



***SP Series***  
**3-Bed Rigid**  
**Potato Planter**

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# **IMPORTANT**

This operator's handbook should be regarded as part of the machine. Suppliers of both new and second-hand machines are advised to retain documentary evidence that this handbook was supplied along with the machine.

On installation of the machine (i.e. starting off in the field), the New Machine Installation Record Card should be completed by the dealer/distributor and be countersigned by the customer. The document is proof that the correct procedures have been followed.

The New Machine Installation Record Card should be returned to Standen Engineering Limited within 7 days of installation. Failure to do so may invalidate the machine warranty.

On delivery check that the machine is as ordered and has not been damaged in transit. Please report any shortfall to your Standen dealer.

The contents of this handbook, although correct at the time of publication, may be subject to alteration by the manufacturers without prior notice.

Standen Engineering Limited operates a policy of continual product development. Therefore, some illustrations and/or text within this publication may differ from your machine.

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## Introduction to the Handbook

This handbook provides the information for the operation, adjustment and maintenance of your **Standen SP Series 3-Bed Potato Planter**. To enable you to achieve the best results from the machine, the manufacturer recommends that you read the handbook thoroughly prior to using the machine for the first time.

Record below the details of your machine.

Dealers name.....

Address.....

.....

Telephone number.....

Machine serial number.....

Date purchased.....

Date started work.....



*This symbol indicates important safety messages within this handbook. When you see this symbol, be alert to the possibility of injury to yourself or others and/or damage to the machine and carefully read the message that follows.*

Throughout this handbook the terms 'front', 'rear', 'left-hand' (LH) and 'right-hand' (RH) are derived from the tractor driver's position facing forward in the normal direction of travel.

Adjustments to the machine may have to be made singly or in combination according soil conditions. Always allow the machine to settle to a new setting before making further adjustments.

Recommended lubrication and maintenance instructions are included in this handbook and if followed will help to keep the machine in a safe working condition.

## Warranty

Should the machine suffer any faults or defects within the warranty period, please contact your dealer. The warranty shall be effective only if the dealer is informed of any such defect as soon as practicable upon discovery.

**Replacement Parts**

Recommended replacement parts are designed for your machine and have the full backing of the warranty. Only when recommended parts are used can responsibility be considered under the terms of the warranty.

The rear section of this handbook contains lists of spare parts available through your Standen Agents. Each illustration shows a complete unit or assembly in exploded form. Standen's policy of continual product development means that components or even complete assemblies are redesigned from time to time. Where possible the modifications are shown in the remarks column.

The first printing of each page in the spare parts section is identified as issue 1 at the foot of the page. When a complete unit or assembly has been redesigned the appropriate pages are revised and printed as issue 2. The revised pages are filed behind the existing issue so that a complete modification history is gradually built up. When using an illustration and parts list it is essential that both are of the same issue.

**Always quote the full serial number of your machine when ordering spare parts.**

**Safety**

The Standen SP Series Potato Planters have been designed to comply with current Safety Regulations. However, as with all machinery there will be inherent dangers whilst operating and carrying out maintenance on the machine. The following list of precautions should therefore be brought to the attention of all persons operating and working on the machine. The list is not exhaustive. All machinery is potentially dangerous and great care must be exercised by the operators at all times. Standen Engineering Limited will not accept liability for damage or injury caused by their products except when such liability is specifically imposed by English statute.



*The machine must never be operated by untrained personnel or children.*

*The tractor must be of a suitable size to lift the implement safely. This may entail the fitting of front weights to counterbalance the machine.*

*Always check that the machine has been correctly mounted to the tractor before setting off on operations and the stabilizers are correctly set.*

*Never set machinery in motion before ensuring that everyone in the vicinity is aware of your intentions.*

*Never allow children or animals in the vicinity where machines are working and never allow anyone to ride on the machine.*

*Never attempt to fit drive chains or drive belts to the machine while the drive sprockets or pulleys are in motion.*

*Normal safe working procedures should be adopted at all times. Reduce speed when transporting the machine on sloping ground.*

*Do not work on ground where there is a possibility of overturning or across steep slopes.*

*The working area should be kept clear and free of obstructions at all times. Be alert for hidden obstructions. Should the machine hit an obstruction, stop and check for damage before proceeding.*

*Wear substantial or proper safety footwear. Avoid loose clothing near moving parts. Wear gloves when handling the implement or parts with sharp edges.*

*Before carrying out any work on the machine, lower the machine to the ground, switch off the tractor engine, apply the handbrake, remove the ignition key. Never work on or pass under the machine when it is raised on the tractor hydraulic linkage.*





*When left free standing i.e. not attached to the tractor, the machine must be on level ground.*

*The operator must not leave the tractor seat until the machine has been lowered to the ground, the tractor engine switched off, the handbrake applied and the ignition key removed.*

*Never stand on the platform whilst the machine is operating.*

*All guards, covers, warning transfers and safety devices must be correctly fitted and operable at all times.*

*Inspect the machine on a regular basis and replace damaged or worn parts as necessary. Inspect the machine for damage after use. Never operate the machine in a state of disrepair.*

*When in transport keep the hopper empty. Always fill the hopper in the field. Transporting with a full hopper will cause strain on the planter and will pack the potatoes in the hopper causing 'bridging' when planting commences.*

*When in transport the hopper and moulding boards must be fully raised. When locking the mould boards into the transport position, never walk under the raised board, always approach from the side.*

*Only transport the machine at a speed suitable to the prevailing conditions. Be aware of the weight and overall length of the machine at all times.*

*Care must be taken when carrying out any work on the hydraulic system. Even when stopped and disconnected from the tractor, residual pressure will exist within the hydraulic system. Therefore, before commencing any work on the hydraulics ensure that the system is free of residual pressure. Regularly check hydraulic hoses for chafing or damage and replace as necessary.*

***Safety is the responsibility of the persons working with this machine. Think "safety" at all times. Read and remember the contents of this handbook.***

## Overview

The SP Series 3-Bed Potato Planter is designed to be towed from the tractor pick-up hitch. The machine plants potatoes with extreme gentleness and accuracy. Seed spacing, planting depth and soil covering are all controlled for optimum results. Gentle seed handling is ensured by a controlled seed flow to the cups. Each moving floor belt is only activated when the seed is required. Independent automatic depth control is provided for each pair of openers enabling accurate planting depth to be maintained on uneven land.

## Tractor Suitability

The SP Series 3-Bed Planter is suitable for tractors of 118 kW (160 hp) minimum.



*The tractor must be of a suitable size to lift the implement safely. This may entail the fitting of front weights to counterbalance the machine.*



*When fitting to the tractor ensure the planter is standing on firm level ground. The operator should have read and understood the tractor operators manual prior to attaching the machine and putting into work.*

## Preparing the Planter for Work

1. Set the drawbar into its work position by removing the short locking pin and securing it with the stay pin.
2. Reverse the tractor up to the planter and engage the drawbar eye on the tractor pick-up hitch. If necessary adjust the height of the drawbar eye using a different set of holes.
3. Raise the planter on the pick-up hitch.
4. Raise the parking stands (item 1, fig 1) and secure with the locking pins.
5. Connect the hydraulic pressure hose (marked red) to the tractor constant supply port. Connect the return hose (marked blue) to the tractor return port.
6. Mount the control boxes securely inside the tractor cab in a position where they are comfortable to operate when seated.
7. Connect the cables between the planter and control boxes ensuring they are safely and securely routed in the tractor cab. The control boxes require a 12v D.C. supply. Connect the power leads to the tractor electrical plug (if fitted) or directly to the tractor battery, blue lead to negative (-) terminal and brown lead to positive (+) terminal.
8. Remove the mouldboard transport pins (item 1, fig 2) and refit them into the hole (item 2, fig 2) to support the adjustable link (item 3, fig 2).



*The parking stands (item 1, fig 1) must be raised before commencing work. When disconnecting the planter from the tractor always ensure the stands are lowered to support the machine.*

## Preparing the Planter for Transport

1. Empty the hopper.
2. Lower the top frame fully using the switch marked 'FRONT LIFT RAISE/LOWER'.
2. Raise the rear section of the tipping hopper.
3. Raise the mould boards and secure them in the transport position with the pins (item 1, fig 2).



*A proximity sensor mounted under the rear of the tipping hopper ensures that the hopper and mould boards do not come into contact with each other at any time during folding. The sensing distance is preset at the factory to 200mm and should not be tampered with.*



*When locking the mouldboards into the transport position, never walk under the raised board, always approach from the side.*

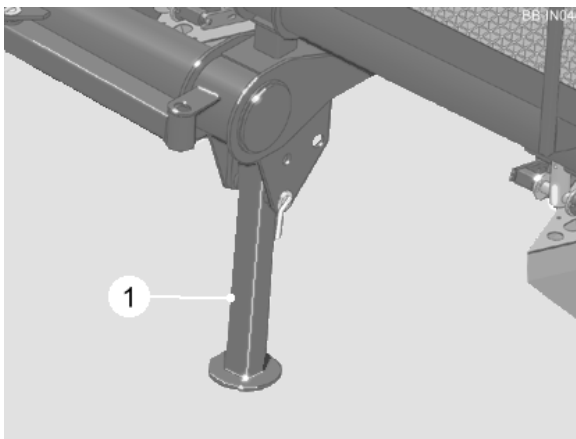


Fig 1

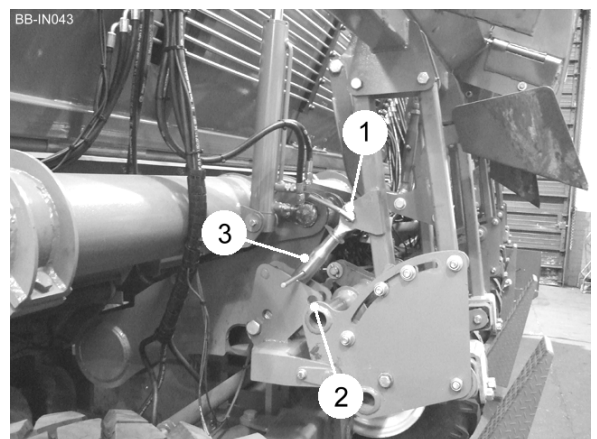


Fig 2

## Main Control Box Functions

POWER ON/OFF:	Power is ON when LED is illuminated.
FRONT LIFT RAISE/LOWER:	Raises/lowers front of machine to lift openers in and out of work.
AUTO-DEPTH ON/OFF:	Automatically raises/lowers individual pairs of openers to maintain planting depth in that bed. Auto-depth circuit is ON when LED is illuminated.
OPENER RAISE/LOWER:	The 3 switches override the automatic depth control on rows indicated.
RH BED ON/OFF:	Starts/stops RH pair of feed belts and cup belts.
CENTRE BED ON/OFF:	Starts/stops centre pair of feed belts and cup belts.
LH BED ON/OFF:	Starts/stops LH pair of feed belts and cup belts.
AGITATOR ON/OFF/SPEED:	Cup belt agitators are ON when LED is illuminated. Agitation increased/decreased by dials ' RH BED 1 & 2', 'CENTRE BED 3 & 4' & 'LH BED 5 & 6'.
SEED MONITOR :	LEDs ' 1,2,3,4,5or 6' illuminate when no potatoes detected in that row. Dial sets time delay for all seed monitors.
BUZZER ON/OFF:	Sounds when no potatoes detected in one of the rows.
ALL RUN ON/OFF:	ON/OFF for all active drives, agitators and auto-depth simultaneously.
AXLE RIGHT/LEFT/CENTRE:	Steers the four land wheels in the direction indicated. Centres the wheels after turning.
MOULDBOARD RAISE/LOWER:	Raises/lowers mould boards at rear of planter.
HOPPER RAISE/LOWER:	Raises/lowers rear section of hopper for filling.

## Planting

Careful planting is one of the pre-requisites for a good crop of high quality potatoes. The potatoes should be planted in straight ridges without gaps and at a correct and even depth. This is achieved when, at the beginning of planting, the functions of the planter and the different adjustments are carefully studied. The seed potatoes used can vary a great deal (i.e. different varieties, shape, size, number of sprouts, skin quality etc.) and the planter must be adjusted accordingly.

## Planting Depth

The planting depth is set by the lift rams mounted between the top frame and bottom frame which raise/lower all six openers at the same time. The front lift rams are used to set the machine into work and to lift the machine out of work at the end of the rows. The rams are operated by the switch marked 'FRONT LIFT RAISE/LOWER'. Additional depth adjustment can be achieved by repositioning the drawbar clevis although making the openers dig too deep can result in the soil 'bulldozing' in front of the planter.



*Always lift the openers and mould boards out of work before reversing or turning the planter on the headland.*

## Floating Openers

Rubber torsion springs (item 1, fig 3) allow the openers (item 2, fig 3) to ride over obstructions reducing damage to the planter and also carry the weight of the openers and prevent them from 'nose diving' in soft soil. To adjust the pressure, reposition the spring mounting bolts into a different hole in the support frame end plate (item 3, fig 3). The adjuster bolt (item 4, fig 3) limits the amount the opener can travel on the parallel linkage arms (item 5, fig 3).

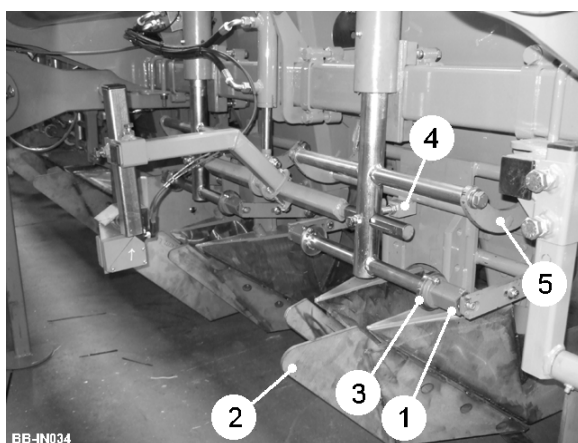


Fig 3

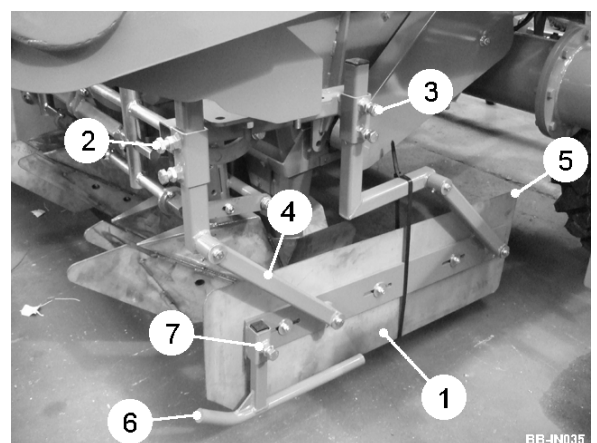


Fig 4

## Soil Retention Panels

The soil retention panels (item 1, figure 4) prevent soil from flowing into the wheelings from the openers. Vertical adjustment is provided to allow the panels to be raised/lowered to match wheel height. To adjust the height loosen the front leg retaining screws (item 2, figure 4) and raise/lower the leg to the required position.

Loosen the rear leg retaining screws (item 3, figure 4) and adjust the leg height so that the panel runs parallel with the ground. The angle at which the pivot arms (item 4, figure 4) operate should be approximately  $30^\circ$  from horizontal allowing the panels to ride the contours of the ground. The depth chains (item 5, figure 4) should be adjusted to allow the panels to float when in work but prevent them from dropping too low when the planter is lifted out of work. The skids (item 6, figure 4) are fitted to assist the soil retention panels in riding over the ground. The skid should be set slightly below the bottom edge of the panel. To adjust loosen the retaining bolts (item 7, figure 4).

### Adjustable Mould Boards

Three adjustable mould boards (item 1, figure 5) are mounted at the rear of the planter via parallel linkage arms (item 2, figure 5). During work these arms should be at approximately  $10^\circ$  from horizontal. This can be achieved by repositioning the bolts (item 1, figure 6) into a different set of holes. The height and downward pressure exerted by the mould board is controlled by the reaction arm (item 2, figure 6) and upper and lower stops. The lower stop (item 3, figure 6) controls the height of the board whilst simultaneously reduces the pressure of the board on the bed. The upper stop (item 4, figure 6) induces a downward pressure on the board by loading the rubber torsion springs (item 5, figure 6) within the lower arm pivots. Both stops are adjusted by loosening their retaining bolt and sliding the stop around the slot to the required position. If when in work no pressure is required on the bed, the stops can be adjusted to allow the reaction arm (item 2, figure 5) to move freely.

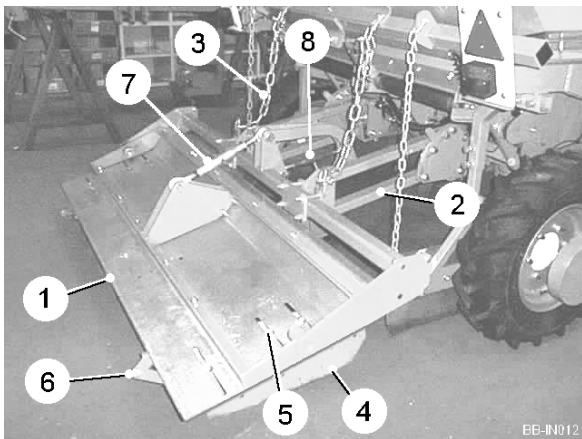


Fig 5

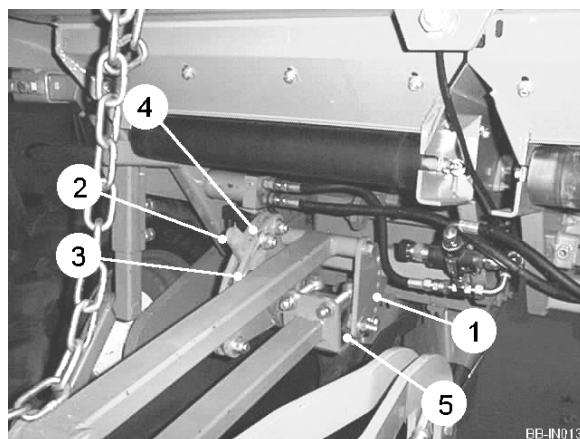


Fig 6

The position of the wings (item 4, figure 5) is important to ensure a nicely formed bed. The outer wings are adjustable for both position and angle. The position of the wing determines the width of the finished bed. To adjust, loosen the mounting bolts (item 5, figure 5) and slide the outer wing assembly to the required position. The angle at which the wings operate will determine the shape of the bed. To adjust, loosen the retaining bolt (item 6, figure 5) and rotate the wings to the required position. The top link (item 7, figure 5) sets the mould board angle. Initially the angle should be set at approximately  $5^\circ$  from horizontal. Increasing the angle will allow more soil under the board.

The depth at which the centre plough operates is set using the top link (item 8, figure 5). The deeper the plough is set, the more soil it will push sideways. Care should be taken however as going too deep may move the seed in the bed.



*The mould boards are raised/lowered hydraulically from the control box. To avoid the mould boards from making contact with the hopper when being raised, ram stroke restrictor brackets (item 2, figure 1) are fitted to the top of each ram. Ensure the restrictor brackets are set in the work position prior to planting. Failure to do so may cause serious damage to the machine. When locking the mould boards into the transport position, never walk under the raised board, always approach from the side.*

## Feed of Potatoes to Cups

When planting, check that the flow of potatoes from the hopper to the feeding cups is satisfactory and that no 'bridging' occurs. The size of gap between the hopper and the feed belts (item 1, figure 7) can be altered by adjusting the regulator plates (item 2, figure 7).

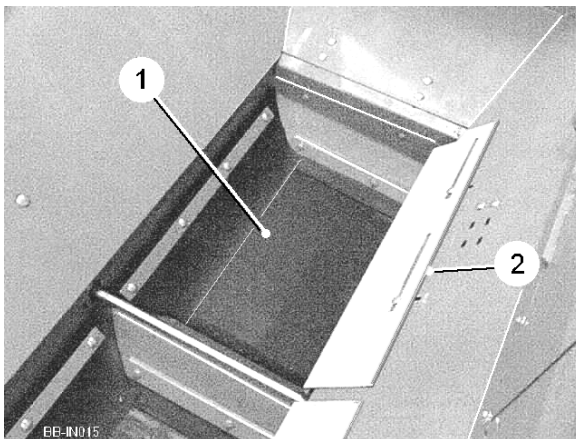


Fig 7

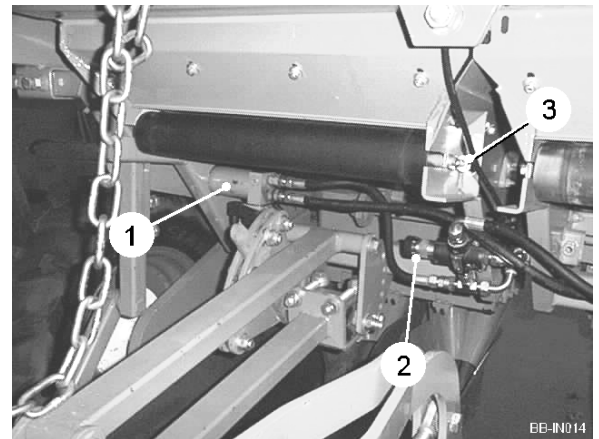


Fig 8

## Feed Belts

The feed belts (item 1, figure 7) convey the seed potatoes from the hopper to the feeding pockets. Each feed belt is driven by a hydraulic motor (item 1, figure 8). The speed of the belts can be varied by turning the flow divider knob (item 2, figure 8). The higher the number the quicker the belt will run. To create a positive drive, spring loaded tensioners (item 3, figure 8) maintain constant tension on the belt. To alter the tension turn the adjuster nuts. Ensure both sides are adjusted evenly.



*Do not overtighten the feed belts otherwise premature wear of the bearings and belts may occur.*

The feed belt drive chains (item 1, figure 9) are each fitted with a tensioner (item 2, figure 9). Adjust the chain tension to be tight enough to give positive drive without undue stretching.

The feed belt motors are actuated by the sensors (item 1, figure 10) situated between the belts and the feeding pockets. When the quantity of potatoes in one of the feeding pockets is so small that the distance between the sensor and the potatoes is more than 8cm (or the feeding pocket is empty), the sensor gives the relay an impulse. This impulse closes the circuit causing the relevant motor to engage and drive the feed belt to transport the potatoes to the feeding pocket. When the quantity of potatoes in the feeding pocket increases such that the distance between the potatoes and the sensor is approximately 8cm, the sensor gives the relay a new impulse which then causes the motor to disengage and so stop the drive to the feed belt. The feed belt will remain at standstill until the quantity of potatoes in the feeding pocket is small enough that the process is repeated. This way the potato layer in the feeding pocket is always kept thin and the feeding cups do not damage the potatoes.

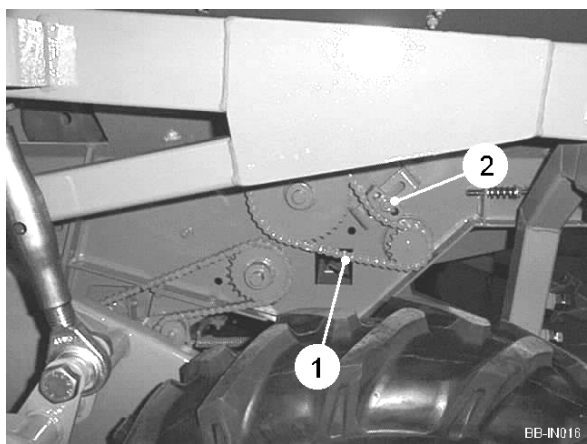


Fig 9

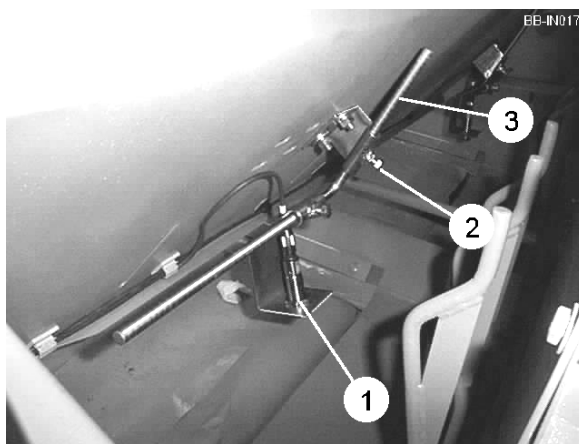


Fig 10

Depending on the size of potatoes being planted, it may be necessary to alter the height of the sensor (item 1, figure 10) in relation to the feeding pocket. The sensor should be positioned higher for larger potatoes and lower for smaller potatoes. To adjust the height of the sensor, loosen the set screw (item 2, figure 10) and slide the support arm (item 3, figure 10) to the required position and re-tighten.

Minor adjustments to the sensing distance can be made by turning the screw located on the side of the sensor. The sensing distance is increased by turning the screw clockwise and decreased by turning it anti-clockwise.

### Cup Belts

The cup belts pick up the seed from the feeding pocket and transfer them to the ground. Rapid locking brackets (item 1, figure 11) fitted to each of the tunnels keep the cup belts tensioned and also allow rapid maintenance of the cup belts. To slacken the cup belts, push the handles fully down until hanging loose. Each belt is tensioned by two spring adjusters (item 2, figure 11) which when tensioned correctly avoid slipping of the belt around the top and bottom rollers. Always adjust both sides evenly.



*Ensure the cup belts are not over-tightened otherwise premature failure of the bearings and belts may occur. After adjustment ensure the belts are running in the centre of the rollers so as to avoid damage to the edge of the belts.*



## Insert Cups

The shape of the feeding cups is designed to pick up the irregular long shaped seed in a large grade. For a seed grade with a wide range of sizes and long seed, every alternate cup should be fitted with a medium insert. For a narrow range seed grade with more irregular shapes a full set of medium inserts should be fitted. For a small size seed grade, small inserts should be fitted. To attach the inserts, simply press them into the hole in the centre of the feeding cups.

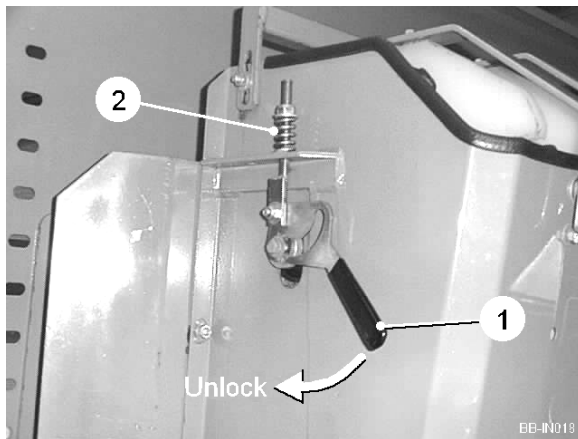


Fig 11

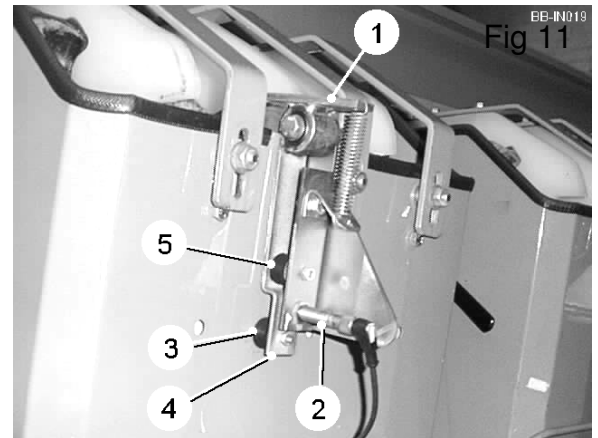


Fig 12

## Seed Monitors

The seed monitors fitted to the top of each tunnel are designed to detect the potatoes as they pass over the top of the cup belts prior to planting. If during work one of the six LEDs on the control box marked '1,2,3,4,5,or 6' remains on for longer than a predetermined period, an buzzer will sound indicating that there are no potatoes in the feeding cups in that row possibly suggesting a 'bridge'. The time delay can be increased/decreased by turning the dial marked 'SEED MONITOR'. The buzzer can also be turned ON/OFF on the control box.

The seed monitors should be adjusted so that the potatoes in the RH cups of each cup belt consistently trip the pivot plates (item 1, figure 12) thus activating the proximity sensors (item 2, figure 12). Initially the bottom stop (item 3, figure 12) should be adjusted so that a gap of approximately 3mm exists between the pivot plate (item 1, figure 12) and the inner face of the tunnel. Loosen the proximity sensor retaining nuts and slowly move the sensor closer to the sensor plate (item 4, figure 12) until it activates. When activated a red light appears on the sensor body. Screw the sensor out until the sensor deactivates and continue for another half turn then retighten the retaining nuts. This setting should leave a gap of approximately 1-2mm between the proximity sensor and the sensor plate. Finally, adjust the top stop (item 5, figure 12) to prevent the sensor plate coming into contact with the proximity sensor. If everything is adjusted correctly the proximity sensor will be activated and deactivated with only a slight deflection of the seed pivot plate (item 1, figure 12).

### Cup Belt Agitators

The cup belt agitators control the number of potatoes in a cup. When planting seed of good quality and size it is possible to drive faster without compromising planting accuracy. The agitation in this case can be kept to a minimum. If the seed is uneven the influence of the agitator can be increased by driving faster. In this case there will be more movement of the cups and the excess potatoes will drop off. When using potatoes which tend to fall out of the cups i.e. oversized or oblong etc. the speed should be slow and agitation set to minimum otherwise gaps may occur. Agitation of each cup belt can be increased/decreased from the dials on the control box marked 'RH BED 1 & 2', 'CENTRE BED 3 & 4' & 'LH BED 5 & 6'.

### Automatic Depth Control (prior to 2013)

Automatic depth control of each pair of openers ensures that the desired planting depth is maintained irrespective of the contours of the bed. Each unit consists of two PIR (passive infra red) sensors (item 1, figure 13) which sense the height of the bed in front of the openers. The depth ram (item 2, fig 13) then raises/lowers the openers independently thus maintaining planting depth. The depth control is turned on from the control box switch marked 'AUTO DEPTH'. The LED will illuminate when the system is active. The 3 switches marked 'OPENER RAISE/LOWER' will override the automatic depth on the rows indicated.

The 'up' and 'down' sensors are preset at the factory to a sensing distance of approximately 460mm and 490mm respectively, giving a neutral (dead-band) zone of approximately 30mm (to adjust the sensor settings see section 'Depth Control Sensor Adjustment').

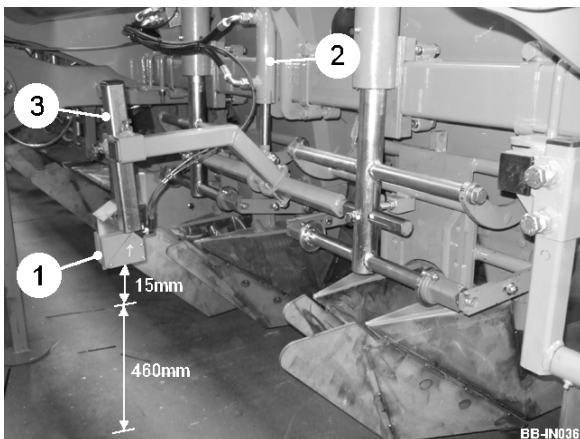


Fig 13

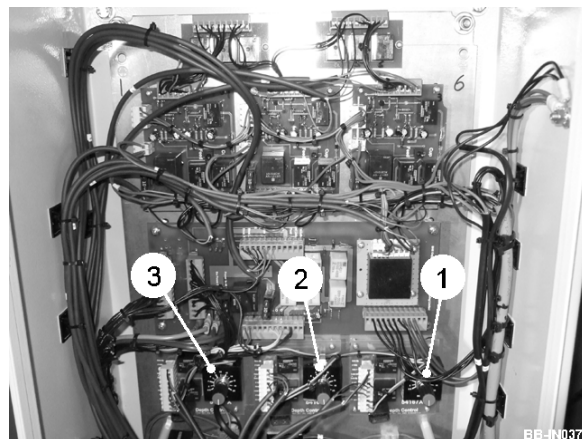


Fig 14

A timer is built into each depth control circuit which is designed to provide a time delay between activation of the 'up' sensor and actuation of the hydraulic control valve. The time delay can be adjusted by turning the relevant dial inside the junction box, LH bed (item 1, fig 14), centre bed (item 2, fig 14) or RH bed (item 3, fig 14). Normally a 3 second delay smoothes out any surface irregularities allowing the opener depth ram to gradually change the opener depth according to changes in bed height.

## Setting the Automatic Depth Control (prior to 2013)

1. Position the planter over the prepared bed.
2. With the 'AUTO DEPTH' switch set to 'OFF', set the opener depth rams to their mid-stroke position using the 3 switches marked 'OPENER RAISE/LOWER'.
3. Set the planting depth using the switch marked 'FRONT LIFT RAISE LOWER'. During work the opener parallel linkage arms should be approximately horizontal.
4. Fully lower the auto-depth sensor leg (item 3, figure 13) and then gradually raise it until the point at which both 'up' and 'down' sensor lights illuminate (approx 460mm above bed). Ensure the sensors are sensing the height of the bed and not any other surface in-between.
5. Raise the sensor leg a further 15mm to position the sensors in the middle of the preset neutral (dead-band) zone. When in the neutral zone only the 'down' sensor will be illuminated. Raising the leg higher will cause both 'up' and 'down' sensor lights to switch off.
6. Engage the auto-depth control by setting the switch marked 'AUTO DEPTH' to the 'ON' position. The LED will illuminate. If necessary re-adjust the height of the sensor leg to regain the desired planting depth.
7. Drive forward and check the planting depth. Make further adjustments if necessary.

If during work adjustments in planting depth need to be made manually, the auto-depth control can be over-ridden using the switches marked 'OPENER RAISE/LOWER'.

## Depth Control Sensor Adjustment (prior to 2013)

The 'up' and 'down' PIR sensors are preset at the factory to a sensing distance of approximately 460mm and 490mm respectively, giving a neutral (dead-band) zone of 30mm. If the sensors need adjustment the following procedure should be followed.

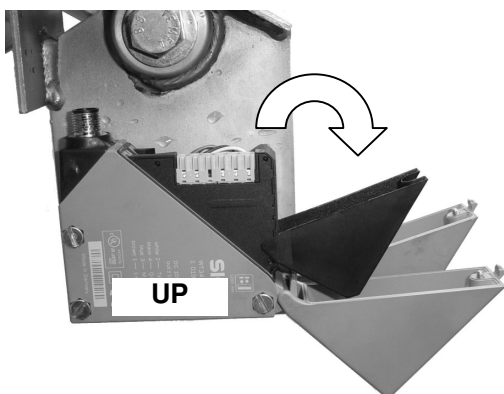


Fig 15

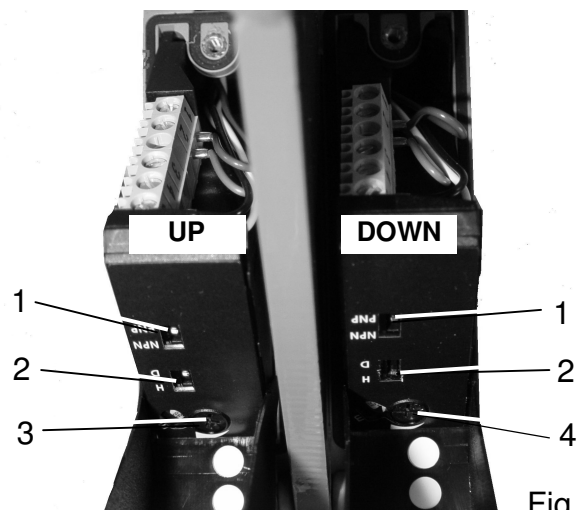


Fig 16

1. Loosen the single screw on top of each sensor and flip open the access covers (see figure 15).
2. The switch (item 1, figure 16) should be set to 'PNP' on both sensors.
3. The switch (item 2, figure 16) should be set to 'D' for the 'down' sensor and 'H' for the 'up' sensor.
4. Place a non-reflective surface on the ground under the sensors and position the sensor unit leg to the required 'up' activating distance.
5. Slowly turn the 'up' sensor screw (item 3, figure 16) until its indicator light illuminates.
6. Slowly turn the 'down' sensor screw (item 4, figure 16) until its indicator light also illuminates. With both lights illuminated this becomes the 'raise' position.
7. Gradually raise the sensor leg until the 'up' sensor indicator switches off leaving the 'down' sensor indicator illuminated. This is the neutral (dead-band) position where no actuation (raise/lower) of the control valve will occur.
8. Continue to raise the sensor leg until both sensor indicators switch off. This point is the 'lower' position.
9. The vertical distance travelled between both sensor indicators being illuminated and both being switched off is the dead-band. The dead-band zone should allow approximately 30mm of movement before actuating the control valve. To adjust the distance turn the down' sensor screw very slightly clockwise to increase, or anti-clockwise to decrease the dead-band.

**Note:** The 'up' sensing distance should always be shorter than the 'down' sensing distance for the sensors to operate correctly. The closer the two sensing distances are, the narrower the dead-band will be.

DOWN sensor indicator	UP sensor indicator	Machine action
ON	OFF	Neutral (dead-band). No movement.
ON	ON	Raise.
OFF	OFF	Lower.
OFF	ON	Sensors set incorrectly. Trying to raise and lower at same time.

## Hydraulic Space Selector

Seed space setting is electronically selected on the space selector box (item 1, fig 17). The hydraulic circuit requires a supply from the tractor of a minimum 13.5 litres/minute (3 gal).

The main components consist of the space selector box (item 1, figure 17), a master solenoid valve (item 1, figure 18) and 3 hydraulic motors (item 2, fig 18) fitted with bypass valves (item 3, figure 18). A monitor is fitted to the output shaft of the motor which provides speed information to the control box. Another monitor is fitted to the inner LH land wheel to provide forward speed information. The monitors consists of toothed wheels and proximity sensors which read the time interval between each tooth.

The control box should be mounted securely inside the tractor cab adjacent to the planter main control box. Electrical power for the space selector is provided via the main control box.



Fig 17

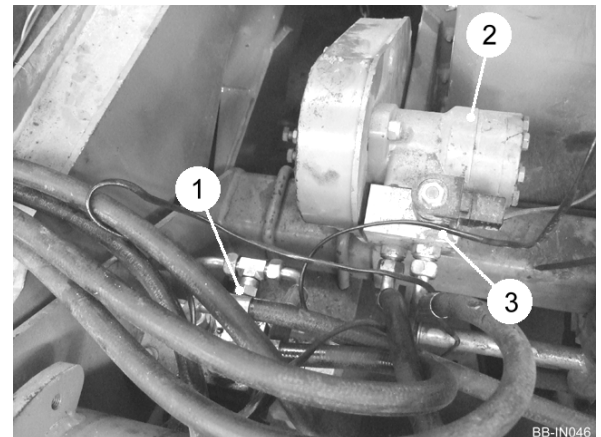


Fig 18



*To ensure accurate results, regular maintenance of the tractor hydraulic oil filters (as recommended by the tractor manufacturer) is essential. Contaminated oil will result in excessive wear.*

## Calibrating the Control Box to the Flow Regulator Valve

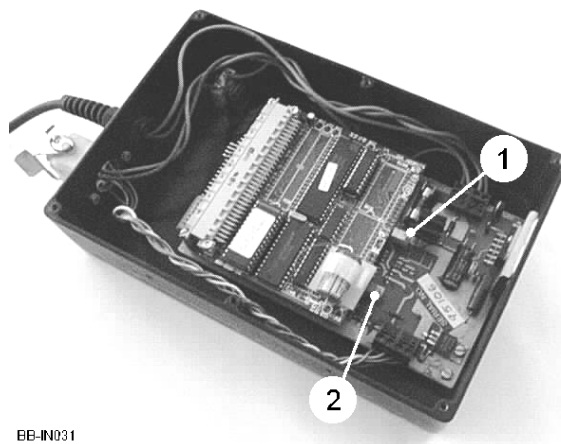
Owing to the manufacturing tolerances of flow regulator valves, it is necessary to calibrate the control box (item 1, figure 17) to its own regulator valve (item 1, figure 18). Calibration will have been checked at the factory prior to dispatch. However, it may be necessary to carry out a further check as the tractor used may have a different hydraulic system and/or output. Always use a tractor, as the unit requires the normal 12v d.c. electrical supply and an adequate supply of warm oil. To carry out a check when the hopper is full, disconnect the drive chain from the hydraulic motor valve before calibrating.

**To check the 'constant' (no oil flow required):**

1. With 'R' depressed switch on the control box and then release 'R'. The constant will appear in the LH display.
2. Press the 'Up' or 'Down' arrow to increase or decrease the constant to '49' for machines with 135mm cup belt centres, or '44' for 122mm cup belt centres.
3. Switch off the control box.

**To check the motor valve output (oil flow required):**

1. With 'U' depressed, switch on the control box and then release 'U'.
2. Remove the back of the control box.
3. Press 'R'.
4. Press the 'Down' arrow. Signal for low end value.
5. Adjust the potentiometer with yellow dot (item 1, figure 19) until the motor just starts to run. '0.00' to '0.04'.
6. Press 'R'.
7. Press the 'Up' arrow. Signal for high end value.
8. Adjust the potentiometer with red dot (item 2, figure 19) until the motor runs at approximately '98' to '100'.
9. Repeat steps 3,4,5,6,7,8 and check.



BB-IN031

Fig 19

## Calibrating the Control Box Area Recorder

To ensure accuracy, the area recorder 'count' must be calibrated to suit the particular field conditions and also preference for information to be displayed in acres or hectares. The area recorder receives impulses from the wheel monitor which together with wheeling (bed width) information is processed into acres/hectares planted.

1. Using the chart, select the relevant 'measured distance' from the acres or hectares column and accurately mark out the distance in the field.
2. With the 'Up' arrow depressed, switch on the control box and then release the 'Up' arrow. The display shows '--:--'.
3. Press 'R'. the display resets to '00:00'.
4. With the hopper half full, drive the planter accurately over the measured distance and stop.
5. Make a note of the control box 'count'.
6. Repeat steps 3,4,5 several times to find the average 'count'.
7. Switch off the control box.
8. With 'A' depressed, switch on the control box and then release 'A'.
9. Press the 'Up' and 'Down' arrows until the display reads the average 'count'.
10. Switch off the control box. The 'count' is now programmed into the recorder memory bank.

		Wheelings (Bed Width)				
		152cm (60")	163cm (64")	173cm (68")	183cm (72")	203cm (80")
<b>Measured Distance</b>	0.01 acre	26.55m	24.9m	23.43m	22.14m	19.92m
	0.01 hectare	65.62m	61.54m	57.9m	54.7m	49.21m

## Hydraulic Space Selector in Operation

At the end of each row:

1. Disengage the planter drives and auto depth using the switch 'ALL RUN ON/OFF'.
2. Lift the planter using the switch 'FRONT LIFT RAISE/LOWER' until the openers and soil retention panels are clear of the bed.
3. Draw forward to cover the remaining uncovered sets in the row and then raise the mould boards using the switch 'MOULDBOARD RAISE/LOWER'.
4. Make the headland turn.
5. On recommencing planting, lower the openers and mould boards and engage the planter drives and auto depth using the switch 'ALL RUN ON/OFF'.

### Seed Spacing

Press button selection is provided for 40 different seed spacings ranging from 10cm to 51cm (4" to 20"). The selected spacing is shown by the control box LH digits. To increase the spacing press the 'Up' arrow. To decrease the spacing press the 'Down' arrow. Monitoring of the actual spacing and of the forward speed is given by the RH digits when the planter is in work. The figures '88' will appear when the unit is switched on and the planter is stationary. The letters 'EE' indicate loss of hydraulic oil supply.

### Planting Rate

By pressing the 'R' button, information is given on the number of sets being planted per second. The in-built control system allows for a planting rate of up to 7 sets per row, per second, after which the letters 'HH' will appear in the RH display indicating too high a forward speed. The figure 'O' appears when the planter is stationary. Normal operating speeds will give a reading of 3 or 4 in the RH display.

### Unload/Prime

The 'U' button, when pressed, starts the hydraulic motor which provides a drive to the cup belt when the planter is stationary. This function can be used to both prime the planter before setting into work and unload the hopper after work.

### Seed Population

The precise control and constant monitoring of the hydraulic drive by the space selector makes it possible to predetermine the seed population per acre/hectare at specific seed spacings. Effectively each cup and therefore each set is counted and provided the planter has been correctly set-up with full cups, both seed spacing and population will be accurate.

Set-up procedure:

1. With 'P' depressed, switch on the control box. The LH digits display the wheelings (bed width) i.e. 60", 64", 68", 72" or 80". With 'P' depressed, press the 'Up' arrow to change the display to read the wheelings required.
2. When the wheelings have been set, press the 'Down' arrow. The LH digits now display the number of rows. Either (a) 2 rows, (b) 3 rows, (c) 3 rows less 10% centre row, (d) 3 rows less 15% centre row, (e) 3 rows less 20% centre row. With 'P' depressed, press the 'Down' arrow to change the display to read the number of rows required.
3. Switch off the control box. The calculator is now programmed for both wheelings and rows.
4. Switch on the control box. Set the required seed spacing by pressing the 'Up' or 'Down' arrows.
5. Press 'P' and hold. The display will now read the plant population. Multiply the four digit figure by 10 to obtain the sets per acre/hectare.



**Area Recorder**

The 'Area' button when pressed, provides a record of the number of acres/hectares that have been planted. This information is automatically stored by the memory bank after the wheelings have been programmed (see Seed Population). It can be accessed at any time by pressing 'A'. Four digits will appear in the display i.e. 15:37 which indicates an area of 15:37 acres/hectares. After a days work the unit can be reset to zero by pressing and holding down 'A' immediately followed by 'R'.

**Proximity Sensor Adjustment**

The hydraulic space selector proximity sensors are activated by the teeth of the monitor wheels passing in front of them. When activated a red light appears on the sensor body. Should the sensor not activate, the gap between the sensor and the monitor wheel may need adjustment. A retaining nut holds the proximity sensor in position. The distance between the sensor and the monitor wheel can be adjusted by loosening the retaining nut and then moving the sensor closer or further from the monitor wheel. This setting should be approximately 1mm to 1.5mm. Do not overtighten. The proximity sensor must be centrally mounted over the monitor wheel.

## Lubrication

Regular lubrication is an integral part of looking after your machine. The schedule of maintenance outlined below is a guide to when certain actions should be carried out. If your machine requires a more frequent lubrication schedule because of your workload, then it is advisable to reduce the time intervals.

Shafts, bearings and pivot points fitted with grease nipples should be greased with good quality medium grease. Do not allow these points to run dry, as this will accelerate wear

When greasing bearings some are sealed and pre-lubricated. You should take care not to over grease this type as the seals may be damaged. If the seals become damaged it may be possible for dirt to enter the bearing causing accelerated wear.

Use only the BP lubricants recommended by Standen or an exact equivalent recommended by your lubricant supplier.

Medium grease = BP      Energrease L S E P 2

## Mechanical Drives Maintenance

All chain drives have adjusters that are visible when the appropriate guard is removed. Adjust the chains tight enough to give positive drive without undue stretching. Where plastic chain tension or guide blocks are fitted, these will show fairly rapid wear initially, but will settle down when the chain rollers rather than the side plates come into contact with the plastic. A suitable chain lubricant or a smear of grease should be regularly applied to the chains to prevent wear.

## Electrical System Maintenance

The components within the electrical system are designed to be maintenance free. If it becomes necessary to carry out any repair, only a competent engineer capable of this type of work should carry out the repair. Periodically ensure that all multi pin plugs are correctly fitted into their sockets and are not becoming loose.

## Hydraulic System Maintenance

The components within the hydraulic circuit are designed, on the whole, to be maintenance free. If it becomes necessary to carry out any repair, the work should be carried out by a competent engineer capable of this type of work.



*Hydraulic oil under pressure is dangerous. Ensure that any residual pressure is released safely before working on the system. Do not release ram hoses without first supporting the part of the machine the ram controls.*

Cleanliness is of paramount importance. Before dismantling any part of the hydraulic system, ensure the surrounding area is clean. If necessary, power wash the area to be worked on. Dirt must be prevented from entering the system, so any orifices left open, such as pipe ends or ports of motors must be blanked off with a suitable plug. Do not use cloth or rag, as the lint from these can contaminate.

As the tractor supplies the oil for the machine's hydraulics, ensure that the tractor hydraulic system is serviced in accordance with the manufacturer's recommendations to prevent any contamination of the machine's system. To extend the life of the hydraulic components it is important to monitor the condition of the hydraulic oil. Always maintain adequate oil level in the tractor's reservoir.

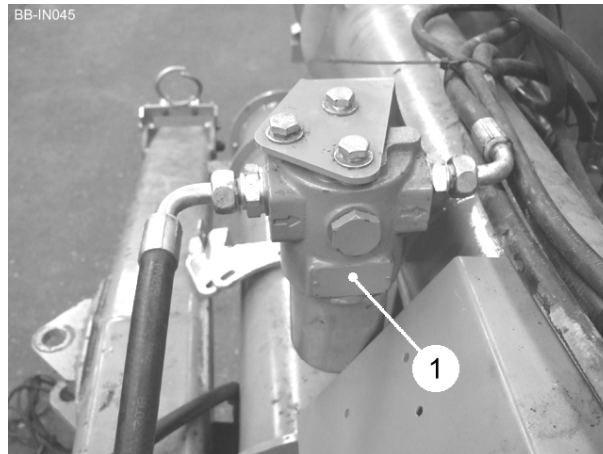


Fig 20

The pressure filter (item 1, figure 20) should be replaced after the first 50 hours running time and then every 500 hours or annually thereafter.

To replace the filter element:

1. Lower the planter to the ground. Switch off the tractor engine, apply the handbrake and remove the ignition key.
2. Operate the spool valve feeding the planter to release any residual pressure and then disconnect the feed hose from the tractor.
3. Unscrew the bottom casing using the spanner spigot.
4. Remove the filter element and rinse out the casing. Check the seal and renew if necessary.
5. Fit the new element and refit the casing ensuring that it is tight.
6. Run the system and check for leaks.

### Steering Ram Link Circuit

The two rear axle steering rams are connected via a link circuit which ensures both rams actuate by equal amounts in opposite directions when turning. The link circuit diverts the oil within the annular section of the extending ram into the annular section of the ram opposite thus retracting that ram by the same amount. The circuit must contain the exact volume of oil necessary for the rams, and thus the wheels, to be set correctly. If oil is lost from the link circuit through leakage or during maintenance work etc., the wheels will no longer track correctly and the circuit volume will need to be reset. This is done using valves 1 and 2 (see fig 21) located behind the valve bank.

1. Operate the steering fully to the left.
2. Open valve 1 to divert oil to the LH axle steering ram.
3. Open valve 2 to allow oil from the RH axle ram through the relief valve.
4. Operate the control box 'FRONT LIFT RAISE' and 'AXLE RIGHT' switches.
5. Close valves 1 and 2.

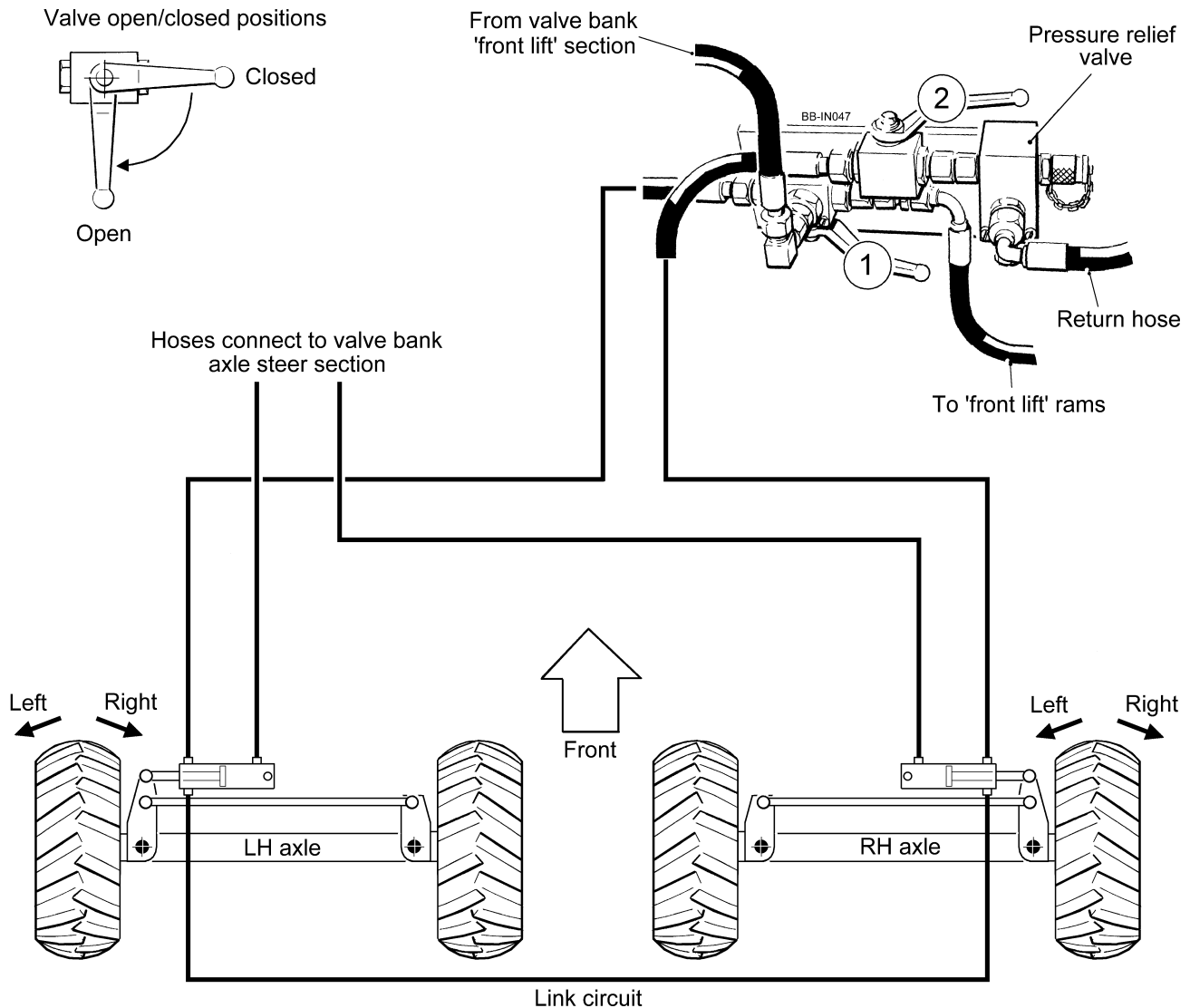


Fig 21

**Daily Maintenance**

During the working season the following daily maintenance should be carried out. Check all covers and guards are in position, free from damage. Repair or replace any found to be defective before operating the machine.

Carry out the following checklist:

1. Check tension of all drive chains, adjust if necessary and lubricate with clean oil.
2. Check tyre pressures and adjust if necessary.
3. Check wheel nuts for tightness.
4. Check all hydraulic cylinders, valves and pipe work for signs of leaks or damage, repair or replace as necessary.
5. Carry out lubrication

**Weekly Maintenance**

During the working season the following weekly maintenance should be carried out.

1. Carry out all the procedures listed in daily maintenance.
2. Check all shafts, bearings for undue wear and replace as necessary.
3. Check all bearings for lubrication, grease as necessary.
4. Check openers, soil retention panels, ridgers/moulding boards etc. for excessive wear, replace if necessary.

**Annual Maintenance**

Prior to the start of the working season the following maintenance should be carried out.

1. Carry out all the procedures listed in daily and weekly maintenance.
2. Check feed belts and cup belts for any damage or wear and repair or replace as necessary.
3. Check metalwork for any damage or wear and repair or replace as necessary.
4. Inspect wheel bearings and check for excessive wear, replace as necessary. Re-pack with fresh grease on re-assembly.
5. Replace the pressure filter element. Use only genuine Standen replacement parts. **THESE ARE NOT WASHABLE ELEMENTS.**

**Out of Season Storage**

The machine can frequently operate in soils which contain chemical fertilisers etc. When the working season is completed wash and clean the machine thoroughly prior to carrying out the following checks and operations.

1. Apply oil, grease or an anti rust agent on any exposed bright metal surfaces which have been polished by the soil flow.
2. Clean all drive chains and lubricate with oil.
3. After carrying out the hydraulic residual pressure dump procedure, any parts of hydraulic cylinders rods that are still exposed should be greased or oiled to prevent corrosion.
4. Ensure that the tyres are inflated to the correct pressure.
5. Ensure that the hydraulic hose quick release couplings and the electrical connectors on the machine are kept clean and dry.
6. Check the whole machine carefully and note any repairs that may need to be carried out. It is always better to carry out any repairs well before the commencement of the following season.
7. Carry out all the lubrication checks outlined in routine maintenance.
8. Ensure the control consoles are kept in a safe, dry place and available for use at the commencement of work or for any maintenance to be carried out.
6. Ensure that this handbook is kept in a safe place and available for use at the commencement of work or for any maintenance to be carried out.

## Machine Dimensions

Length	5.9 m (in work) 3.4 m (hopper/mould boards raised & drawbar folded)
Width	6.7 m
Height	2.6 m (hopper/mould boards raised)

## Machine Weight

4 Cup Quad	7280 kg
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## Technical Data

Bed widths	72" and 80"
Seed spacing	13 cm (5") to 51 cm (20")
Hopper capacity	3.5 tons
Tractor power requirement	118 kW (160 bhp) minimum
Minimum oil flow requirement	13.5 ltr/min (3 gal)
Tyre size (standard)	12.5x18 12 ply
Tyre pressure	3.5 Bar (50 psi)
Wheel nut torque	360 Nm

## Nut/bolt torque

Description	Torque	Description	Torque
M6 nyloc zinc nut	10 lb/ft	M6 bolt/steel nut	7 lb/ft
M8 nyloc zinc nut	23 lb/ft	M8 bolt/steel nut	19 lb/ft
M10 nyloc zinc nut	44 lb/ft	M10 bolt/steel nut	38 lb/ft
M12 nyloc zinc nut	87 lb/ft	M12 bolt/steel nut	70 lb/ft
M16 nyloc zinc nut	208 lb/ft	M16 bolt/steel nut	170 lb/ft
M20 nyloc zinc nut	380 lb/ft	M20 bolt/steel nut	325 lb/ft
M24 nyloc zinc nut	690 lb/ft	M24 bolt/steel nut	565 lb/ft

## 2 Row &amp; 2 Cup Quad Seed Population (SP600 &amp; SP640)

SETS PER HECTARE

Seed spacing cm	72 "	78.74 "	80 "
	Wheelings 6 Row	(2 metre) Wheelings 6 Row	Wheelings 6 Row
1	1,093,611	1,000,000	984,250
2	546,806	500,000	492,125
3	364,537	333,333	328,083
4	273,403	250,000	246,063
5	218,722	200,000	196,850
6	182,269	166,667	164,042
7	156,230	142,857	140,607
8	136,701	125,000	123,031
9	121,512	111,111	109,361
10	109,361	100,000	98,425
11	99,419	90,909	89,477
12	91,134	83,333	82,021
13	84,124	78,923	75,712
14	78,115	71,429	70,304
15	72,907	66,667	65,617
16	68,351	62,500	61,516
17	64,330	58,824	57,897
18	60,756	55,556	54,681
19	57,558	52,632	51,803
20	54,681	50,000	49,213
21	52,077	47,619	46,869
22	49,710	45,455	44,739
23	47,548	43,478	42,793
24	45,567	41,667	41,010
25	43,744	40,000	39,370
26	42,062	38,462	37,856
27	40,504	37,037	36,454
28	39,058	35,714	35,152
29	37,711	34,483	33,940
30	36,454	33,333	32,808
31	35,278	32,268	31,750
32	34,175	31,250	30,758
33	33,140	30,303	29,828
34	32,165	29,412	28,949
35	31,248	28,571	28,121
36	30,378	27,778	27,340
37	29,557	27,027	26,601
38	28,779	26,316	25,901
39	28,041	25,641	25,237
40	27,340	25,000	24,606
41	26,673	24,390	24,006
42	26,038	23,810	23,435
43	25,433	23,266	22,890
44	24,855	22,727	22,369
45	24,302	22,222	21,872
46	23,774	21,739	21,397
47	23,268	21,277	20,941
48	22,784	20,833	20,505
49	22,319	20,408	20,087
50	21,872	20,000	19,685
51	21,443	19,608	19,299
52	21,031	19,231	18,928
53	20,634	18,868	18,571
54	20,252	18,519	18,227
55	19,884	18,182	17,895
56	19,529	17,857	17,576
57	19,186	17,544	17,268
58	18,855	17,241	16,970
59	18,536	16,949	16,682
60	18,227	16,667	16,404
61	17,928	16,393	16,135
62	17,639	16,129	15,875
63	17,359	15,873	15,623
64	17,088	15,625	15,379
65	16,825	15,385	15,142
66	16,570	15,152	14,913
67	16,323	14,925	14,690
68	16,083	14,706	14,474
69	15,849	14,493	14,264
70	15,623	14,286	14,061

SETS PER ACRE

Seed spacing cm	72 "	78.74 "	80 "
	Wheelings 6 Row	(2 metre) Wheelings 6 Row	Wheelings 6 Row
1	442,569	404,686	398,312
2	221,284	202,343	199,156
3	147,523	134,895	132,771
4	110,642	101,171	99,578
5	88,514	80,837	79,662
6	73,761	67,448	66,385
7	63,224	57,812	56,902
8	55,321	50,588	49,789
9	49,174	44,965	44,257
10	44,257	40,469	39,831
11	40,234	36,790	36,210
12	36,881	33,724	33,193
13	34,044	31,130	30,639
14	31,612	28,906	28,451
15	29,505	26,979	26,554
16	27,681	25,293	24,894
17	26,033	23,805	23,430
18	24,587	22,483	22,128
19	23,293	21,299	20,964
20	22,128	20,234	19,916
21	21,075	19,271	18,967
22	20,117	18,395	18,105
23	19,242	17,595	17,318
24	18,440	16,862	16,596
25	17,703	16,187	15,932
26	17,022	15,565	15,320
27	16,391	14,988	14,752
28	15,806	14,453	14,225
29	15,261	13,955	13,735
30	14,752	13,490	13,277
31	14,276	13,054	12,849
32	13,830	12,646	12,447
33	13,411	12,263	12,070
34	13,017	11,903	11,715
35	12,645	11,562	11,380
36	12,294	11,241	11,064
37	11,961	10,937	10,765
38	11,647	10,650	10,482
39	11,348	10,377	10,213
40	11,064	10,117	9,958
41	10,794	9,870	9,715
42	10,537	9,635	9,484
43	10,292	9,411	9,263
44	10,058	9,197	9,053
45	9,835	8,993	8,851
46	9,621	8,798	8,659
47	9,416	8,610	8,475
48	9,220	8,431	8,298
49	9,032	8,259	8,129
50	8,851	8,094	7,966
51	8,678	7,935	7,810
52	8,511	7,782	7,660
53	8,350	7,636	7,515
54	8,196	7,494	7,376
55	8,047	7,358	7,242
56	7,903	7,227	7,113
57	7,764	7,100	6,988
58	7,630	6,977	6,867
59	7,501	6,859	6,751
60	7,376	6,745	6,639
61	7,255	6,634	6,530
62	7,138	6,527	6,424
63	7,025	6,424	6,322
64	6,915	6,323	6,224
65	6,809	6,226	6,128
66	6,706	6,132	6,035
67	6,606	6,040	5,945
68	6,508	5,951	5,858
69	6,414	5,865	5,773
70	6,322	5,781	5,690



## 4 Cup Quad Seed Population (SP644)

PLANTS PER HECTARE

Seed spacing cm	72 " Wheelings	78.74 " (2 metre) Wheelings	80 " Wheelings
1	2,187,222	2,000,000	1,968,500
2	1,093,611	1,000,000	984,250
3	729,074	666,667	656,167
4	546,806	500,000	492,125
5	437,444	400,000	393,700
6	364,537	333,333	328,083
7	312,460	285,714	281,214
8	273,403	250,000	246,063
9	243,025	222,222	218,722
10	218,722	200,000	196,850
11	198,838	181,818	178,955
12	182,269	166,667	164,042
13	168,248	153,846	151,423
14	156,230	142,857	140,607
15	145,815	133,333	131,233
16	136,701	125,000	123,031
17	128,660	117,647	115,794
18	121,512	111,111	109,361
19	115,117	105,263	103,605
20	109,361	100,000	98,425
21	104,153	95,238	93,738
22	99,419	90,909	89,477
23	95,097	86,957	85,587
24	91,134	83,333	82,021
25	87,489	80,000	78,740
26	84,124	76,923	75,712
27	81,008	74,074	72,907
28	78,115	71,429	70,304
29	75,421	68,966	67,879
30	72,907	66,667	65,617
31	70,556	64,516	63,500
32	68,351	62,500	61,516
33	66,279	60,606	59,652
34	64,330	58,824	57,897
35	62,492	57,143	56,243
36	60,756	55,556	54,681
37	59,114	54,054	53,203
38	57,558	52,632	51,803
39	56,083	51,282	50,474
40	54,681	50,000	49,213
41	53,347	48,780	48,012
42	52,077	47,619	46,869
43	50,866	46,512	45,779
44	49,710	45,455	44,739
45	48,605	44,444	43,744
46	47,548	43,478	42,793
47	46,537	42,553	41,883
48	45,567	41,667	41,010
49	44,637	40,816	40,173
50	43,744	40,000	39,370
51	42,887	39,216	38,598
52	42,062	38,462	37,856
53	41,268	37,736	37,142
54	40,504	37,037	36,454
55	39,768	36,364	35,791
56	39,058	35,714	35,152
57	38,372	35,088	34,535
58	37,711	34,483	33,940
59	37,072	33,898	33,364
60	36,454	33,333	32,808
61	35,856	32,787	32,270
62	35,278	32,258	31,750
63	34,718	31,746	31,246
64	34,175	31,250	30,758
65	33,650	30,769	30,285
66	33,140	30,303	29,826
67	32,645	29,851	29,381
68	32,165	29,412	28,949
69	31,699	28,986	28,529
70	31,246	28,571	28,121

PLANTS PER ACRE

Seed spacing cm	72 " Wheelings	78.74 " (2 metre) Wheelings	80 " Wheelings
1	885,137	809,371	796,624
2	442,569	404,686	398,312
3	295,046	269,790	265,541
4	221,284	202,343	199,156
5	177,027	161,874	159,325
6	147,523	134,895	132,771
7	126,448	115,624	113,803
8	110,642	101,171	99,578
9	98,349	89,930	88,514
10	88,514	80,937	79,662
11	80,467	73,579	72,420
12	73,761	67,448	66,385
13	68,087	62,259	61,279
14	63,224	57,812	56,902
15	59,009	53,958	53,108
16	55,321	50,586	49,789
17	52,067	47,610	46,860
18	49,174	44,965	44,257
19	46,586	42,598	41,928
20	44,257	40,469	39,831
21	42,149	38,541	37,934
22	40,234	36,790	36,210
23	38,484	35,190	34,636
24	36,881	33,724	33,193
25	35,405	32,375	31,865
26	34,044	31,130	30,639
27	32,783	29,977	29,505
28	31,612	28,906	28,451
29	30,522	27,909	27,470
30	29,505	26,979	26,554
31	28,553	26,109	25,698
32	27,661	25,293	24,894
33	26,822	24,526	24,140
34	26,033	23,805	23,430
35	25,290	23,125	22,761
36	24,587	22,483	22,128
37	23,923	21,875	21,530
38	23,293	21,299	20,964
39	22,696	20,753	20,426
40	22,128	20,234	19,916
41	21,589	19,741	19,430
42	21,075	19,271	18,967
43	20,585	18,823	18,526
44	20,117	18,395	18,105
45	19,670	17,986	17,703
46	19,242	17,595	17,318
47	18,833	17,221	16,949
48	18,440	16,862	16,596
49	18,064	16,518	16,258
50	17,703	16,187	15,932
51	17,356	15,870	15,620
52	17,022	15,565	15,320
53	16,701	15,271	15,031
54	16,391	14,988	14,752
55	16,093	14,716	14,484
56	15,806	14,453	14,225
57	15,529	14,199	13,976
58	15,261	13,955	13,735
59	15,002	13,718	13,502
60	14,752	13,490	13,277
61	14,510	13,268	13,059
62	14,276	13,054	12,849
63	14,050	12,847	12,645
64	13,830	12,646	12,447
65	13,617	12,452	12,256
66	13,411	12,263	12,070
67	13,211	12,080	11,890
68	13,017	11,903	11,715
69	12,828	11,730	11,545
70	12,645	11,562	11,380



### Automatic Depth Control (from 2013)

Automatic depth control of each pair of openers ensures that the desired planting depth is maintained irrespective of the contours of the bed. The ultrasonic sensor (item 1, fig 21) senses the height of the bed in front of the openers. The depth ram (item 2, fig 13) then raises/lowers the openers independently thus maintaining planting depth. The depth control is turned on from the control box switch marked 'AUTO DEPTH'. The LED will illuminate when the system is active. The 3 switches marked 'OPENER RAISE/LOWER' will override the automatic depth on the rows indicated.

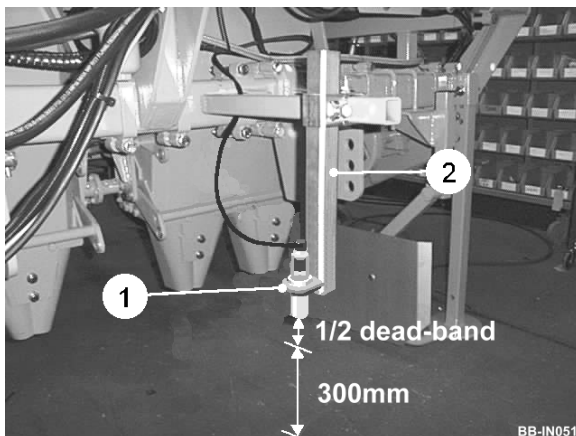


Fig 21

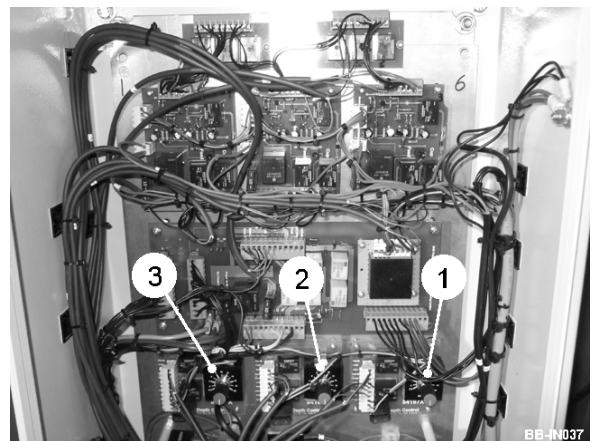


Fig 22

A timer is built into each depth control circuit which is designed to provide a time delay between activation of the 'up' sensor and actuation of the hydraulic control valve. The time delay can be adjusted by turning the relevant dial inside the junction box, LH bed (item 1, fig 22), centre bed (item 2, fig 22) or RH bed (item 3, fig 22). Normally a 3 second delay smoothes out any surface irregularities allowing the opener depth ram to gradually change the opener depth according to changes in bed height.

### Setting the Automatic Depth Control (from 2013)

1. Position the planter over the prepared bed.
2. With the 'AUTO DEPTH' switch set to 'OFF', set the opener depth rams to their mid-stroke position using the 3 switches marked 'OPENER RAISE/LOWER'.
3. Set the planting depth using the switch marked 'FRONT LIFT RAISE LOWER'. During work the opener parallel linkage arms should be approximately horizontal.
4. Fully lower the sensor leg (item 2, figure 21) and then gradually raise it until both LED's (D1 & D2, fig 23) are illuminated green. This is the neutral (dead-band) zone. Raise the leg slightly to position the sensor in the middle of the neutral zone. Ensure both LED's are still green and then retighten the leg.

5. Engage the auto-depth control by setting the switch marked 'AUTO DEPTH' to the 'ON' position. The LED will illuminate. If necessary re-adjust the height of the sensor leg to regain the desired planting depth.
6. Drive forward and check the planting depth. Make further adjustments if necessary.

If during work adjustments in planting depth need to be made manually, the auto-depth control can be over-ridden using the switches marked 'OPENER RAISE/LOWER'.

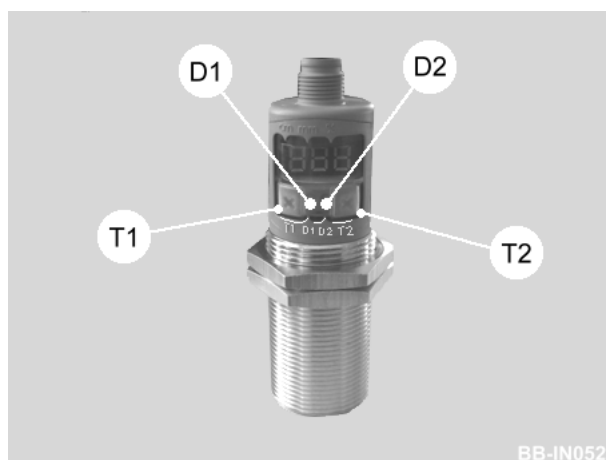


Fig 23

### Depth Control Sensor Adjustment (from 2013)

**SET RAISE DISTANCE** (This must be a lower figure than the Lower Distance)

Press T1 + T2 for 3 seconds

**Pro**

Press

↓

**d1**

Press

T1 + T2

**3 0 0**

Set Raise distance. Press T1 or T2 to alter (e.g.300mm)

Press

T1 + T2

**- - -**

single detect, has to be dashes (press T2 to alter)

Press

T1 + T2

**┌ ─ ─**

This represents Raise

Press

T1 + T2

**End**

Press T1 + T2

**Sensor now Ready to work**

**SET LOWER DISTANCE** (This must be higher than the Raise Distance)

Press T1 + T2 for 3 seconds

**Pro**

Press

↓

**d1**

Press

T2

**d2**

Press

T1 + T2

**3 1 5**

Set Lower distance, Press T1 or T2 to alter (e.g.315mm)  
The difference between the Raise & Lower figure is the Dead band where the depth control is inactive

Press

T1 + T2

**- - -**

single detect, has to be dashes (press T2 to alter if a number)

Press

T1 + T2

**└ ─ ─**

This Represents Lower

Press

T1 + T2

**End**

Press T1 + T2

**Sensor now Ready to work**

#### Wiring:

Brown = Power 12v

Blue = Earth 0v

White = Raise signal

Black = Lower signal