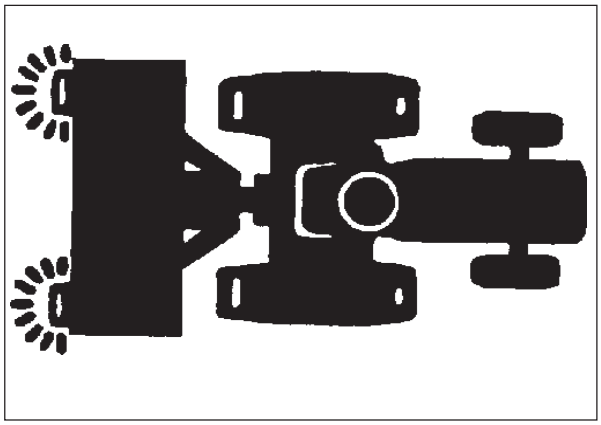


Fig. 11

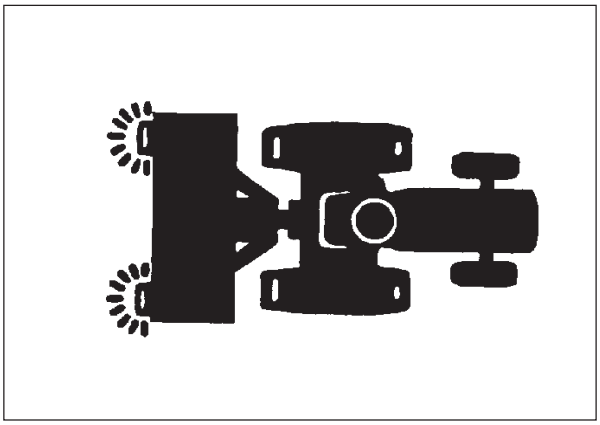


Fig. 12

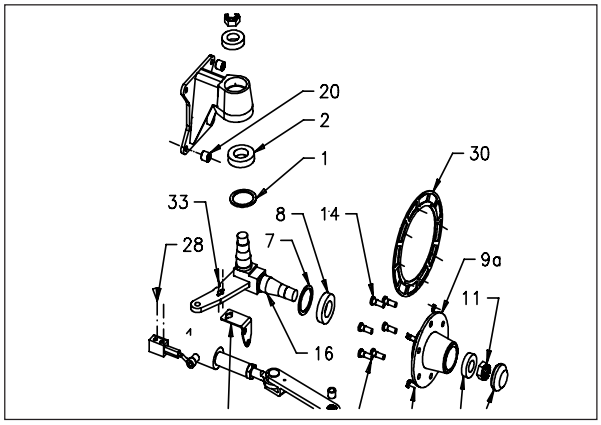


Fig. 13

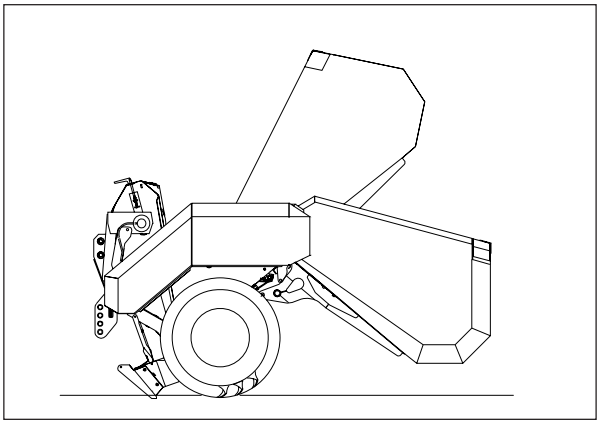


Fig. 14

Supplementary safety instructions for the UP3720 potato planter

This machine is designed for the purpose of baling & stretch film wrapping of grass or other straw material in the form of round bales.

The machine is equipped with warning signs. If any of the decals are damaged, they must be replaced. Ordering numbers are shown on the illustrations in this paragraph.

Warning sign UH220532. Be careful! Read and understand the instructions in the manual before the machine is put into service and before attempting adjustment/ maintenance.

Warning sign UH220525. Be careful when machine is lowered! Keep feet away from furrow openers, ridgers and wheels. When operations are to be performed underneath a raised machine, a support should be placed under the main frame.

Warning sign 220526. Risk of cutting fingers if catched between roller chain and sprocket..

Warning sign 220536. Keep distance to the movable hydraulic operated potato hopper.

Warning sign UH220534. Disconnect all electronics before welding commences.

Lifting machine with crane

Only use approved lifting device. The weight of the machine is given in paragraph “Technical specifications”.

Be careful! Make sure that nobody stands under or near the machine when it is being lifted.

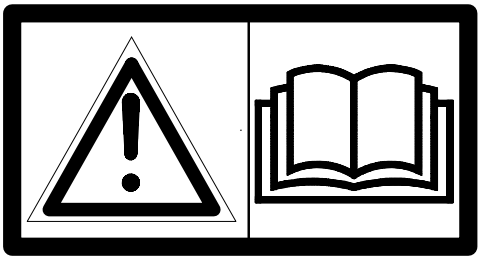
Attach the lifting straps by the "sling here" signs. Make sure that straps are securely fastened before lifting.

Use a guide wire to keep machine in position.

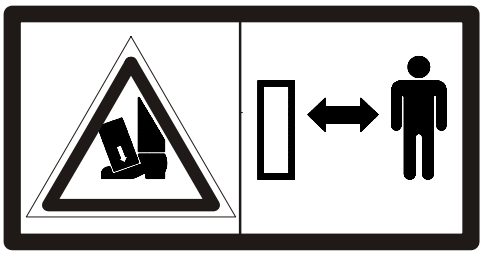
Hazard at use of chemicals

The chemical manufacturer's prescriptions regarding handling of pesticides, insecticides and fertilizer should be noticed.

UH220532



UH220525



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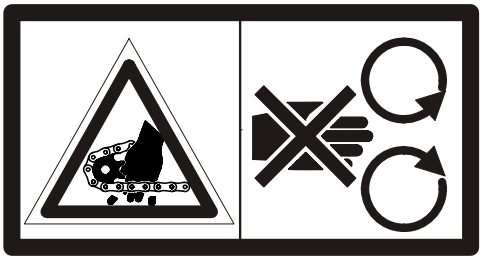

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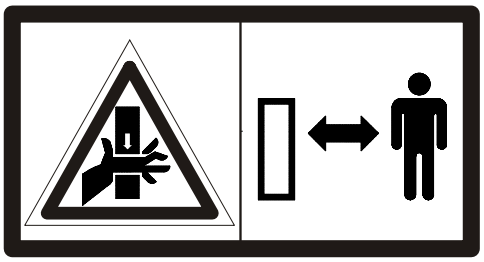


New machine - be careful

Read the operator's manual. Great care must be taken when starting a brand new machine for the first time. Incorrect assembly, faulty operations etc. may cause expensive repairs and loss of profit. The TKS product guarantee does not cover damage occurring when the instructions given in this book are not followed.

Pay particular attention to this symbol, - it emphasises operations where great care must be taken in order to avoid incorrect assembly, faulty operations etc.

Carefully do as described below when starting a new machine.

Check that the machine is mounted correctly and that it is not damaged. Assure that electric wirings have length and position that allow machine to move without causing any damage to the wirings.

Check the connections between tractor and machine.

Check that the roller chains are tensionned and correctly positioned on the sprockets.

Check that the drive rollers on top of both planting tubes are equally adjusted in order to assure cup belts run straight.

Lubricate the machine according to lubrication instructions.

Check wheel bolts torque setting.

Cleaning

General

We recommend the use of pressured air when cleaning the machine. Thus there is less risk of damaging the bearings of the machine. If high pressure water is used, keep clear of bearings and electric components.

Cylinders

Assure that piston rods are kept free from aggressive chemicals in order to avoid corrosion.

1.1 Packing

Remove all kind of packing. Any equipment stored in the machine should be removed.

1.2 Row width control

Check that row width is in accordance with customer's specifications. See Paragraph 1.3 below regarding row width adjustment.

1.3 Row width adjustment

It is advantageous to loosen, move and attach the row unit(s) on one side before the other side is loosened. This reduce the risk of getting the main frame out of position. **Hopper should be removed prior to row width adjustment.**

When moving the driving unit (Fig. 21/ A) the upper drive chain cassette (B) position is close to the planting tube. Move the lower sprocket on the shaft from the motor (lock with set screw C on the flat shaft surface). The upper sprocket is locked on the hexagonal drive shaft by means of stop rings (D).

Before row width adjustment can be made, loosen all connections between the row units (E) and the main frame, and the hexagonal drive shaft (Fig. 22/F) for agitation discs, the squared shaft (G) connecting the choke plates, the bar (H) and finally the telescopic wheel shaft (I) should be loose. Make sure that the wheel shaft is locked at correct track width.

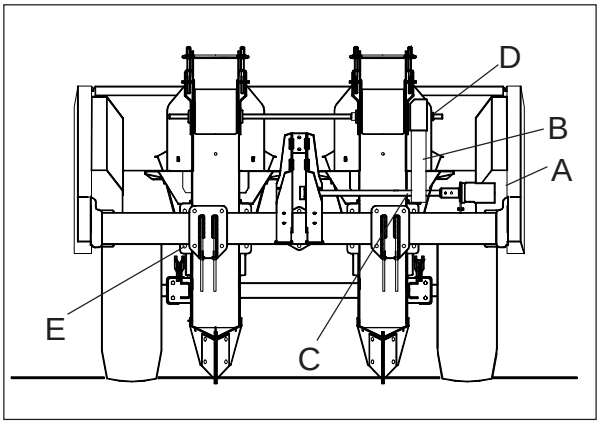


Fig. 21

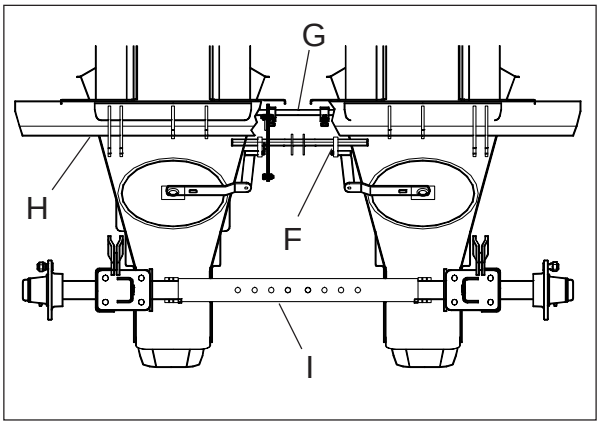


Fig. 22

1.4 Assembling the coverers

Disc coverers 450mm (Fig. 23 & 24):
Attach roller disc (A) to the arm (B) before fitting left and right-hand disc section in the rear slotted holes of the frame plate (C). Adjust the disc angle by moving the centre attachment (D) forwards or backwards on the frame plate.

Track loosener (E) for disc coverers (Fig. 23 & 24):
Attach in the rear holes of frame plate (C) for the disc coverers. The track looseners are attached on the outside of the row sections (left-hand track loosener on left hand section and vice versa). Set position to run in the middle of the furrows deep enough to make good guide tracks for later ridging.

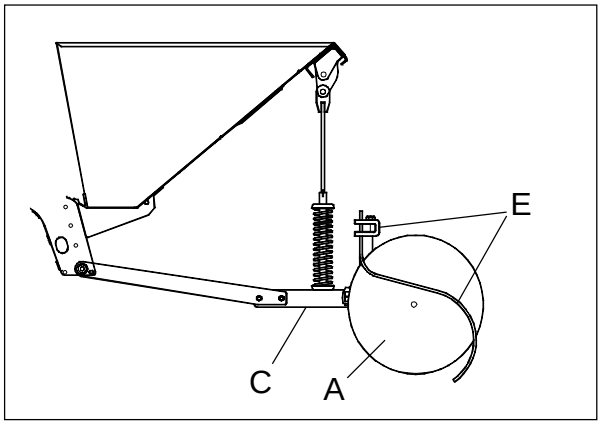


Fig. 23

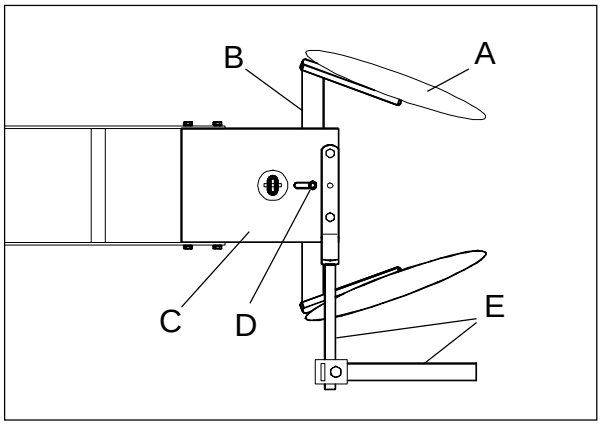


Fig. 24

Ridging hood (fig. 25):
Is ready for use when factory fitted.

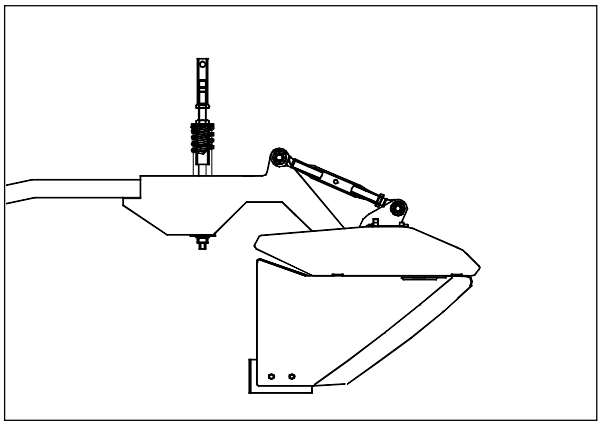


Fig. 25

1.5. Preparing the furrow openers

Is ready for use when factory fitted.

3. TRACTOR REQUIREMENTS

Recommended lifting capacity with full hopper(s)

Planter size	Recommended lifting capacity
Two row w/2000kgs hopper	min. 3500kp

Threepoint linkage

Cat. 2 or 3.

Hydraulic connection

Single acting output with free return, continuous oil flow, capacity 35 litres/min.

Electrical supply

12V, standard 12mm socket or cigarette lighter socket (with electronic planting monitor only).
IMPORTANT! Ensure all electrical contacts and the socket are well connected in order to avoid a power supply cutoff due to vibrations. Even a very short cutoff will start the computer test procedure.

4. TRACTOR CONNECTIONS

4.1 Threepoint linkage

When the top link and draft arms are parallel, maximum lifting capacity is obtained. Correct top link length is when profile lines on the side panels of the potato hopper are parallel with the ground (fig. 26).

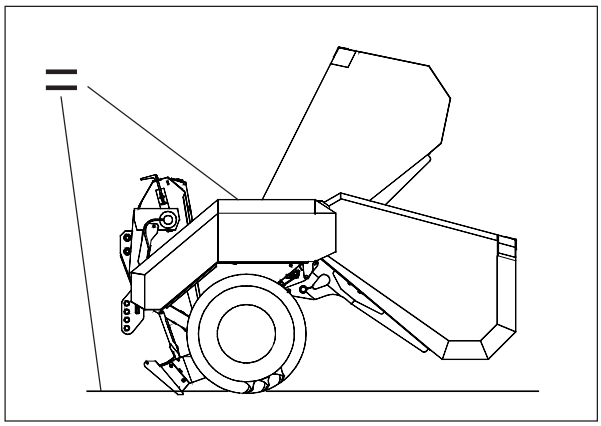


Fig. 26

4.2 Hydraulic driving unit

4.2.1 Components

The hydraulics of the planter includes following (see fig. 27):
Two or three spool valve bank (A)
Oil motor (B) for planting shaft drive
Cylinder (C) with check valve (C1) for hopper
2 cylinders (D) for lifting/lowering of machine (option)
2 way check valve (D1) for cylinders for raising/lowering of the machine (option)
Oil filter (E)
Oil container (F)

4.2.2 Connection

When connecting the hydraulics to the tractor, the hose from the oil filter should be connected to the pressure line, the other one to the return line.

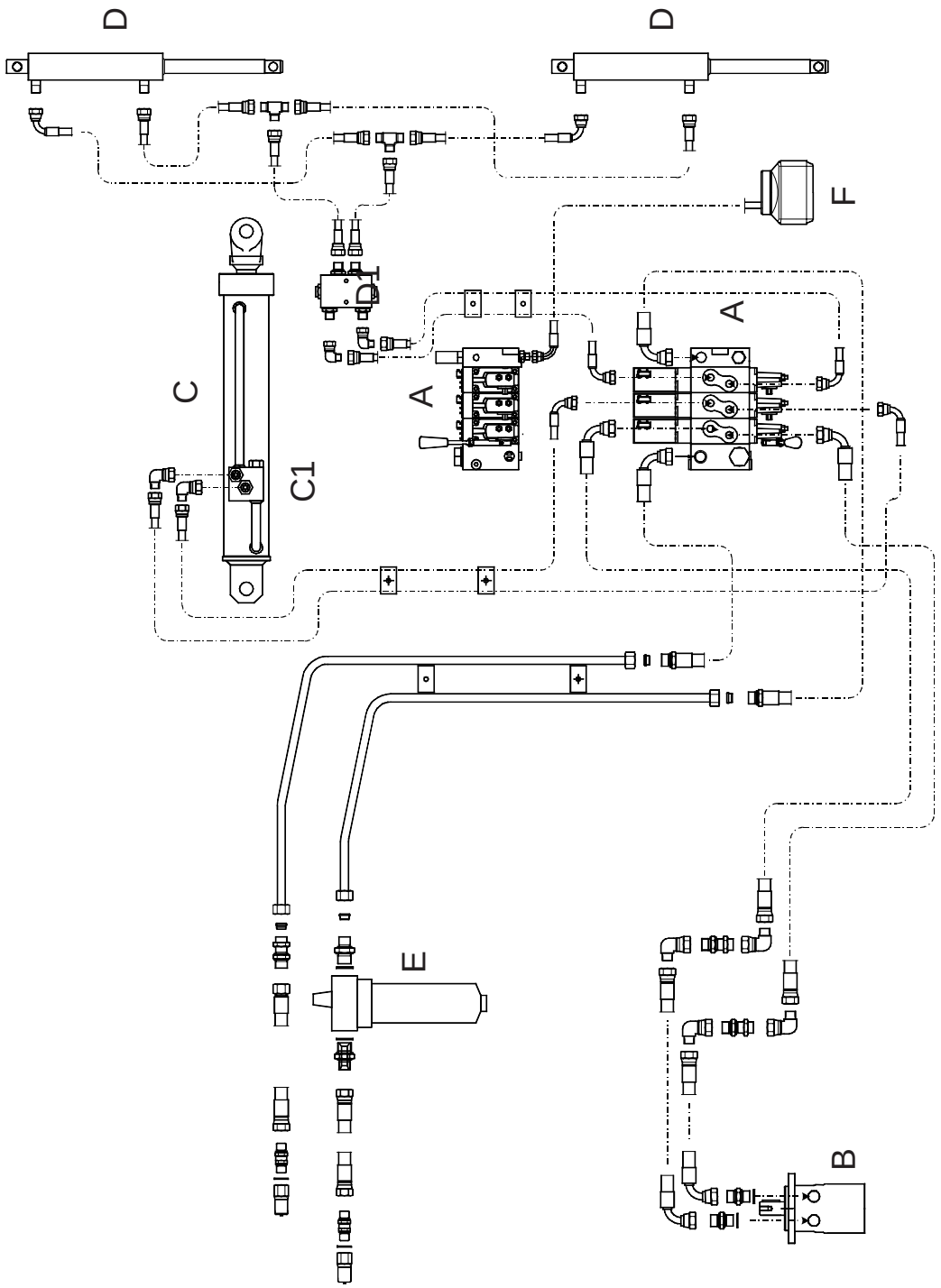


Fig. 27

4.3.3 Open/closed centre system

When connected to a tractor with constant pressure hydraulics (such as John Deere 30, 40 and 50 series), the control section of the valve must be rebuilt according to the following description (ref. fig. 28):

- Unscrew coverplug 4 and plug 22.
- Mount orifice 7 and plug 24 with sealring 23.
- Refit coverplug 4 and sealring 5.'

When connected to a tractor with open centre hydraulics, plug 24 with sealring 23, and orifice 7 must be replaced by plug 22. If not, all oil will pass with full pressure over the tractor hydraulic's safety valve with a risk of damaging the tractors hydraulic pump!

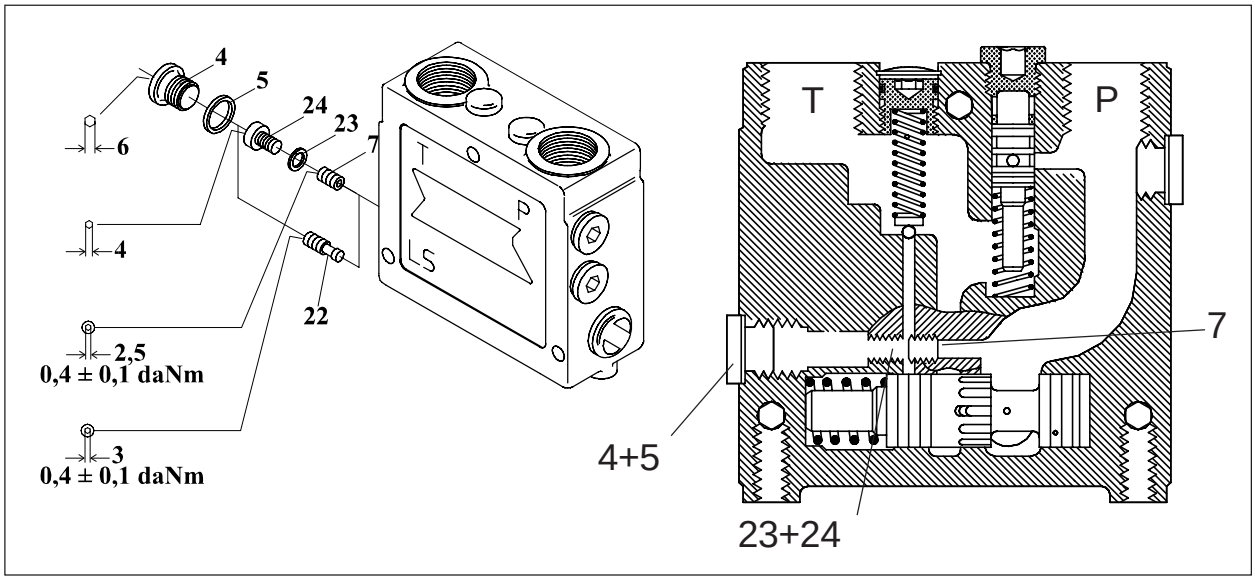


Fig. 28

4.3.4 Integrated oil filter

The filter should be exchanged when the indicator on top of the filter show a red indicator.

For replacement of the filter element - see chapter "Maintenance".

Filter visual indicator (I)

Green - filter element is clean
Red - change filter element

Check the filter when the oil is warm. Cold oil may give wrong indication.

4.3.5 Draining the valve bank

The valve bank is connected to a container (fig. 27/F) positioned behind the left-hand rear side panel. If the return pressure of the oil from the valve bank is too high, e.g. the return hose is disconnected while still pressure in pressure side, a small volume of oil will flow into the container.

The container should be emptied in an environmental friendly way.

4.3.6 Manual hydraulic operation

The valve bank can be manually operated by using the lever included with the machine. Connect the lever to the hexagonal shaft of the valve sections, see fig. 29. The lever is stored inside the panel covering the valve bank.

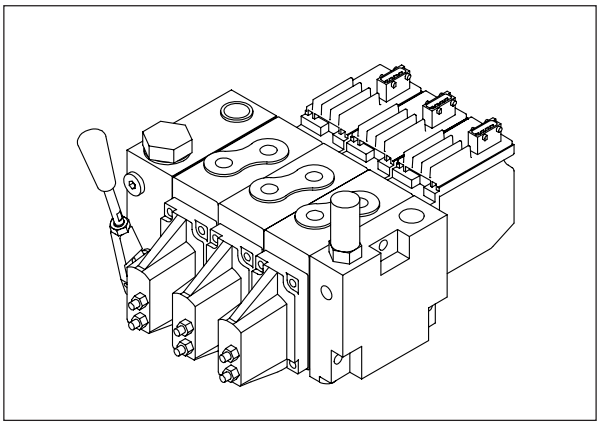


Fig. 29

5. OPERATING THE MACHINE

5.1 Seed potato size

Use graded seed potatoes as equal size gives an improved yield and optimal planter performance.

Recommended grading (square sieve):

	Min. sieve	Max. sieve	Max length of potatoes
Large cup ø74mm	40mm	60mm	100mm
Large inserts (white)	35mm	50mm	75mm
Small inserts (green)	25mm	40mm	55mm

The best result is achieved when the difference in the size is kept to a minimum.

5.2 Altering the row width

See paragraph 1.3. When a machine with hopper for row width 75-80cms needs to be altered to 85 or 90cm, the plates in the bottom of the hopper have to be exchanged. This is necessary even for a machine fitted with hopper covering row width 85 to 90cms when changed to 75 or 80cms row width.

Row width adoption kit 75-80cm UH210492
Row width adoption kit 85-90cm: UH210493

Make sure that the new row width input is stored in the menu (see fig. 42).

5.3 Planting spacing adjustment

To be set in the menu, see Paragraph covering the control system.

5.4 Depth adjustment

a. Rigid furrow opener (fig. 30):

Adjust length of wheel stem stay A at the rear of the machine, between the wheel shaft and the planting units, till the desired depth is achieved.

Depth adjustment may be performed automatically (option), see Paragraph covering the control system.

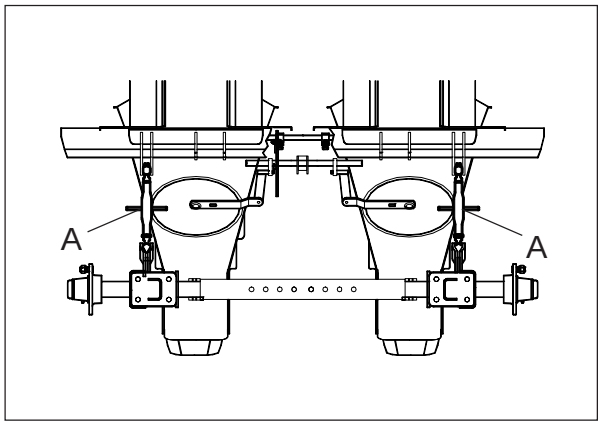


Fig. 30

5.5 Covering up

a. Roller discs (fig. 31a):
A large ridge is achieved by adjusting discs to max. distance. Discs that are set to a wide angle will make sharp-topped ridges, whereas a smaller angle will produce flat ridges. Loosen bolt (A) on the frame plate for adjustment.

If the discs make the ridge too small due to hard or heavy soil, increase the spring pressure by lengthening the stay (B).

Set track looseners (C) to desired depth.

b. Ridging hood (fig. 31b):
Set the spring pressure by adjusting the nut (A) on top of the spring. As an alternative the lower spring stay can be repositioned.

Adjust the tilting of the ridging hood by mean of the turnbuckles (B).

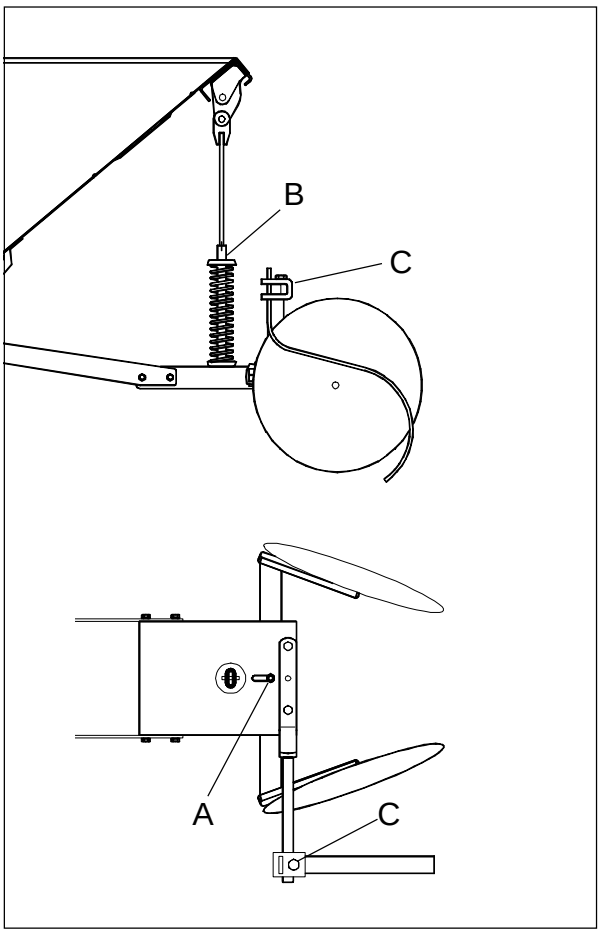


Fig. 31a

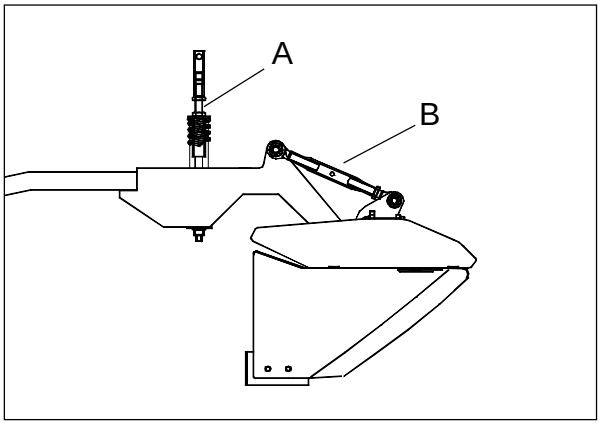


Fig. 31b

5.6 Working speed

Depends on cup belt speed, i.e. the chosen spacing.

Small spacings = low speed
Large spacings = high speed

Spacings (cm) x 0.25 = optimal working speed (km/h).

Observe! Round seed can be planted at larger speed while oblong and cut seed should be set at lower speed.

5.7 Belt agitation

Set to minimise misses and doubles. Six positions (Fig. 47/A).

Minimum agitation = Large potatoes, high belt speed
Maximum agitation = Small potatoes, low belt speed

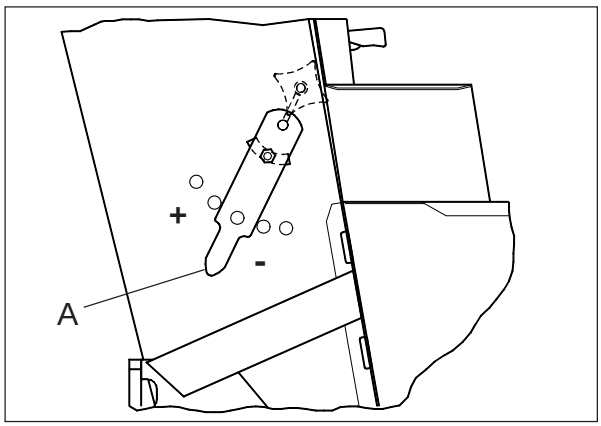


Fig. 32a

5.7.1 Mechanic agitation

6 positions (fig. 32/A).

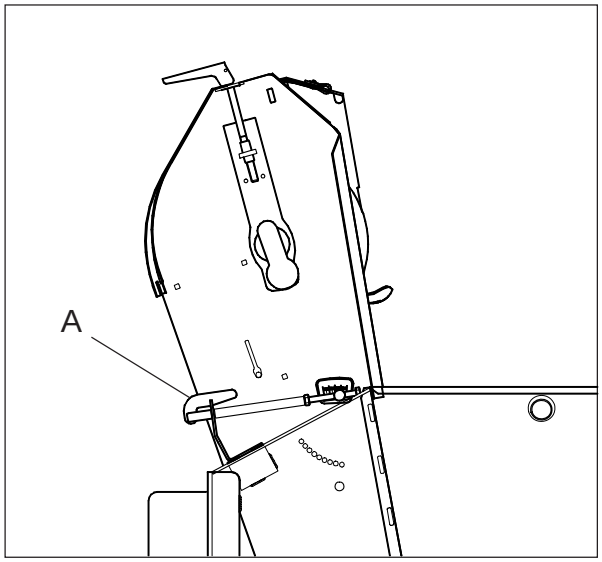


Fig. 32b

5.7.2 Electric agitation

The agotatpr motors are located inside the planting units as shown in fig. 32c. The control unit fitted on the main frame at the front of the planter includes fuses for every motor.

It is important to make sure that every movable component of the agitating system may move freely, otherwise the motors may overload the electric circuits causing fuses to blow.

Adjust the agitator speed by means of the control panel (see paragraph 6.8). The agitator system's pressure on the cup belts is adjustable. Turn the handle (fig. 32b/A) inwards or outwards. The agitation is increased when the handle A is turned anticlockwise.

In order to get access to the greas nipple (fig. 32c/B) the cup belt has to be disconnected.

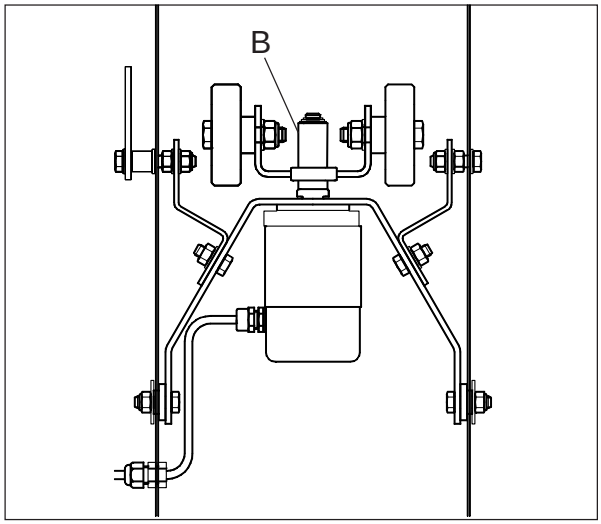


Fig. 32c

5.8 Regulation of potato flow from hopper to planting units

Set the choke plates (angle and length) (fig. 33) to obtain balance between supply and planting. Potato level should normally be approx. 15-20cms below the lower edge of the hopper's front plate.

Central adjustment of choke plate angle by chain (A) at the headstock:

Increase flow - pull the chain
Reduce flow - slacken the chain

Individual adjustment of choke plate length (slotted bolt holes) (B):

Increase flow - shorten plate
Reduce flow - lengthen plate

Observe! The agitator disc movement can be adjusted (oblong holes in arm at the rear side).

The indicator on left-hand side of the planter shows the position of the choke plates.

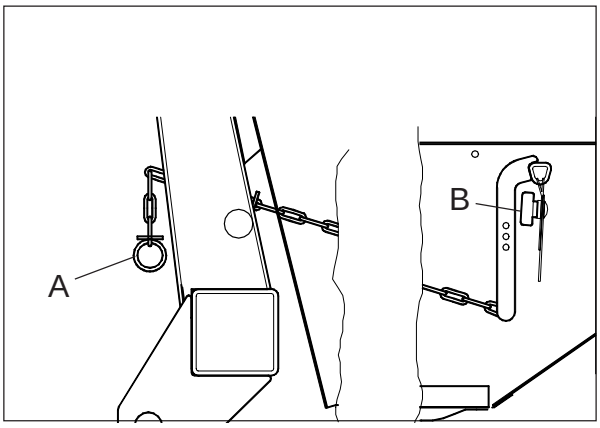


Fig. 33

5.9 Emptying the potato hopper

Empty all accessible cups. Open the hatches (fig. 34/A) and empty the hopper. If the flow blocks, move the belts. Finally turn the belts in order to empty the planting tubes. Reposition the hatches.

It is even possible to empty the hopper by engaging the drive of the planter, see the section covering the control system.

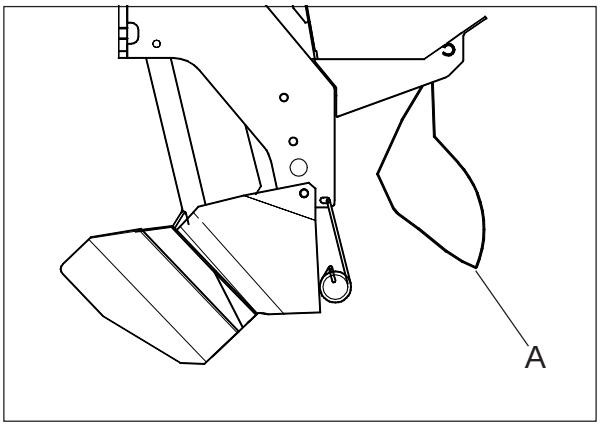


Fig. 34

6 ELECTRONIC CONTROL PANEL

The electronic control system includes (see fig. 35):

- A Control panel
- B Black box
- C Wheel sensor
- D Drive shaft sensor
- E Valve bank cable
- F Depth control sensor (optional)
- G Battery cable
- H Power supply cable
- I Panel cable

The black box is fitted behind the right-hand side panel of the planter.

6.1 The keys of the control panel

See fig. 36.

- A-B Arrow keys for moving the marker on the screen
- C Not in use
- D-E ± keys for change of screen values
- F Not in use
- G OK key confirming the selection/storing the new value
- H-I Not in use
- J-O Function keys with variable function, see soft key display on screen

When operating the ± keys (D-E) with no parameter selected, the screen contrast is adjusted.

6.2 Connecting the tractor power supply

In order to start using a machine with electronic control system, the power supply to the black box must be connected. Insert the plug in the power supply socket of the tractor. If the tractor does not include a proper power supply socket, a new one should be fitted. A battery cable with fuse is included with the machine. Connect cable to the tractor's battery when fitting the battery cable.

Note that red cable should be connected to the + terminal of the battery.

On the rear side of the panel an ON/OFF switch is provided (fig. 36/T). When turn ON the control system is powered and the screen lights up.

See paragraph 6.1 and fig. 36 for the description of the keys of the control panel. See fig. 37 regarding description of symbols on the screen and the varying function of the function keys.

Disconnect the power supply if the machine is not used for several days.

OBSERVE! The screen displays may differ slightly from the figures included in this manual.

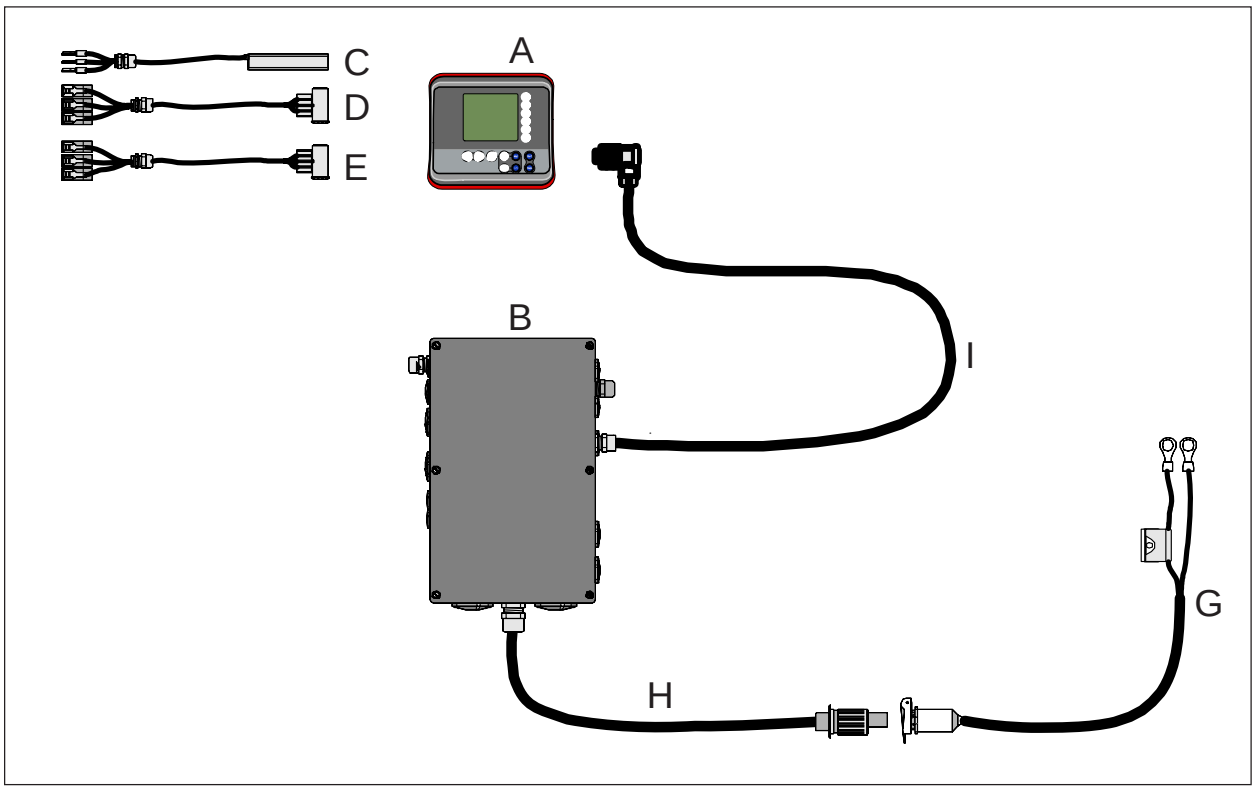


Fig. 35

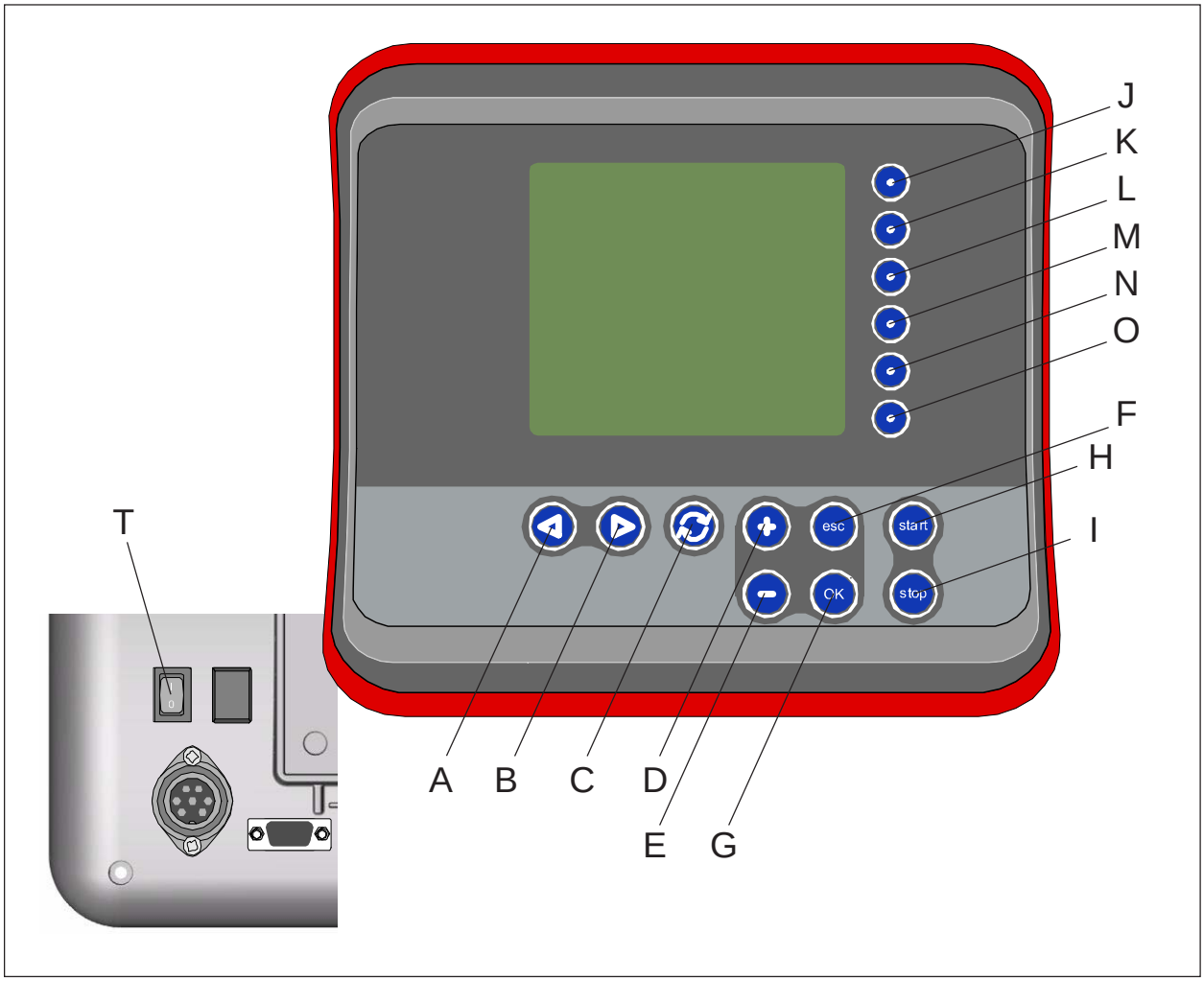


Fig. 36

6.3 Selecting measuring unit system

Select between metric and imperial sizes in screen display "Adjustments 1" (see fig. 42). Activate field "unit" and select the desired size units by means of the ± keys D or E. Confirm by pushing the OK key.

6.4 Planting distance adjustment

Push arrow key A or B /fig. 36 in order to activate planting distance field displayed on the screen (see fig. 37). Adjust by pushing the ± keys D and E. Confirm finally the new distance by pushing the OK key G.

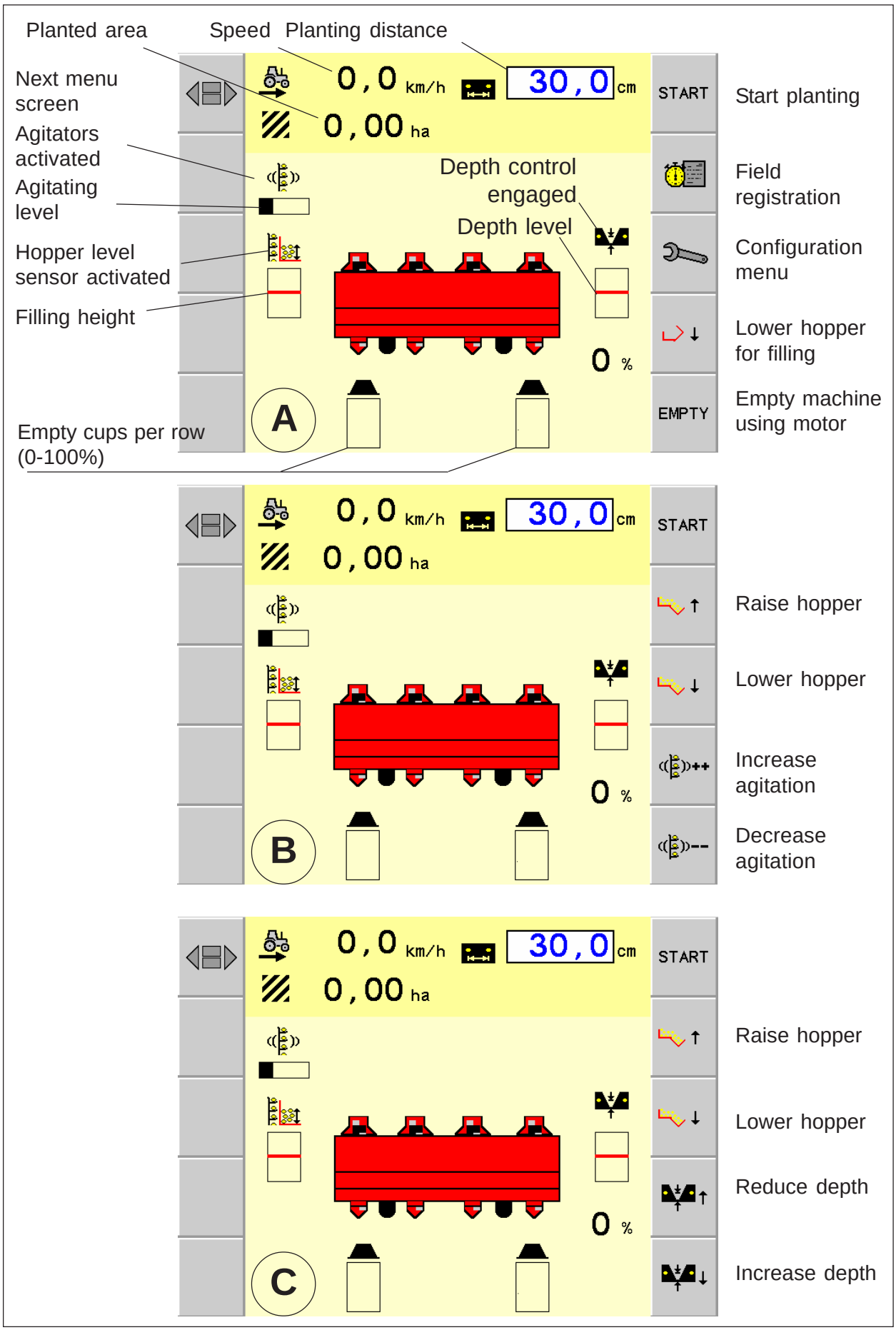

Planted area
Speed
Planting distance
Next menu screen
Agitators activated
Agitating level
Hopper level sensor activated
Filling height
Empty cups per row (0-100%)
0,0 km/h
30,0 cm
0,00 ha
Depth control engaged
Depth level
0 %
A
START
Start planting
Field registration
Configuration menu
Lower hopper for filling
EMPTY
Empty machine using motor
B
Raise hopper
Lower hopper
Increase agitation
Decrease agitation
C
Reduce depth
Increase depth

Fig. 37

6.5 Automatic depth control (option)

Make sure that machine stand still. Push the "Configuration menu" key (fig. 38/L).

Select "Adjustments 2" menu screen by means of the page selection keys (fig. 38/J-K). Move the cursor to the depth level setting field, adjust to desired level and press the OK key. Note that depth is given as %, which means that 100% is the maximum depth, while the 0% is the minimum depth. Make an input, e.g. 50%, make a test run and check the depth. Thereafter readjust the depth setting accordingly.

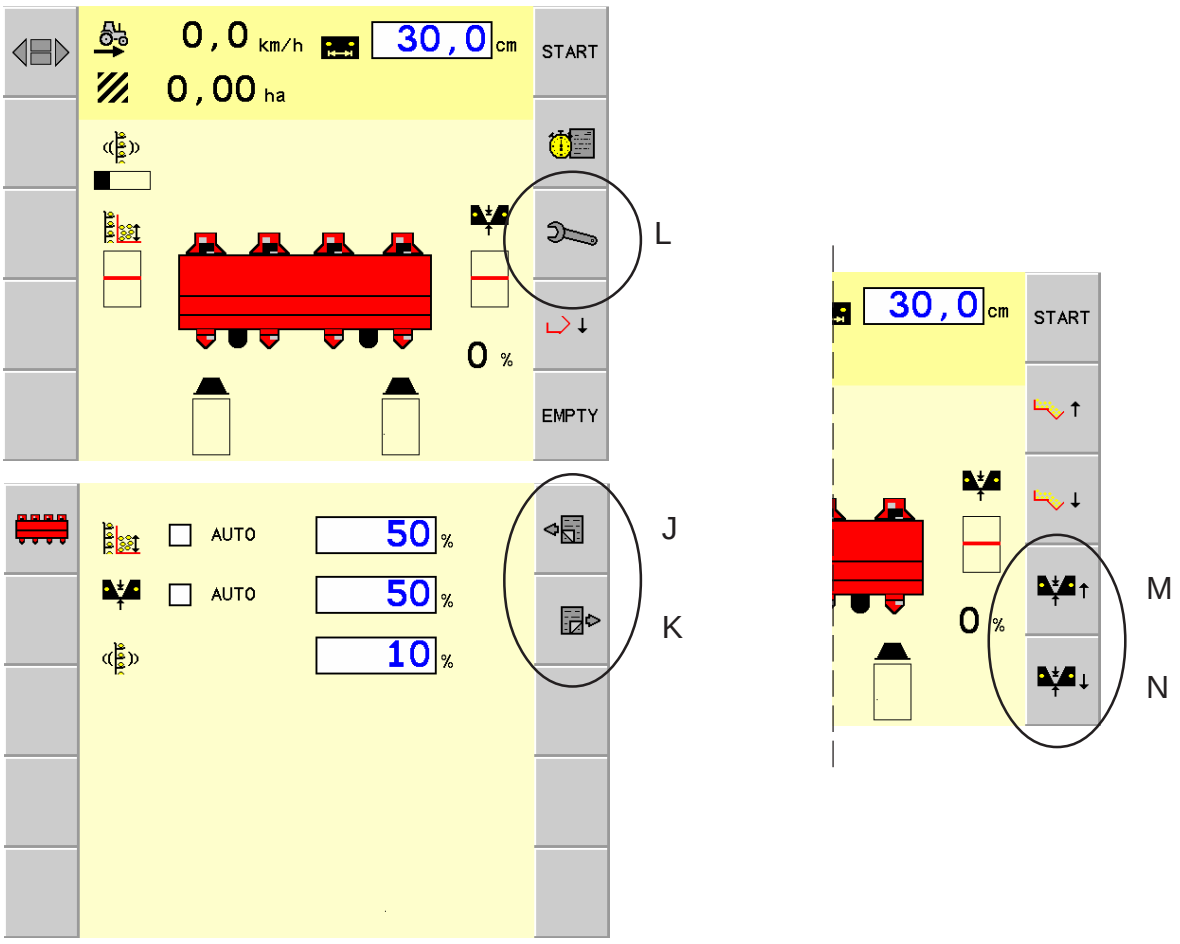
It is possible to manually raise or lower the machine with auto depth control active. Keep pushing one of the depth adjustment keys (fig. 38/M-N) and the machine will alter the depth to minimum or maximum depth accordingly. Release the key and the machine will automatically return to its preset depth.

If desired the auto depth control can be disengaged. Select "Adjustments 2" menu screen, see fig. 38. Set the cursor (by means of the arrow keys) on the «AUTO» field, push the ± key in order to set the value to "MANUAL". Adjust then the depth by means of the function keys "Reduce depth"/"Increase depth", see fig. 37/screen display C. The control is thus set to manual adjustment.

Confirm any changes by pressing the OK key.

6.6 Lowering the hopper prior to filling

Push the "Lowering hopper for filling" key (see fig. 39) prior to filling the hopper. The hopper will lower and make filling easier.



Adjustments 2

Fig. 38

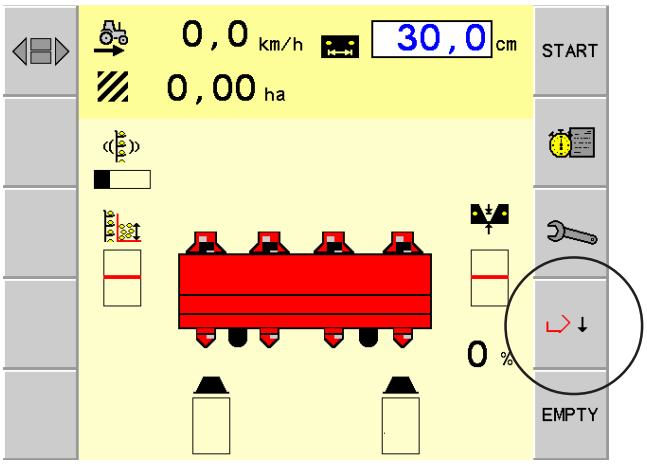


Fig. 39

6.7 Normal planting

Note that forward speed should exceed 0,5 km/h to activate planter drive.

Lower the machine and push the "START" key, see fig. 40. The key symbol will thus change to show "STOP".

Press "STOP" key to stop the planter drive and continue for at least 2 meters in order to cover the end of the row. Thereafter raise the machine.

During the planting the planting units will empty. To keep the correct level of tubers in the planting units, the hopper should be raised. Use the "Raise hopper"/"Lower hopper" keys, see fig. 41. It is recommended to maintain a fairly constant level of tubers in the planting units in order to obtain a good result.

6.8 Planting distance calibration

If the distance achieved does not correspond with the values of the screen display, the control system should be calibrated according to the wheel slippage and soil conditions.

First check that the wheel sensor (positioned behind the right-hand wheel) lights up 25 times per wheel turn.

Mark a distance of 100 meters and select the "Adjustments 1" screen menu, see fig. 42. Push the arrow key till "START" is highlighted.

Push the "OK" key and drive 100 meters.

Push the "OK" key once more.

The correct number of pulses per 100 meters of driving distance is thus registered.

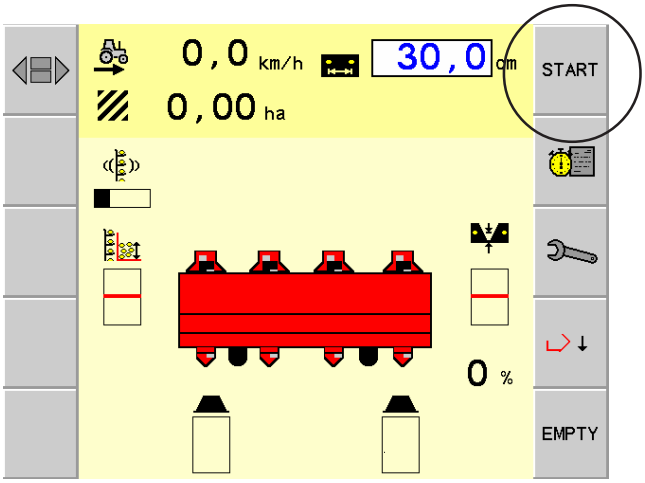


Fig. 40

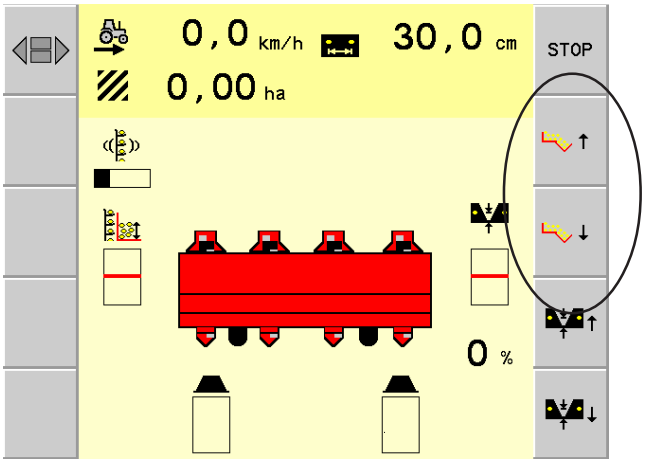
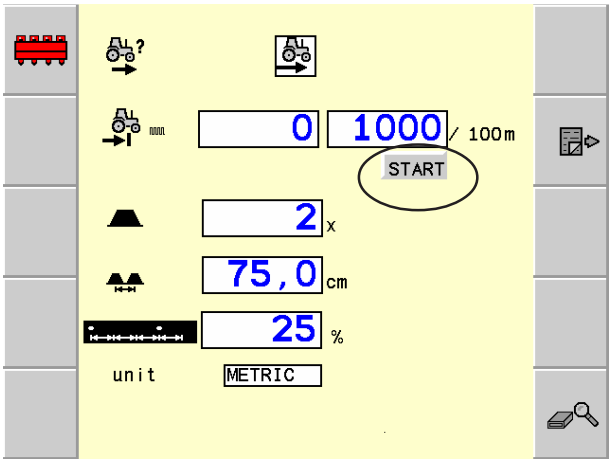


Fig. 41



Adjustments 1

Fig. 42

6.9 Electric cup belt agitators (option)

Operate the function keys "Increase agitation"/"Decrease agitation" (see fig. 43) in order to adjust the electric agitators.

6.10 Emptying the planting units

Operate the "EMPTY" key to start the planting drive for emptying the planting units, see fig. 44.

6.11 Adjusting the alarm at empty cups

The planting monitoring system includes sensors at the cup belt. The user can select the allowed number of misses in sequence to activate the alarm.

Select the "Adjustments 1" menu screen, see fig. 45. Use the arrow keys to activate the "Alarm level empty cups". Set the percentage of empty cups required to activate the alarm. When desired value is set, confirm by pushing the "OK" key.

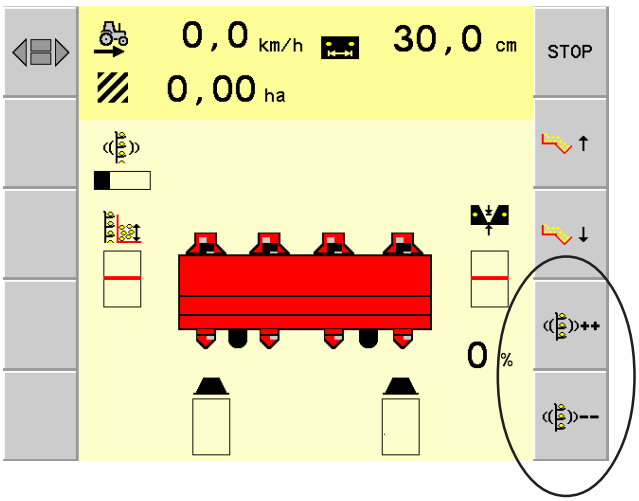


Fig. 43

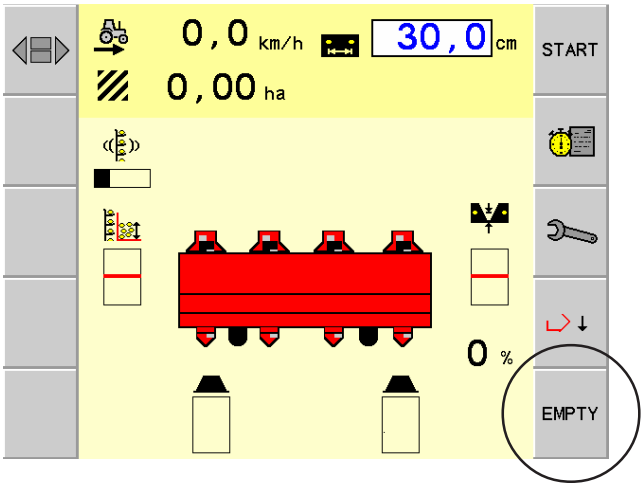


Fig. 44

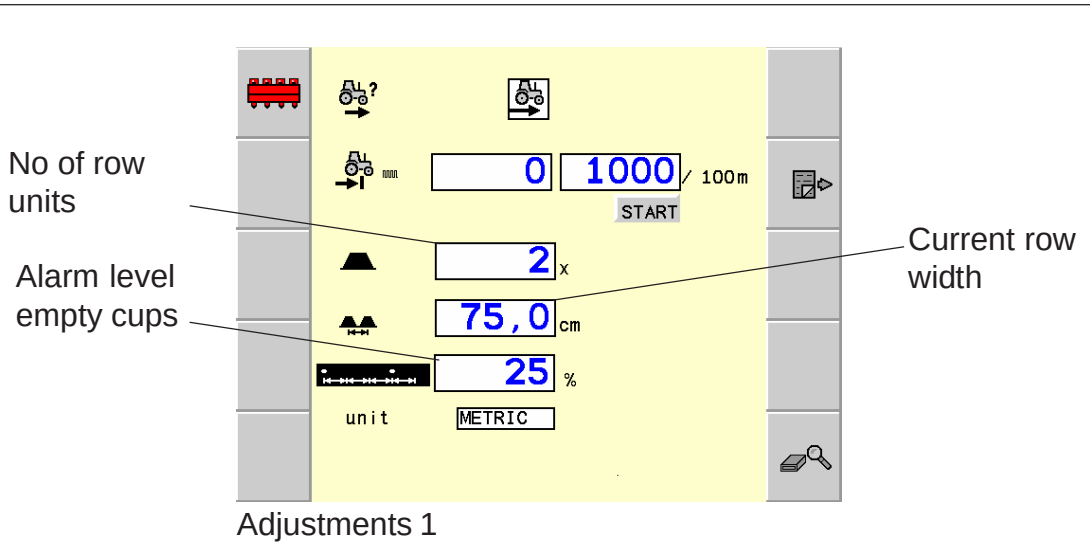


Fig. 45

6.12 Alarms displayed on screen

6.12.1 Misses (empty cups)

See fig. 46. Too many empty cups on row unit number given in the alarm display.

Check the tuber level and the adjustments of the choke plates, agitators etc.

6.12.2 Cup belts does not run

See fig. 47. No oil supply to the drive motor. Check the hydraulic system.

6.12.3 Too low voltage

See fig. 48. Check the electric connections of control system and the power supply system of the tractor.

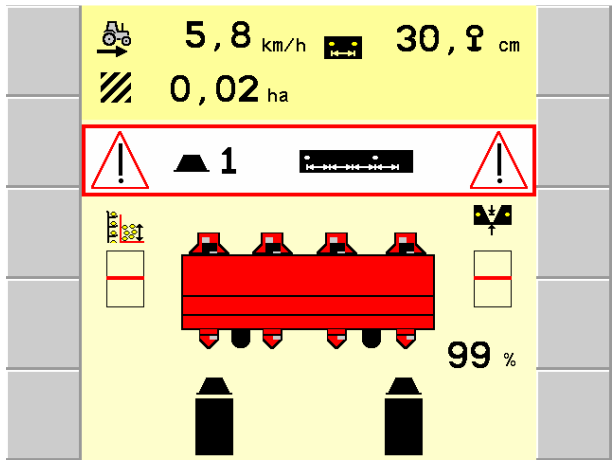


Fig. 46

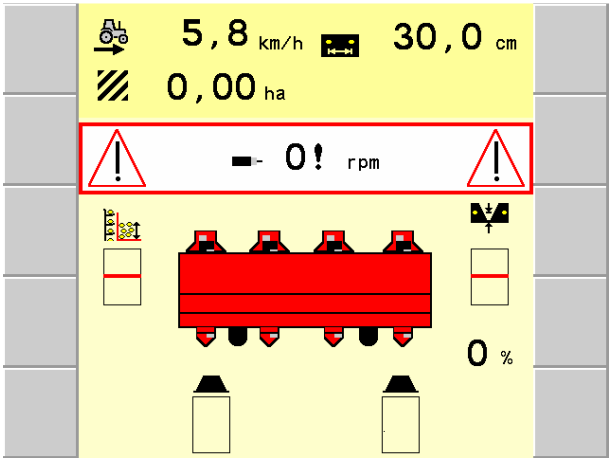


Fig. 47

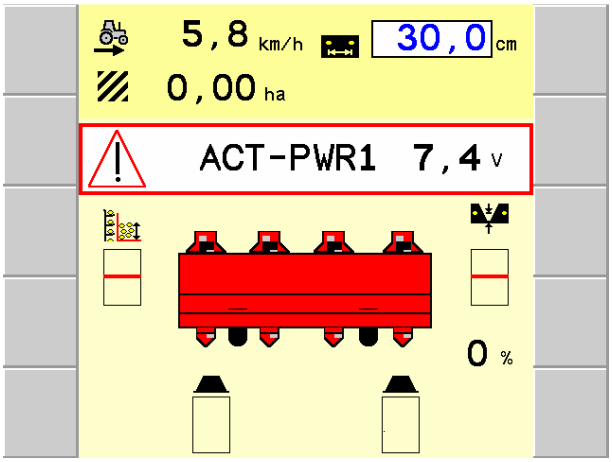


Fig. 48

6.12.4 Too high speed of the cup belts

See fig. 49. Faulty planting distance setting or too high forward speed on the tractor.

6.12.5 Varying planting distance

See fig. 50. Faulty oil supply to the planter.

6.13 Field registration

See fig. 51 or fig. 37/A. Push key K (Field registration) in order to activate the field registration display (see fig. 52 on next page).

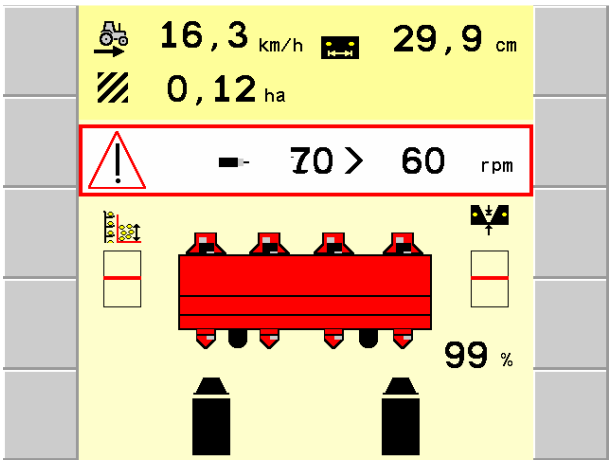


Fig. 49

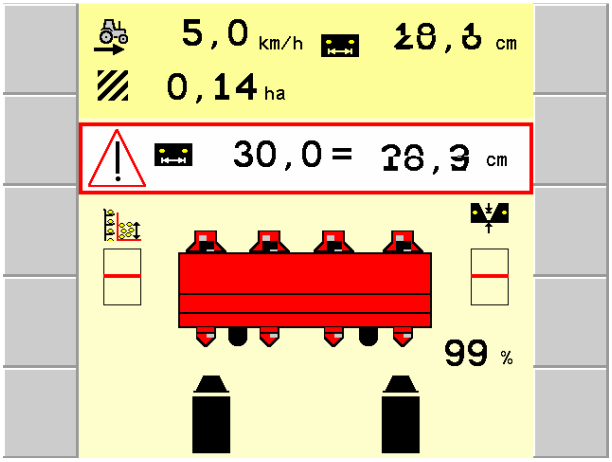


Fig. 50

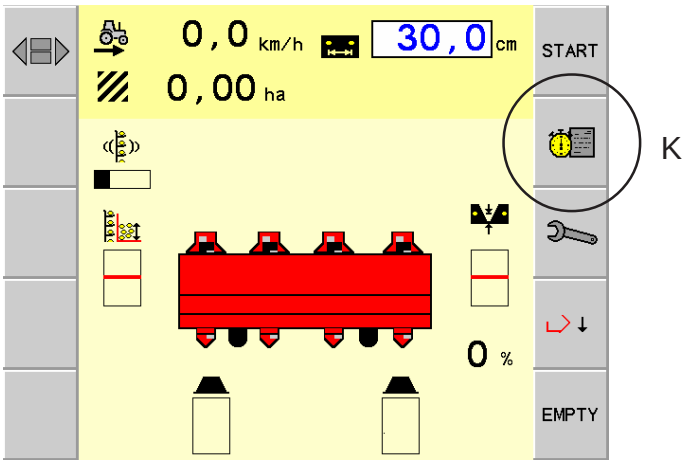


Fig. 51

Select the field to be activated by operating the keys J-K. Push the Clear key (key L on fig. 52) in order to delete old information. Push the M key in order to activate the field. Return to main menu and continue the planting work.

The main menu displays area planted (ha - hectar). The field registration screen displays even the start and stop time and the driven distance (km).

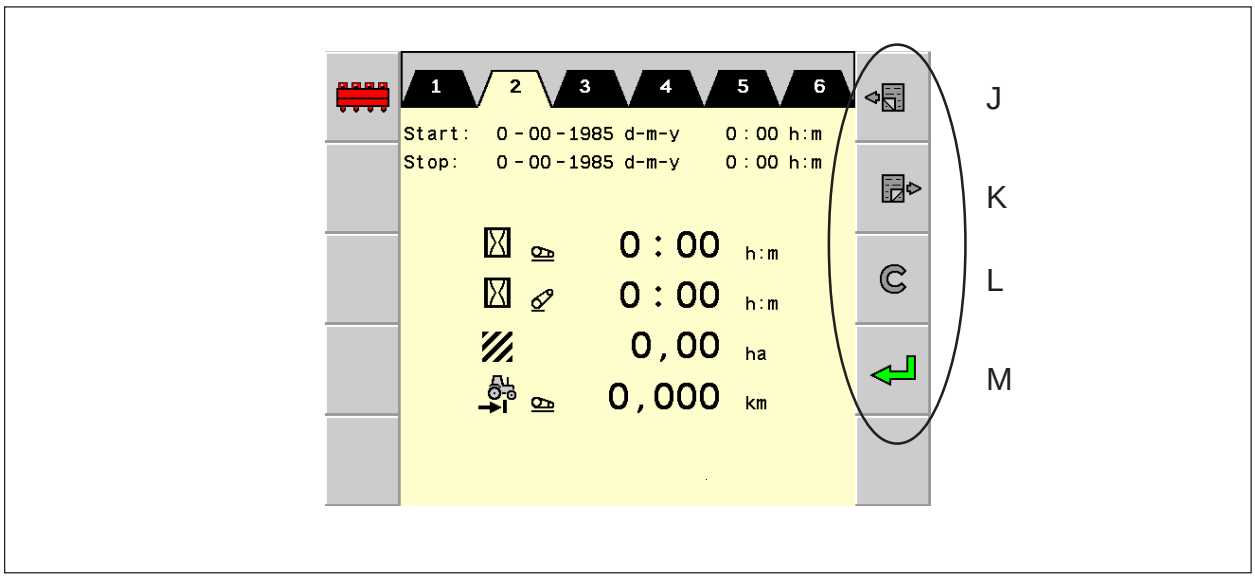

1
2
3
4
5
6
Start: 0-00-1985 d-m-y 0:00 h:m
Stop: 0-00-1985 d-m-y 0:00 h:m
0:00 h:m
0:00 h:m
0,00 ha
0,000 km
J
K
L
M

Fig. 52

7 MAINTENANCE

Warning:
Never carry out adjustment or repair work, or service and maintenance work, on the machine when in operation. Switch off the tractor engine, remove the ignition key and wait for the machine to come to a standstill before working on moving machine parts. Support the hopper before accessing under a raised hopper.

To ensure the efficient running of the planter and to avoid premature repairs, make sure that the machine is well looked after and that repairs are carried out in time.

7.1 Maintenance of mechanic components

7.1.1 Welding on machine

Disconnect the command panel and the electric cabinet before any welding is done on the machine.

7.1.2 Re-tensioning bolts

Check thoroughly all bolts of drawbar, top section's hinge pins, wheels and wheel shafts after 1 hour of use and thereafter weekly. All other bolts and nuts should be checked after 8 hours of use and thereafter weekly.

Bolt tensioning torque

Ø	Material 8.8	Material 8.8
M5	5.7 Nm	50.5 lb.in
M6	9.9 Nm	7.3 lb.ft
M8	24 Nm	17.7 lb.ft
M10	48 Nm	35.4 lb.ft
M12	85 Nm	62.7 lb.ft
M16	210 Nm	155 lb.ft
M20	400 Nm	295 lb.ft
M24	1000Nm	737 lb.ft

7.1.3 Chain tensioning

All drive chains are tightened elastically by spring-loaded chain tensioners. The chain tensioners are to be assembled in the chain row so that they can move freely with no torsion and that the wear on chains and chain wheels is reduced to a minimum.

7.1.4 Lubrication

Drive chains:
We recommend a special roller chain lubrication type (motor bike roller chain lubrication). This should prevent dust and soil from sticking to the chains.

Grease nipples (grease):

Roller discs	every 50 hours
Electric belt agitators (nipple inside the cup belt)	annual
Ridging hood (nipple on tilting point of hood)	annual

7.1.5 Tyre pressure

Wheel size.:	Loading capacity 2000kg potatoes
11,5/80x15,3"	2.0

Pressure given in kp/cm²

7.1.6 Cup belt tensioning

Equal tension on both sides is essential to ensure that the cup belts run centrally. In order to avoid stretching the belts, reduce the tension when not in use.

7.1.7 Cleaning

General
We recommend the use of pressured air when cleaning the machine. Thus there is less risk of damaging the bearings of the machine.

Cylinders
Keep away from aggressive chemicals etc. in order to avoid damage to the piston surface.

7.1.8 Control

Check tightness of all bolts and nuts, especially the wheel bolts, main frame bolts, bolts in hopper and any other main structure connections highly stressed, after first day of work and at regular intervals thereafter.

Check wearing points of furrow openers, ridging bodies and tines for excessive wear.

Check wheel pressure.

7.2 Maintenance hydraulics

7.2.1 Oil filter

Filter visual indicator (I)
Green - filter is clean
Red - change filter element

Check the filter when the oil is warm (at tractor engine rpm. as for ordinary planting). Cold oil may give wrong indication.

Note! On tractors with closed centre system the motor must rotate in order to get correct indication (oil must flow through the filter). Be careful. Beware of the rotating components.

Filter exchange intervals
Check the filter element every 20 hectar or at least once a season. The filter element should be replaced for every 100 hectars being wrapped and always once a season.

Caution!
Release pressure in the system before opening the filter housing.

7.2.2 Hydraulic tractor oil replacement

Keep hydraulic oil clean! Clean hydraulic oil will prevent excessive wear and premature failure of components. Replace the tractor filter and oil as per manufacturer's instructions.

7.3 Maintenance electrics & electronics

7.3.1 Controls

Check wirings for damage or corrosion.
Check all plugs and sockets.

7.3.2 Cleaning

Keep command panel and electric cabinet clean. Use a moist cloth. Avoid flowing water.

8. TROUBLE SHOOTING

Symptom	Action
Inaccurate planting:	
Misses	Remove/exchange inserts
	Reduce belt agitation
	Reduce working speed
	Increase choke plates openings
Doubles	Use cup inserts
	Increase belt agitation
	Increase working speed
	Reduce choke plate openings
Doubles and misses	Reduce variations of seed size
Potatoes out of line in the row	Increase the planting depth to make a deeper vee shaped furrow
Potatoes out of centre of ridge	Adjust coverers' position according to planter's row centres
Faulty planting depth	a) Rigid furrow opener
	Lift or lower land wheels
Varying planting depth	a) Rigid furrow openers
	Reduce hopper filling
Covering:	
Too little soil covering	Increase depth of coverers
Too much soil covering	Reduce depth of coverers
Sharp top of ridge	a) Disc coverers
	Increase distance between pair of discs
	b) Ridging shovel/ridging hood Move shovel wings inwards
Wide furrow	a) Roller discs Increase distance within the pari of discs
Narrow furrow	a) Roller discs: Decrease distance within the pari of discs

Notes

Underhaug