Underhaug

Operator's manual
4-row potato planter
UP3745

UH124416

Operator's manual UP3745 EN, issue 2008

CE certificate of conformity

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

Potato planter type Underhaug UP3745

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, 15 September 2008

Henning Thunheim
Managing Director

Enter here the serial number of your machine:

_____

TKS Mekaniske AS, 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. 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.

Content

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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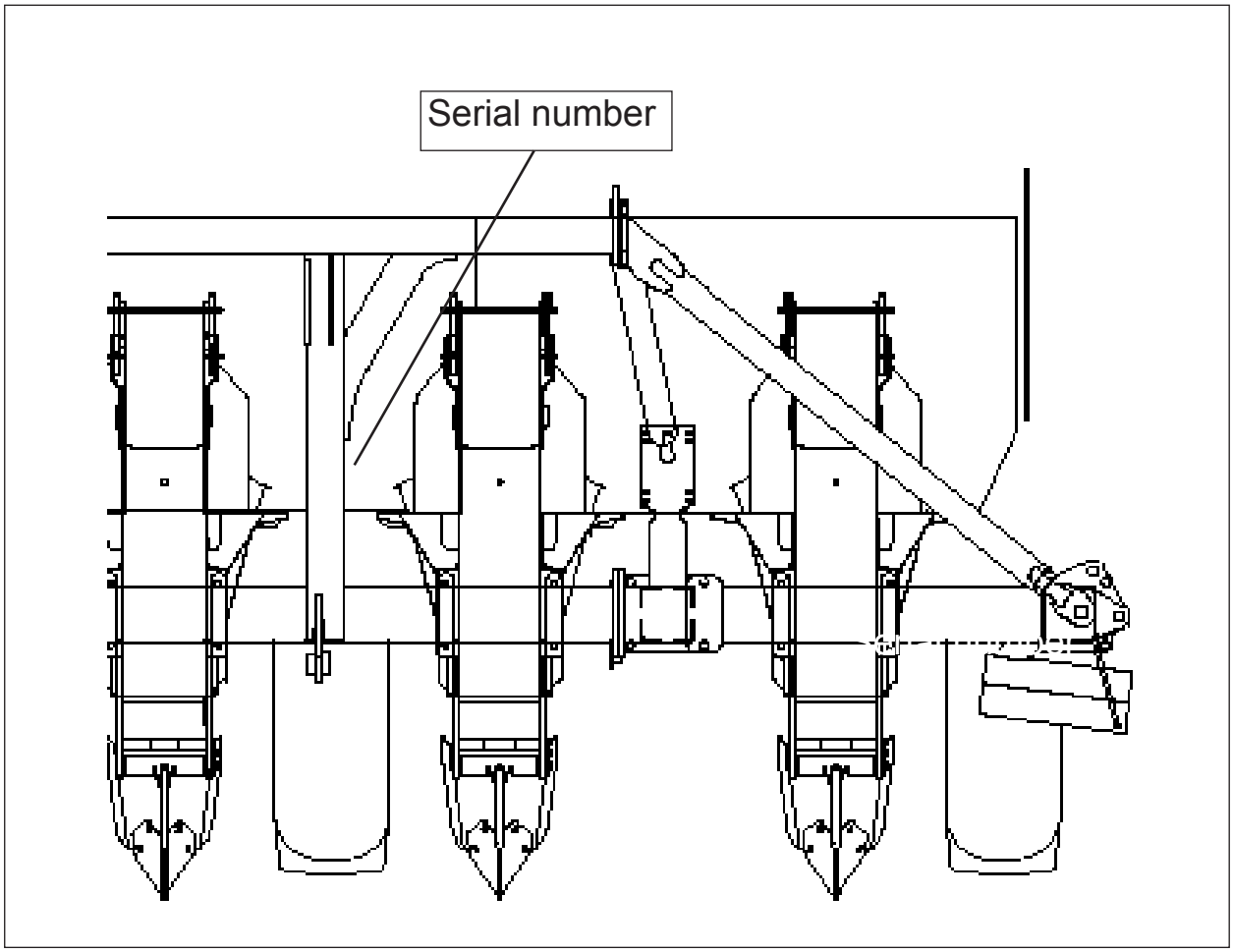
Machine identification

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.



Technical specifications/standard

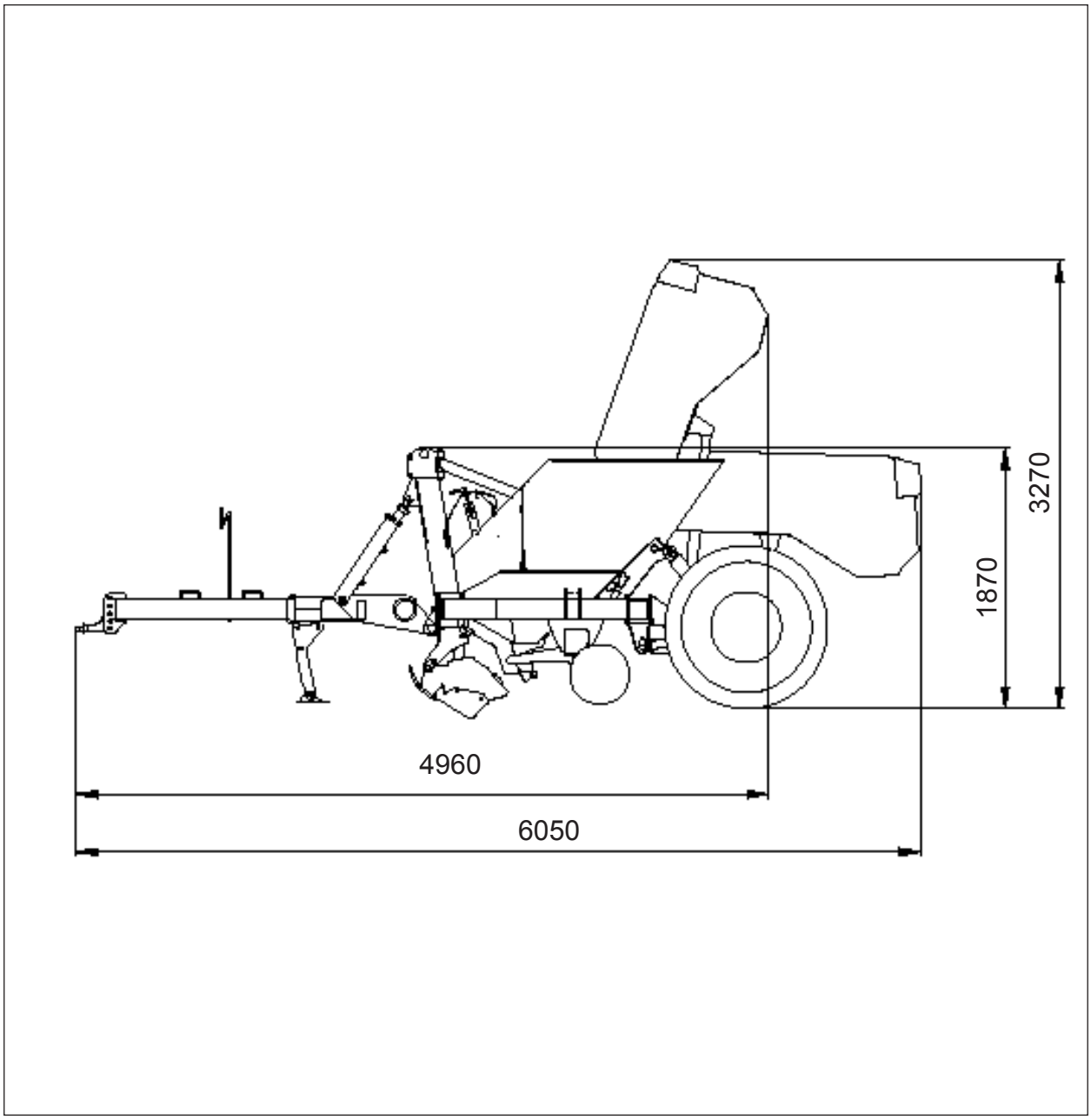
Model	**UP3745**
Number of rows	4
Connection to tractor	
Row width (intervals of 5 cms)	80 cm - 95 cm (32" - 38")
Planting intevals	infinite variable 10 - 80 cms
Hopper capacity / fertilizer potatoes	5000 kg
Minimum filling height, potatoes / fertilizer	118 cm
Wheel dimension, Regular	11.2"-24" 8 layer w/ribs
Area meter	
Electronic planting monitoring system	
Planting discs HD w/damper	
Hydraulic working	
Electronic steering	
Disc-rollers for coverers	
Track width	150 - 180 cm
Weigth emty machine	4810 kg
Axle weight	3560 kg
Drawbar weight	1250 kg
Working speed	4-10km/t

Extra equipment:

Markers
Floating disc (instead for standard)
Floating discs (as kit)
Insert cup - small
Insert cup - medium
Automatic depth control

Dimensions

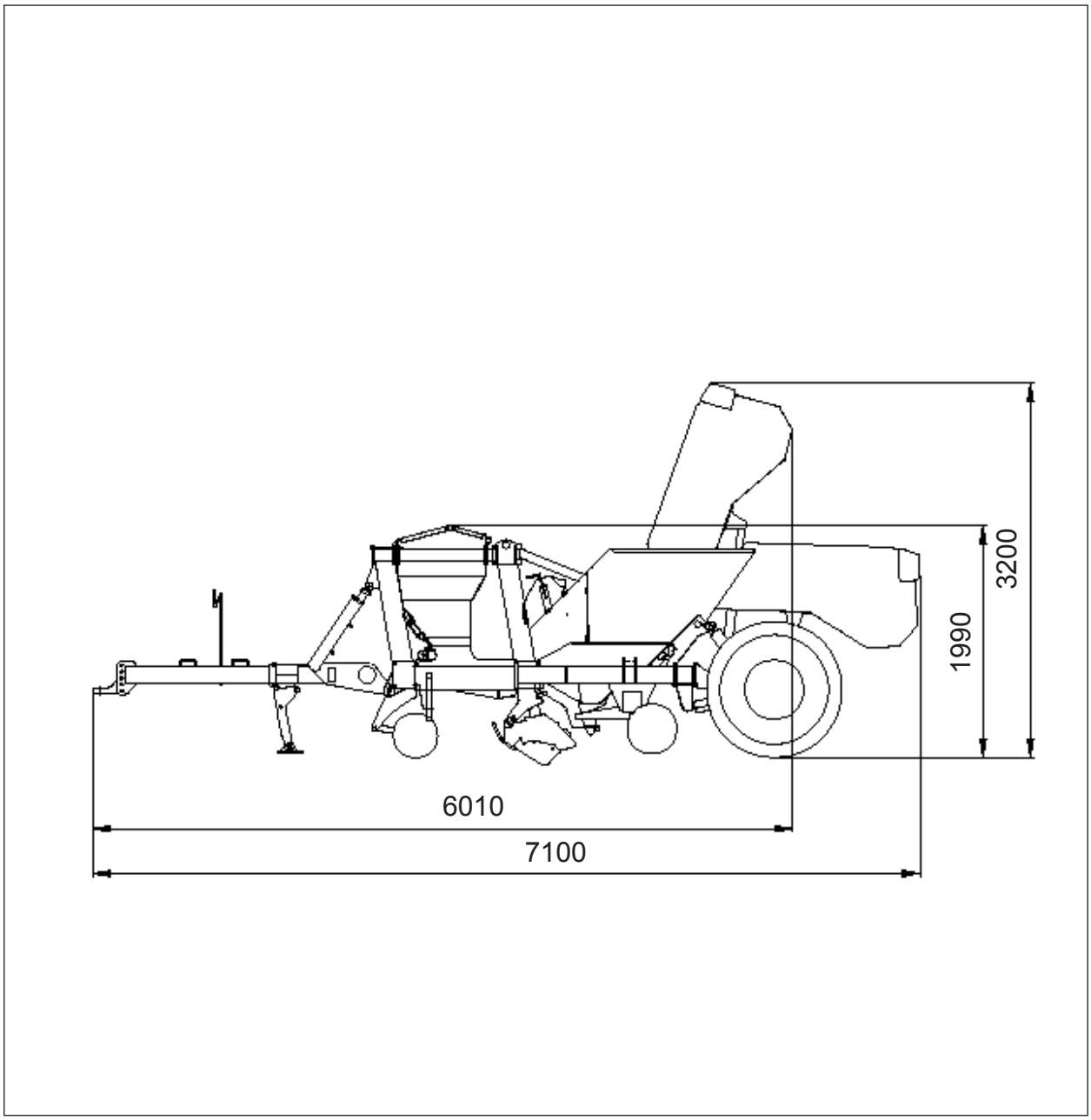
Valid for machine with wheel size 11,2"-24" 8 PLY lugged left and right



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

Dimensions potato planter w/fertilizer

Valid for machine with wheel size 11,2"-24 8 PLY lugged left and right



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

Model descriptions

The UP3745 automatic potato planter from TKS is a 6 row trailed 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:

6-row basic machine, row width 80cm
6-row basic machine, row width 32"
6-row basic machine, row width 85cm
6-row basic machine, row width 34"
6-row basic machine, row width 90cm
6-row basic machine, row width 36"
6-row basic machine, row width 95cm
6-row basic machine, row width 38"

The machine is equiped with hydraulic hopper 5000Kg

The machine is equiped with double cup belt.

Choose between folowing cup types:

- Planting cup Ø66mm
- Planting cup Ø74mm
- Planting cup

The planter is delivered with disc roller 450mm to coverer.

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.

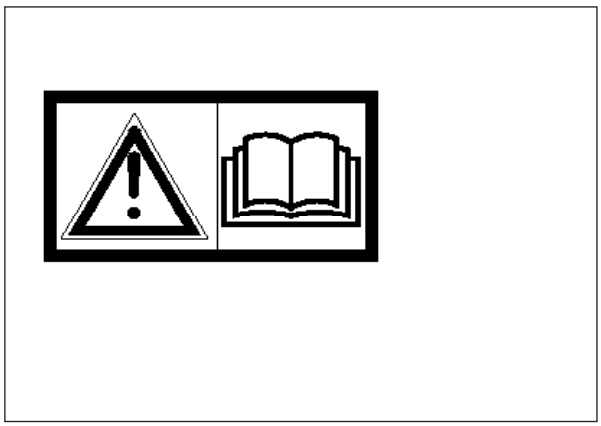


Fig. 1

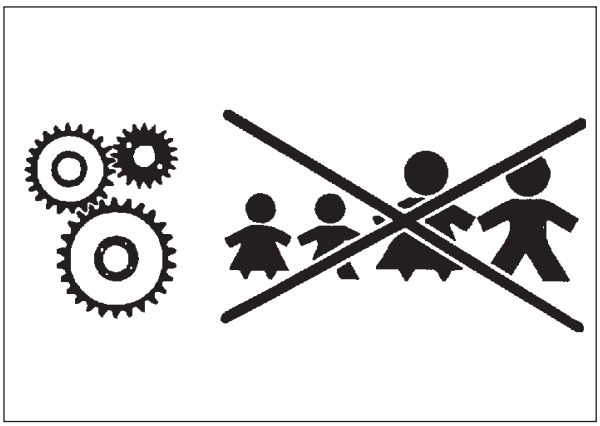


Fig. 2

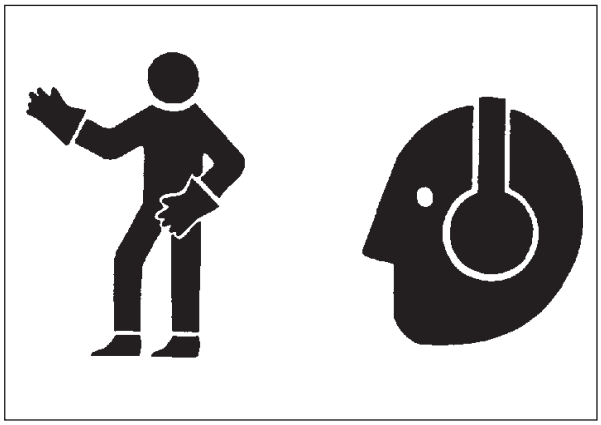


Fig. 3

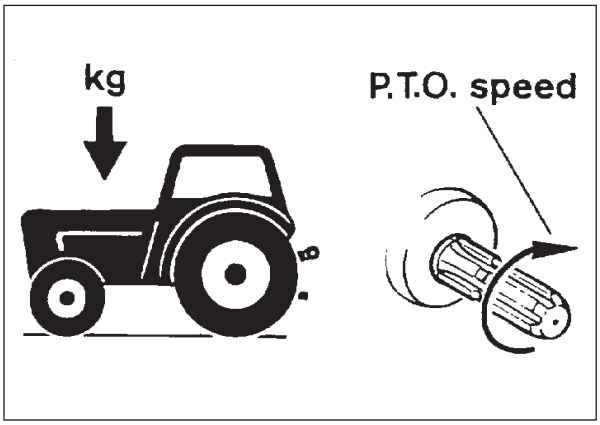


Fig. 4

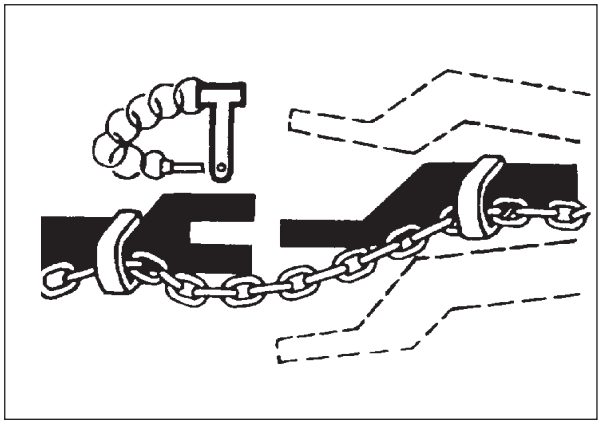


Fig. 5

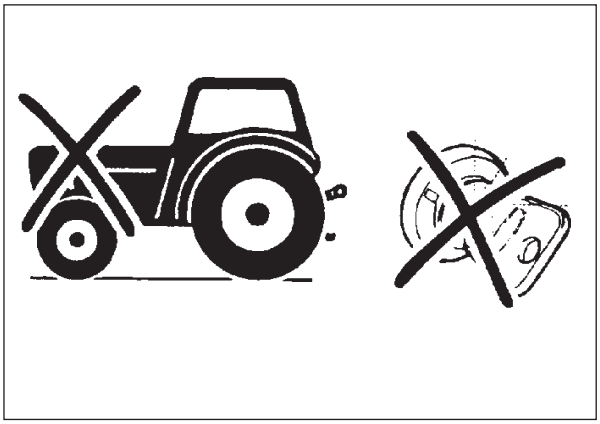


Fig. 6

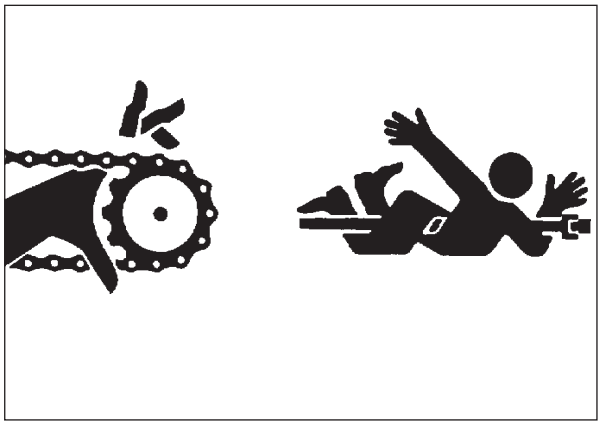


Fig. 7

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.

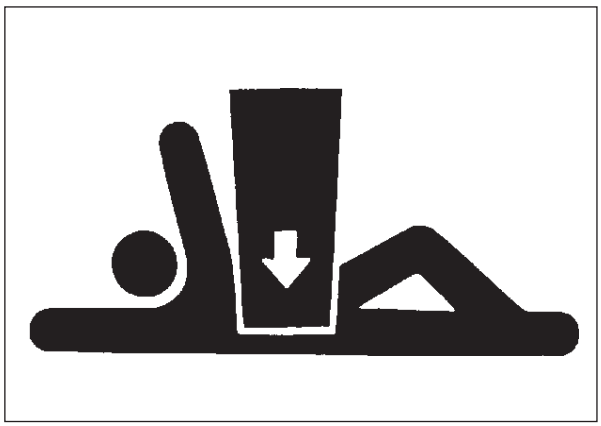


Fig. 9

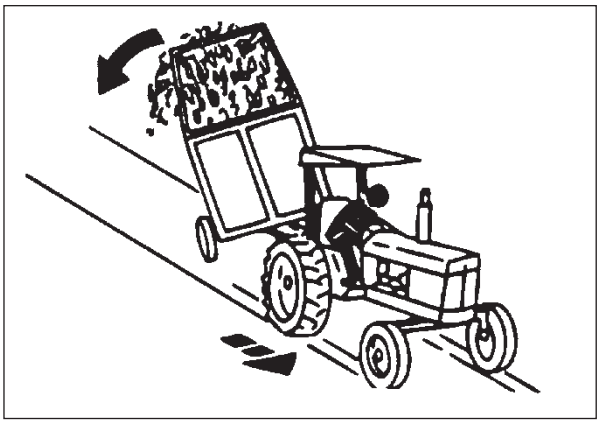


Fig. 10

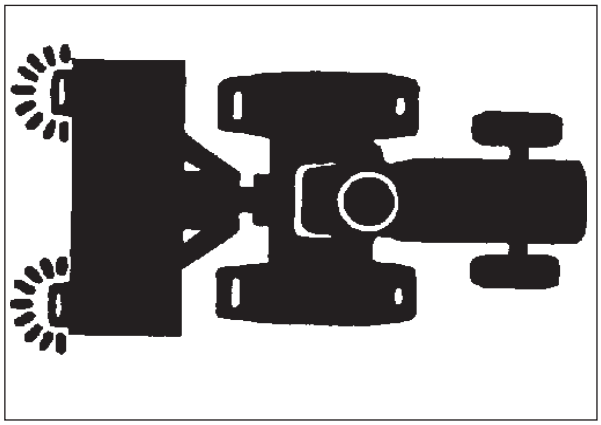


Fig. 11

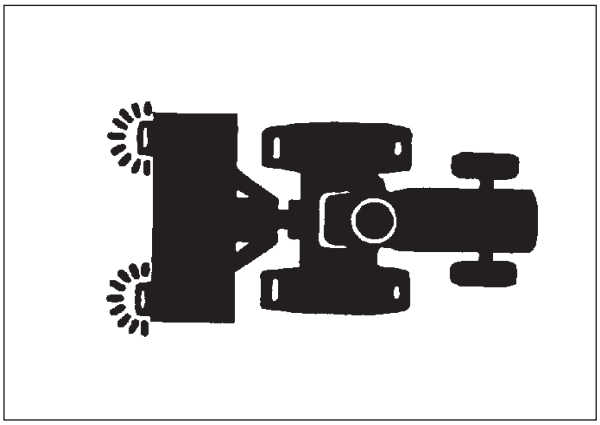


Fig. 12

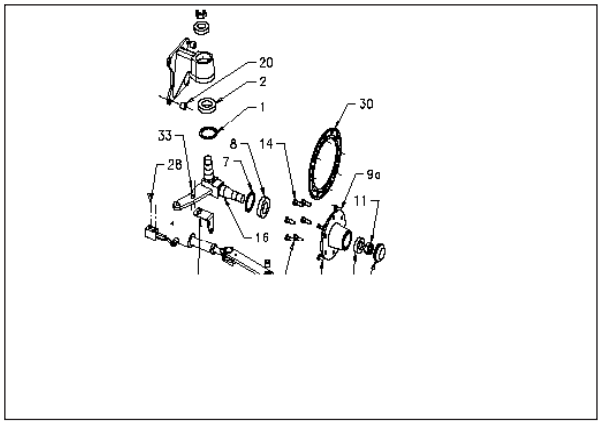


Fig. 13

Supplementary safety instructions for the UP3745 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.

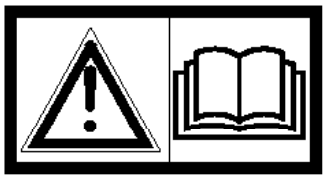
Attach the lifting straps by the "sling here" signs. Make sure that straps are securely fastened before lifting.

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



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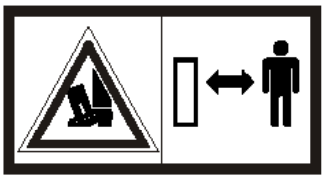

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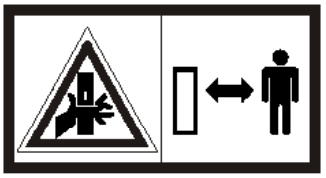

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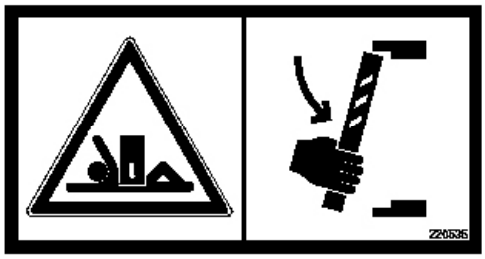

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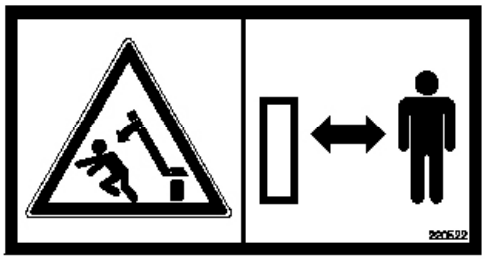

New machine - be careful

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 Underhaug 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. PREPARING A NEW MACHINE

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.

The row width could preferential be ordered directly from the factory, since it is demanding to change the row width.

6-row basic machine, row width 80cm
6-row basic machine, row width 32"
6-row basic machine, row width 85cm
6-row basic machine, row width 34"
6-row basic machine, row width 90cm
6-row basic machine, row width 36"
6-row basic machine, row width 95cm
6-row basic machine, row width 38"

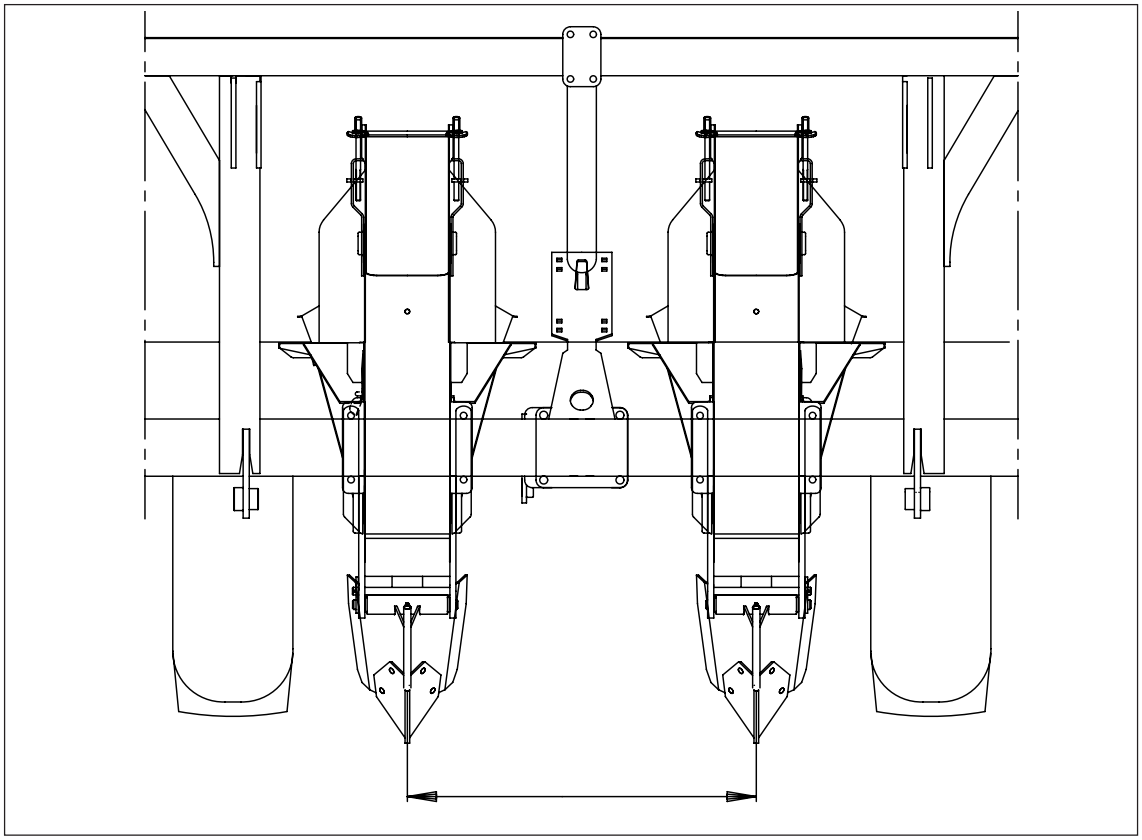

Fig. 20

1.3 Assembling the coverers

Disc coverer frame is attached to the planting unit with bolts, **Fig. 22 (A)**, normally in the 3rd.hole counted from the lowest one.

The adjustment stay controlling the depth of the disc sections is attached with bolt and bushing in the suspension bracket's arm, **Fig. 21 (C).**

The roller disc pressure can be adjusted by the spiral spring, using the handle **Fig.21 (D)**.

The mutual distance of the discs is adjustable by using the different holes in the roller discs arms, **Fig. 22 (E)** , locked by centre bolt **(F)**. Also the angle of the roller discs can be adjusted in different positions by means of the centre plate and the bolt **(F)**.

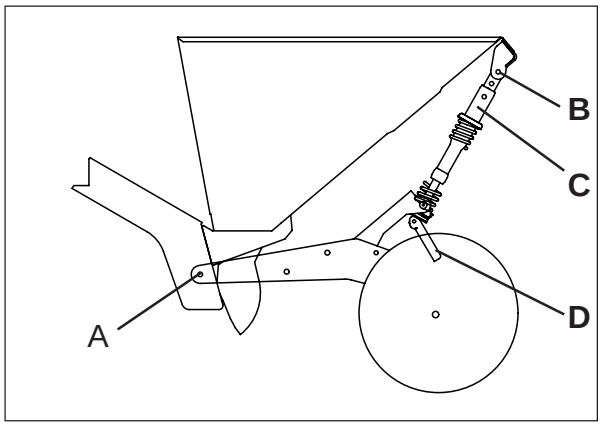

Fig. 21

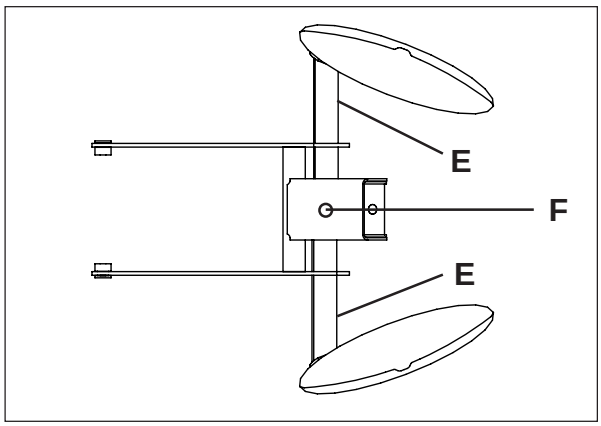

Fig. 22

1.4 Wheel axle

Left and right wheel axles in **Fig.23** are attached to the planters main frame by the bracket **(A)**. The cylinder **(B)** is also attached by using the adapted brackets on the main frame.

The wheel axle frame has to be turned so that the ball joint stay **(C)** points towards the planters centre. Correct centering is when mentioned cylinder is plane parallel with the planters driving direction.

The wheel hubs stud axles are fixed on the wheel axles by tightening up the bolts **(D)**.

The distance between the wheels (2R) have to be adjusted so that the centre distance (c/c) = 2x row distance.

If the machine has got road transport equipment, it is possible to store the stays for this on the wheel axle **(E)**. The purpose of this stay is to keep the wheels in upright position during transport.

On the outside of the left wheel shaft the wheel sensor will be attached **(H)**. The distance between sensor and counting plate **(J)** has to be 4mm, +- 2mm.

It's important to check the sensor after mounting. Lift the wheel axel from the ground and rotate the wheel. Then check that the light at the end of the sensor is lightning every time the sensor is passing the counting disc **(J)** at the complete circle.

It is important that the sensor bracket **(K)** is closer to the counting plate than the sensor. This will then act as a scraper and will in addition protect the sensors plastic cover.

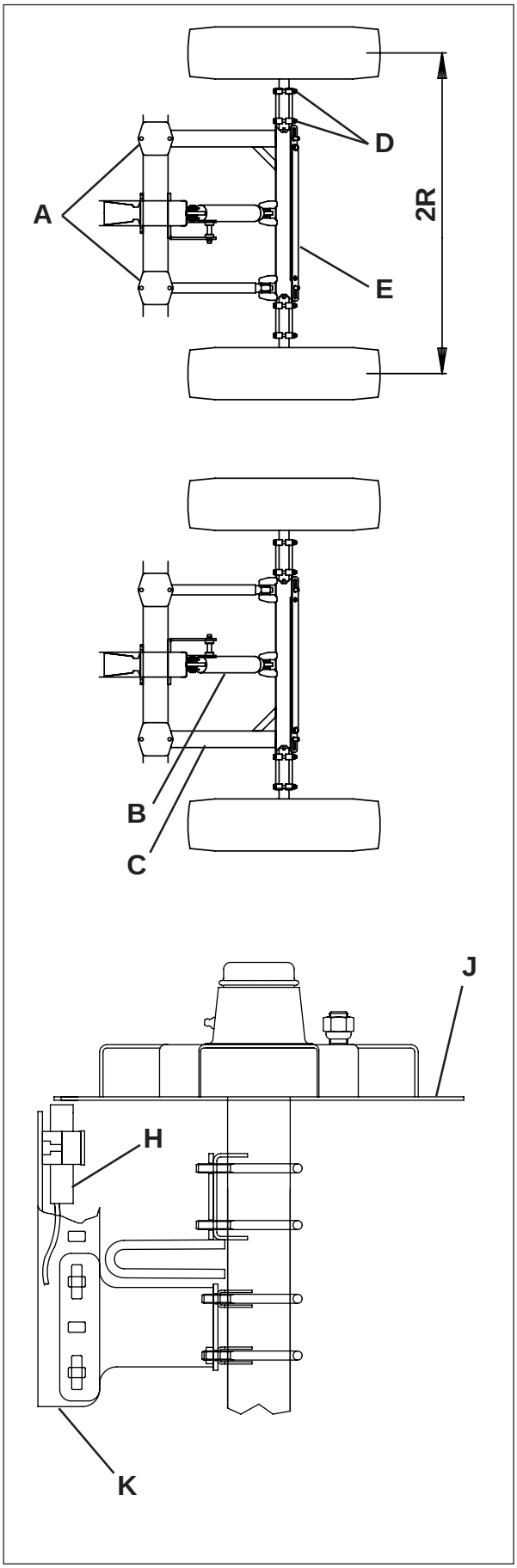

Fig. 23

1.5 Drawbar

Attach the drawbar to the planter with bolts **(A)** and **(B)**. Adjust the drawbar eye **(C)** : In working position the drawbar should be as close to horizontal position as possible.

Support leg **(D)** will keep the drawbar in position when planter is parked, thus making it easy to connect the planter to the tractor again.

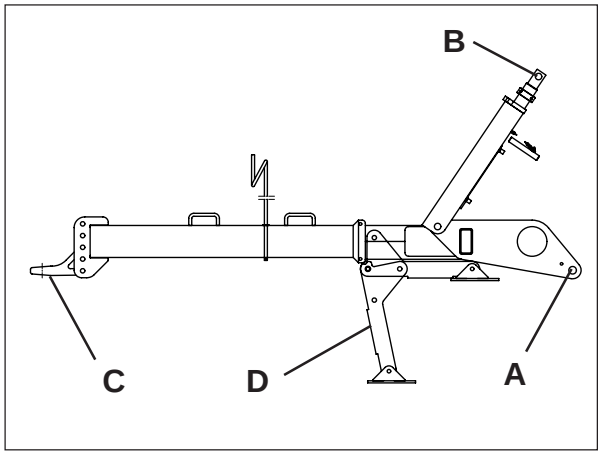

Fig. 24

1.6 Hopper

Connect the hopper **Fig.25** to the planter at the hinges (A) by using the 3 central hinge bolts and one hinge bolt on each side .

Assemble the 3 cylinder brackets **(B)** on the mid plate of the hopper and connect the 3 lifting cylinders **(C)** with bolts.

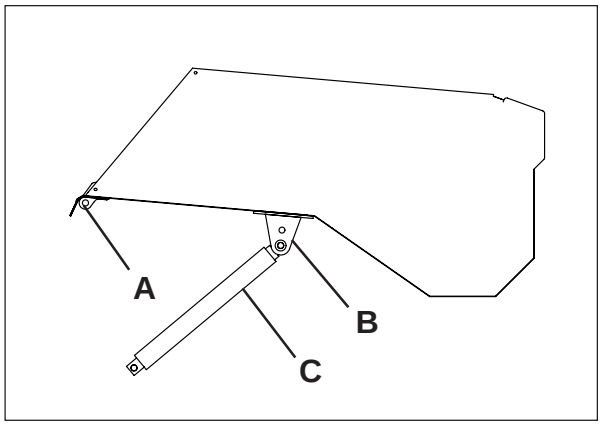

Fig. 25

1.7 Markers

Left marker **Fig. 26**.

Fit the left and right markers to the planters frame with bolt **(A)** and **(B)** and the markers cylinder **(C)**. Adjust the roller disc with the telescopic arm **(D)** . The marker will indicate where the middle of the tractor is to run. In working position the distance from the middle of the planter to the marker should be 6 x the row width .

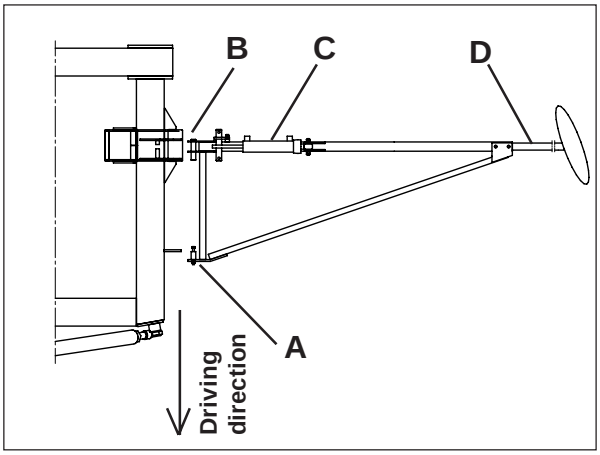

Fig. 26

1.8 Fertilizer attachment

Fertilizer attachment **Fig.27**

The fertilizer attachment has to be fixed to the upper **(A)** and lower **(B)** frames.

The frame is being reinforced by the 2 diagonal stays **(C)**, which have to be fine tuned by the ball joints **(D).**

Fix the roller discs **(E)** on the fertilizer attachments frame just in front of the planting units

Guide the fertilizer tubes **(F)** into position by using the brackets **(G).**

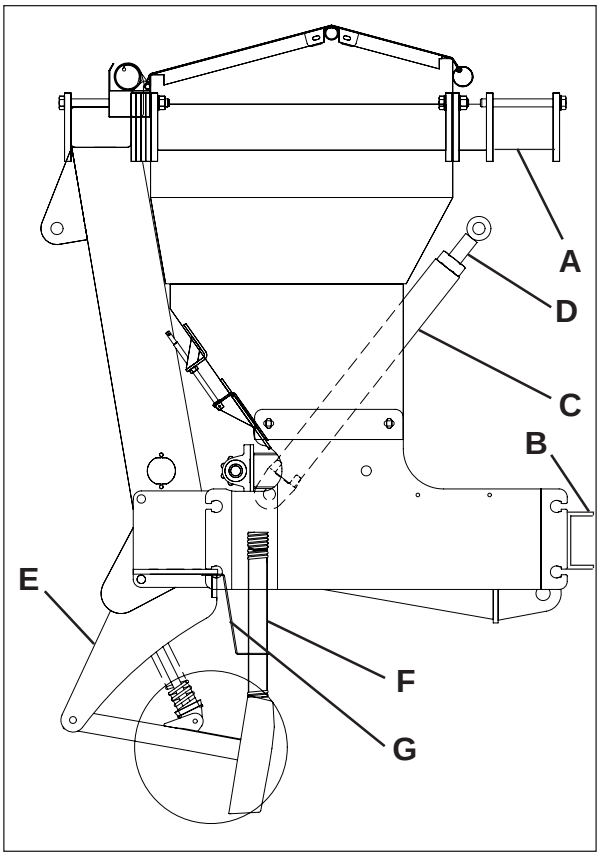

Fig. 27

1.9 Potato planter

Assembled 6-rows trailed potato planter with HD furrow openers w/schoch absorber and roller disc. **Fig. 28**

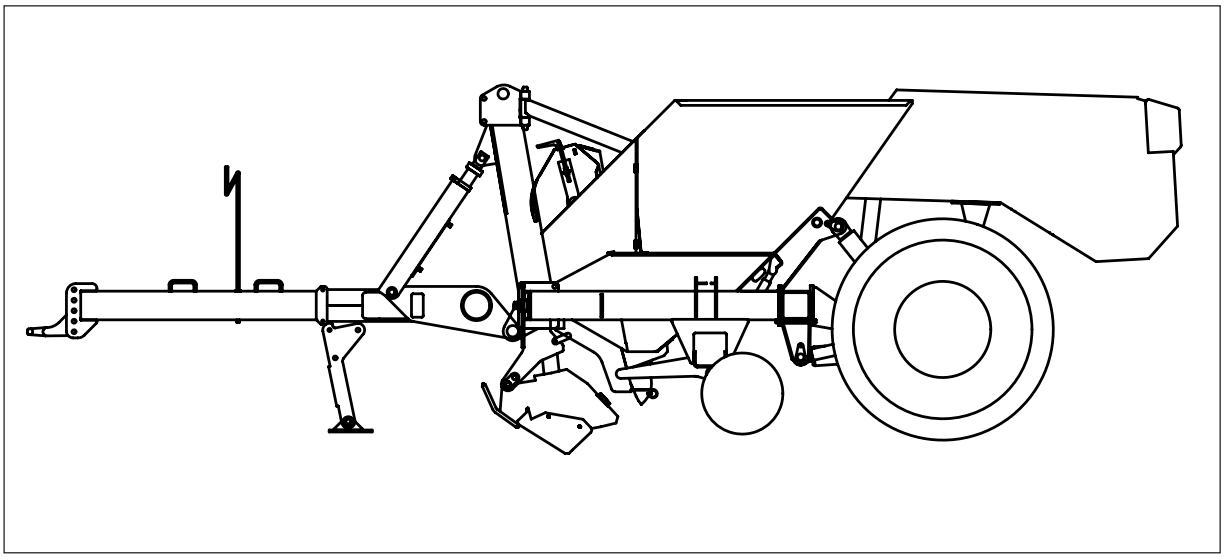

Fig. 28

1.10 Potato planter w/fertilizer

Assembled 6-rows poteto planter as1.9 with fertilizer disc opener. **Fig. 29**

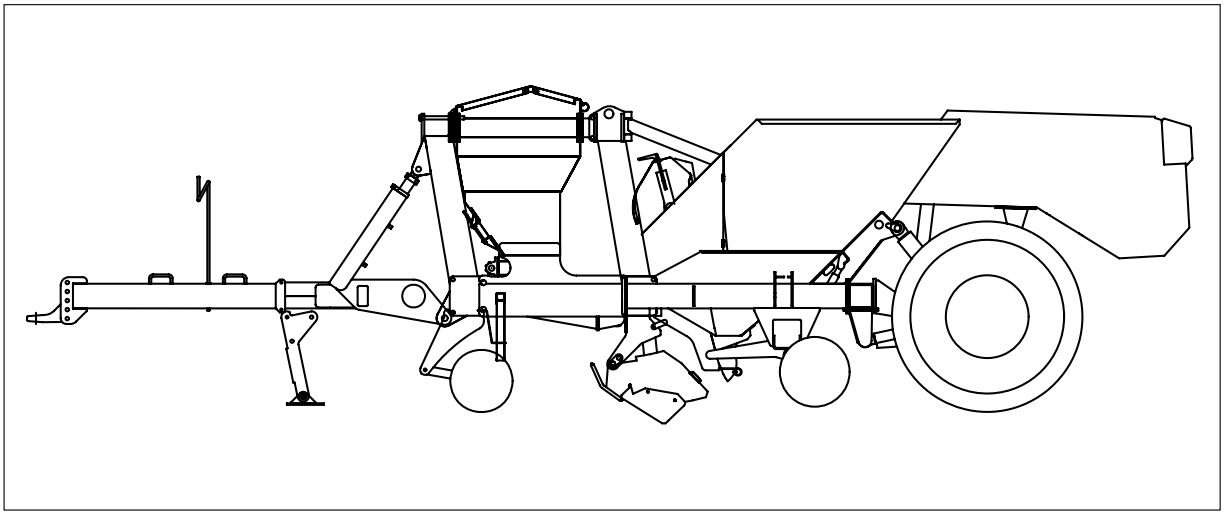

Fig. 29

1.11 Transporting wheel

When transporting the potato planter assemble transport wheel 3m **(A)**, or if the planter has fertilizer transporting wheel 3,5m **(B)**. When changing from ordinary planting action to road transport, moves outer part of the drawbar from position **(C)** to position **(D)**. To get the minimum width at road transport (under 3m without/fertilizer), must also the inner part of the drawbar be dismounted. **Fig. 30**

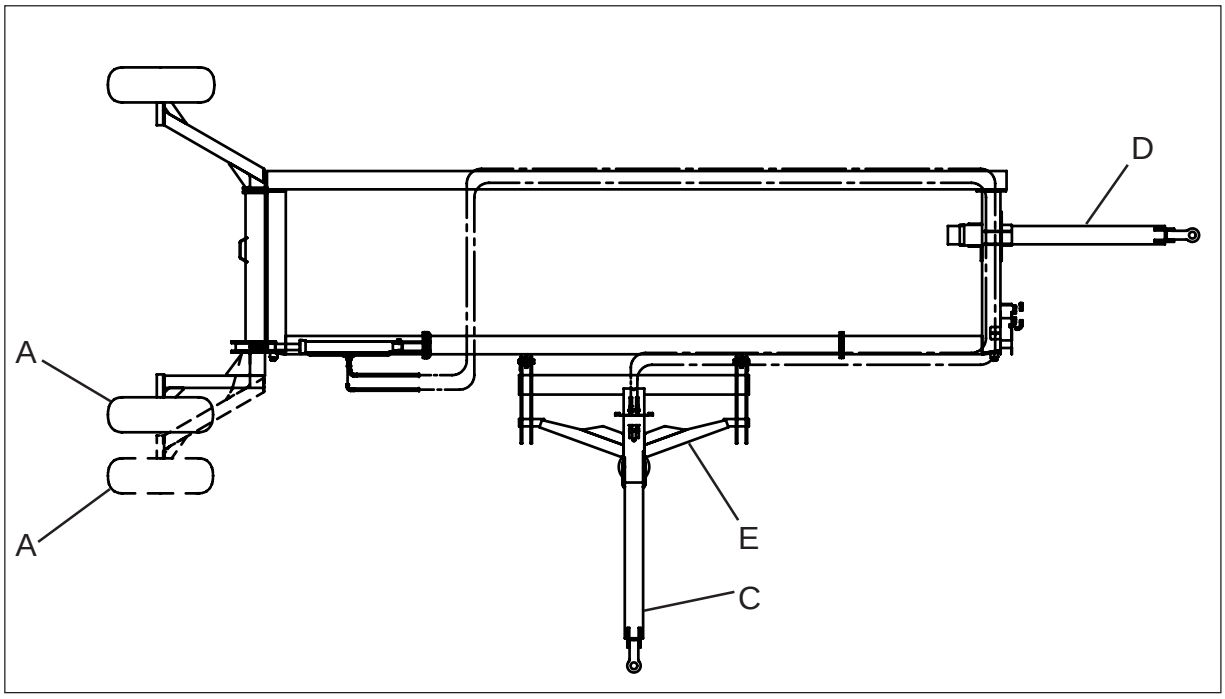

Fig. 30

1.12 Frame jack

Frame jack is a part of the equipment which follows the transporting wheel. When changing the draw position, the frame jack has to be used to get the end of the planter in right position when connecting to tractor. **Fig. 31**

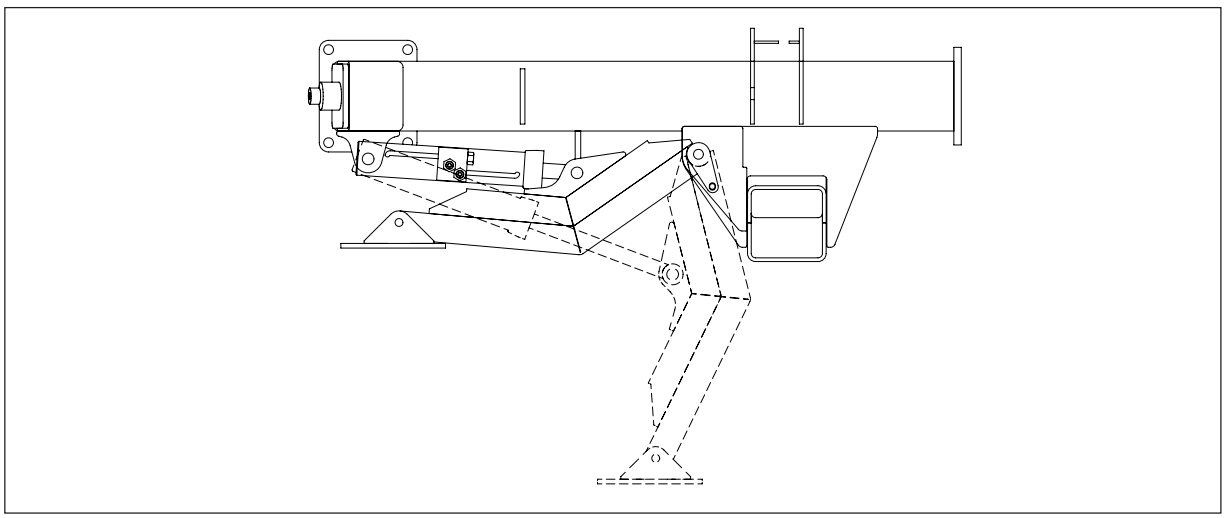

Fig. 31

2. TRACTOR REQUIREMENTS

The hydraulics recommended lifting capacity:

Planter size	Recommended tractor size
Six row without fertilizer	min. 100 hk
6-row with fertilizer	min. 120 hk

Hydraulic connection
Single acting output with free return, continuous oil flow, capacity 45 litres/min.
One double acting hydraulic valve.

Electrical supply
12V, standard 12mm.
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.

3. TRACTOR CONNECTIONS

3.1 Road Transport

Prepare the planter for road transport:

-Lower the planter to parking position, and raise the hopper to top position. Secure wheels and hopper with the attached yellow stays.

-Disconnect and move hydraulic hoses, power cable, cable from control panel in cab, and disconnect drawbar

-Move the front part of drawbar from planting position to bracket for road transport on the left side of planter, and secure.

-Re-position tractor

-Connect hydraulic hoses for transport wheels

-Raise planter on transport wheels (by turning handle on the flow direction valve) and frame jack to a height where the drawbar can be connected to the tractor.

-If necessary remove inner part of the drawbar for planting position to obtain narrower transport width. By removing the 4 main wheels transport width will be reduced by another 30 cms (12").

From transport to planting position

Follow the above instructions in reversed order

 Adjust the telescopic drawbar to a give a comfortable distance between planter and tractor wheels for sharp turns

 **Important!** Remember to raise the parking leg to transport position before moving the planter.

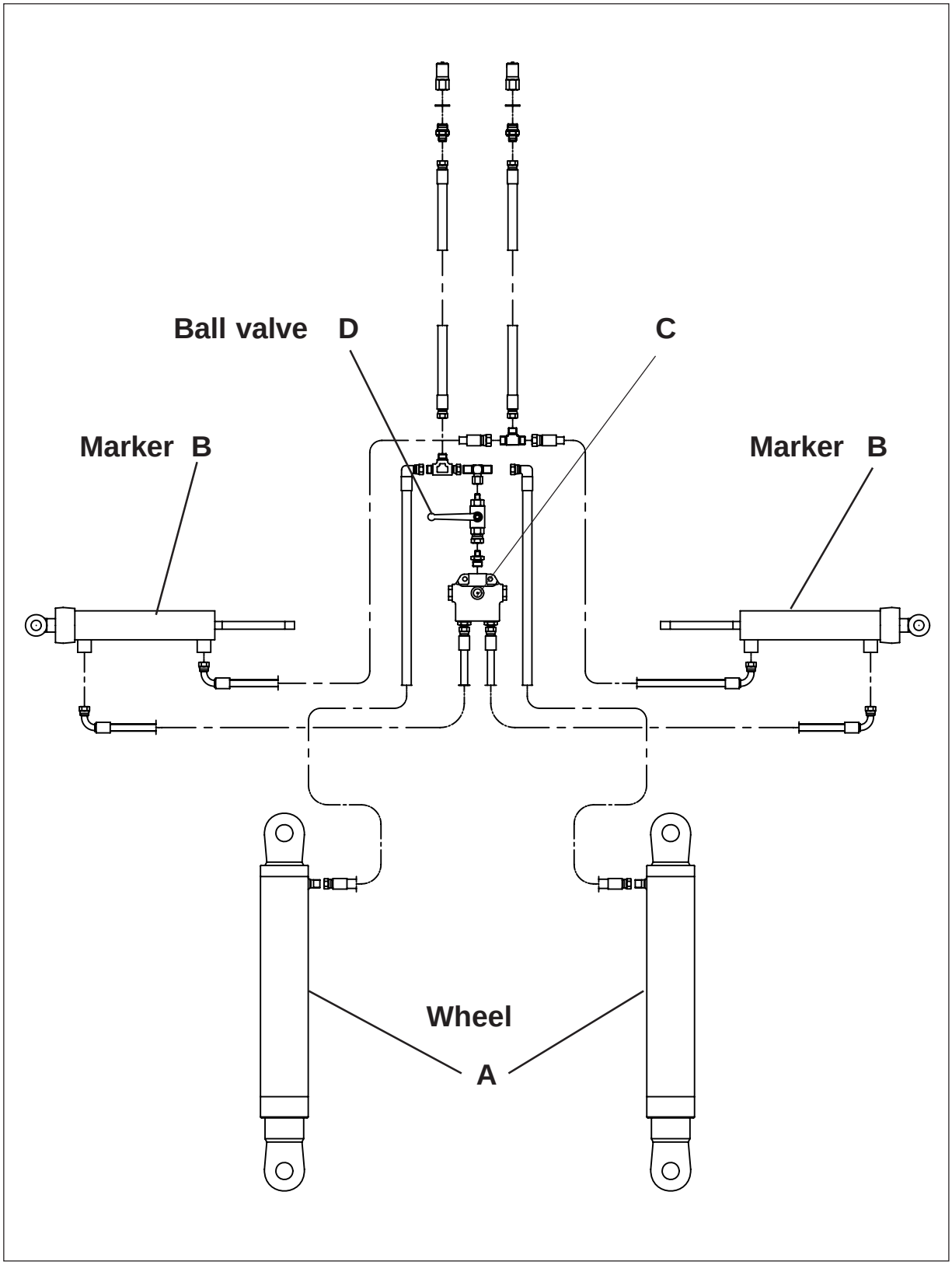

Fig. 32

3.2 Hydraulic drive system

3.2.1 Components

The hydraulic drive system on this machine consists of the following items, **Fig 33:**

- Two or four spools valve block **(A)**
- Oil motor **(B)** for driving planting units
- 3 cylinders **(C)** for lowering/raising of bunker
- 2 cylinders **(D)** for lowering / raising of drawbar and 2 cylinders for lowerinig / raising of main wheels
- 2 pcs 2-way check valves **(D1)** for hopper cylinders
- Oil filter **(E)**
- Reservoir **(F)** for collecting oil leaking from valve
- Oil motor **(G)** for driving the belt agitation
- Flow control valve **(H)** for agitation frequency

Option
Oil motor for driving fertiliser attachment

3.2.2 Connecting the hydraulic valve

When connecting hydraulic hoses to tractor, the pressure hose goes to the oil filter on the planter, the second hose is return.

3.2.3 Connecting tractor hydraulics

Fig. 32

The main wheels are connected directly to the tractor hydraulics for lowering /raising, and operated by the tractor levers.

If row marker arms are fitted, cylinders to operate these are also connected to this circuit, and the sequence valve **(C)** will alternate the left and right arms every time the circuit is activated.
If you don't want to drive with active marker, the function can be stopped by closing the ball valve.

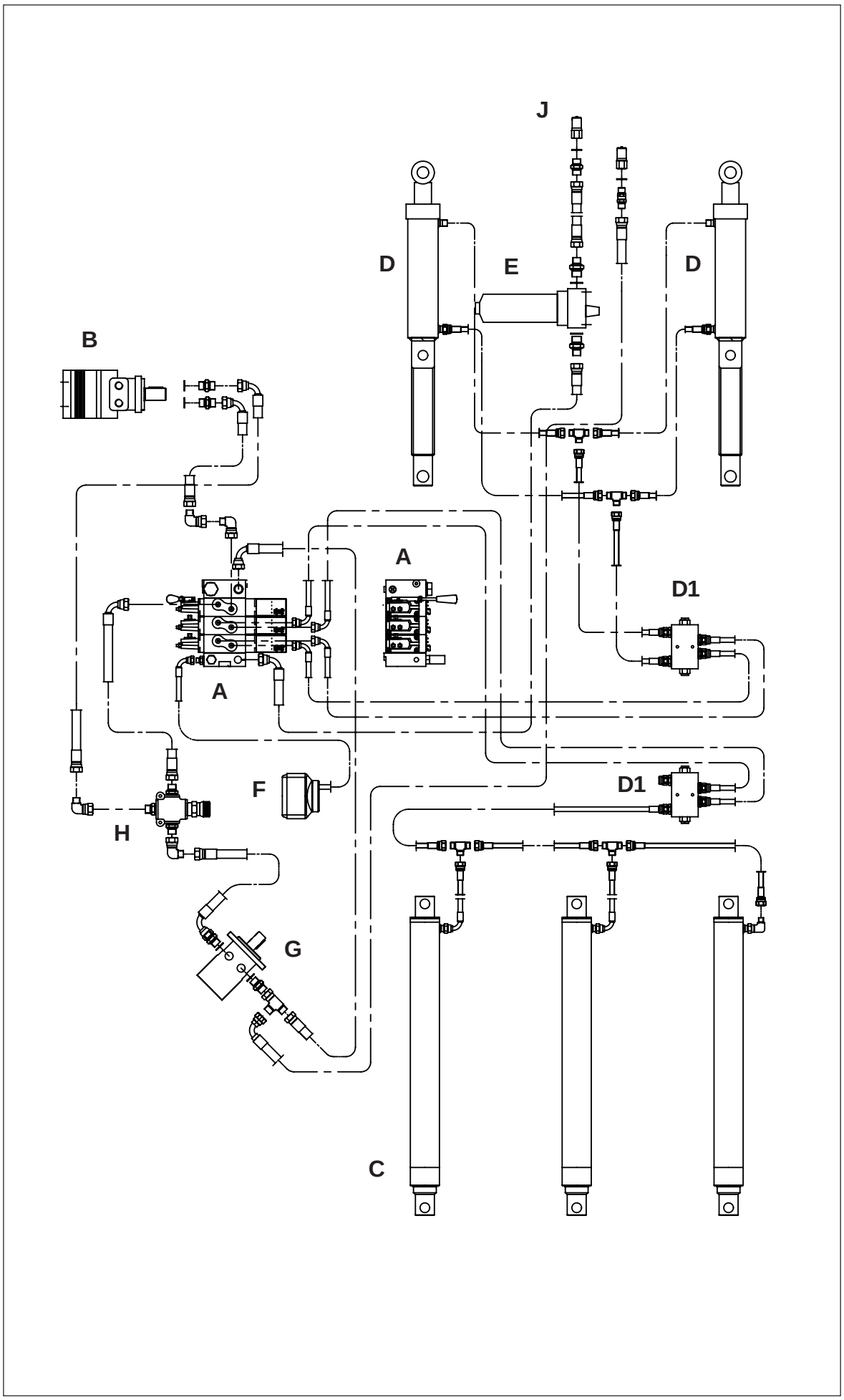

Fig. 33

3.2.4 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. 34):**

- 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!

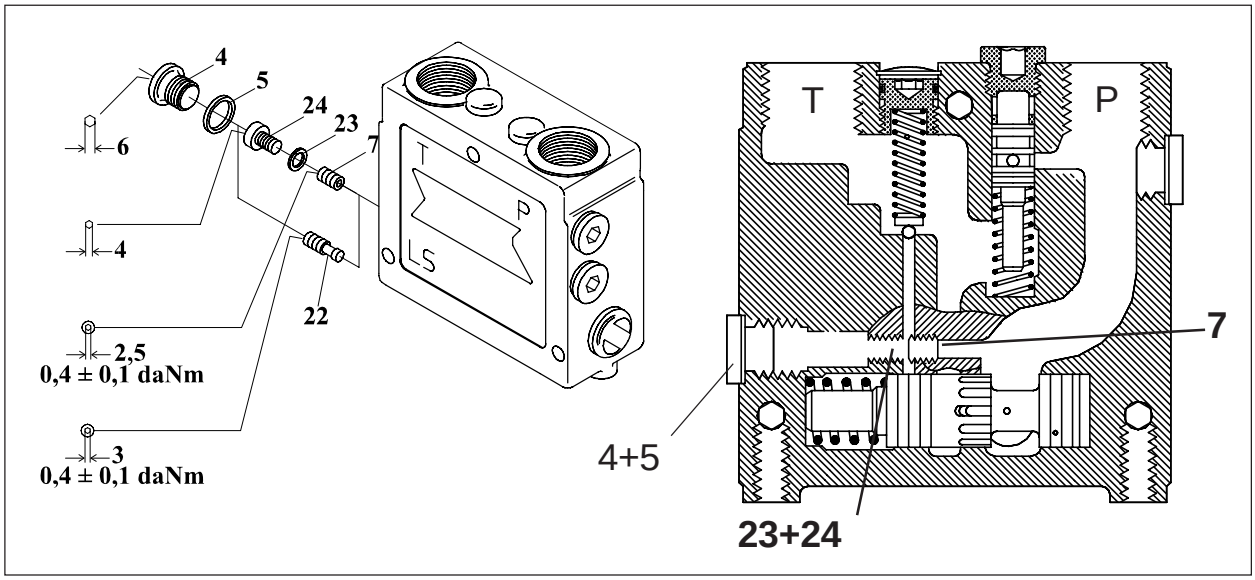

Fig. 34

3.2.5 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.

3.2.6 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.

3.2.7 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.

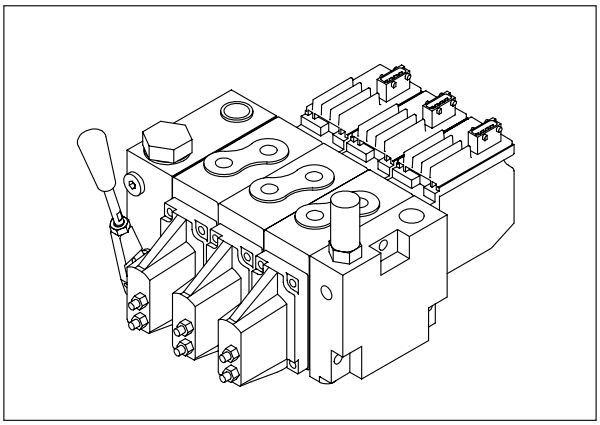

Fig. 35

4. OPERATING THE MACHINE

4.1 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.

4.2 Depth Control

Planting depth is decided by adjusting the drawbar cylinder **(A)** to required length. This can be done mechanically by locking the adjusting nut **(B)** on the cylinder in a certain position **Fig.40.** This procedure will give the same planting depth every time the machine is lowered on the drawbar cylinder.

When driving the machine with depth control, the nut **(B)** have to be placed in upper position to prevent up and down movement on the machine.

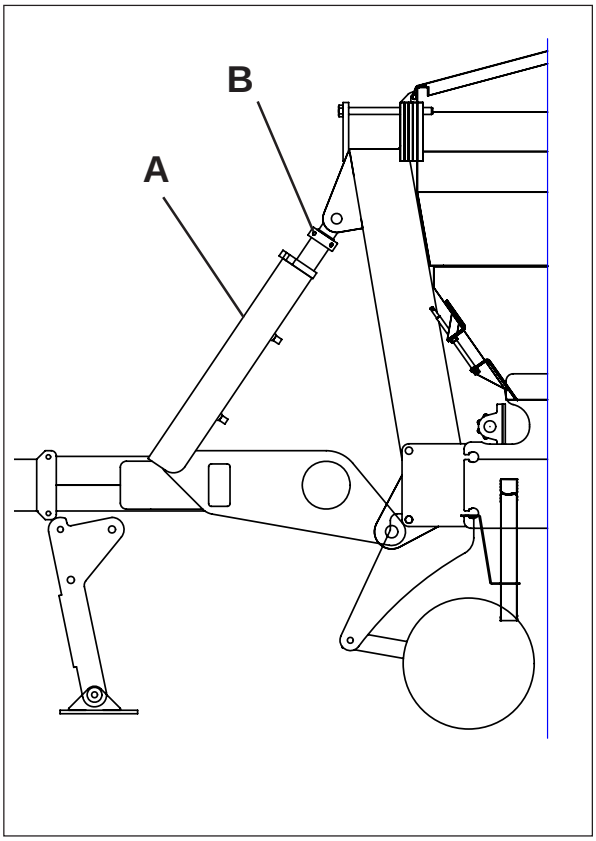

Fig. 40

a. Fixed opening shoe (fig. 40)

Raise the machine and turn the adjusting nut **(Fig. 40/B)** to required setting. The depth will change with 12mm/14mm per turn (without or with fertiliser attachment). Lock the nut with the chain.

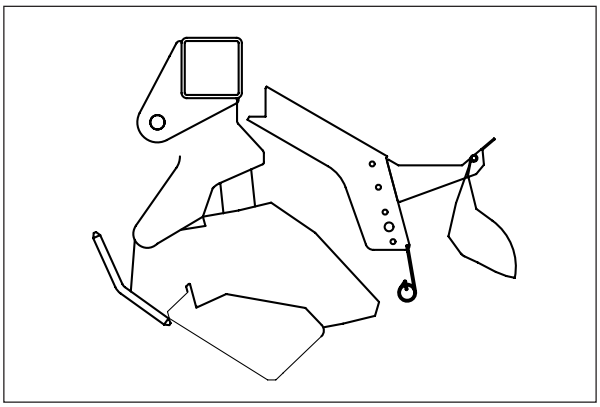

Fig. 41

b. Floating opening shoe (Fig. 42)

Adjust the length of the suspension chain **(Fig. 42/A)** so that the parallelogram is horizontal when the planter is in planting position. Adjust to required depth **(Fig. 42/B)** by the nut on drawbar cylinder as under point a.

Re-set the spring tension to compensate for soil resistance so that an even planting depth is achieved even if the main wheels should sink in.

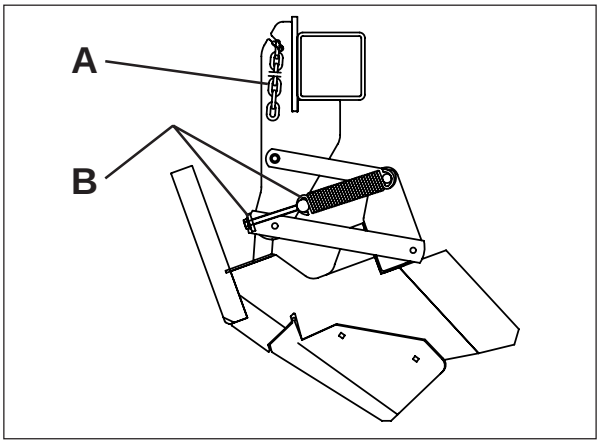

Fig. 42

c. Floating planting shoes with depth wheels (Fig. 43)

As point b. above, but after the depth wheel has been set at the required position with the set screw **(Fig. 43C)**, the suspension chain may be lengthened with a few links.

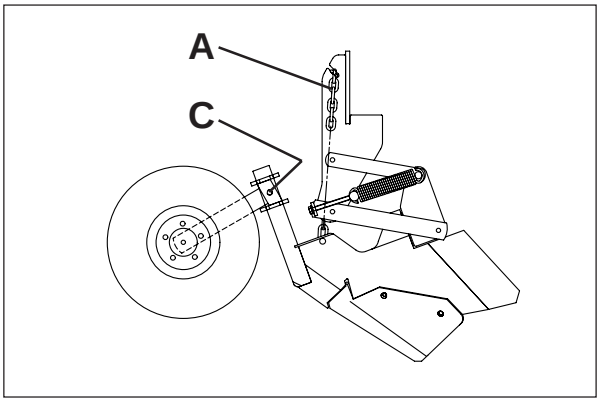

Fig. 43

4.3 Covering up

a. Roller discs (Fig. 44):
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)**.

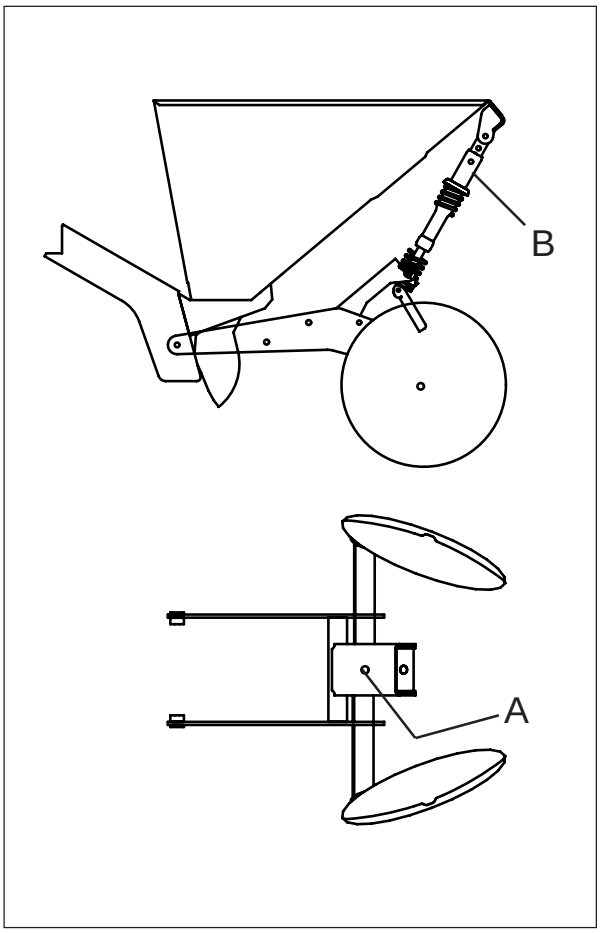

Fig. 44

4.4 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.

4.5 Belt agitation

Set to minimise misses and doubles. Six positions (**Fig. 45a/A)**.

Minimum agitation = Large potatoes, high belt speed

Maximum agitation = Small potatoes, low belt speed

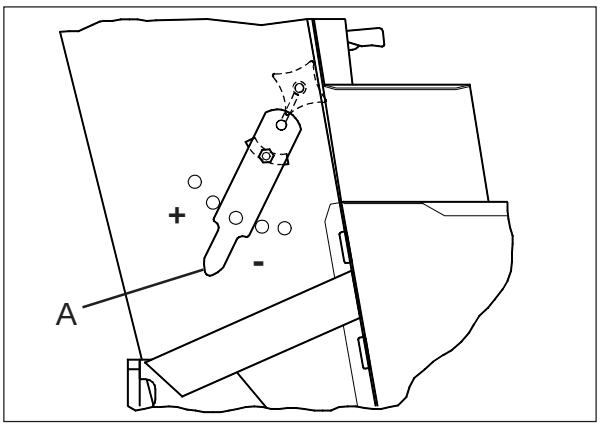

Fig. 45a

4.5.1 Mechanic agitation

9 positions **(Fig. 45b/A)**

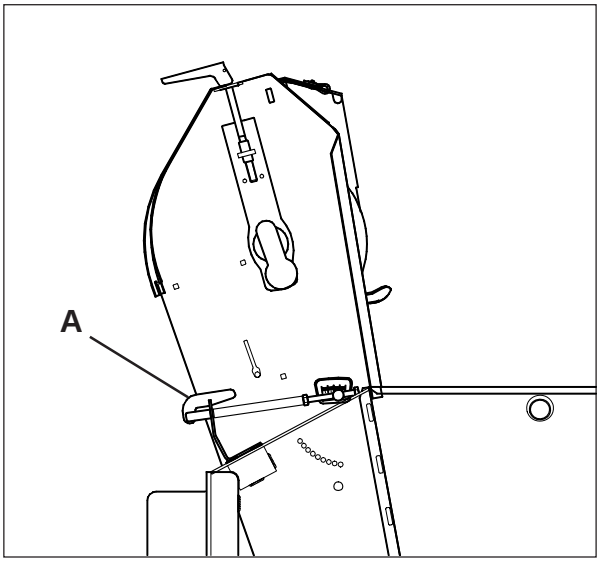

Fig. 45b

4.5.2 Electric agitation

The agotatpr motors are located inside the planting units as shown in **Fig. 45c.** 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. 45b/A)** inwards or outwards. The agitation is increased when the handle A is turned anti-clockwise.

In order to get access to the greas nipple (**Fig. 45c/B)** the cup belt has to be disconnected.

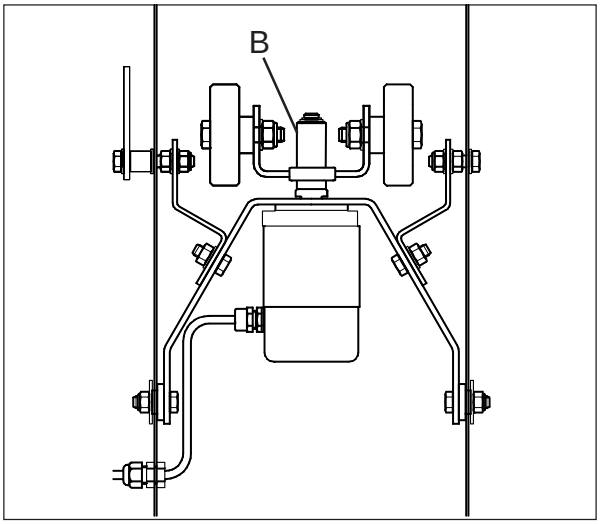

Fig. 45c

4.6 Regulation of potato flow from hopper to planting units

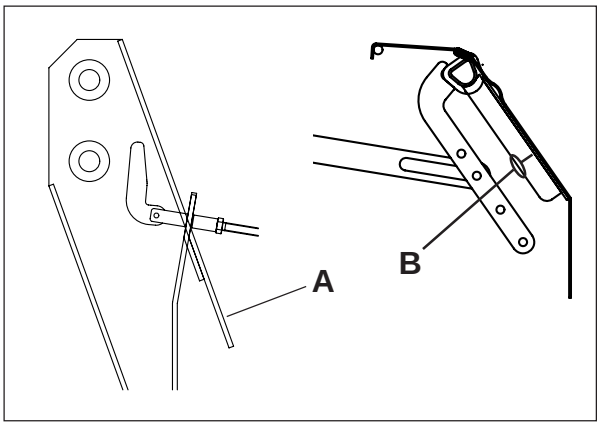

Fig. 46

Set the choke plates (angle and length) **(Fig. 46)** 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 for 2 planting units of choke plates, by adjusting screw 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

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

4.7 Emptying the potato hopper

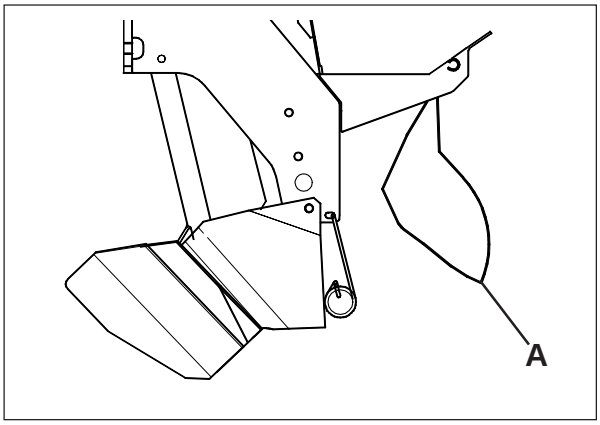

Fig. 47

Empty all accessible cups. Open the hatches **(Fig. 47/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.

5 ELECTRONIC CONTROL PANEL

The electronic control system includes **(Fig. 50):**

- **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.

5.1 The keys of the control panel

See Fig. 51.

- **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
- **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.

5.2 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. 51/T)**. When turn ON the control system is powered and the screen lights up.

Wait then about 25 seconds for the main menu.

See Fig. 51 for the description of the keys of the control panel. **See Fig. 51** 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.

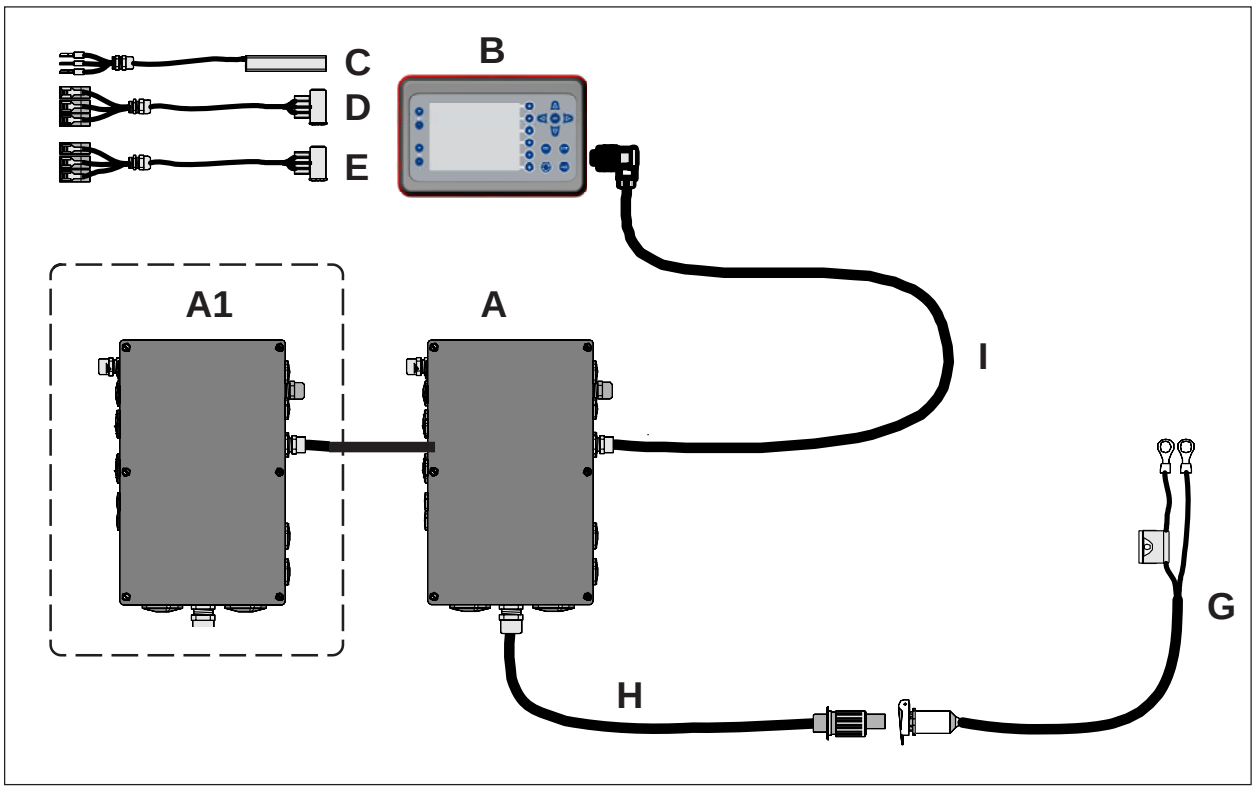

Fig. 50

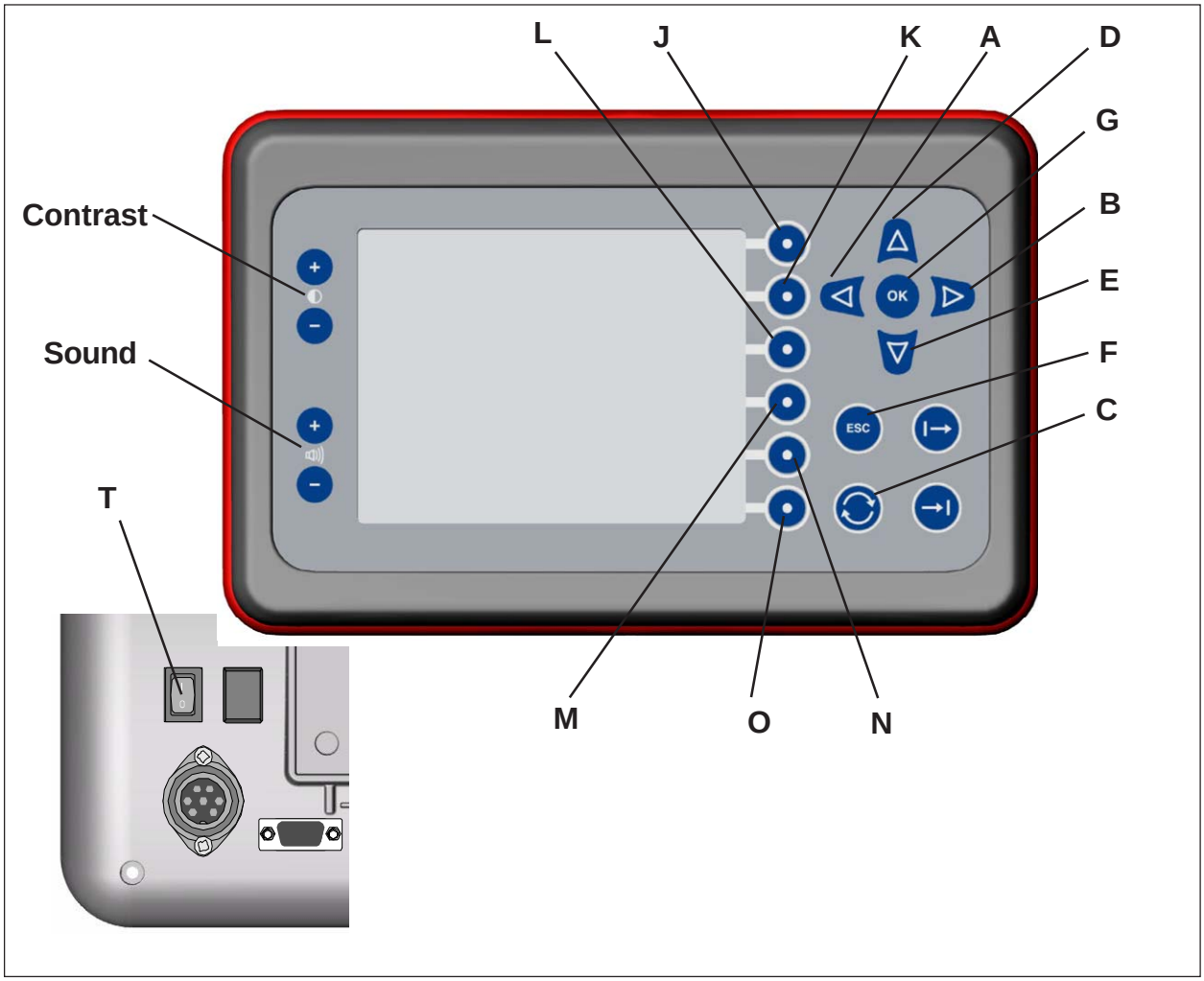

Fig. 51

5.3 Panel display

Operating the machine:

A Start/stop of the machine

Note that forward speed should exceed 0,5 km/h to activate planter drive. Lower the machine and push the **"START"** key, see **Fig. 52 (A)**. 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. 52 (C/D)**.
Machines with automatic filling of the planting units, this will happen automatically.
It is recommended to maintain a fairly constant level of tubers in the planting units in order to obtain a good result.

B Changing between menues for operating the hydraulic functions on the machine
C Raise hopper
D Lower hopper
E Machine up/reduce planting depth
F Machine down/increase planting depth
G Increase agitation of cup belt
H Decrease agitation of cup belt

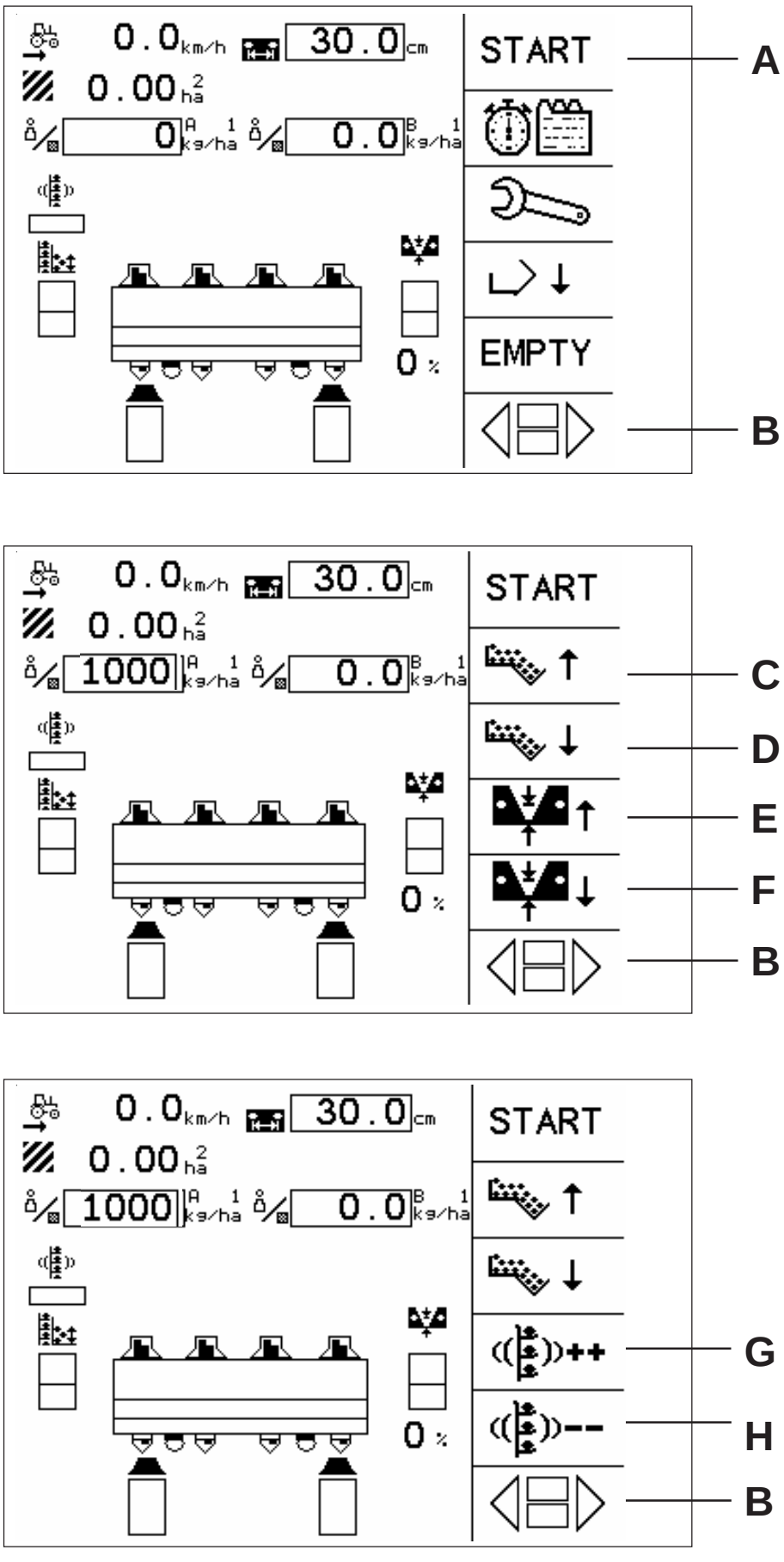

Fig. 52

Main menu:

- **A** Showing the progress of speed
- **B** Wanted planting width
- **C** Indicates the area registration which is active, and total areal in ha which have been driven on this area registration
- **D1** Wanted fertilizer amount Kg/ha for fertilizer hopper **A**
- **D2** (Wanted fertilizer amount Kg/ha for fertilizer hopper **(B/C)**
- **E** Indicates the agitation intensity Min-Max on the cup belt
- **F** Shows if the automatic hopper levelling sensor is activated and also the potato level in the planting unit
- **G** Shows if the automatic depth control sensor is activated and also the depth of the machine
- **H** Shows if the planting sensor is activated 2-8 rows and also the error planting for each row (0-100%).
- **I** Lower hopper for loading
- **J** Empty planter with cup belt
- **M1** Total time the machine has been driven in raised position
- **M2** Total time the machine has been driven in lowered position
- **M3** Total area with planted potatoes
- **M4** Average speed during work

Area registration:

- **K** Change to area registration
- **L** Change between area registration 1-20
- **M** Indicate for every area registration
- **N** Reset the registrations
- **O** Activates the choosen area registration
- **P** Change to the main menu without activating choosen area registration

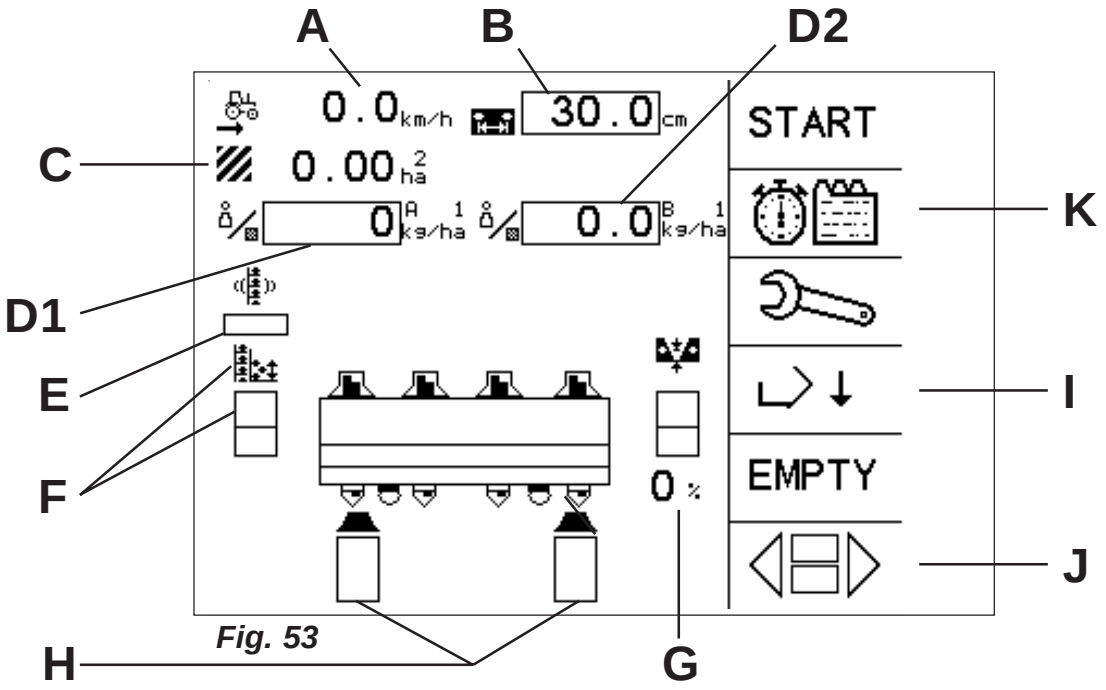
A
B
D2
0.0 km/h
30.0 cm
C
0.00 ha
0
A 1 kg/ha
0.0
B 1 kg/ha
START
K
D1
E
F
I
0 %
EMPTY
J
H
G

Fig. 53

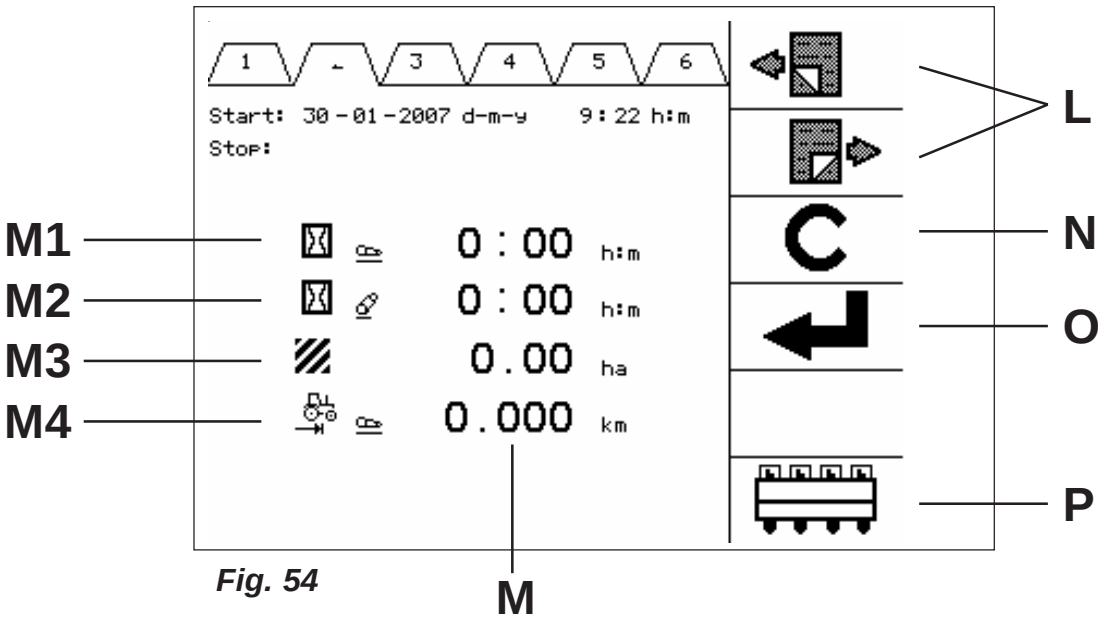
1
2
3
4
5
6
Start: 30-01-2007 d-m-y 9:22 h:m
Stop:
L
M1
0:00 h:m
N
M2
0:00 h:m
O
M3
0.00 ha
M4
0.000 km
P
M

Fig. 54

Programming/calibrating the machine

Programming the control:

A Service menues

B Activate the wheelsensor. If this is set to symbol "tractor"the wheel sensor is activated and the wheel on the planter has to rotate for starting the machine. If this is set to symbol"hand" the sensor is not activated. And the planter is starting directly after the start has been pressed. You then have to add the speed of the tractor manually in the main menu. **(Fig. 53 A)**

C Calibration of the wheel diameter. Measure 100 meter (109 yd)
Press the arrow key **(Fig 51 A-B)** until the **"START"** symbol is flashing.
Press **"OK"** key and drive 100m (109 yd)
Press once again **"OK"** key to store the correct numbers of pulses for 100 meters (109 yd)

D Number of planting units. After confirming **"OK"** the current **must** be turned off/on, so the value in the software should be changed.

E Actual row with

F Turn off/on the planting control

G Choose between metric and imperial measuring value. After confirming **"OK"** the current **must** be turned off/on, so the value in the software should be changed.

H Go directly to the main menu

I Next page

J Activates the hopper level sensor and add the wanted level of potato in the planting unit from 0-100%, 0% gives a low level of potatoes, and 100% gives high level of potatoes.

K Activate the depth sensor. Adjust the planting depth by setting the value from 0-100%. 0% gives a shallow or none planting depth, and 100% gives maximum planting depth

M Define the intensity fo the agitation for each press on++or-- **(Se Fig. 57 G-H)**

L Prevous page

I Next page

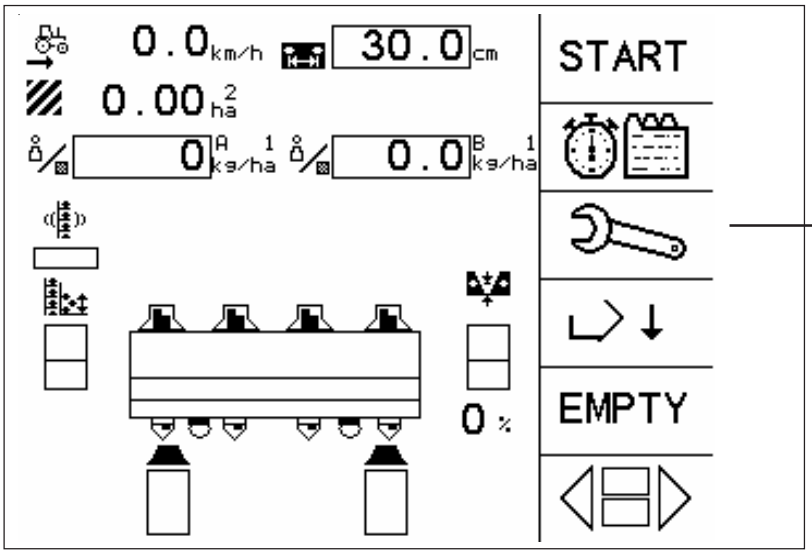

Fig. 55

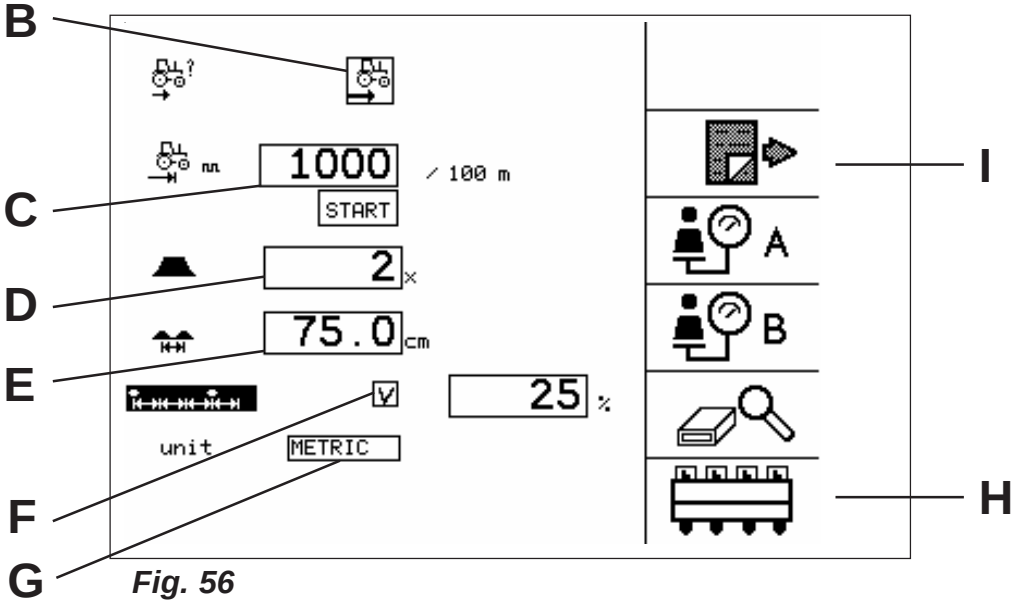

Fig. 56

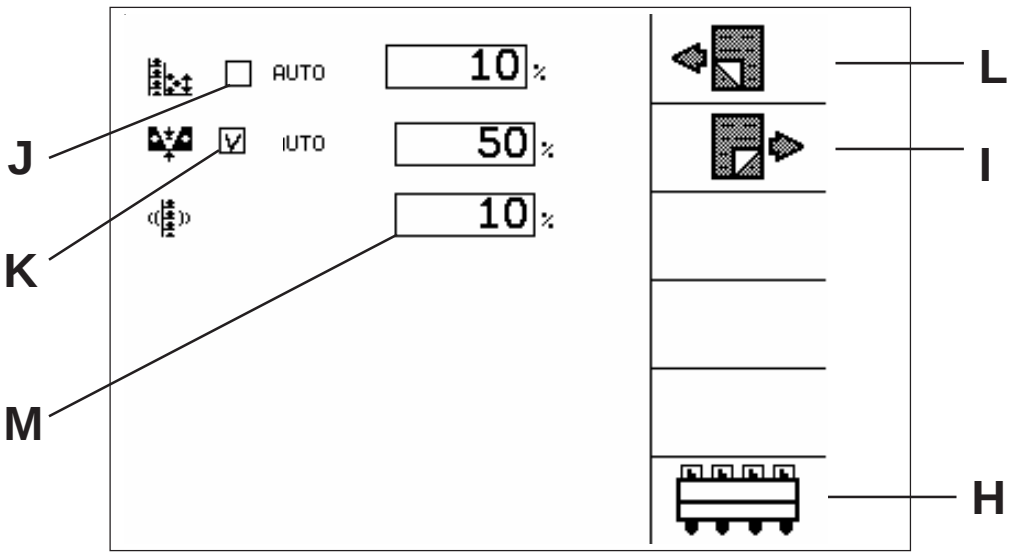

Fig. 57

N Activate/deactivate the fertillizer hopper **A**
O Activate/deactivate the granule hopper **B or C**
L Prevous page
H Main menu
I Dealer menu

Dealer menu

The different equipment on the machine:

A Activate the automatic hopper level sensor
B Activate the automatic depth control
C Activate the electric agitation of the planting belt
D Choose between trailed or mounted machine
E Choose if the machine has an electric box for the fertilizer equipment
F Choose between machine trailed behind or offset (not for this model)
G Choose the different fertilizer hoppers for the machine
L Prevous page
H Main menu
I Next page
J Activate the hydraulic wheel steering (not for this model)
I Activate the automatic wheel steering (not for this model)

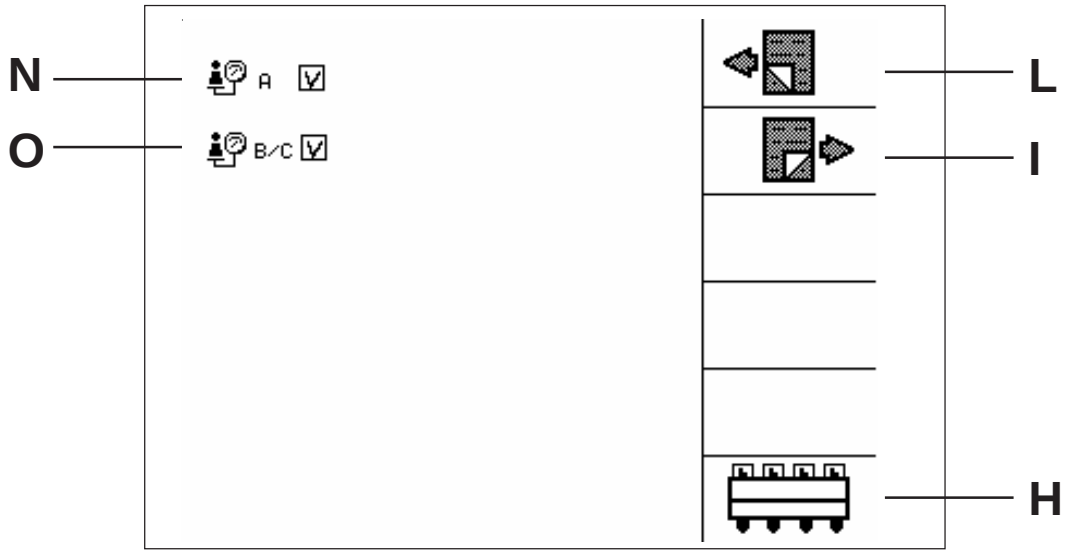

Fig. 58

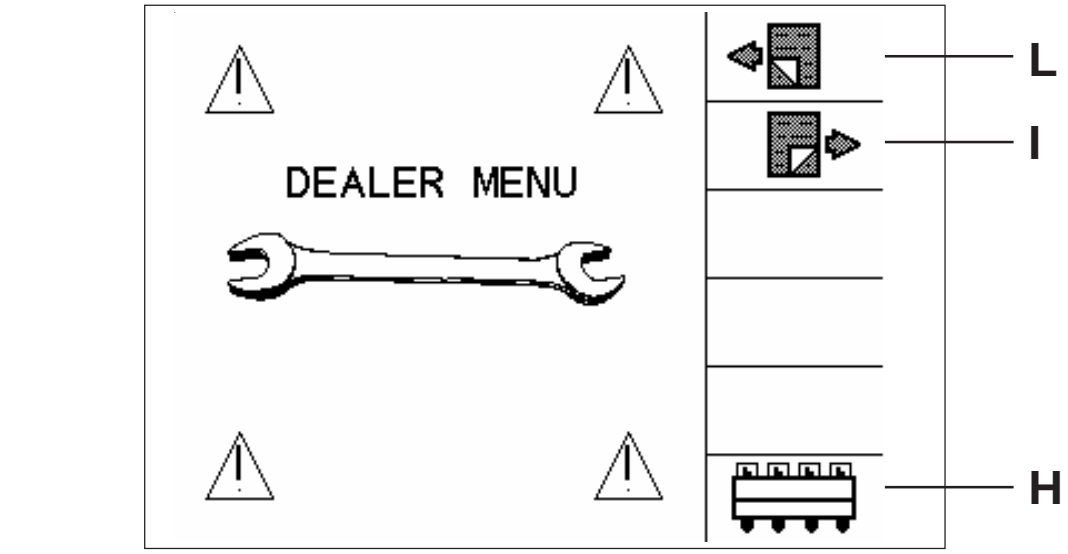

Fig. 59

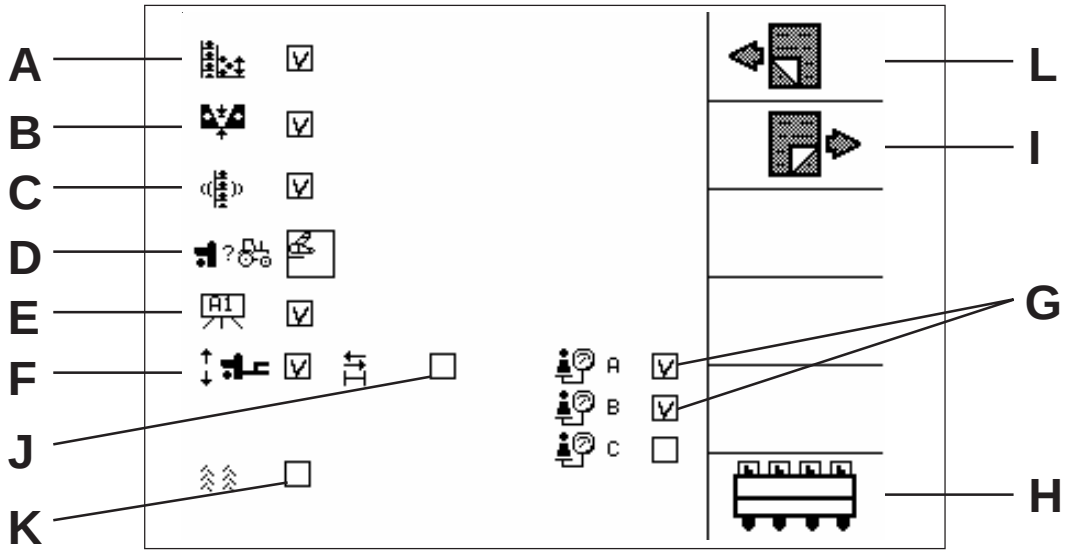

Fig. 60

Programming of the machines sensors and hydraulic valve:

A This value is centering the proportional valve for the drive of the planting belt. The value for the centre position of the valve is about 500 ppg. If the belt is starting to late this value has to increase. Or if the belt is going to fast during planting this value has to reduce

B This value is centering the proportional valve for the drive of the planting belt. The value for the centre position of the valve is about 50%. If the fertilizer chain is starting to late this value has to increase. Or if the chain is going to fast during planting the value has to reduce.

C The active time for the hopper filling sensor
Ton = time cylinder is active
Toff = time for next reacting

D The active time for the depth sensor
Ton = time cylinder is active
Toff = time for next reacting

E After enter the "STOP" the machines runs (X) meters before lifting in front. And then (X) seconds before lifting up the rear of the machine, after the front lifting has started.

F (x) seconds the lifting in front is activated

G (x) seconds the lifting of the rear of the machine is activated

L Prevous page

H Main menu

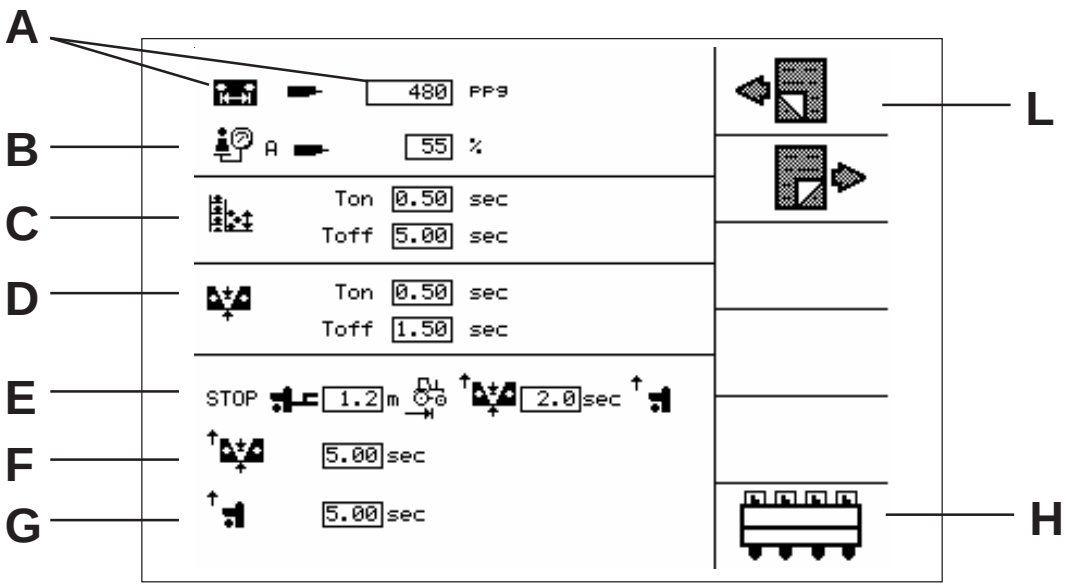
A
B
C
D
E
F
G
L
H
480 PPS
A 55 %
Ton 0.50 sec
Toff 5.00 sec
Ton 0.50 sec
Toff 1.50 sec
STOP 1.2 m 2.0 sec
5.00 sec
5.00 sec

Fig. 61

Calibrating the fertilizer equipment:

A Service menu
B Calibrating the fertilizer hopper **(A)**
C Calibrating the granule hopper **(B) or (C)**
D Wanted amount of fertilizer (Kg/ha)
E Tractor speed (Km/t)
F Wanted calibration area (ha).
This value controls the time of the calibration. If this value is too high, there will be a high amount of fertilizer coming out of the chain during the calibration
G Next step in the calibration

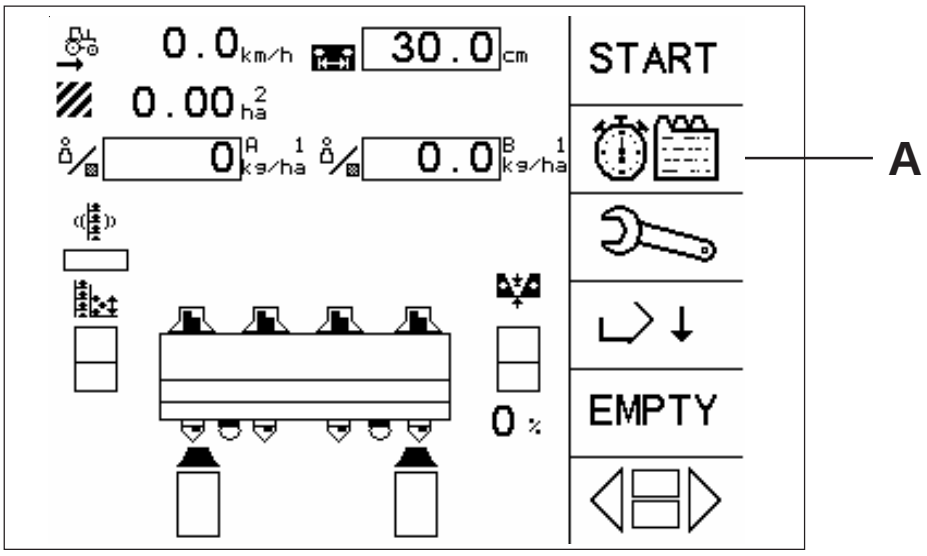

Fig. 65

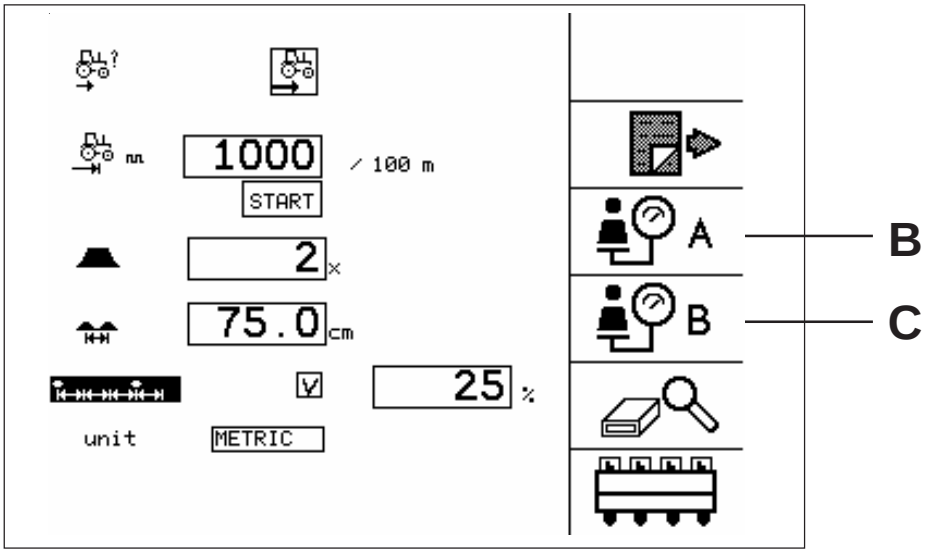

Fig. 66

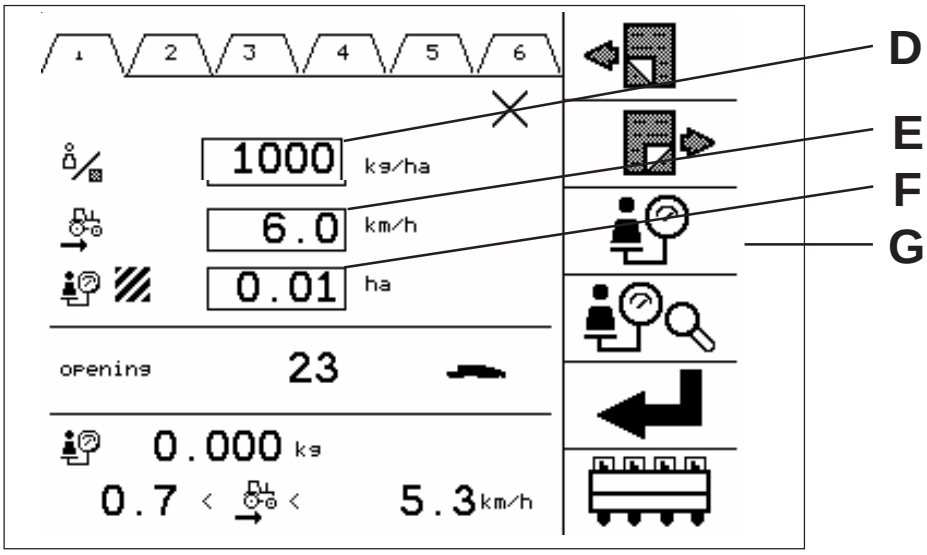

Fig. 67

How to do the calibrating:

It's important that the calibrating is done on only one outlet. The programme is made so it's automatically calculating the outputted fertilizer value in the program. So it's important to add only small amount of fertilizer inthe tank where the current outlet is.
Then hang a bucket or similar under the outlet to collect the fertilizer for weighing.

A Filling the fertilizer chain so it's ready for calibrating
B Starting the calibrating
C Pauses the calibrating

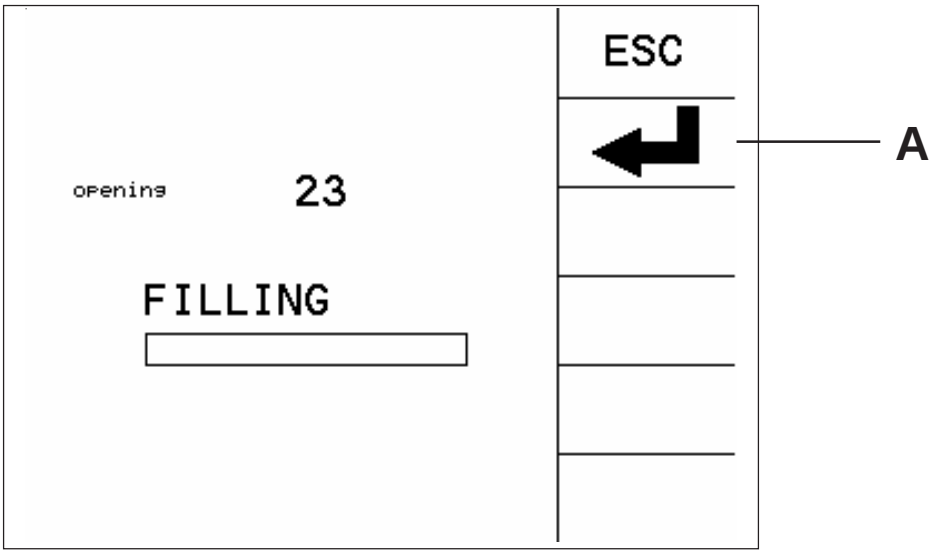

Fig. 68

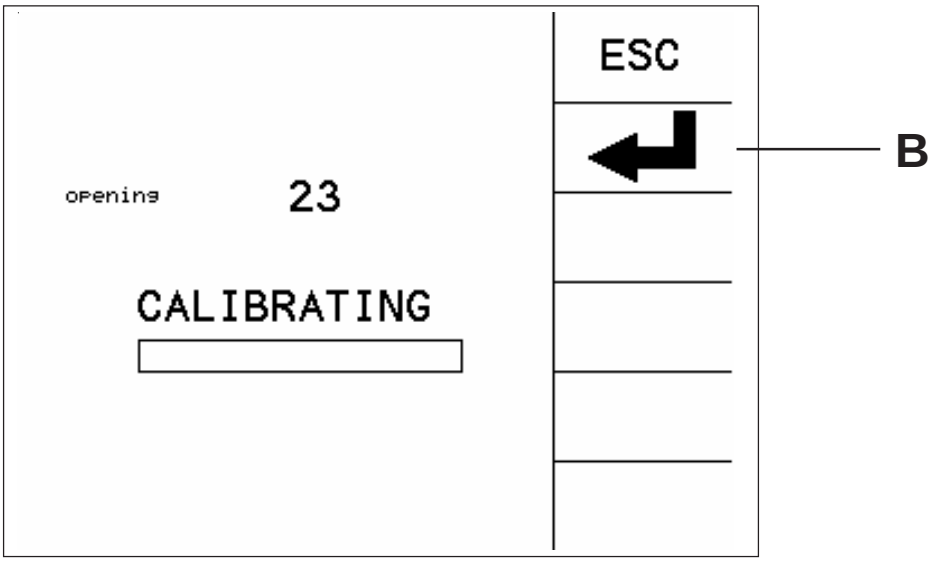

Fig. 69

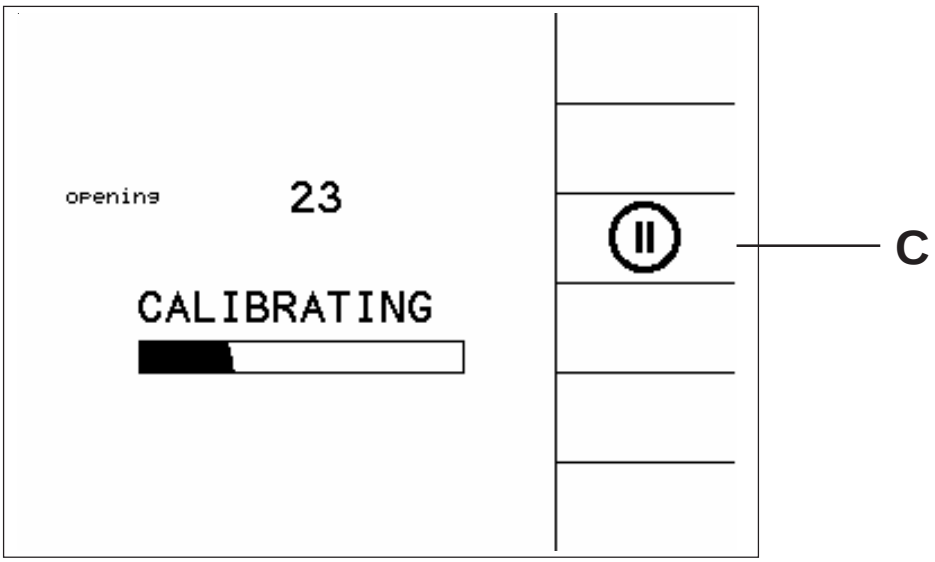

Fig. 70

D After weighing output of fertilizer calibration test, enter number of Kg and confirm with **"OK"**
E Testing of calibration.
F Info about the minimum and maximum speed
G Use this calibration for this area registration

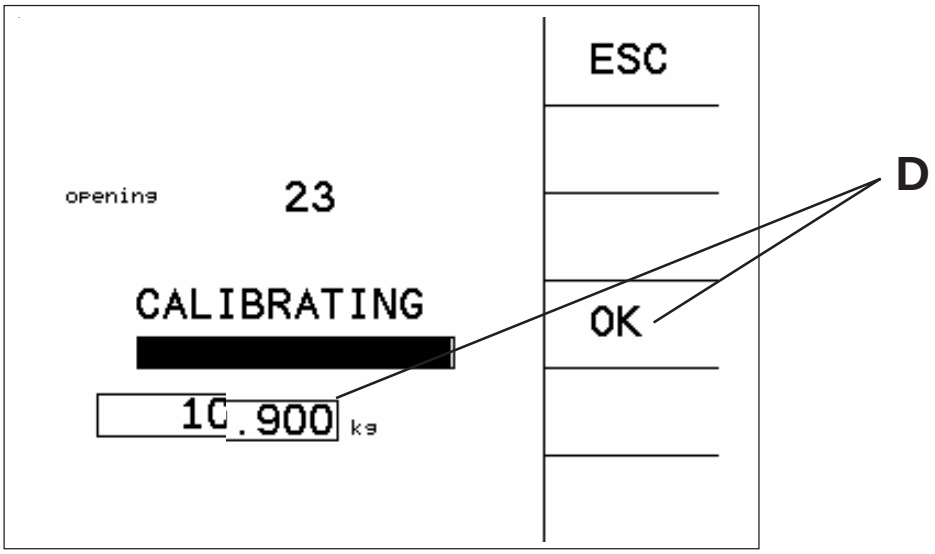
ESC
opening
23
CALIBRATING
OK
10.900
kg
D

Fig. 71

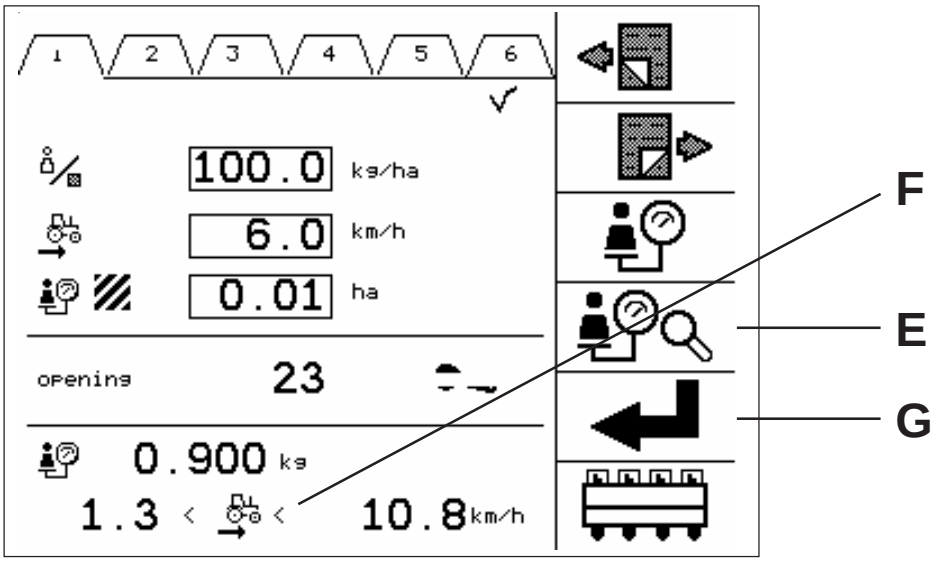
1
2
3
4
5
6
100.0
kg/ha
6.0
km/h
0.01
ha
opening
23
0.900
kg
1.3
10.8
km/h
F
E
G

Fig. 72

5.4 Alarms displayed on screen

5.4.1. Misses (empty cups)

See Fig. 75. 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.

5.4.2 Cup belts does not run

See Fig. 76. No oil supply to the drive motor. Check the hydraulic system.

5.4.3 Too low voltage

See Fig. 77. Check the electric connections of control system and the power supply system of the tractor.

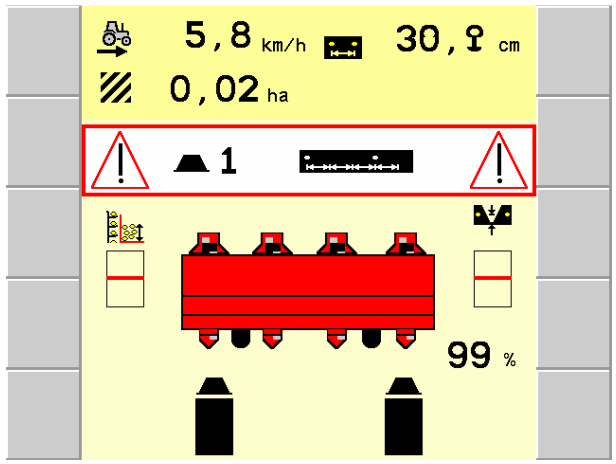

Fig. 75

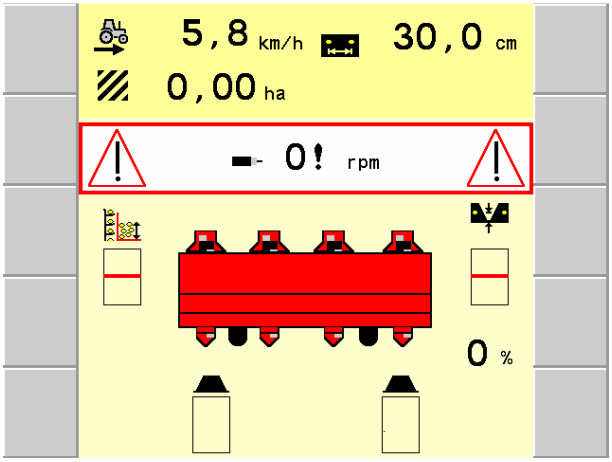

Fig. 76

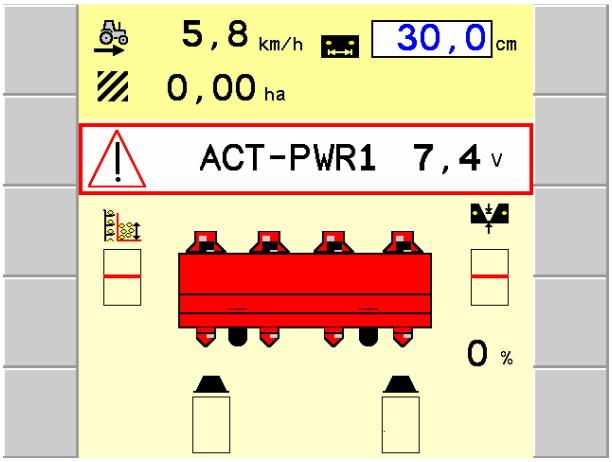

Fig. 77

5.4.4 Too high speed of the cup belts

See Fig. 78. Faulty planting distance setting or too high forward speed on the tractor.

5.4.5 Varying planting distance

See Fig. 79. Faulty oil supply to the planter.

5.4.6 Field registration

See Fig. 80. Push key K (Field registration) in order to activate the field registration display.

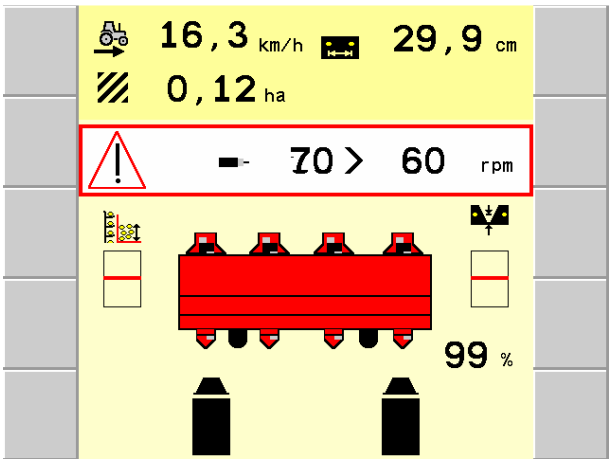

Fig. 78

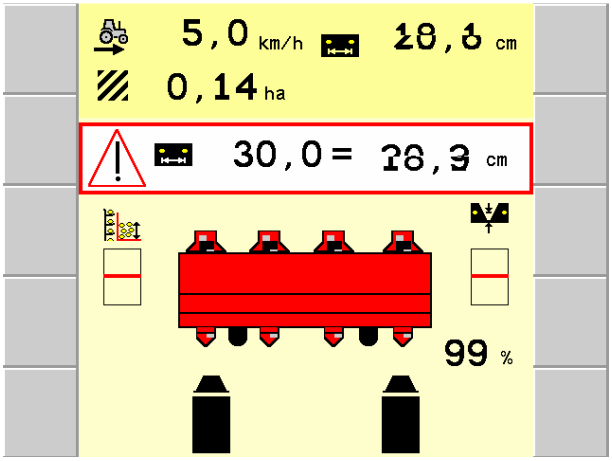

Fig. 79

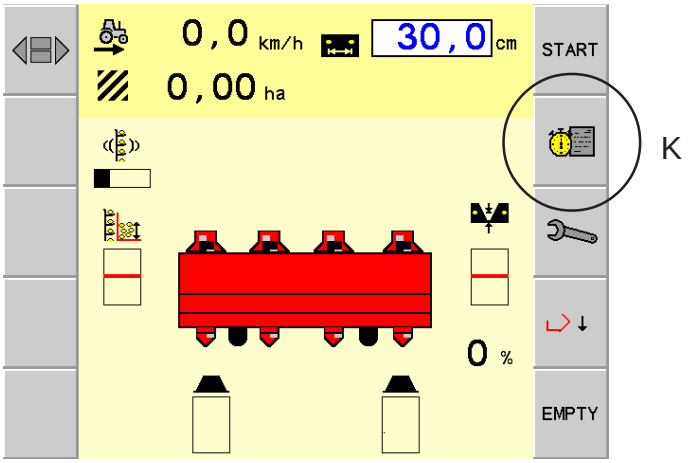

Fig. 80

6 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.

6.1 Maintenance of mechanic components

6.1.1 Welding on machine

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

6.1.2 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

6.1.3 Chain tensioning

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.

6.1.4 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

6.1.5 Tyre pressure

Wheel size.:	Loading capacity 6000kg potatoes
12,4"-242 8 PLY lugged	4.0

Pressure given in kp/cm²

6.1.6 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.

6.1.7 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.

6.1.8 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.

6.2 Maintenance hydraulics

6.2.1 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.

6.2.2 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.

6.3 Maintenance electrics & electronics

6.3.1 Controls

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

6.3.2 Cleaning

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

7. 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