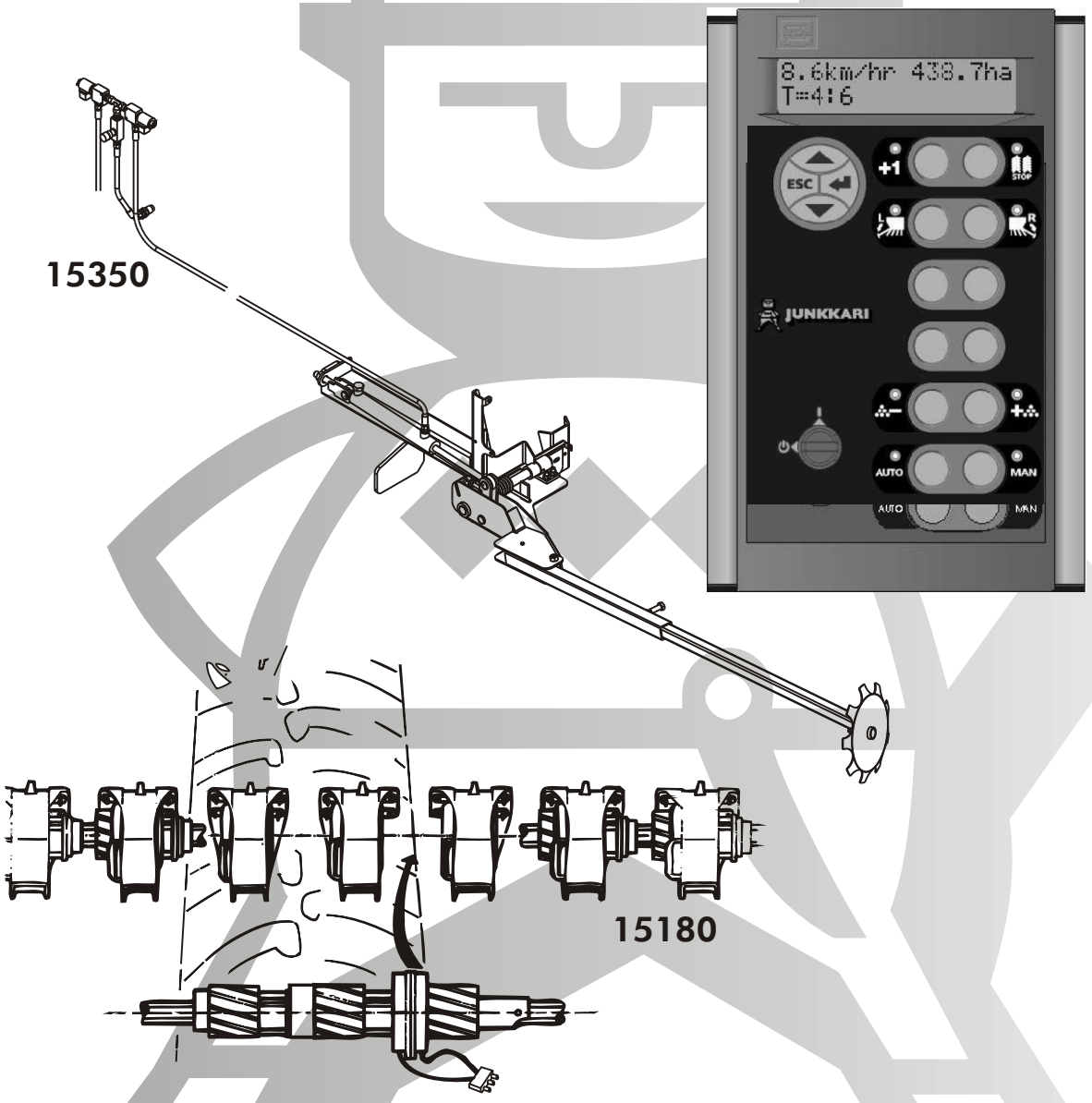
JUNKKARI

Expert-multi-function drill control with tramline marker and row marker for Junkkari Simulta seed and fertilizer drill



OPERATOR´S MANUAL AND SPARE PARTS CATALOGUE

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ENGLISH 2003 CE

Electro - Magnetic Compatibility (EMC)

1. CONTENTS

2. FOR THE READER

We wish you every success in your profession.
We would ask you to read through the instructions contained in this booklet and acquaint yourself with your machine, its principles of operation and the maintenance schedules all points which will affect operational safety and uninterrupted operation during the busy sowing seasons.
It is imperative that each and every specific point raised in this manual be fully understood and that the instructions regarding the machine's operation be complied with. Should any doubts arise, please contact your Dealer.
We also hope that you will kindly return the Certificate of Warranty after having acquainted yourself with the instructions of this manual.

2.1 WARNING SIGN

This sign will be used throughout the manual to indicate any operation, which might constitute a threat of injury to the operator or to any person close to the machine.

NOTE !

This book is a supplement to the operator's manual of Junkkari Simulta seed and fertilizer drill.
Following instructions concerning Junkkari Simulta

4.	SAFETY INSTRUCTIONS
6.3	OPERATIONAL LIMITATIONS AND FORBIDDEN FORMS OF USE
8	TRANSPORTATION, HANDLING AND STORAGE
9.1	PREPARATIONS PRIOR TO OPERATION
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19	TERMS OF WARRANTY
20	SCOPE OF LIABILITY

Concerns also all equipment introduced in this manual.

Acquaint yourself with the safety instructions of row marker on page 16.

2.2 TECHNICAL SPECIFICATIONS

2.2.1 EXPERT

The Junkkari Expert multi-function drill control has been designed to facilitate usage of the Junkkari Simulta seed and fertilizer drill and it's equipment.

Forward speed km/h
Area worked (part and total area)
Bout count and tramline bouts
Row marking
Fertilizer distribution shaft and seed distribution shaft control
Hopper level alarm
Fertilizer amount adjustment while sowing

More detailed technical specification of Expert on page 20.

2.2.2 ROW MARKER

TYPE----------	JUNKKARI HYDRAULIC ROW MARKER
WEIGHT----------	48 kg
COUPLING TO TRACTOR HYDRAULICS----------	ONE SINGLE ACTION OUTPUT, STANDARD ISO 5676 COMPLIANT BAYONETS
WORKING PRESSURE OF THE HYDRAULIC SYSTEM---	Max. 210 bar

3. GENERAL INFORMATION

3.1 OBJECTIVE OF DESIGN, APPLICATIONS AND PRINCIPLE OF OPERATION

Expert

The Junkkari multi-function drill control has an illuminated digit display with functions for : forward speed km/h, area worked (part and total area), bout count and tramline bouts, row marking, fertilizer distribution shaft and seed distribution shaft control, hopper level alarm, the fertilizer amount adjustment while sowing.

The Drill Control has six memory registers to record part and total area worked. Data is automatically stored in memory when the instrument is powered off.
The programm mode allows default settings to be altered as required.
The Junkkari multi-function drill control has no other applications than these mentioned in this booklet.

This product complies with Council Directive 89/336/EEC when installed and used in accordance with the relevant instructions. Our policy is one of continuous improvement and the information in this document is subject to change without notice. Check that the software reference matches that displayed by the instrument.

The updating of the Program can be downloaded to Expert-multi-function drill control unit.
It is easy and quick to update the current Expert-program. A PC/portable PC and cable between these are needed when uploading the Expert-unit.
When uploading is needed, please contact Junkkari Oy/dealer or service.

Tramline marker

The tramline marker has been designed for the Junkkari Simulta seed and fertilizer drills to mark out a tractor path for pesticide spraying.
The tramline marker has no other applications.
The tramline marker marks out a path for tractor to help the pesticide spraying operation later during the season. The path is marked out by closing two + two seed spouts during the tramline bout only, the width between seed spouts is chosen by the track dimension of the tractor used for spraying.

Row marker

The hydraulic row marker has been designed for the Junkkari Simulta seed and fertilizer drills to mark out the center of the tractor path.
The row marker is suitable as it is to Simulta T- and ST-models from the model year 2002, with other models, please contact your nearest dealer.
The hydraulic row marker does not have any other applications.
The row marker gets it's hydraulic pressure from the hydraulic line of the machine lifting. The Junkkari Simulta seed and fertilizer drill has a factory-assembled female bayonet for connection of the row marker hydraulic system.
The row marker controls and operations are done from the tractor cabin by using the Expert multi-function drill control. The row marking mode is chosen from the Expert, there are four different ways how to drive. You can choose a manual operation mode, deciding either right or left side marking or simultaneous marking of both sides, or an automatically controlled mode, when you choose the side to start from.
Marker arms will lower and rise, due to chosen program, simultaneously with the drill.
At the end of the marker arms are the rotating wheels, which will make a mark to the field when touching the surface.

The row marker has two hydraulic cylinders, one at each side, to lift up the marker arms when the drill is lifted up. The marker arms are lowered by the spring, the hydraulic system will limit the speed of the lowering.
The adjustable restrictor valve limits the lifting speed when the drill is lifted up.

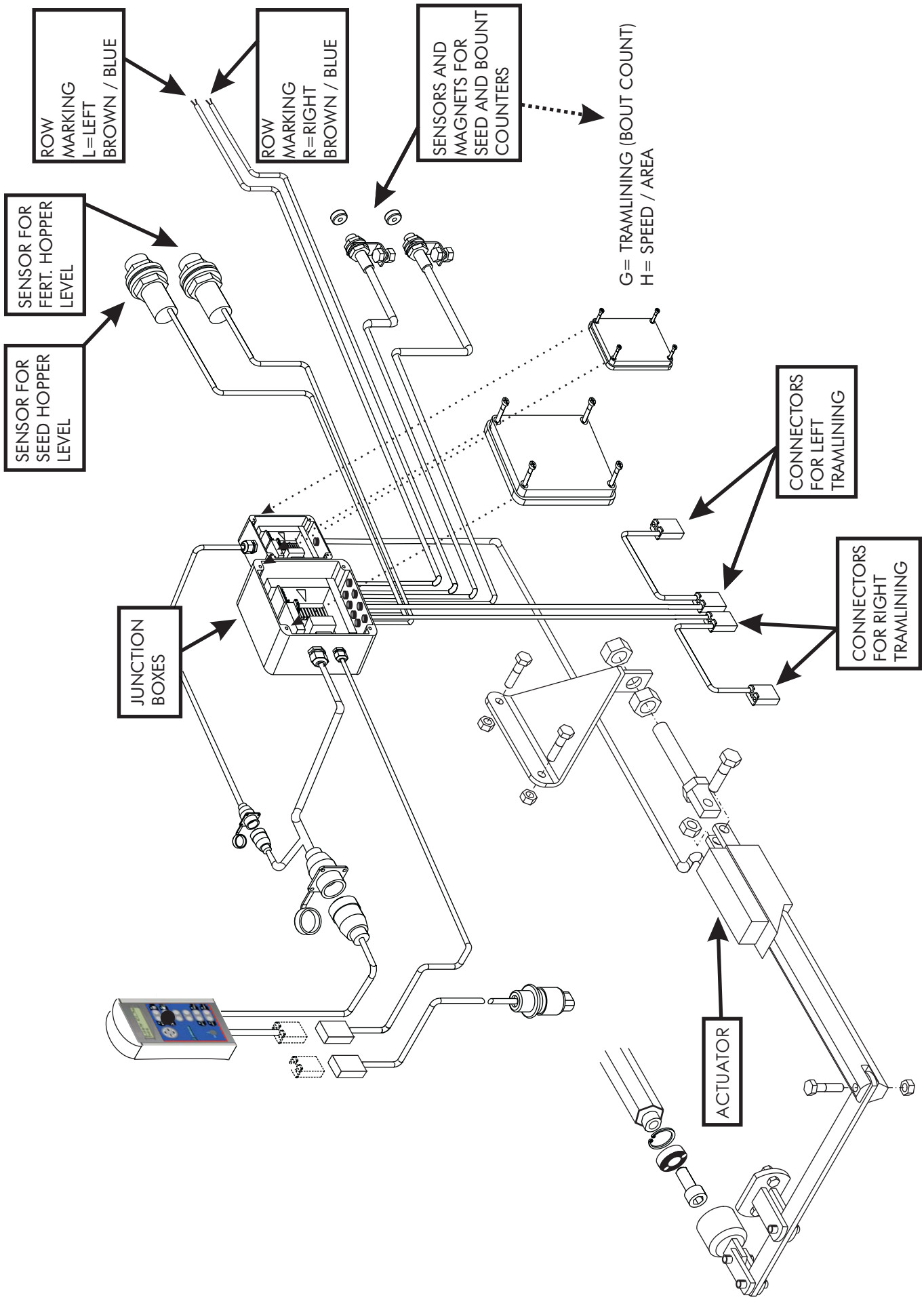
3.2 PREPARATIONS PRIOR TO OPERATION

Package

Dismount the package and dispose packing materials due to point 9.3 in the Simulta manual.
The tramline marker is packed to one parcel in full, with all fittings required.
The hydraulic row marker is packed as follows :

- Left side turning unit, locked with a linch pin *(do not remove)*
- Right side turning unit, locked with a linch pin *(do not remove)*
- Left side extension arm and wheel, assembled
- Right side extension arm and wheel, assembled
- Hydraulics and couplings
- Instruction manual
- Warning stickers and plates
- Bag of fittings and accessories

4. INSTALLATION



4.1 INSTALLING THE MONITOR

Expert multi-function drill control is installed to the tractor cabin so, that it is directly on the driver's field of vision when driving forward.
The drill control stand will be installed on it's place with screws. When placing the monitor, pay attention to driver's movement in the cabin to avoid touching the device unintentionally.

Note, that the device must not be placed near by any LA- or cellular phones. Expert drill control must not be connected to the same circuit with other electrical equipment.

CONNECTING THE ELECTRICAL WIRING

Connect electrical wiring connector to a corresponding connector from the junction box, the three-poled plug is connected to the corresponding socket in the tractor. If the tractor is not equipped with such socket, it is recommended to fit it. This cable will supply all power to the system, so it is recommendable to secure the circuit with a 10 Amp fuse.

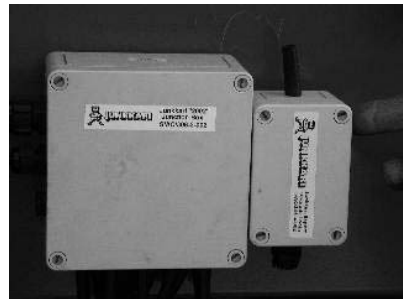
CONNECTING THE DATA TRANSFER CABLE

There is only one data transfer cable leading from the Expert to the junction box. This transfer cable has a 16-pole socket and that is connected to the corresponding plug from the junction box, and will be transferring data from the drill to the monitor.

The power must be switched off from the whole system during all cable work.

4.2 INSTALLING THE JUNCTION BOX AND THE SENSORS

INSTALLING THE JUNCTION BOX



Install the junction box to the drill with screws provided with the machine. The Junkkari Simulta drills from year 2002 will have assembly holes factory made.

INSTALLING THE ACTUATOR

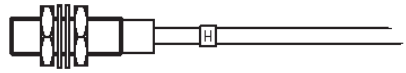
Install the actuator to the drill with screws and fasteners provided with the device, see instructions on page 6. Assure the free movement of the actuator, intermediate shaft and fertilizer shaft after the installating work.

INSTALLING THE SENSORS FOR HOPPER LEVEL ALARM

The cables are identified and placed as follows (see collar on the cable) :
N1 = seed hopper, N2 = fertilizer hopper.
The sensors are located ca. 150 mm above the bottom of the container, one at each side.
Assembly holes for the sensors are factory made to the year 2002 T- and ST-models.
The installation is done by drilling a hole, size of the sensor's threaded end, to the container side.
Place the sensor through the hole and tighten with the sensor's plastic nut.

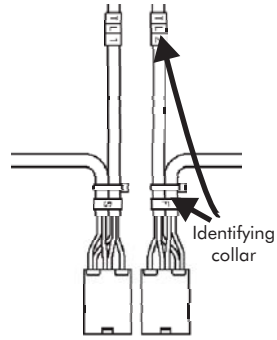
INSTALLING THE SENSORS AND MAGNETS FOR THE SPEED AND BOUT COUNTERS

Sensors for the speed and bout counters are installed with a sensor mounting.
The sensors are identified as follows (see identifying collar on the cable): G = tramlining bout counter, H = speed and area counter.



Location of the sensors : Speed and area counter sensor is fitted to the end of the fertiliser distribution shaft, tramlining bout counter sensor to the end of the right hand side bogie arm
There are 2 magnets for the speed and area counter sensor and one for the tramlining bout counter sensor. The magnets are secured with screws, be careful not to tighten the screws too much, the magnet metal is friable and will damage easily.

CONNECTING THE TL1 AND TL 2 ELECTRIC CABLES



The TL1 cable connector identified with letter "S", is connected to the combination switch installed to the left side of the drill, and the TL2 cables are connected to the combination switch installed to the right side of the drill, follow the identifying collars on the cables.
NOTE : If you have the 18-metre system in use, the connector identified with letter "F", is connected to the combination switch installed to the fertilizer distribution shaft, and then you must have 4 (four) combination switches in the seed distribution shaft.

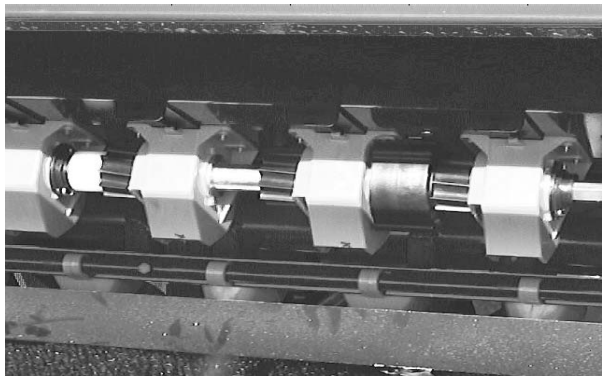
The placement of the combination switches depends on what is the relation between the tractor and the pesticide sprayer. See pos. 12.3.

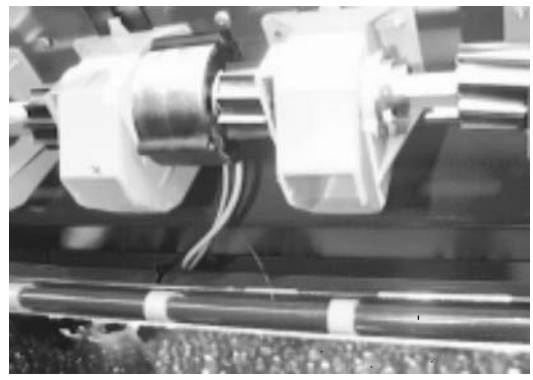
4.3 INSTALLING THE DISTRIBUTION SHAFT COMBINATION SWITCHES

COMBINATION SWITCH (seed spout closing switch and rotation sensor)

The attachment of the combination switches is done as follows. The wiring harness is placed and fixed to the spout shafts with cable ties as in the pictures below. Note, that the spout shafts must be able to move to get the calibration test done.
The combination switch is also moved by the adjustment of the feed, and that movement should also be notified when fixing the cables.

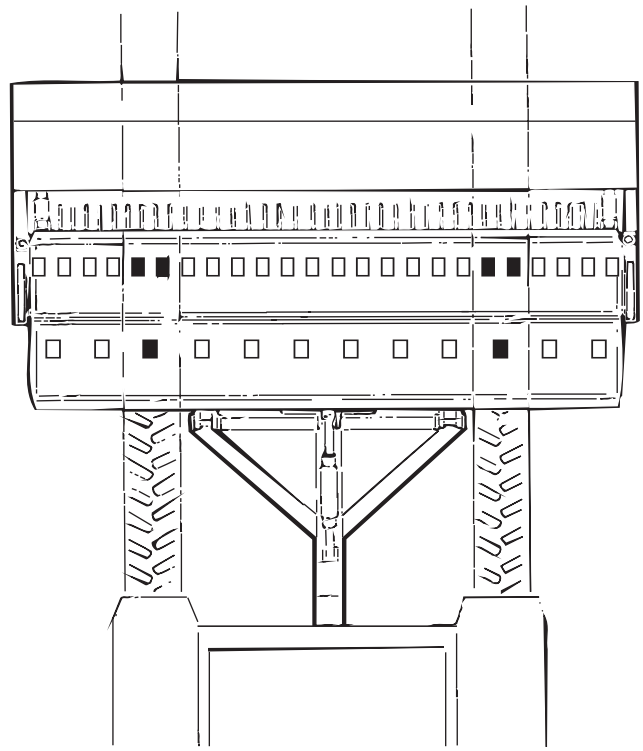
Take care that all cables are fitted to the correct sides of the machine to ensure accurate functions of the Expert.





INSTALLATION

The tramline marker is installed in the factory. For retrofitting, the installation requires that some standard parts must be altered. Alteration is quite easy and all information needed to do that are described here.

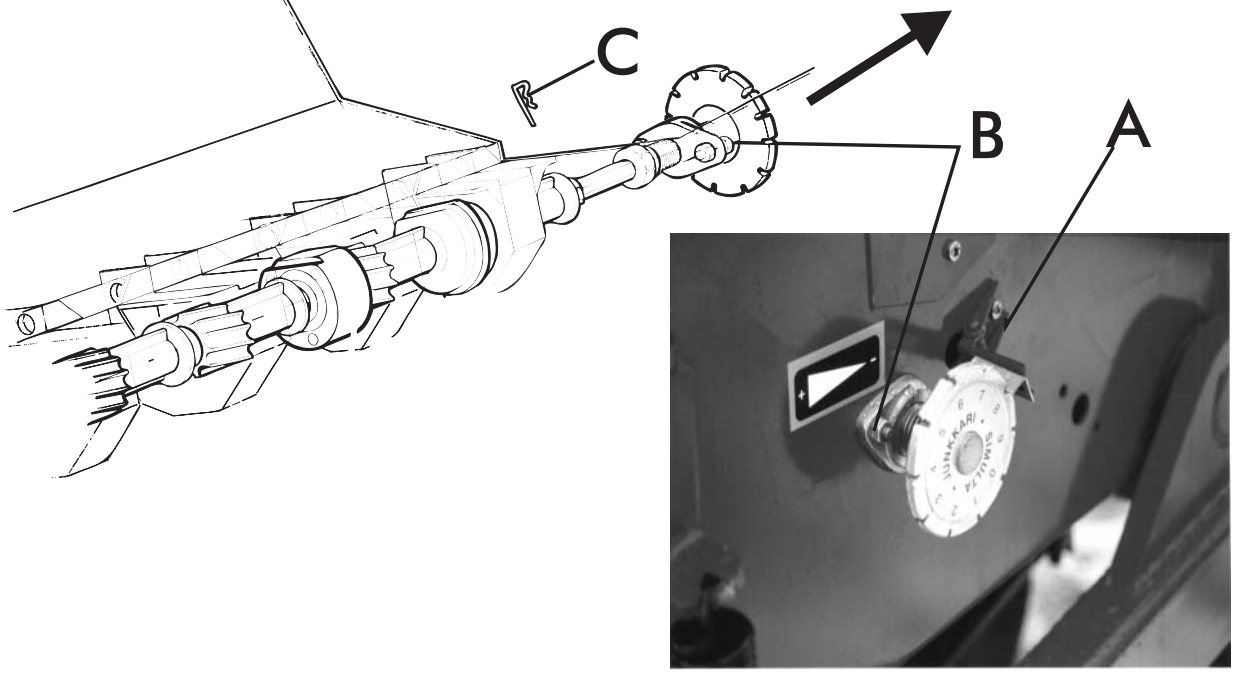


TRACK

At first you measure the track of the tractor used for pesticide spraying, and mark out the feed chambers of the drill in which the combination switches will be installed. (refer to the illustration)

DISMANTLING OF THE DISTRIBUTION SHAFT

At first, lower the calibration test troughs into the test position, so all falling parts will end to the troughs while dismantling the shaft.
Remove the feed adjustment clamp A from the distribution shaft (refer to the illustration below). After that, remove the feed adjustment frame nut B at the face of the machine. The frame nut is fixed to the face with two M8 screws.
All feed roller retaining pins C are removed from the distribution shaft, there are 20-32 pcs of pins depending on the Simulta model. Carefully pull out the distribution shaft, far enough to be able to change new parts to all marked chambers. NOTE, that to prevent damaging the distribution shaft, the shaft must be supported while pulling it out.
When pulling out the distribution shaft the feed rollers and seals usually stay inside the feed chambers. In that case it is recommendable that the feed rollers are removed only from those



FITTING THE COMBINATION SWITCHES

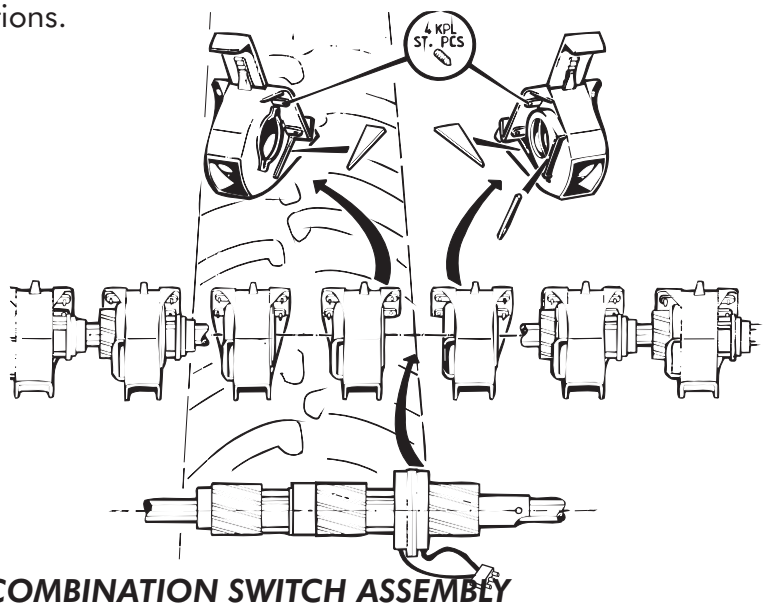
When equipped with standard distribution equipment, the Junkkari Simulta seed an d fertilizer drill will require some special alterations to fit the distribution stop switch into it's place.

The distribution of the Simulta is adjusted by changing the effective length of the feed roller, then the whole distribution shaft is moving, and because of that, the switch will require all the space between feed chambers and it needs to be able to move from min to max while adjusting the distribution.

As a consequence of that, it is required to remove the ribs that resist the movement of the switch from the feed chambers according to the picture below. Also cut off all excessive length from the fixing screws.

This work can be done using, for example, a hack saw.

These alterations are done only to the feed chambers beside the switches, the other feed chambers do not need any alterations.

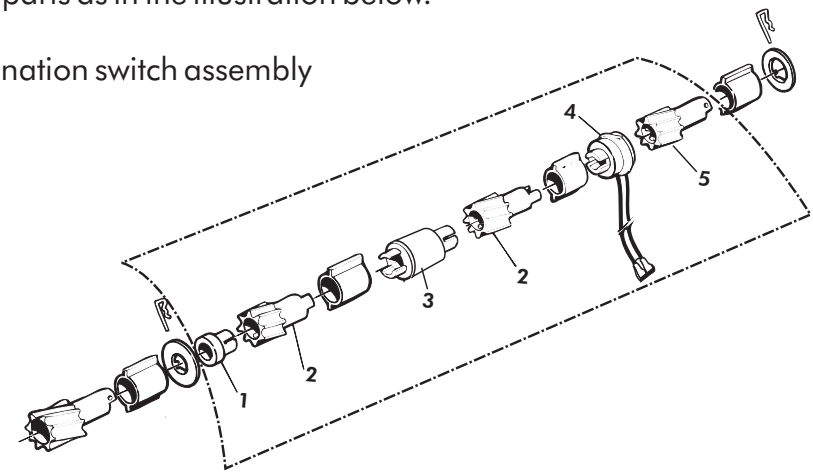


INSTALLING THE COMBINATION SWITCH ASSEMBLY

The combination switch assembly (refer to illustration above) can be installed after the alteration done to the feed chambers, , order of the parts as in the illustration below.

Parts for the seed distribution shaft combination switch assembly
(one assembly / wheel)

1.	End bushing	1pcs
2.	Feed roller	2 "
3	Drive bushing	1 "
4	Combination switch	1 "
5.	Free feed roller	1 "



INSTALLING THE DISTRIBUTION SHAFT

The distribution shaft can be installed back to it's place after the combination switch assembly has been installed. Take care during the installation that all feed rollers are placed correctly and the retaining pin holes are in position. Note when putting the switch assembly together to fit claw couplings correctly.

4.4 INSTALLING THE ROW MARKERS

Start the installation of the row markers by attaching the hydraulic components ; the valve mounting, valve pack and cover, hoses and the hydraulic cylinders to the face of the seed and fertilizer drill. The assembly screw holes are drilled at the factory to the face of the drill, remove covering plastic caps, use screws and nuts provided with the machine.
Fix hydraulic hoses by clamps enclosed to welded hose mountings in the drill, ensure that the hoses won't be damaged during the use of the machine.
The hydraulic cylinders are attached with a yoke to the mounting bracket in the drill (see fig. 3. next page), place nuts to both sides of the bracket for the adjustment.

Install turning units to the sides of the drill with screws and nuts enclosed, the assembly holes are factory made to the drill (see fig. 2.).
Note the drive direction to fit the parts to correct sides (see fig. 3.).

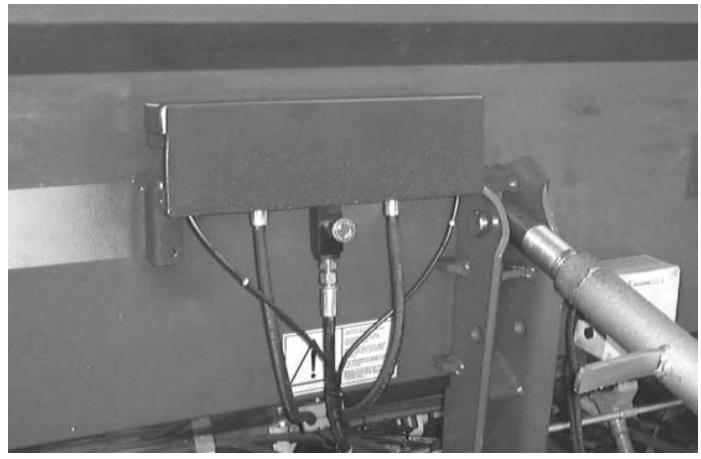


Fig.1. Placement of the valve pack and cover.

NOTE

The turning unit is delivered fixed to transport position with a linchpin. Engage hydraulic cylinder and pressurize the system before removing the linchpin, the spring will otherwise make the arm drop down quickly causing immediate risk of injury.

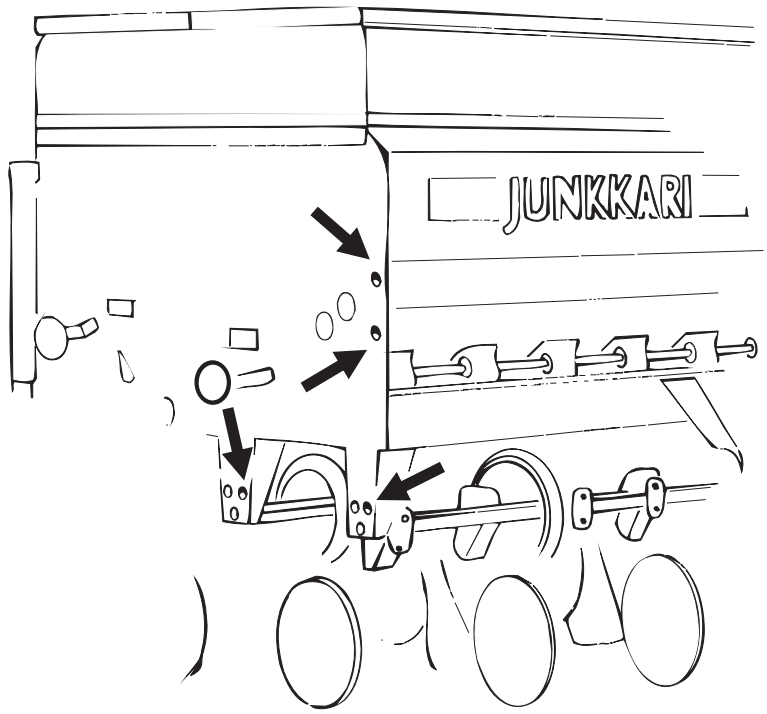


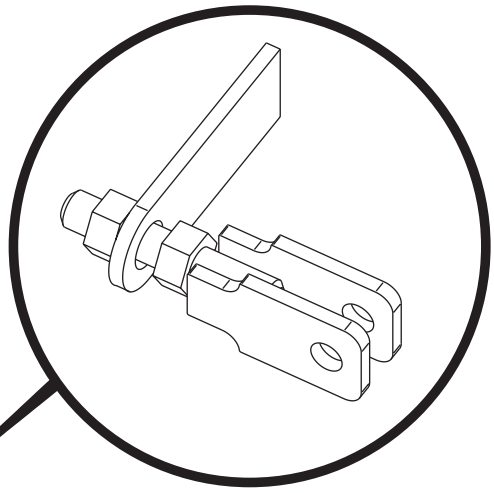
Fig. 2. Assembly holes for the turning unit at the side of the drill.

UNLESS THE CYLINDER IS PRESSURIZED, THE TURNING UNIT RESTS AGAINST THE LINCHPIN, AND IN THAT CASE REMOVING THE PIN CAUSES A DANGER OF INJURY.

When all hydraulic components and turning units are installed to the drill, the extension arms and marker wheels can be assembled to turning unit arms.
Use screws and nuts provided with the machine to assemble parts, note the driving direction, the wheel must stick out compared to driving direction (see fig. 3.).

First assemble the wheels to the extension arms. Then assemble extension arms to turning units by passing the extension arm inside the turning unit arm and tighten to required length with retainer screw (see fig. 3.).

WHEN REMOVING THE LINCHPIN, ALWAYS EXERCISE EXTREME CAUTION



Adjust the hydraulic cylinder yoke to keep the marker resting against the cylinder when the it is in its shortest position, not against the turning unit. The linchpin is also then easy to remove. The yoke is locked after the adjustment by two nuts to the position where the hydraulic connection is upwards. (see fig. 3)

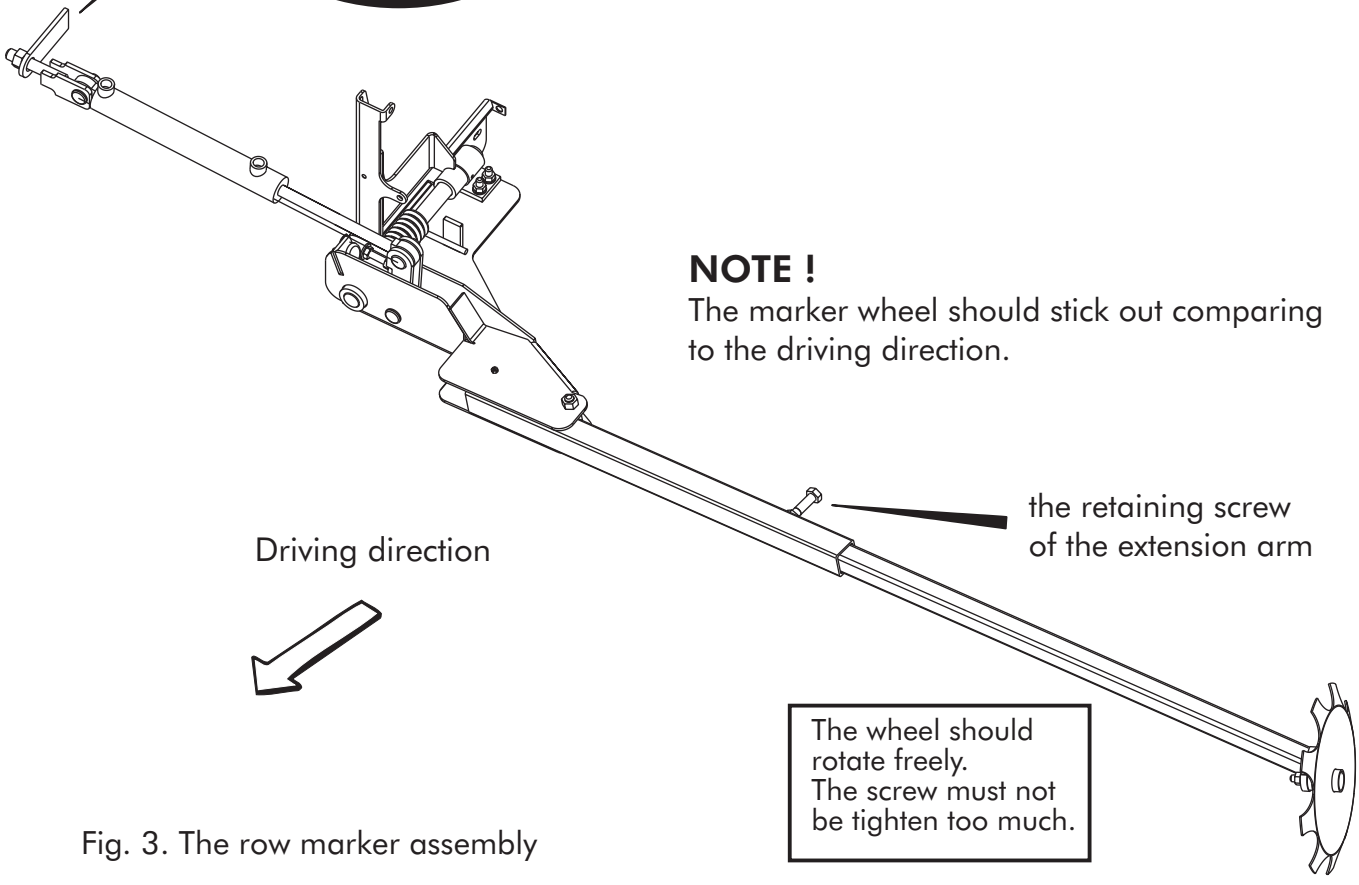


Fig. 3. The row marker assembly

HYDRAULICS

The row marker is coupled to the seed and fertilizer drill hydraulics by a factory assembled bayonet in the drill. This way the row marker will function automatically due to the chosen row marking program, lifting and lowering the marker arms when the drill is lifted or lowered.

The row marker is provided with ready-made hose assemblies, valve pack, hydraulic cylinders and all needed fittings. The valve pack consists of a restrictor valve and two electrically controlled 2/2 directional valves.

The two electrically controlled 2/2 solenoid valves are to control the row markers side changing through the Expert. When all hydraulic components are assembled, connect the control wiring from the Expert to the two-way directional valve solenoids.
The Expert control wiring for the solenoids consists of two cables, brown and blue, in black covering, one per side, for left and right marker. The cables are marked with identifying collars, L=left and R=right.
Connecting the wiring to the solenoids, see page 42 : **ELECTRICAL CONNECTORS; Row marker valve solenoid connectors.**

It is recommendable to do some operating moves with the machine to test the functions and make the eventual air from the system to drain out.

See assembly illustration below and the instructions for the row marker speed adjustment on next page.

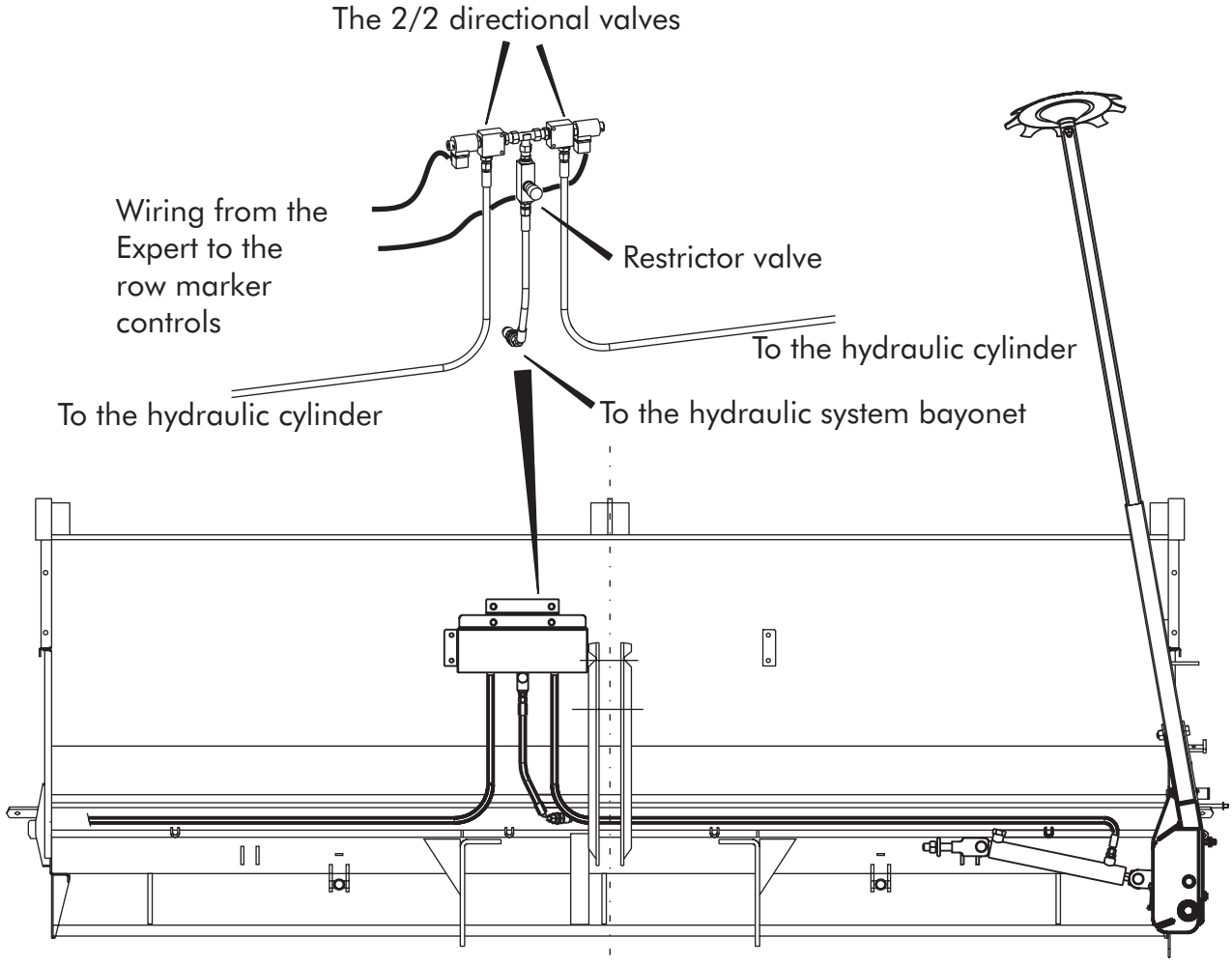


Fig. 4. The assembly of the row marker hydraulics to the seed and fertilizer drill

ADJUSTMENTS

1. Working width

When the row marker has been assembled to the drill, the marking width can be adjusted by adjusting the length of the extension arm. The adjustment is done by loosening the retaining screw from the turning unit arm and moving the extension arm in or out to the required width. When the adjustment is done, tighten the retaining screw lo lock the extension arm to its position. The marking width is the same as the working width. Measure the width from the center line of the machine to the marking wheel. (Fig. 5).

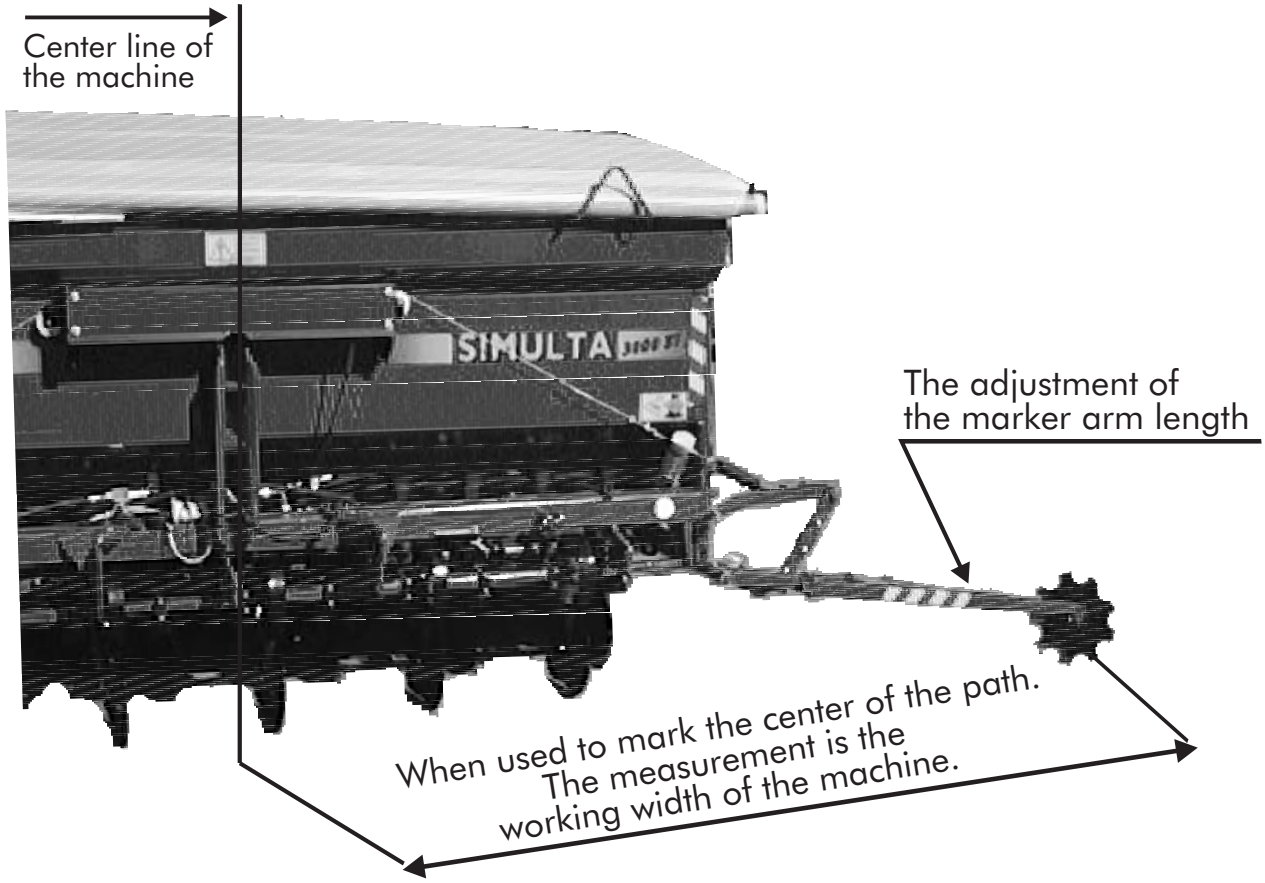


Fig. 5. The working width adjustment

2. The marker arm bumper adjustment

To prevent damages caused to the turning unit and the hydraulic cylinder by sudden downwards movement of the marker arm, there is an adjustable bumper in the hydraulic cylinder mounting of the turning unit. The bumper will prevent damages in situations, for example, when driving close range to the ditch bank and the marker suddenly "falls on top of nothing".
The bumper is adjusted by opening the lock nut and turning the retaining screw to the required length, and locking the position with the lock nut again.
Note : If the retaining screw is too far out, the marker might be too high on the working position and the marking weakens.

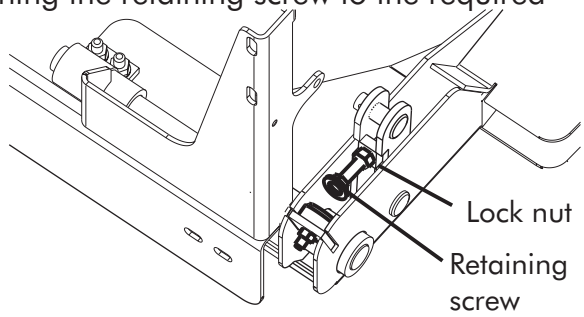


Fig. 6. The marker arm bumper

ADJUSTMENTS

3. The row marker arm speed adjustment

The lifting speed of the marker arms is adjusted by the restrictor valve. The lowering speed is limited by the oil returning from the hydraulic cylinder and running freely through the restrictor valve.
The row marker hydraulic system flow can be adjusted to fit the tractor hydraulic system oil flow with the restrictor valve. The flow is adjusted correctly, when the movements are smooth and sudden moves are no danger to the machine.
Note, that the hydraulic oil flow is highest when the oil is warm, and the hydraulic pump output is at its maximum level at high tractor engine speed.
The restrictor valve restricts the flow only to one direction, the restriction is adjusted from the adjusting knob on the valve.
The restriction adjustment is done by loosening the lock screw (tiny allen screw at the side of the knob) on the adjustment knob and the valve is fully closed. Then pressurize the hydraulics by switching on one of the row markers from the Expert and lowering the drill. Then start turning the adjustment knob observing the movement of the chosen row marker arm, and when the movement speed is adequate, lock the knob with the lock screw on this position. The speed is adequate, when the lifting is as fast as the lowering.
This adjustment is tractor-specific.

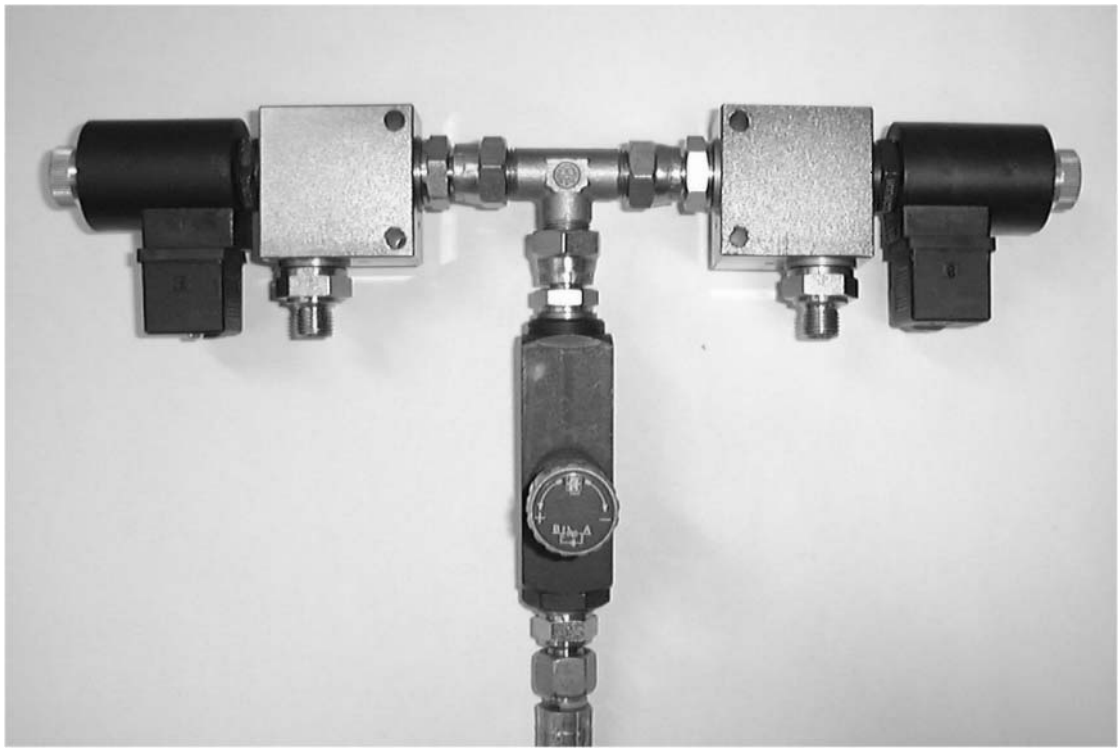
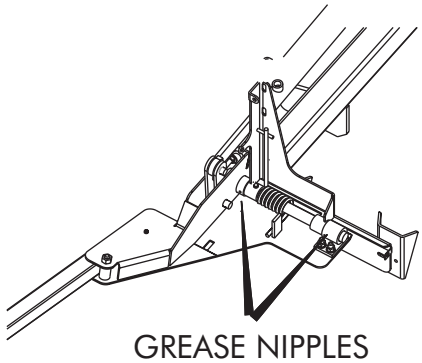


Fig. 7. The adjustable restrictor valve and two 2/2 directional valves with solenoids

LUBRICATION CHART

TARGET	LUBRICANT	MAINTENANCE INTERVAL
the turning unit hinge sliding bearings, 2 kpl	Vaseline	At the beginning and at the end of the season after washing the machine



GREASE NIPPLES

WARNINGS AND WARNING STICKERS

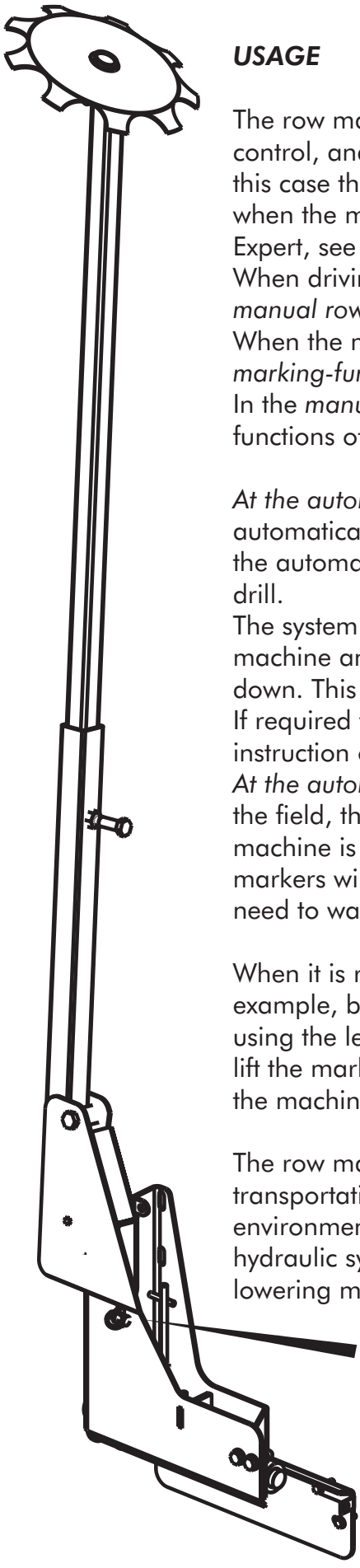
BEFORE STARTING THE ASSEMBLY WORK, ALWAYS MAKE SURE THAT THE HYDRAULIC SYSTEM IS UNPRESSURIZED AND THE DRILL IS LOWERED TO THE GROUND.

THE MOVING SPEED OF THE HYDRAULICS IS DANGEROUSLY HIGH WHEN UNADJUSTED OR ADJUSTED INCORRECTLY.
BEWARE OF THE FAST MOVING MARKER ARMS.

See also Junkkari Simulta operator's manual : 4.3 Maintenance and repairs and 4.4 Hydraulics
Attach the warning stickers provided with the machine according to picture below.mukaisesti.

Danger of crushing !

Beware of the lowering marker arms !
Beware of the power lines !



USAGE

The row marker is always operated with the Expert multi-function drill control, and it is coupled to the seed and fertilizer drill hydraulic system. In this case the row marker arms are always lifted and lowered automatically when the machine is lifted or lowered. The exact description in use of the Expert, see page 33, chapter 13. Row marking
When driving circle at the field, e.g. starting from the outer border , use the *manual row marking-mode*, switch on the inner row marker.
When the marks are required to both sides of the machine, use *manual row marking-function* and switch on both markers.
In the *manual row marking-mode* lifting of the drill does not affect the functions of the row markers.

At the automatic row marking-mode, left and right side markers alternate automatically due to programming, when driving the field back and forth, the automatic row marking can be started on the right or the left side of the drill.
The system has to sense the change of the driving direction from the lifting machine and it has to "know" which side of row marker has to be laid down. This is programmed with the Expert.
If required to lift the machine without affecting the row marker counter, see instruction on chapter **13. Row marking, 13.4. Lifting the drill**
At the automatic row marking-mode, when the drill is lifted up at the end of the field, the markers will be lifted up along with the machine. When the machine is lowered down, the driving can be continued immediately, the row markers will be lowered automatically within 5 seconds delay, there is no need to wait for them.

When it is required lift the marker / markers up for a little while, for example, because of an obstacle, it can be done by lifting the markers up using the lever used for lifting the machine, shifting the lever just enough to lift the markers but not the drill. (The Expert will not recognize this as a lift of the machine, and it does not affect the automatic row marking).

The row marker arms must be lifted up and locked with a linchpin for the transportation, to prevent causing danger to the machine or the environment. When taking the machine into operation, always couple the hydraulic system before removing the transportation linchpins. Beware of the lowering marker arm after removing the linchpin. (Fig. 8.)

THE TRANSPORTATION LOCK LINCHPIN

WHEN REMOVING THE LINCHPIN, ALWAYS EXERCISE EXTREME CAUTION

Fig. 8. The turning unit at transportation position

5. DEFAULT SETTINGS

The Expert has three kinds of default settings :

The Expert default settings (first default setting)
- In case the monitor has to be reset,
  these are the settings it will return to.

Settings, that are programmed at Junkkari : (second default setting)
- Programmed at the factory
- Especially altered settings for Simulta

User preference settings : (third default setting)

The settings, that the operator is able to program :

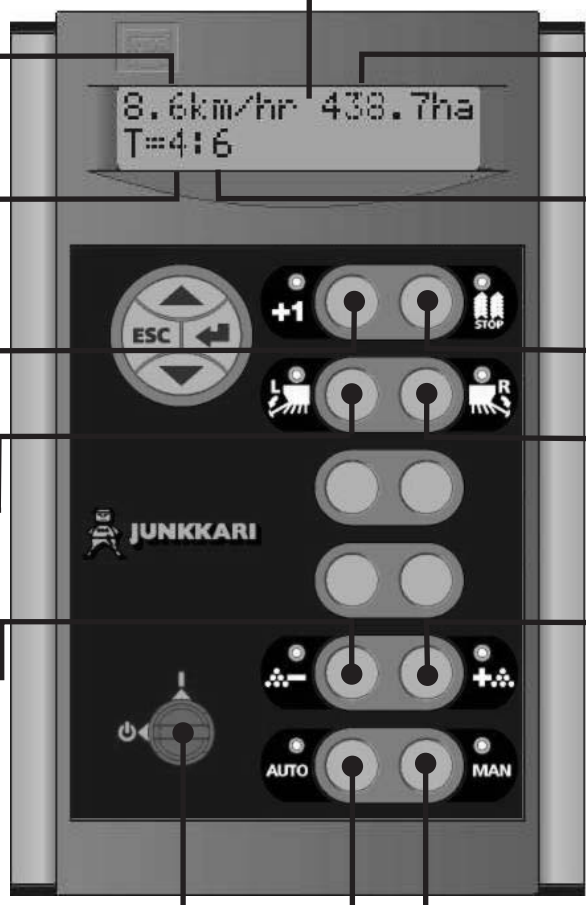
Function	**Programmable value**	**default setting** (Expert)	**default setting** (Junkkari)	**default setting** (User)
1. Hopper level/seed	Hopper level alarm on/off	1	1 = ON	----------
2. Hopper level/fert	Hopper level alarm on/off	1	1 = ON	----------
3. Tramline	Tramline marking	SY, AL, AR, 18m	SY, AL, AR, 18m	----------
4. Contrast	Display contrast	****	****	----------
5. Language	Fi, Swe, Nor, Ge, Eng	Englanti	Suomi	----------
6. Km/h	Wheel circumference	2.00.m	1.32 m	----------
7. Auto calibration*	Wheel circumference	2.00m	1.32 m	----------
8. Width	Working width	2.0m	width of drill	----------

* see manual on page 32

Expert Technician setup:
Browse the Expert- screen with Enter- button until **Technician setup** shows on the screen. Enter the PIN-code if needed.

Function	**Programmable value**	**default setting** (Expert)	**default setting** (Junkkari)	**default setting** (User)
1. Fert. shaft speed Seed shaft speed	Speed pulse / round	0.00ppm	0.01 with switch 0.00 w/o switch	----------
2. Fert. shaft alarm Seed shaft alarm	Speed revolutions / round	0.00rpm	0.01 rpm	----------
3.Actuator	Min/Max positions	Manual calibration		
4. Delay	Time delay	5.0s	5.0s	----------
5. Drill type	Manufactor/mounted later	Default	Default	----------
6. Memory reset	Resets the defaults	Default		

6. SUMMARY OF FUNCTIONS



Fert rate kg/ ha in use

FORWARD SPEED, km/h

AREA, total trated area

CURRENT BOUT

TRAMLINING BOUT

MANUALLY ADVANCE the bout number +1

HOLD, stops the bout counter STOP

ROWMARKER control, left

ROWMARKER control, right

FERT RATE MINUS /bout

FERT RATE PLUS /bout

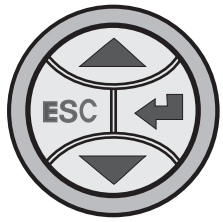
MAIN POWER SWITCH on/ off

AUTO, automatic row marking-mode AUTO

MAN, manual row marking-mode MAN

ARROW UP
advance the digit value or browse the menu.

ESC
Go back one step or return to former digit, when entering numbers.



ENTER
confirm the values, select the functions and confirms the selected functions.

ARROW DOWN
Reduces the digit value or browse the menu.

Make sure that all electrical wiring is disconnected before performing any maintenance !

RESETTING

With the screen on basic-mode, press arrow-up-button and "select all"-text will appear. Press Enter and "resetting the fertiliser type"-text appears. Then you are able to reset the recently sowed fertiliser amount by pressing Enter.
The "area A"-text will appear to the screen, reset the area counter by pressing Enter.

Total area-count will not be reset when this operation is being performed.

This is the conventional
display of the instrument.

TECHNICAL SPECIFICATIONS

Outside dimensions:	Width: 154mm x Height: 238mm x Thickness: 70mm. The wiring and fittings connected to the instrument are ignored.
Operating voltage:	10 - 30V dc
Power consumption:	500mA + outputs
Display:	LCD-display with 16 digits on two rows. Adjustable contrast. 8 red LED signal lights.
Operating keys:	12 + 1x4-functional keyboard covered with flexible plastic, main power switch.
Processor:	Hitachi H8/300H
Memory:	128K flash RAM
Saving mode:	32K SRAM
Inputs:	7 anal. (0 - 7.5V) 8 digit. 200Hz max 4 digit. 2KHz max
Outputs:	16 x MOSFET (5A) 4 x PWM MOSFET (5A)
Serial port:	1 x Rs232
Protection:	Reverce polaricity protection.
Box:	ABS plastic, aluminium frame.
Position:	Freely standing.
EMC:	EEC 89/336, ISO 14982
Temperatures:	0° - 50°C - in use and 30° - 70°C during storage
Vibration durability:	5G @ 10 to 500Hz
Impact durability:	100G
Casing:	Ip67

7. RATE, RATE STEP %

RATE STEP %

Rate step % that is set, for example, for fertiliser, is the step percentage of increasement / decreasement when the button or is pressed during the drilling. The sowed amount of fertiliser is increased or decreased by the percentage set.

TO SET THE RATES AND THE RATE STEP

When the display is in its basic mode, press the Enter-button -> **set rates**

1. **Select fertiliser**-text is shown on the screen. Select either seed or fertiliser, with arrow keys, to set sowing rates. After selection->

2. The display will now show : **To set rates**. Set rates by using arrow keys, the first digit will flash and can be either increased or decreased, pressing enter will move to setting the next digit. When there are no digits flashing the setting is approved by pressing Enter.

3. The rate step is set by pressing the arrow keys, options available being 55, 10%, 15%, 20% and 25%. Approve desired setting by pressing enter, the instrument will return to basic mode.

***TECHNICAL SPECIFICATIONS*:**

KEY L5 Decreasing of the amount of fertiliser to be sown.
When pressed the fertiliser actuator is moved to close the metering unit, reducing the volume of fertiliser per revolution and thus the drilling rate.
In "Auto" mode the Expert closes the actuator by steps, until the desired sowing rate is reached.
In the "MAN"-mode the the Expert operates the actuator to close the actuator and the amount sowed is decreased. The sowing rate shown on the displays depends on the position of the actuator and the calibration rate.

KEY R5 Increasing of the amount of fertiliser to be sown.
When pressed the fertiliser actuator is moved to open the metering unit, increasing the volume of fertiliser per revolution and thus the drilling rate.
In "Auto" mode the Expert opens the actuator by steps, until the desired sowing rate is reached.
In the "MAN"-mode the the Expert operates actuator to open the actuator and the amount sowed is increased. The sowing rate shown on the displays depends on the position of the control cylinder and the calibration rate.

Check the fertilizer rate actuators settings on page 26, pos.14.2.4

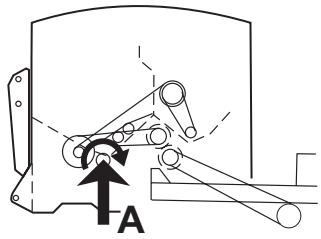
8. CALIBRATION, NUDGE FACTOR, CALIBRATION TEST RESULT

In select calibration-mode the display is showing text to calibrate products, push Enter button and select the product you are going to calibrate. -> select seed -> confirm by pressing enter. Second stage has three options which are cycled using the arrow-buttons.

1. **Select calibrate**
2. **Select nudge factor**
3. **Select calibration test result**

8.1 CALIBRATION

Select calibrate -> positioning actuator, the metering units are moving 50% open position -> start calibration -> **0,000 of 0,01HA** ->
Make calibration test.



Turn the calibration test arm until the instrument beeps (0,012), -> enter the weight gained, enter it with arrow buttons. After confirming the weight gained with Enter button. The instrument will show " calibration complete".
The new calibration factor will be stored.

***TECHNICAL SPECIFICATIONS*:**

1. Calibration. In case the enter is pressed with this option shown, the display will then show "POSITIONING ACTUATOR" and the appropriate O/P will be operated to move the actuator the metering units to the metering units 50% open position.

When this position is achieved the instrument will show **Start calibration** and at this point the operator will begin turning the metering system by hand. When the first pulse is eceived from the forward speed sensor, the instrument will show " **0.001 of 0.01 ha completed**" and will continue to accumulate area until it reaches 0.01ha, the buzzer will sound contnually as an indicator the operator to stop.

When no more pulses are receved, the buzzer will stop and the instrument will show " **Enter weight 00.00 kg**", then set the weight gained to the instrument by using arrow keys and enter. When all the digits are set and the enter is pressed, the instrument will show "**CALIBRATION COMPLETE**".

The new calibration factor will be stored, the actuator will move to the required position for rate set for the product just calibrated and once this is done the instrument will return to the "**TO CALIBRATE PRODUCTS**" screen of the menu.

8.2 NUDGE FACTOR

The screen shows " **To calibrate products**". If En ter is pressed with this option shown, the display will then show "**To select fert A**" -> Select fertiliser and approve by pressing enter -> select nudge factor -> **factor 00,00%** ->
To change nudge factor, use arrow keys.

▲ = max +20% ▼ = max -20%

Nudge factor increases or decreases the calibration factor by entered percentage. The instrument will then operate the actuator to close the metering unit by required amount thus reducing the volume per revolution.

TECHNICAL SPECIFICATIONS:

2- **Nudge factor** If En ter is pressed with this option shown, the display will then show "**Factor by 0%**". The Arrow up-key is then used to increase the percentage to a maximum of 20% and the Arrow down-key is used to decrease the percentage to a mximum of 20%. If the percentagies positive, it indicates that the drill has currently over applied. When the Enter is then pressed the current calibration factor will be multiplied by this percentage which will then operate the actuator to close the metering unit by the required amount thus reducing the volume per revolution. Vice versa if the percentage programmed is negative.
The instrument will return to "**To calibrate products**" screen of the operator menu.

8.3 CALIBRATION TEST RESULTS

The screen shows " **To calibrate products**". If Enter is pressed with this option shown, the display will then show "**To select fert A**" -> Select fertiliser and approve by pressing Enter -> select calibration test result factor -> **factor 0,000 kg/ 0,1ha.**
The calibration test result factor is to be entered using the arrow buttons, move to the next digit by using Enter-button.

Default 2,000

TECHNICAL SPECIFICATIONS:

3- '**Enter Factor**' If the CR key is pressed with this option shown the display will then show 'Factor 0.000 Kg/0.1ha'. The number shown will either be the default (2.000) or the current factor determined form a product calibration. The first digit will flash and can be changed using the CU and CD keys, when the CR key is pressed the next digit will flash. When all digits have been set and the CR key is pressed the actuator will move to the required position for the rate set. This being for the product whose factor has just been altered and once this has been done the instrument will return to the '**To Calibrate Products**' screen of the operator menu

9. TO CHANGE PRODUCTS

There are 6 different types of fertiliser that can be saved to the instruments memory. When the text " **to change *products***" appears on the screen, select fertiliser to change and select the desired one from 6 different types A-F.

TECHNICAL SPECIFICATIONS:

The first option will be to decide which type of product you wish to change (either Seed X or Fert X) and this is done using the arrow- keys and confirmed with the Enter- key. The second screen will then allow the operator to cycle through the 6 different products using the arrow- keys.

10. REAR HARROW (NOT IN NORMAL MODEL)

The screen allows You to disable or enable.
In mode **rear harrow** -> push the Enter-button, using the arrow buttons the selection can be cycled between **ON** or **OFF**, confirm with Enter.
If set to "**ON**", the rear harrow will be lifted up with the drill.

TECHNICAL SPECIFICATIONS:

This is the screen for enabling and disabling the rear harrow. Using the arrow- keys the selection can be cycled between 'On' and 'Off'.

11. PRE EMERGE (NOT IN NORMAL MODEL)

The screen allows You to disable or enable.
In mode **pre emerge** -> push the Enter-button, using the arrow buttons the selection can be cycled between **ON** or **OFF**, confirm with Enter.

TECHNICAL SPECIFICATIONS:
This is the screen for enabling and disabling the pre-emergence marker. Using the arrow keys the selection can be cycled between '**On**' and '**Off**'. When the desired selection is made, press the Enter- key. If set to '**On**' then when the unit moves onto a tramlining bout, O/P 6 will only be turned on. It will be turned off when the instrument moves onto a non-tramlining bout.

12. OPERATOR SETUP

OPERATOR SETUP:
Operation setup mode allows You to cycle througt the following:

1. Seed hopper level
2. Fert hopper level
3. Tramlining
4. Contrast
5. Language
6. Speed sensor
7. Auto calibration
8. Width

12.1 SEED HOPPER LEVEL ALARM
If the seed level drops below the sensors (fitted in the side of the hopper), the instrument will beep. You can either disable or enable the use of hopper level alarm with the arrow buttons, confirm selection with Enter- button.

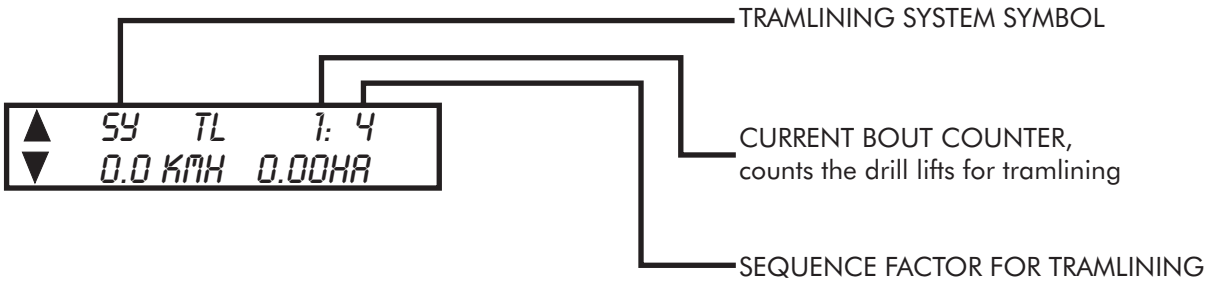
12.2 FERTILIZER HOPPER LEVEL ALARM
If the fertilizer level drops below the sensors (fitted in the side of the hopper), the instrument will beep. You can either disable or enable the use of hopper level alarm with the arrow buttons, confirm selection with Enter- button.

12.3 TRAMLINIG
There are four systems of tramlining- symmetrical, asymmetrical left, asymmetrical right and 18 metre. The tramline bout is programmable for symmetrical, asymmetrical left and asymmetrical right sequences.

After the Enter- button have been pressed, can the system for tramlining be selected, the symbols flashes opposite to the cursor, below it.
Browse the **SY, AL, AR, 18m** with the arrow- buttons. When selection has confirmed with Enter-button, the current bout number flashes and it is able to change 01-12 with the arrow- buttons. Confirm selection (bout number) with Enter.

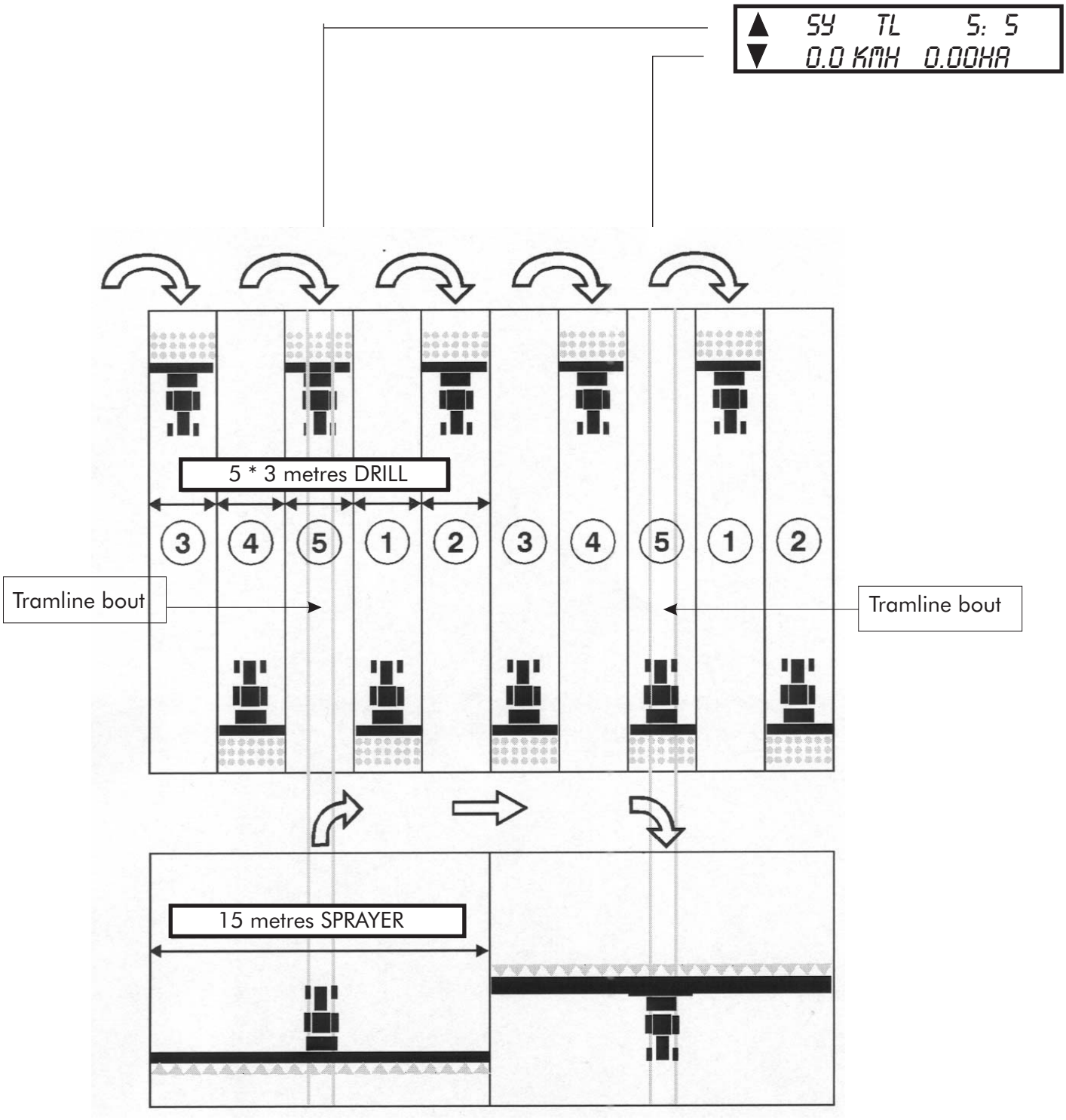
+1 MANUAL ADVANCE THE CURRENT BOUT, advances the current bout number with one.

STOP HOLD, stops the bout counter and the current bout will stay on the screen.



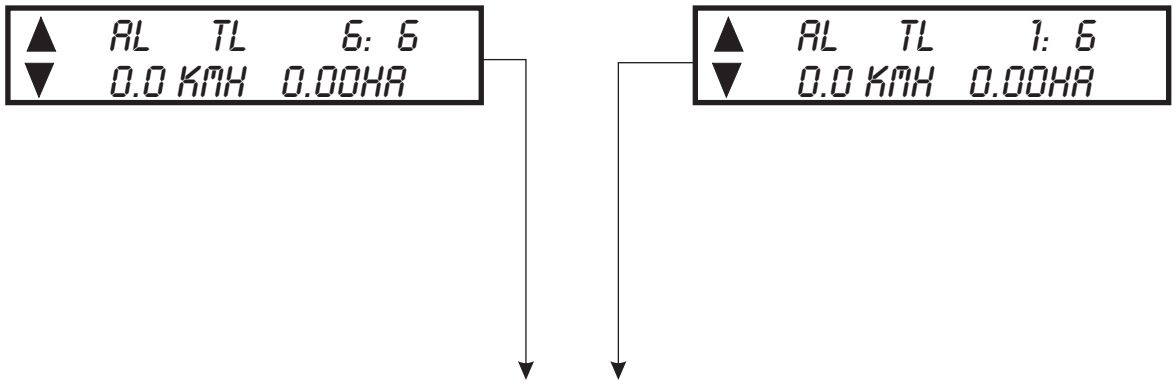
12.3.1 SYMMETRICAL TRAMLINING

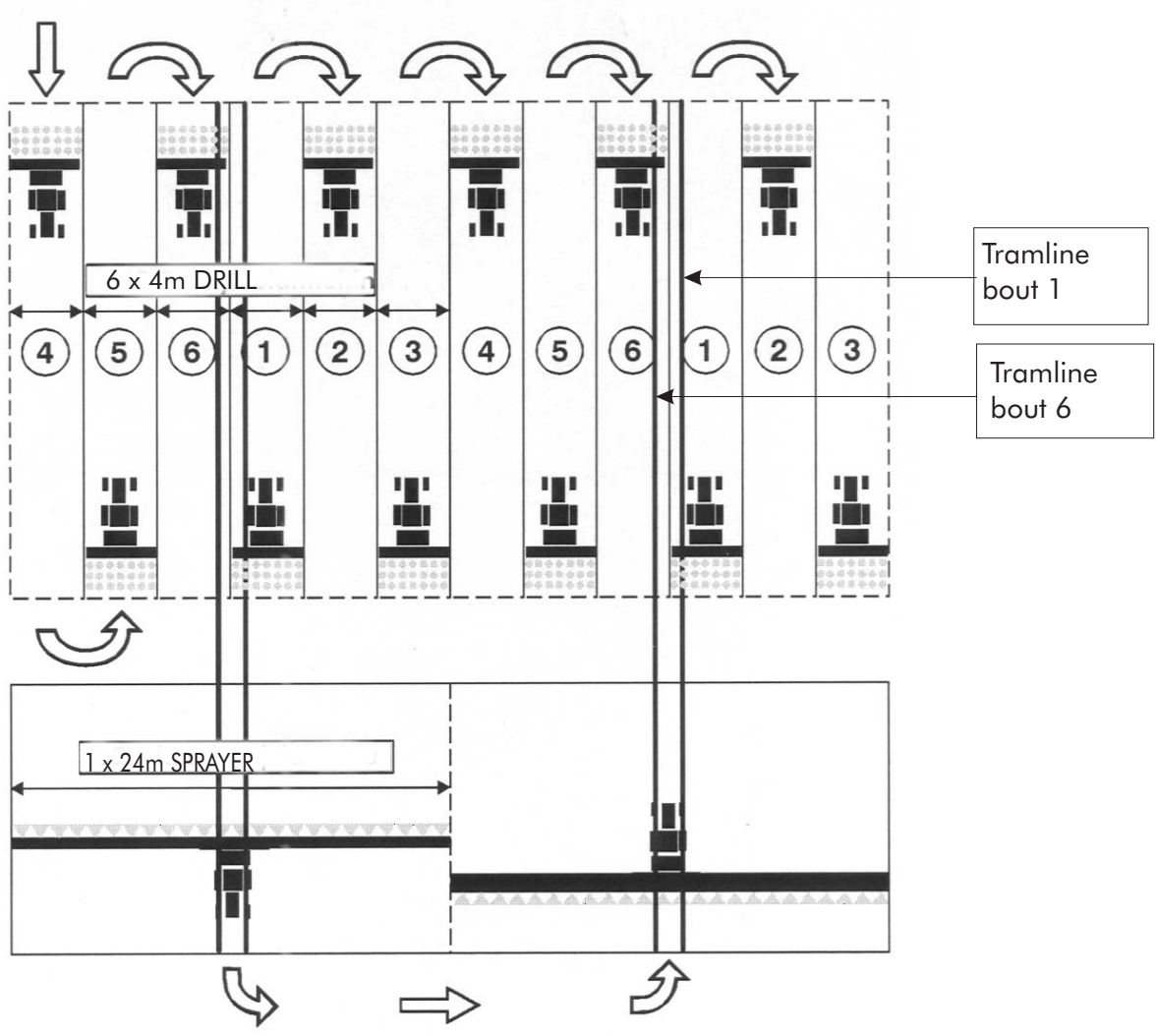
2+2 seed spouts are closed during the tramline bout only.



12.3.2 ASYMMETRICAL LEFT TRAMLINING

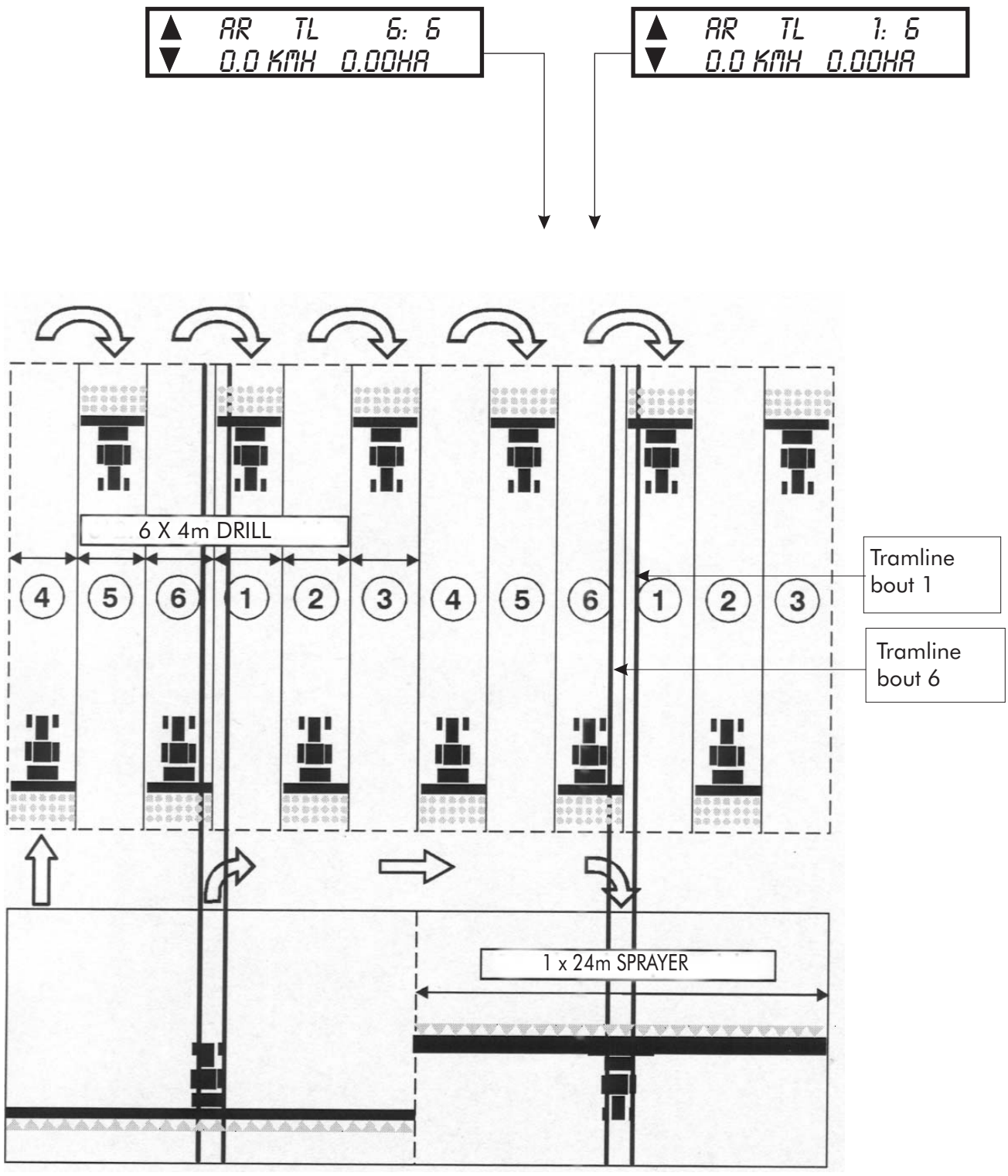
2 seed spouts are closed on the **left hand side** of the drill on bouts 1 and 6.





12.3.3 ASYMMETRICAL RIGHT TRAMLINING

2 seed spouts are closed on the **right hand side** of the drill on bouts 1 and 6.

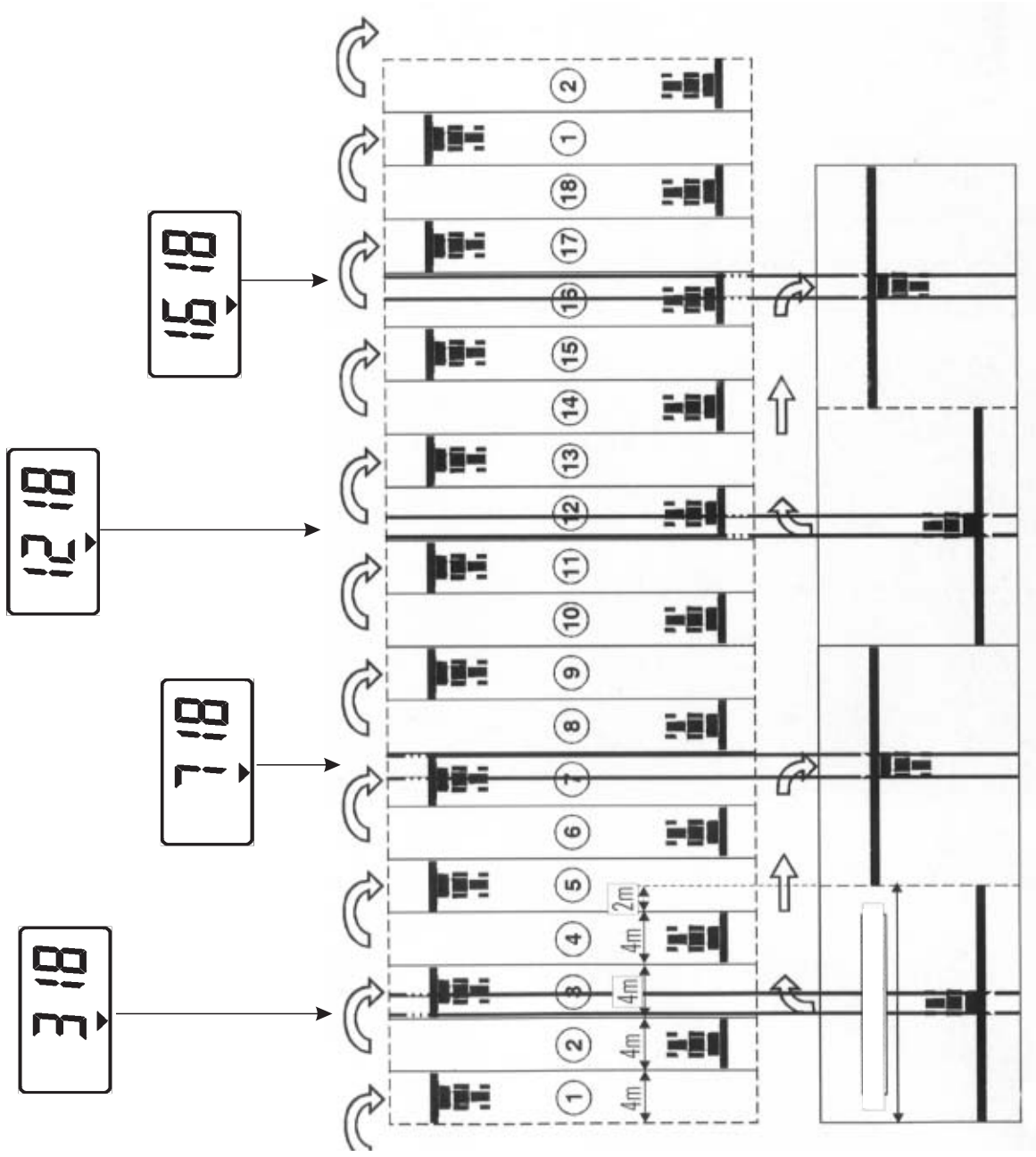


12.3.4 18 METRE TRAMLINING

This method is used in cases where the width of the drill is 4 metres and the width of the sprayer is 18 metres. In this case, the width of the sprayer is not evenly divisible by the width of the drill. As a result the tramlining combination switches must be mounted asymmetrically on the sides of center of the drill.
In this case, the drill requires two pairs of tramlining combination switches, one pair per side of the machine, and the center of the spraying tractor path will be in quarter of the drill working width (see illustration below).

Starting on bout 1 requires turning LEFT at the end of the FIRST bout.

NOTE : To turn right at the end of the first bout, cycle the instrument display through to bout 10 before beginning.



18 metre SPRAYER

TECHNICAL SPECIFICATION:
If Asymmetric Left is selected, then output T/L 1 only is switched on for the last bout and the first bout of the sequence.
If Asymmetric Right is selected, then output T/L 2 only is switched on for the last bout and the first bout of the sequence.
E.G. If a tramlining bout of AL 6 is programmed, then tramlining will be engaged on both bouts 1 and 6 on the left hand tramline output (output T/L 1).
If a symmetrical rythming is selected then both outputs come on for only the tramlining bout.
The sequence for the 18m tramlining is as follows:

Bout Number	Tramline Output
1	-
2	-
3	O/P 1
4	-
5	-
6	-
7	O/P 2
8	-
9	-
10	-
11	-
12	O/P 2
13	-
14	-
15	-
16	O/P 1
17	-
18	-

12.4 CONTRAST

This is the contrast setting screen. *'s are shown as solid blocks and the arrow- keys are used to increase or decrease the contrast.
Confirm with Enter- button.

12.5 LANGUAGE

Selected language will be stored in instrument memory.
There are five different languages to choose from: Finnish, Swedish, Deutch, Norwegian, English.
Browse the different languages with arrow- keys, confirm with Enter.

Default language: English

12.6 SPEED SENSOR

Speed sensor factor manual entering. When the first digit flashes, enter the value between 0-9, move on to next digit by pressing Enter, and so on until all four digits are entered, confirm after last digit with Enter- button.

Default factor: 1,32 m

12.7 AUTOMATIC SPEED CALIBRATION

Auto-calibrate in field conditions for maximum accuracy.
Set the markers 100 m apart and position the vehicle opposite the first marker, push Enter.

This screen now tells the operator to start driving towards his 100m marker. The pulses received will be shown on the bottom line of the display.

This screen is seen when 10 pulses have been received. The top line of text changes to tell the operator to stop on the 100m mark and then press Enter.

The newly calculated speed sensor factor is shown on the bottom line of the display with the top line indicating to press Enter to accept this new value.

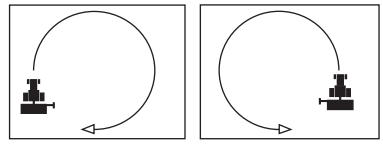
12.8 WIDTH

This is the screen for entering the working width of the drill. Using the arrow- keys the width can be increased or decreased in 0.1m increments. Confirm with Enter- button.

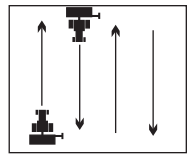
Default: 2m

13. ROW MARKING

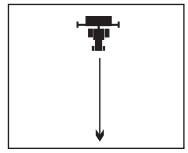
In the manual row marking-mode only one row marker is in use, either the right or the left one.



In the automatic row marking-mode the right and the left marker alternate, the change of side is done when the drill is lifted. Automatic operation can be started either left or right.



When the row marking is done to both sides of the drill, both markers are lowered down from the Expert.



13.1 MANUAL ROW MARKING-MODE

The manual row marking is switched on by pressing the MAN -button on Expert.
Row marking symbol will be on upon the button. The row markers are controlled by the button (the left side) and with button (the right side).
The row marking symbol will be on upon the button to remind that the marker is lowered.

13.2 AUTOMATIC ROW MARKING MODE

The automatic row marking is switched on by pressing the AUTO -button on Expert.
Row marking symbol will be on upon the button.
The automatic row marking mode is switched on by pressing the button (left side) or (right side), depending on which side of the drill the row marking is required to start from.
The row marking symbol will be on upon the button to remind of the side which of the row marking starts.

13.3 SIMULTANEOUS ROW MARKING TO BOTH SIDES OF THE DRILL

To switch on simultaneous row marking to both sides of the drill, press both row marker buttons simultaneously (left marker) and (right marker).
The row marking symbols will be on upon both buttons.

13.4 LIFTING THE DRILL

Press the button before additional drill lift.
This way the row marker program will not register the lift of the machine as a change of bout even though the row markers lifted up and lowered down along with the machine. The tramlining function stops as well.
Press again to resume the normal bout sequence.

14. TECHNICIAN SETUP

Enter the 4- numeric PIN-code when and if needed.

14.1 ENTERING THE PIN CODE

Select TECHNICIAN SETUP from main menu, press Enter and enter the PIN code.

At this point the 1st digit will flash opposite to the cursor below it and the arrow keys can be used to cycle through the numbers until the desired one is found. Pressing the Enter key will then confirm the selection and move to the 2nd digit. The process is repeated until all four digits are entered. If the PIN code is incorrect then entry to the technician mode will not be allowed and the unit will return to flashing the 1st digit. Return to main menu with ESC- button.

14.2 TECHNICIAN SETUP MENU

Use the arrow- keys to cycle through the menu. Pressing the Enter- key moves to the required screen. Pressing ESC leaves the menu.

14.2.1 SEED SHAFT PPR

This is the screen for entering in the pulses per revolution for the seed shaft speed.
To ensure buoyant action of the Expert- instrument, do not change the values.
The arrow- keys are used for cycling the first digit through 0 to 9, when the correct digit is shown the Enter- key is pressed.
Default is 12.00 PPR.

14.2.2 FERTILIZER SHAFT PPR

This is the screen for entering in the pulses per revolution for the seed shaft speed. If there is not installed combination switch for tramlining on the fert side of the drill, must the value be entered as 00.00.
To ensure buoyant action of the Expert- instrument, do not change the values.
The arrow- keys are used for cycling the first digit through 0 to 9, when the correct digit is shown the Enter- key is pressed.
Default is 12.00 PPR

14.2.3 SHAFT ALARMS BY RPM

The default value for seed- and fertilizer shafts is 00.0 RPM. Enter a value at minimun 00.1 RPM to both shafts. Press the Enter- key to change the default value. Change the values with the arrow-keys. The new value can be stored into memory by pressing Enter.

14.2.4 ACTUATOR SETTINGS

On this screen the operator must us the arrow- keys to cycle between 'Min Kg/Ha' and 'Max Kg/Ha'. When the Enter- key is pressed with the required selection it informs the instrument of which position the actuator is going to be moved to so that it can record the position feedback. Go on by pressing Enter.

Select TO SET MIN KG/HA from menu to set the minimum value. Press then  -key, ensure that the actuator is on its extreme position.
Store the new information by pressing Enter.
For five seconds the screen will show text that the new settings are stored in memory.

Select TO SET MAX KG/HA from menu to set the maximum value. Press then  -key, ensure that the actuator is on its extreme position.
Store the new information by pressing Enter.
For five seconds the screen will show text that the new settings are stored in memory.

14.2.5 DELAY

This is the screen for entering in the time delay between I/P 11 opening and the selected marker solenoid output being turned on. The arrow- keys are used for cycling the first digit through 0 to 9, when the correct digit is shown the Enter- key is pressed. The next digit can then be cycled though 0 to 9 by using the arrow- keys, the Enter key confirming the selection. When the correct time delay has been entered, press the Enter- key. The maximum delay time programmable is 10 seconds. Default is 5 seconds.

14.2.6 DRILL TYPE

This is the screen for selecting which drill type the instrument is too be used on. The options being either 'Normal', or 'Direct' (not available), which means that it is for the new direct drill and provides variable rate for both seed and fertiliser along with controlling the hydraulic functions on the drill. Move to the menu with Enter, select the type and confirm it with Enter- key.

14.2.7 RESET DEFAULTS

This is the screen for performing a reset to all the programmable factors. Pressing the Enter- key will perform a power-on reset and return all the programmable factors to the default settings. This will reset all the values that are stored by user.

15. ALARMS

15.1 HOPPER LEVEL ALARMS

If either the seed or fertilizer level drops below the sensors (fitted in the side of the hopper), the instrument will beep 5 times and shows the reason for alarm on the screen. The arrow- keys pointing down will flash. The tramlining information will stay on the upper row.

Low seed level

Low fertilizer level

The alarm will terminate when the hopper is filled again or by pressing Enter- key.

15.2 SHAFT ALARMS BY RPM

With the default alarm setting, if the fertilizer distribution shaft stops for more than 40 seconds the instrument will sound 5 beeps and shows the reason for alarm on the screen. The arrow- keys pointing down will flash. The tramlining information will stay on the upper row.

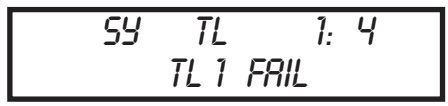
Seed shaft rpm too low

Fert. shaft rpm too low

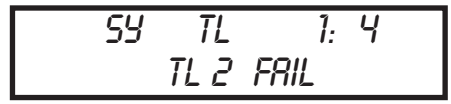
The alarm will terminate by pressing the Enter- key or when the shaft rotates faster than the value which is set to alarm. The alarm will activate only if the seed distribution shaft stops for more than 40 seconds on slow RPM.

15.3 SEED SHAFT ALARM BY PPR

Expert will alarm when the tramlining is in use on the seed distribution shaft, even though the tramliner should be standby. It will sound 5 beeps and shows the reason for alarm on the screen. The lower line will flash. The tramlining information will stay on the upper row.



Fault on the seed distribution shaft on the left side



Fault on the seed distribution shaft on the right side

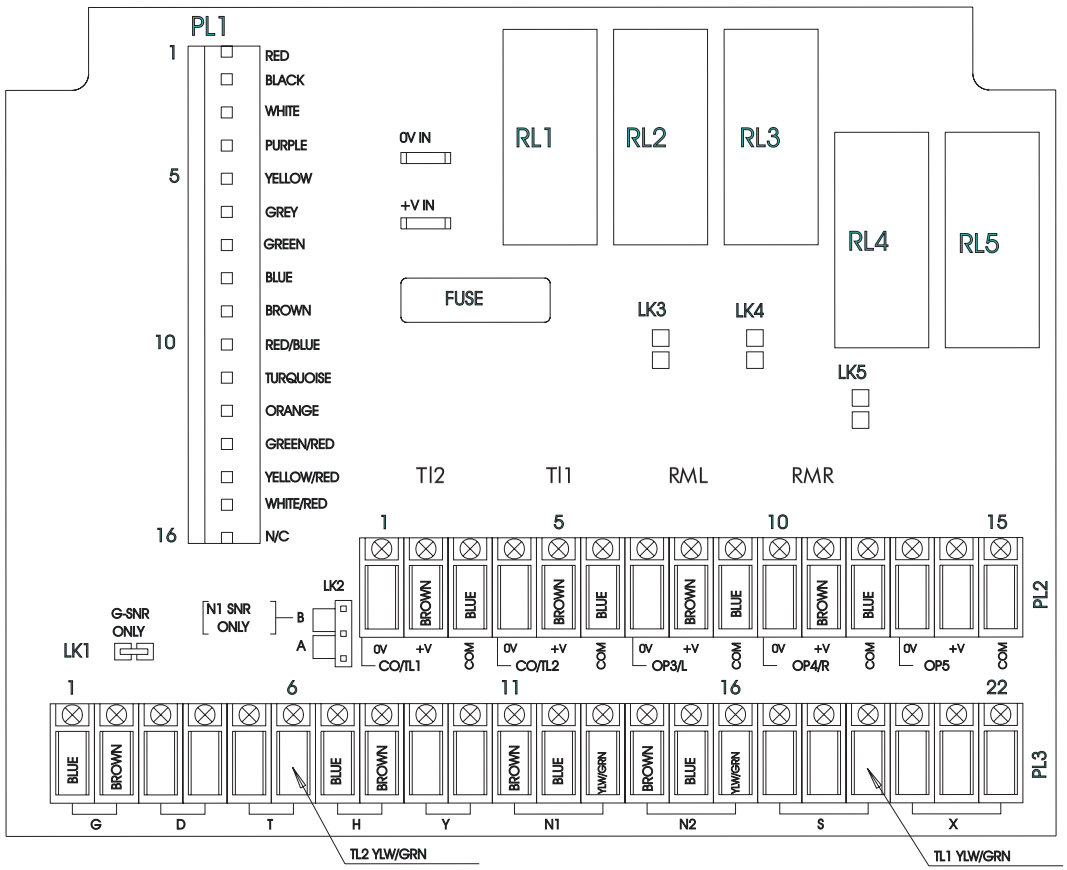
The alarm will terminate by pressing the Enter- key or in 5 seconds when the tramliner (which caused the alarm) passes to standby- mode.

16. TROUBLESHOOTING CHART

FAULT	CAUSE	REMEDY
The display does not turn on.	The voltage is less than 8 Volts.	Take care that there is enough power reserve, for example, charge the battery in time.
Display is dim .	The voltage is less than 10 Volts.	Check the condition of the power supply and make sure that there is enough power available.
Display indistinct. .	The computer memory has been degenerated.	Contact the nearest service or the dealer.
"TL 2" flashes on the display.	There is, for example, dirt on the seed shaft combination switches that causes the malfunction. The cable is broken.	Turn the calibration lever half (1/2) round clockwise, check the switch and if needed, replace the switch. Replace or repair the cable.
"TL 1" flashes on the display.	There is, for example, dirt on the fert. shaft combination switches that causes the malfunction. The cable is broken.	Turn the calibration lever half (1/2) round clockwise, check the switch and if needed, replace the switch. Replace or repair the cable.
The display does not show the forward speed	The magnet has fallen off. The sensor bracket is loose. The sensor cable is broken. The distance between the magnet and the sensor is too wide.	Fix the magnet or the bracket again. Replace or repair the cable. Make sure that the magnet is fixed and adjust the distance to be adequate.
The tramlining bout value is not stable.	Refer to last paragraph to find out the cause.	Refer to last paragraph to find out the remedy.
The tramlining bout value does not show on the display or it is not counting.	The tramlining function is OFF. The tramlining has been stopped.	Switch the tramlining on to appropriate mode. Press  to continue tramlining.
The AREA TOTAL is not counting.	See paragraph "The display does not show the forward speed".	Refer to paragraph "The display does not show the forward speed" for remedy.
Incorrect display on FORWARD SPEED and AREA TOTAL.	The sensor calibration is not done properly.	Re-calibrate FORWARD SPEED and AREA TOTAL according to the instructions.
The hopper level alarm does not alarm even when the hopper is totally empty.	The hopper level alarm is switched off. The cable is broken.	Switch the alarm on. Replace or repair the cable.
The hopper level alarm alarms continuously.	Either the seed or fertilizer level has dropped below the sensors.	Switch the hopper level alarm off when performing the small seed sowing.

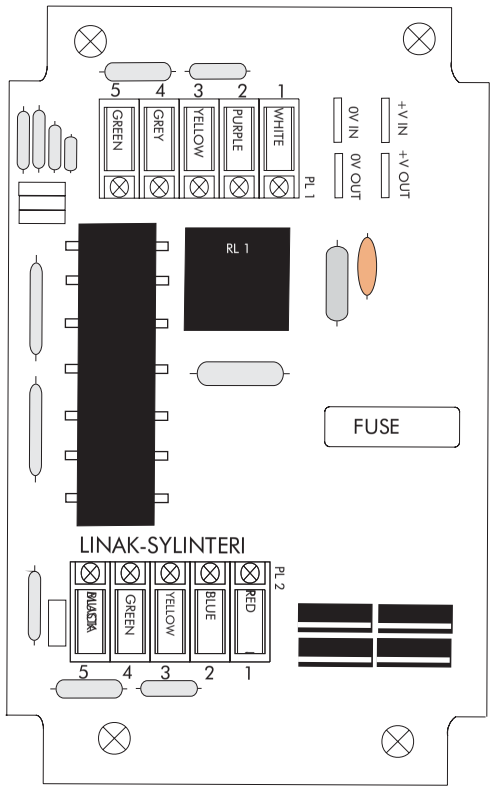
FAULT	CAUSE	REMEDY
The row markers don't work.	The restrictor valve is closed.	Open the restrictor valve and adjust the flow according to the instructions.
	The row marking function is switched off.	Switch on row markers from the Expert.
	The cable is broken.	Replace or repair cable.
	The transportation linchpin is still attached to the marker.	Detach the transportation linchpin from the row marker turning unit.
	The row marking has been stopped.	Press  to continue row marking.
The row marker is too slow.	The restrictor valve is adjusted to too small flow.	Re-adjust the flow from the restrictor valve according to the instructions.
	There is air in the hydraulic system.	Check the tractor hydraulics and perform required reparations
	There is too little oil in the tractor hydraulic system.	
The row marker is too fast.	The restrictor valve is adjusted to too big flow.	Re-adjust the flow from the restrictor valve according to the instructions.
The instrument resets Itself	The wires don´t touch each other.	Check all electrical connections and wires.

Junkkari "2002" Junction Box S/AC/306-3-002 WIRING LABEL



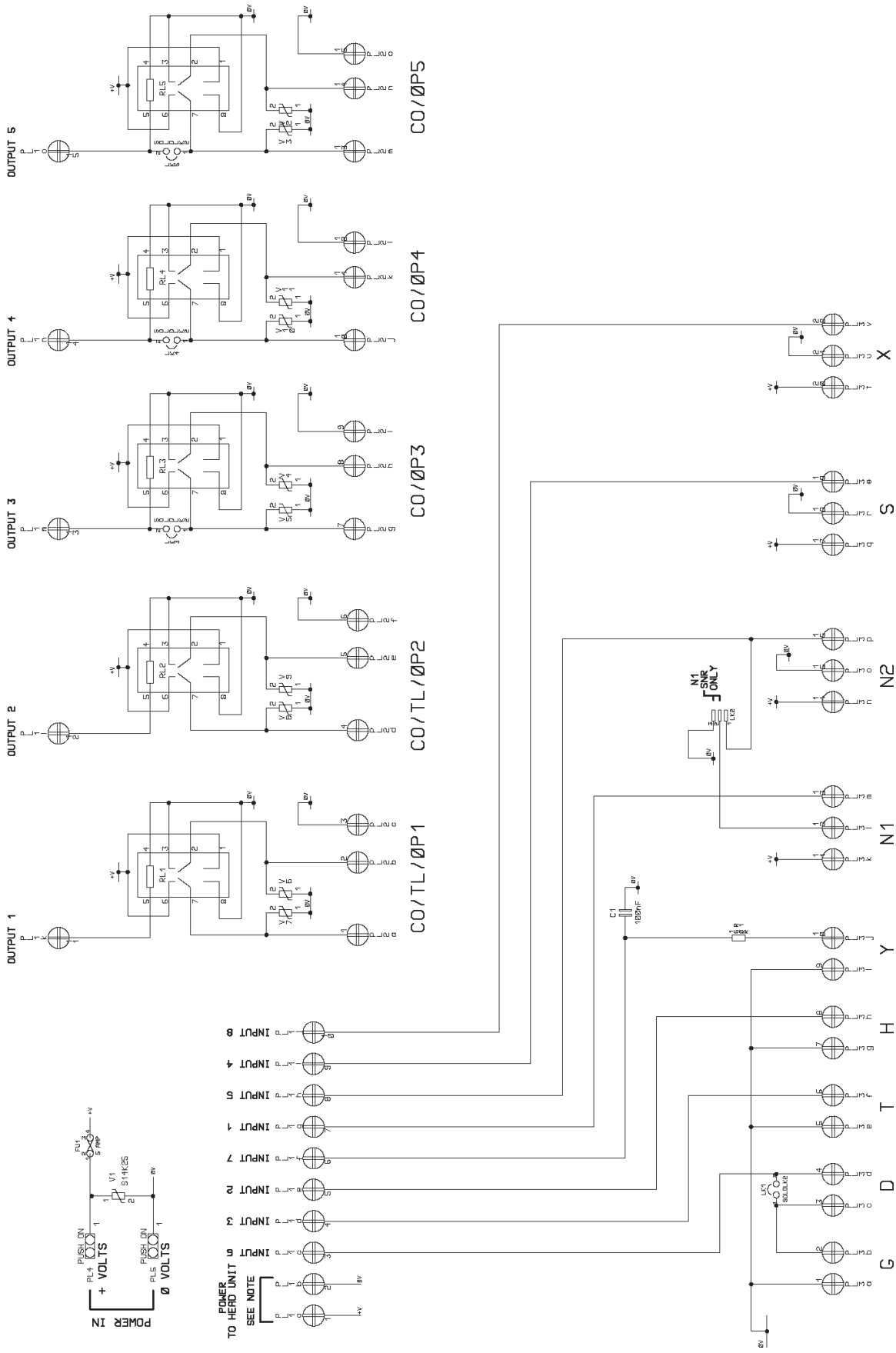
TI1	TRAMLINE LEFT
TI2	TRAMLINE RIGHT
G	COUNTER SENSOR
H	SPEED SENSOR
RML	ROW MARKER LEFT
RMR	ROW MARKER RIGHT
N1	HOPPER LEVEL ALARM SEED
N2	HOPPER LEVEL ALARM FERT

Junkkari Expert Upgrade Loom S/AC/306-4-002



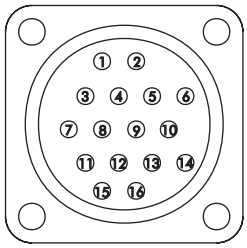
17. CIRCUIT BOARDS

18. WIRING DIAGRAM

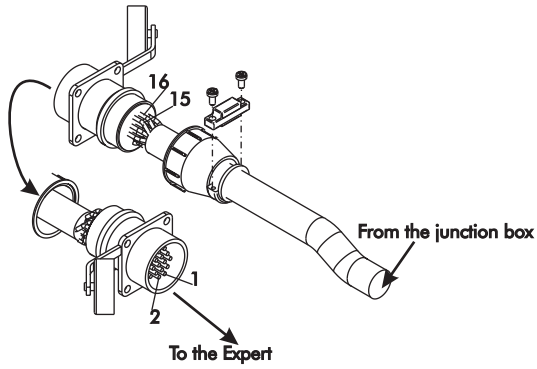


19. ELECTRICAL CONNECTORS

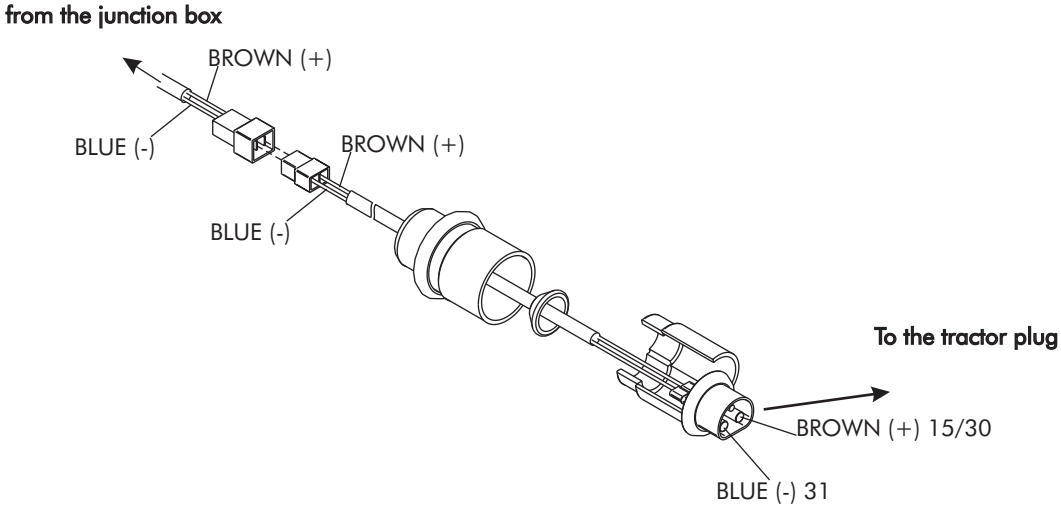
16-PIN DATA TRANSFER CABLE CONNECTORS



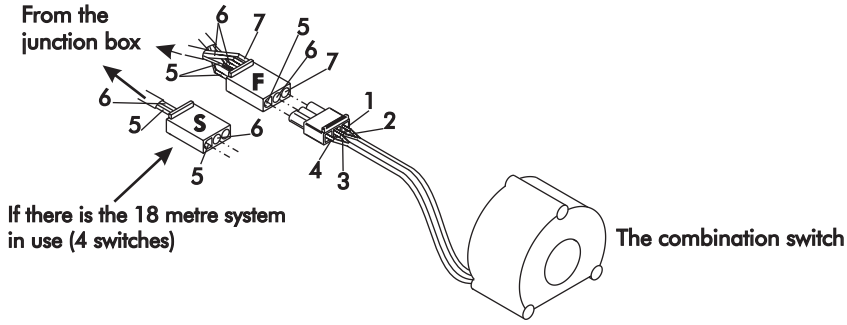
NR	CABLE COLOR
1	RED
2	RED-BROWN
3	YELLOW-RED
4	GREEN
5	VIOLET
6	BROWN
7	WHITE
8	YELLOW
9	TURQUISE
10	PINK
11	BLACK
12	GREY
13	GREEN-RED
14	BLUE
15	ORANGE
16	RED-BLUE



3-PIN CONNECTOR



TRAMLINE MARKER CONNECTORS



NR	CABLE COLOR
1	BLACK
2	DARK BLUE
3	PURPLE
4	LIGHT BLUE
5	BROWN
6	BLUE
7	YELLOW-GREEN

THE ROW MARKER SOLENOID CONNECTOR