



BOSS Engineering Pty Ltd
Air Seeder Operator's Manual

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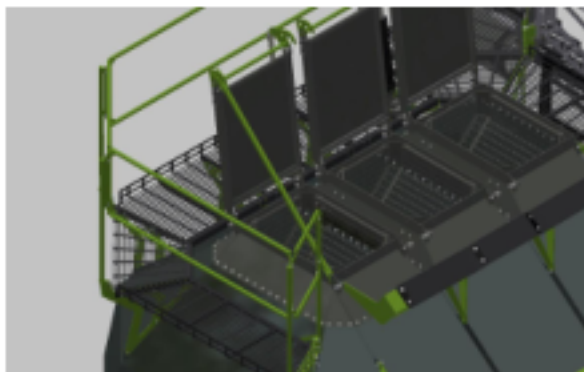


SHUT OFF THE TRACTOR ENGINE, REMOVE THE KEY FROM THE IGNITION AND BE CERTAIN THAT ALL MOVING PARTS HAVE STOPPED BEFORE SERVICING.

BEFORE SERVICING MAKE SURE WHEELS ARE CHOCKED AND SAFETY PINS ARE IN PLACE.



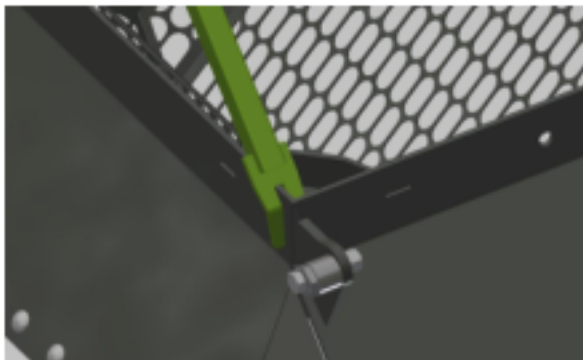
Danger – do not enter any air seeder bins unless the tractor engine is switched off and the lid propped open.



Use the prop supplied after switching engine off. Pin through the bin fill door latch as shown.



Engage the prop securely over the rim of the bin top flange.





Air Seeder right hand side (12000L cart depicted)



Air Seeder left hand side (12000L cart depicted)

7 AIR SEEDER SAFETY

- Ensure wheel chocks are in place before working under machine.
- Check that the tractor is shut down and the key removed before working on machine.
- Be aware of pinch points such as hydraulic metering unit drives.
Drives may start without warning while over hydraulic power is available.
- Ensure auger guard is in place before use



- Inspect for hydraulic leaks and replace hoses if required.
Pressurised hydraulic oil can harm or kill.
- Never ride on machine when operating.
- Do not let children climb or play on machine.
- Be aware of overhead powerlines when transporting machine.
- Width and height restrictions may apply when travelling on public roads, consult your local transport regulator for specific requirements in your area.
- **Max travelling speed is 20km/h.**
- Ensure tyres are inflated to the correct pressure as recommended.
- Inspect the machine regularly for loose bolts, damaged or worn components and replace as required.
- Inspect and keep wheel studs tight.
- Do not stand between the air seeder and implement while coupling the machine up.
- Ensure all safety signs are in place and replace if damaged.
- Ensure all safety guards are in place.
- Ensure no persons are within 50 metres when the machine is operating.

2 SPECIFICATIONS

BOSS Air Seeders are currently available in many 2 and 3-bin models, with a range of sizes from 4500 L to 20000 L. Optional Small Seeds Boxes are also available on select models. Other innovative features of BOSS Air Seeders include:

- Australian first optional Sectional Control for reduced seed & fertiliser use
- Hydraulically operated 9' loading & unloading auger that gives smooth operation for operator safety and comfort
- Standard with LED Lighting, both for undercarriage and catwalks
- Standard with Hydraulically Operated Bin Lids that are Operated at Ground Level
- Standard ISO Ready (Will Operate Through Most Late Model Consoles)
- Standard with Heavy Duty Blower Motor
- Standard with Electronic Calibration Scales
- Standard with Large Sight Glass in Both Bins
- Standard with Fully Powder-Coated Bins & Metering Units (Inside & Outside)
- Standard with Stainless Steel Fittings & Fixtures used in the Metering Unit
- Standard with Quick Release Removable Metering Rollers
- Standard with Crit. Impregnated Powder-Coating on Stairs & Catwalk for Safety
- Standard with Adjustable Bin Dividers
- Standard with 8 x 2 1/2" Primary Lines
- Easy Clean Out
- Ability to Split Rates between Primary Lines
- Exceptional Flotation
- Heavy Duty Chassis & Front End Assembly
- Auger Cradle for Ease When Loading
- Short Wheel Base for Tighter Turning Radius
- 2m, 3m & 4m Centres Available (2m 9000L models only)
- Optional Ground Drive Kit with Zero-Max Boxes

2.1 4500L Models

Capacity	4500L		
Configuration	Frame Mounted		
No. of compartments	2	2	
Bin Split Options	40:60	50:50	

2.2 9000L Models

Capacity	9000L		
Configuration	Castoring or Steerable		
No. of compartments	2	2	3
Bin Split Options	45:55	50:50	37.5:25:37.5
Tyres			
Standard	18.4x30 R1		
Optional (Steerable only)	23.1x30 R1		

2.3 12000L Models

Capacity	12000L		
Configuration	Steerable only		
No. of compartments	2	2	3
Bin Split Options	45:55	50:50	37.5:25:37.5
Tyres			
Standard	24.5x32 R1		

2.4 20000L Models

Capacity	20000L		
Configuration	Steerable only		
No. of compartments	3	3	
Bin Split Options	35:30:35	33:34:33	
Tyres			
Standard	30.5x32 R1		

3 SETUP AND CALIBRATION

3.1.1 Tyre Pressures

Tyre size	Recommended Pressure (psi)	Pressure max. (psi)
400/90-24	50	73
18.4x30 R1	28	33
23.1x30 R1	22	25
24.5x32 R1	20	25
30.5x32 R1	20	25

3.1.2 Oil Flow Requirements

Motor	Max rated flow per unit	Suggested max units per remote
Hydradrive (80cc)	15 lpm	4
12cc fan motor (standard 79s fan)	54 lpm	1
16cc fan motor (large 22s fan)	64 lpm	1

3.2 Bin Splits

On two bin air seeders, the internal bin dividers may be configured in the following ways:

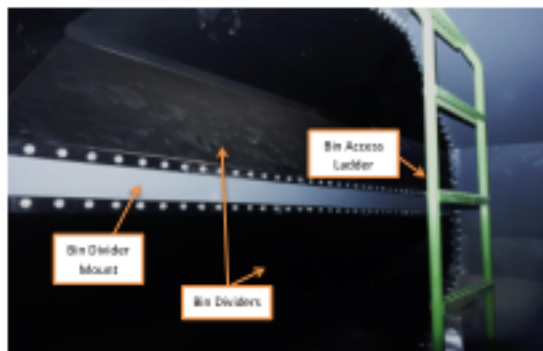
Front:Rear	Front:Rear	Front:Rear
55:45	50:50	45:55

Bin splits are pre-configured at the factory to the owner's requirements. However, requirements may change and the dividers can be re-configured using the following procedure.

WARNING: Confined Space.

Never work alone in the bin.

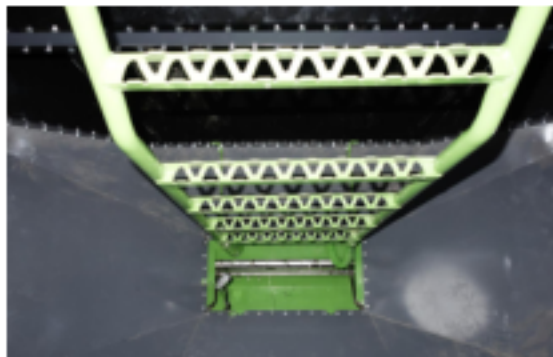
**Before entering ensure that the tractor is switched off,
the keys removed and the park brake
or park setting applied.
Prop lid open.**



After calculating the required bin split, two people must enter the bin either side of the dividers to be changed.

3.2.1 Bin-split change procedure

1. Remove retaining bolts from first bin divider to be changed, leaving 3-4 bolts at the top and bottom corners.



2. Use a putty knife to cut the sealant all the way around the first bin divider. All sealing surfaces on bin divider/s and bin walls must be cleaned of any sealant before refitting the divider/s.
3. Remove ladders to allow access to bin divider; retain in compartment out of the way.
4. Remove remaining bolts and remove divider. Carefully feed divider through hole to other compartment.
5. After cleaning thoroughly, apply a generous amount of silicon sealant (Sikaflex brand recommended) to bin divider/s and bin wall mating surfaces. Fit bin dividers in place in the configuration determined. Refit all retaining bolts and nuts and tighten.
6. If required, repeat steps 1,2,4,5 for second bin divider.
7. Replace access ladders.
8. Test for air leaks. See section 5.5

3.2.2 Calculating Bin Split Required

Product volumes of various seeds and fertilisers depend on both application rates (kg/ha) and densities (kg/L) of the product. Properly matched compartment sizes will ensure that seed and various fertilisers empty at the same time.

Average densities of common products are listed below. This information should be used as a guide only – Calibrate according to section 3.8 before sowing commences.

Superphosphate	1 kg/L
Urea	0.74 kg/L
Wheat	0.77 kg/L
Oats	0.68 kg/L
Barley	0.62 kg/L
Corn	0.72 kg/L
Sorghum	0.73 kg/L

For other products, densities can be obtained by weighing a litre of the product using the 1 litre jug and scales provided. See section 3.5 for details.

For the following example application rates of 70kg/ha wheat and 75kg/ha super are assumed.

1. Convert application rates from kg/ha to L/ha using the density table above:

Grain:

$$\frac{70}{0.77} = 91 \text{ L/ha}$$

Super:

$$\frac{75}{1} = 75 \text{ L/ha}$$

2. Add application rates of products to obtain a total application rate in litres per hectare:

$$91 \text{ L/ha} + 75 \text{ L/ha} = 166 \text{ L/ha}$$

3. The percentage total for each is as follows:

Grain:

$$\frac{91 \times 100}{166} = 55\%$$

Super:

$$\frac{75 \times 100}{166} = 45\%$$

A 55:45 bin split is appropriate for this application.

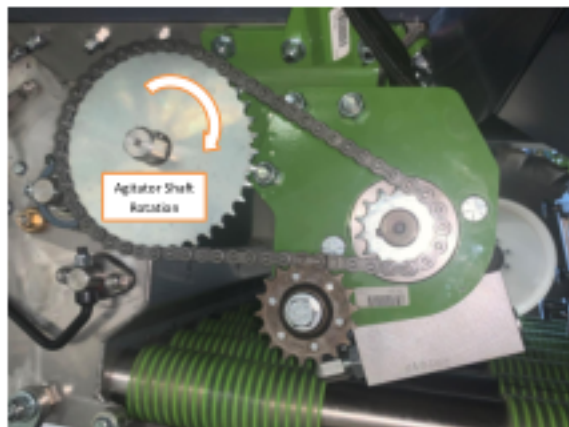
3.3 Metering unit

3.3.1 Metering Drive



Be aware of pinch points such as hydraulic metering unit drive chains and gears.

Drives may start without warning while ever hydraulic power is available.



Metering unit chain drive – power is transferred through the agitator shaft, which in turn drives the metering roller via a set of secondary reduction gears.



The metering roller turns in a clockwise direction when viewing the drive gear. This action precisely lifts grain over the top of the metering roller and into the airstream below.

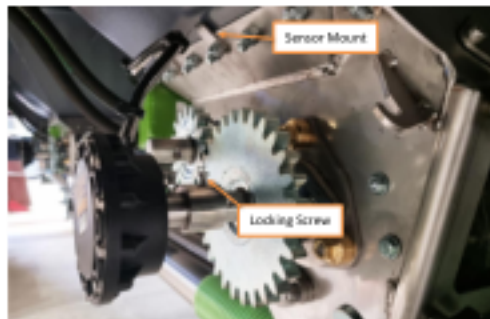


Metering drives are equipped with an override screw to allow manual operation. This may be used in troubleshooting to confirm operation of drive/ metering roller.

3.3.2 Metering Roller

WARNING: Ensure Tractor is switched off and the key removed before commencing

Metering rollers can be configured with various rollers and blanks to suit a range of planting conditions. Before attempting to remove rollers ensure that the bin is empty. In addition, spare rollers can be kept on hand for quick change between different configurations (e.g. summer, winter planting), a simple slide-in/slide-out procedure.



To change or service metering roller, firstly detach application rate sensor locking collar from the metering shaft. There is no need to remove the sensor mount.



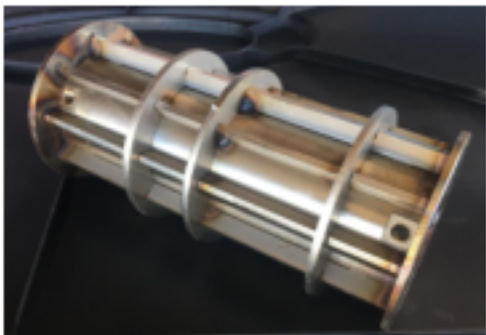
Undo 3 mount nuts and carefully slide shaft out.



After replacing metering roller, always ensure that the application rate sensor collar is installed and the locking screw is tightened.

Roller Types:

9-Cell



Stainless steel roller, suitable for cereals, small legumes (e.g. lupins, chickpeas) and fertilisers at rates of 5-25 kg/ha per line subject to air flow and seeding kit limitations.

Nine cell rollers are available in both single line and double line to suit various configurations.

6-Cell Straight – Faba



High clearance for very large seeds e.g. Faba beans, broad beans at 7.5-30kg/ha per line. Not recommended for fertilizer or smaller seeds.

Small seeds roller



Full rate (Left) and half rate (Right) small seeds rollers. Suitable for small or low rate seeds e.g. Sorghum, canola, millet at 0.5-2kg/ha per line. Used in conjunction with slip rings and sealing rings as shown below to allow independent rotation between the roller components.

3.3.3 Spool covers/Windows

For use in conjunction with 9 cell rollers, these clip in for effective rate reduction without changes to rollers or drive ratios. Ensure these are clipped in correctly and 'O' rings are in good order. Material calibration must be repeated to account for the reduction in metering flow (see section 3.7)



2/3 Open Window

Planting rates of 3-15 kg/ha per line, for use with low rates of cereals. If low shaft speed alarms sound while travelling at minimum normal planting speed, or if the calculator indicates a metering spool rpm of less than 5-8 rpm, fit 2/3 window blanks and repeat catch test calibration.

1/3 Open Window

Planting rates of 2-8 kg/ha per line, for use with Mung beans, cow peas etc.

Full Blank (no window)

Used to completely close off a line to seed flow. These are factory fitted to machines using 4 or 6 primary lines. Not recommended for use on lines where a metering roller is fitted.

An [online calculator](https://www.bossagriculture.com.au/calculator/) is available at the link below to help establish where spool covers are required and to assist in calibrations. The spreader constant is calculated by Dickey John systems when performing a catch test calibration (see section 3.7). If speeds are varied during planting then use the minimum normal planting speed. Enter all other variables as they apply to your configuration and the calculator will indicate metering spool and motor rpm's for various options.

<https://www.bossagriculture.com.au/calculator/>

See section 3.7 to find spreader constant.

Use lowest normal planting speed.

Figures estimate the impact of fitting spool covers.

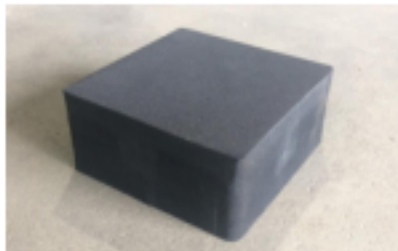
Spreader Constant - (no spool covers)	400	mm/m
Target Rate (kilograms per Hectare)	25	kg/ha
Engine RPM in Minutes	10	min
Planting Speed in Kilometres per Hour	8	km/h
Primary Reduction - Hydraulic Motor to Input Shaft	10 100	Ratio
Secondary Reduction - Output Shaft to Metering Shaft	10.00 1	Ratio
Non Effective Reductions		Ratio
Gears in roller Speed	1 1	Ratio
Calculate		
Spool RPM to Achieve Target Rate		647 rpm
Hydraulic Drive RPM		647 rpm
Use with 30% Spool Cover		647 rpm
Use with 50% Spool Cover		647 rpm
Planting Coverage		647 rpm
Applied from the 50%		647 rpm
Gears (displayed per second in measurement)		1

Example of output from the metering roller calculator

3.3.4 Blocking unused lines in metering units

Any lines not carrying product in metering units must be blocked in all bins with foam plugs to prevent air line crossover. Plugs must be installed in every unused line in every metering unit so that air cannot transfer between lines.

90x90mm square foam blocks [part no. 937-105] are supplied for this purpose. The blocks are cut oversized, so they will be installed with compression when in the seed gallery as shown below. Use of a non-solvent lubricant such as Lanox is recommended to aid installation.

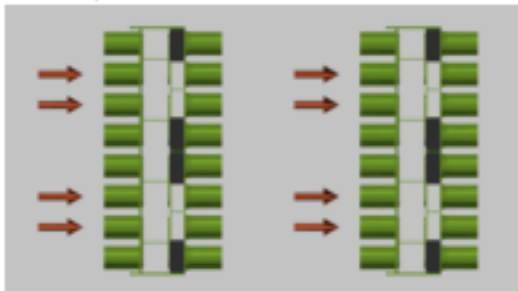


Foam block 937-105

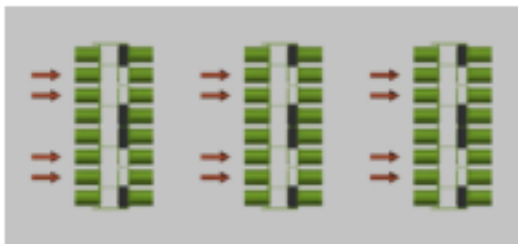


Foam block installed in gallery

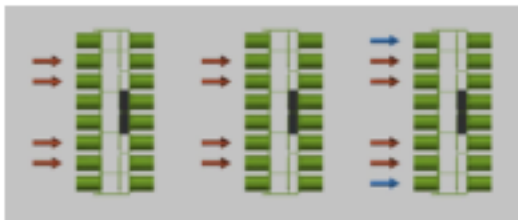
Where to position Foam Blocks



2-bin, bleed-through in this example of a 2-bin, 4-line bleed-through setup, all unused galleries are blanked.

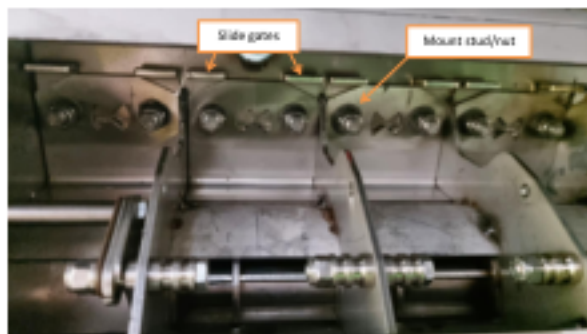


3-bin, bleed-through in this example of a 3-bin, 4-line bleed-through setup, all unused galleries are blanked.



3-bin, double shoot: in this 3-bin, 4-line setup, all unused galleries are blanked.

3.3.5 Slide Gate Settings



BOSS metering units are equipped with one slide gate assembly per metering roller. Gates can be set in either fully open or fully closed position to suit seed size and metering rollers.

NOTE: Must be down for small seeds roller.



Slide gates, seen from above in lowered position. This is the standard setting.

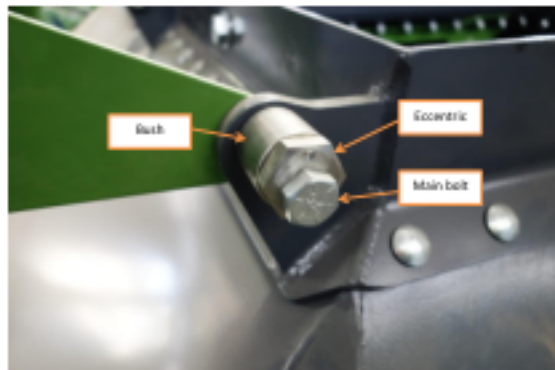


Slide gates, seen from above in raised position. This configuration is suitable for coarse seeds such as faba beans or broad beans. Raised gates may be required for difficult products such as oats or very high rates of fertilizer.

3.4 Bin Lid Adjustment



Bin lids are equipped with eccentric locking rollers



To Adjust, loosen main bolt and rotate eccentric until lid lock bar engages tightly. Re-tighten main bolt.

3.5 Bottom Door Adjustment



Like the bin lid catches, metering unit bottom doors are equipped with eccentric adjusters.



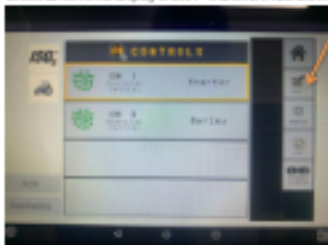
To adjust, loosen main bolt and rotate eccentric until bottom door closes tightly. Re-tighten main bolt.

3.6 Valve Calibration (Dickey John)

On initial operation, a valve calibration should be done prior to any product being put in the bin, to set the correct relationship between control solenoid percentage and oil flow to the drive motor.

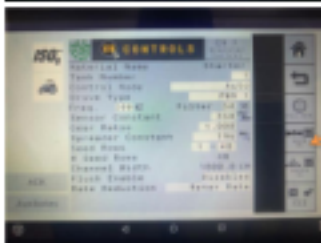
Valve calibrations should also be performed at the beginning of every season or whenever a different tractor is used.

Universal terminal display shown – if different rate controllers are fitted contact your supplier for information.

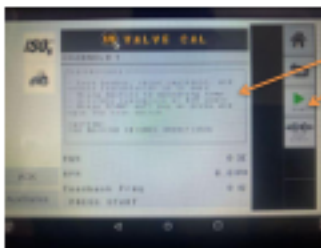


From the home screen, press 'HYDRO CONTROLS' and select the channel to be calibrated and press 'EDIT'.

Hydrodrives consume 6-10L/min each and share common pressure and return lines. Before starting the procedure the relevant hydraulic remote must be in constant flow. As tractors vary in oil delivery, allow 50% margin above the calculated flow required for all drives.



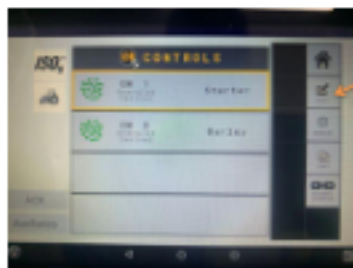
Press 'VALVE CAL'.



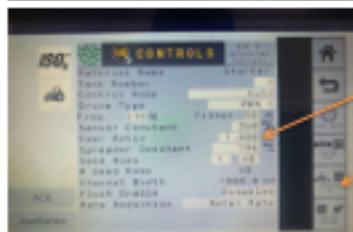
- Carefully read the instructions on this screen
- To commence Valve Calibration press 'START'
- Then press 'CONTROL ON'

It takes a few minutes to complete the Valve Calibration. During calibration the Feed Meter will speed up, slow down, start & stop a few times.

3.7 Material Calibration

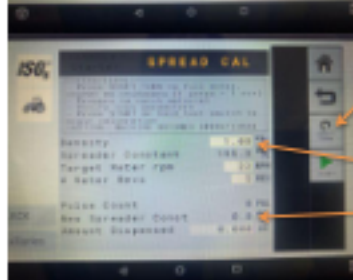


From the home screen, press IO controls and select the channel to be calibrated and press 'Edit'



Gear ratio must remain as 1

Press SPREAD CAL



Press "SHAFT TURN" button until Feed Meter is full.

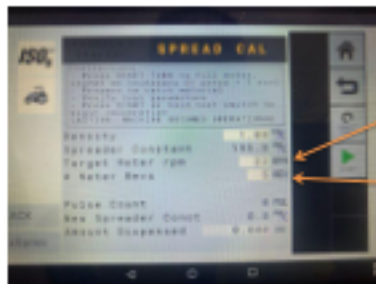
Density must remain as 1kg/L

Spreader constant will be shown here once a catch test is performed.



Place scales on level surface. Place large plastic tub on scales. Press tare to account for the weight of the tub. Press 'unit' to select between pounds and kg. Place tub under metering unit to be calibrated.

Calibration should ideally be performed at the actual shaft speed that will be used at normal planting speed. See section 3.3.3 for more information.



- Set "Target Meter RPM" at normal operating RPM. As operational rpm's vary, 15rpm is suggested as a starting point if actual shaft speed is not known.
- Set no. of "P Meter Revs" to collect approx 10kg. (You should collect 10 to 15Kg)
- Press "START" button.
- Press "CONTROL ON" button.

The meter will start up and begin dispensing material. When the Meter stops turning, weigh the Material.

Enter exact weight in "Amount Dispensed", Press "SAVE" to keep the New Spreader Constant.

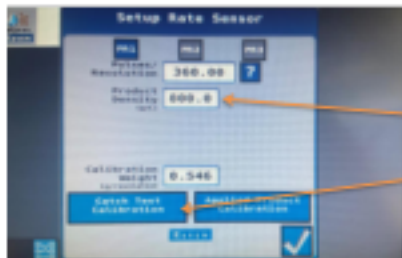
3.8 Raven Calibration



From the Home screen, press the Gear icon.



Then, press "Rate Sensor Setup".



Weigh 1 litre of product and enter into product density.

Then, press Catch Test Calibration.

Calibrate Rate Sensor

Enter the values below. Test time must be between 10 seconds and 10 minutes.

Product Density (kg/L)	800.0
Calibration Weight (kg)	9.546
Test Speed (km/h)	10.0
Rate (kg/h)	49.00
Desired Weight (kg)	12.000
Estimated Test Time	00:59

✕ 📄 🖨

Enter test speed, seeder rate, and desired test weight (10-15 kg recommended for main bins).

Calibrate Rate Sensor

Turn Master Switch on.
Press Start to begin test.

Master on

Start

Master: Turn the master switch off to stop application.

✕ 📄

Turn master on and then press start.

Calibrate Rate Sensor

Enter amount of product applied and accept new calibration value.

Amount Accumulated by Rate Controller (kg)	12.045
Actual Amount Applied (kg)	12.000
Old Calibration Weight	9.544
New Calibration Weight	9.542

Product 1 Granular

✕ ✓

Weigh and enter weight (actual amount applied). Recommended 2 calibrations (minimum). Old calibration and new calibration weight should be very close to each other.

3.8 Electrical

Electrical Module

The electrical module is mounted inside the front chassis rail (below product bins). Remove Control module cover to access fuse locations. All fuses are automotive blade type.



Electrical module layout for Dickey John ISOBUS systems. For third party control systems (i.e. Greenstar, Trimble etc.) contact system installer for details.

Mini CAN Terminator

ISOBUS based systems are equipped with a Mini CAN terminator after the last implement controller in the system. On BOSS air seeders it is conveniently located in or adjacent to the electrical module. The Mini CAN terminator should be seated firmly in place and the plug retainer clip closed.

4 OPERATION

4.1 Hitching

All BOSS air seeders are designed for tow behind operation in conjunction with an appropriate pull and drawbar connection to the planter. While configurations vary, the following general procedure should be applied.

- Ensure that the air seeder pull is correctly aligned to the planter and that the air seeder wheels are checked.
- Reverse planter until cart pull and drawbar eyes are aligned. After pinning securely, stow drawbar stand.
- Check that hydraulic lines, air lines and wiring harnesses are properly routed through the loops and clamps along the drawbar. All lines must have sufficient slack to avoid damage when the machine is turned tightly.



ISOBUS compatible Connection Plug and hydraulic lines. Hydraulics are colour coded for identification.

- Connect all hydraulic lines making sure all hose ends are clean prior to connection. It is very important that the **case drain** (marked red) is returned to the tractor via a low resistance, low back pressure line to the main hydraulic reservoir. Hydraulic lines are colour coded and labelled for easy coupling to cross-frame lines:

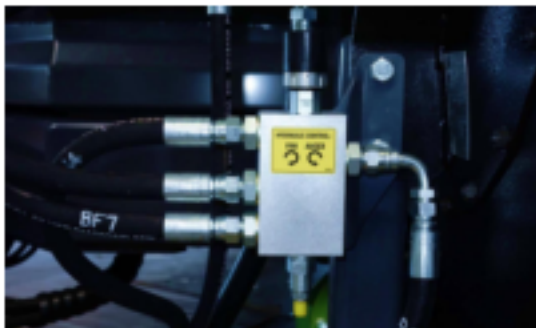
Colour:	Red	Yellow	Blue	Blue/Red
Line	Case Drain (3/8) Dump Line (3/4)	Blower Fan (1/2)	Hydra-Drive Pressure	Hydra-Drive Return

- Connect primary lines to manifold and tighten hose clamps securely.
- Connect electrical wiring plug
- Double check case drain and dump line for correct seating

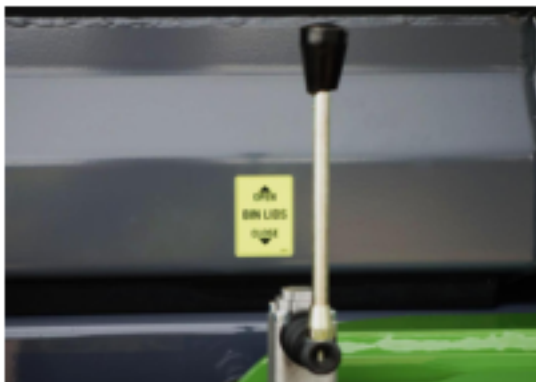
4.2 Auger Operation – Filling



4.2.1 – Unlatch auger transport latches.



4.2.2 – Turn oil diverter valve to 'auger' position



4.2.3 – Open bin lids using remote hydraulic control



4.2.4 – Check bin fill strainers for cleanliness. Remove strainer to check inside bin and metering unit. Remove any foreign matter that could cause blockages.



4.2.5 – Position auger using remote controls. The auger can be positioned for both bin filling and emptying



4.2.6 Operate controls with left hand, while steering extension bar with the right.



Be very mindful of overhead obstacles, particularly catwalks & Power Lines.
Do not operate without safety screen on auger.



Once auger is fully extended, lower auger until hopper heel contacts ground. The auger pivots are designed to allow filling either bin without repositioning hopper and truck.



4.2.7 – When correctly positioned in cradle, engage auger. Controls are conveniently duplicated for operation from either the top of the auger or from ground level.



4.2.8 – After filling, park sugar in cradles, close locking handles and engage locking plunger. Close bin lids. Return distributor manifold to the “far” setting.

4.3 Auger Operation – Unloading

Repeat steps 4.3.1 to 4.3.3 above. With auger removed from cradles and with the hopper at ground level, the following should be applied.



4.3.1 – Flip rubber skirt down on auger to increase clearance under air seeder.



4.3.2 – Position hopper under bin to be emptied and flip rubber skirt up



4.3.3 – With auger engaged, open bottom door and lock back

Open bin bottom door via handle. The air tunnels may also be removed to assist product flow.



4.3.4 – Removal of air tunnels. These parts simply clip into place.

After emptying, return auger to parked position and isolate cylinder following the steps outlined in section 4.1.

4.4 Blower Fan

WARNING: Blower Fan speed should not exceed 4500rpm (4000rpm with optional Z2 series fan).



The CASE DRAIN hose (marked red at fan and at drawbar) **MUST BE CONNECTED** to prevent damage to the fan motor.



19s blower fan complete with remote intake and strainer

Setting the Fan Speed

The blower fan is driven by a high-power hydraulic motor. By increasing or decreasing the oil flow to the motor the blower speed and hence the airflow volume can be controlled. All BOSS air seeders are equipped with a fan speed sensor, which displays fan rpm on the in-cab console. Setting the blower speed to correctly match the equipment and required sowing rates is important for operating the Air Seeder to maximum efficiency.

Checking Fan Speed

While stationary, set control screen to manual speed mode and set to the maximum expected planting speed. Do not engage drives yet.

To check the blower speed setting, set the fan speed to 3750 rpm and remove the secondary head cap furthest from the fan. With the blower operating engage the metering unit drives using the maximum application rate and using the highest [manual] speed. The material should rise 2 – 4 metres above the secondary head at planting speed. If the material rises too high or too low adjust the blower speed accordingly.

Tractor Hydraulic System Requirements

Both the blower fan and metering unit hydraulic drives must be fitted to priority hydraulic circuits for steady, constant speed operation. Most modern tractors feature variable displacement (closed centre) hydraulic systems, in which the oil flow to the priority circuits is constant regardless of other loads.

If there is uncertainty regarding the type of hydraulic system on the tractor, consult the tractor Operators Manual or the tractor Dealer.

Blower Pressure

BOSS Air Seeders are equipped with an air pressure sensor, with readout integrated into the in-cab console.

The sowing width of the implement, the size and number of outlets, ground speed, sowing rate of seed and fertiliser, the texture and weight of the material will all have an effect on how much air pressure is required.

Blower speed and pressure does not control the sowing rate but it is very important that enough air is available to move the required amount of product from the bin to the top of the secondary head without blocking (too little air volume) or causing seed bounce (too much air volume). Higher ground speeds and higher sowing rates require greater quantities of seed and fertilizer to be moved in a given time which requires greater air volume.

Air Seeder Delivery Capacity

The heavy duty hydraulic motor fitted to BOSS Air Seeders is rated to deliver a up to 750kg per hour per primary line depending on the bar configuration, planting width and seed types.

Calculating Delivery Rate

The information required for calculating the delivery rate is:

- Ground speed at which the air seeder is to sow.
- Sowing rate required i.e. total kilograms per hectare
- The sowing width

The formula for calculating tonnes per hour using this information is given below.

$$[Sowing\ Width\ (m) \times Sowing\ Rate\ (kg/ha) \times Speed\ (kph)] / 10000 = Usage\ Rate\ (Tonnes/h)$$

For a 12m machine planting 100 kg per hectare at 10 km/h, the formula would read:

$$[12m \times 100kg/ha \times 10km/h] / 10000 = 1.2\ tonnes\ per\ hour$$

4.5 Multiple shooting and blending

BOSS Air Seeders can be configured to deliver different blends of product for up to two seed tubes per tyne or disc. Alternatively, two different product lines can be kept separate and planted into separate zones.

4.5.1 Vein Assembly

Eight-roller metering units are supplied with four vein assemblies. These can be adjusted to divert metered products to adjacent tubes, for example partially blending fertilizer with seed.

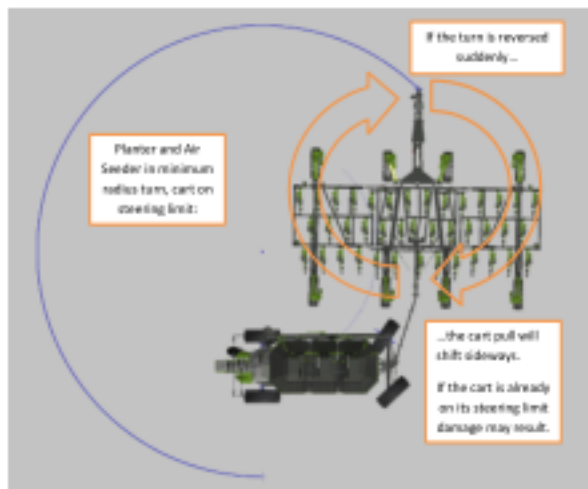


Vein Positions and Ratios

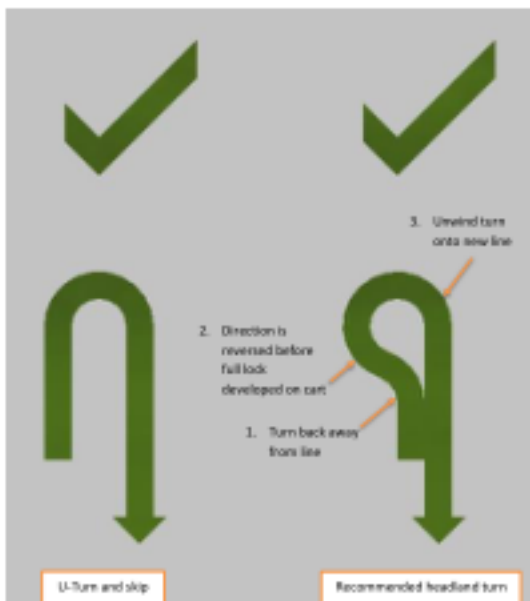
Vein Position	Ratio
First Hole	75/25
Second Hole	50/50
Third Hole	25/75
Fourth Hole	100/0

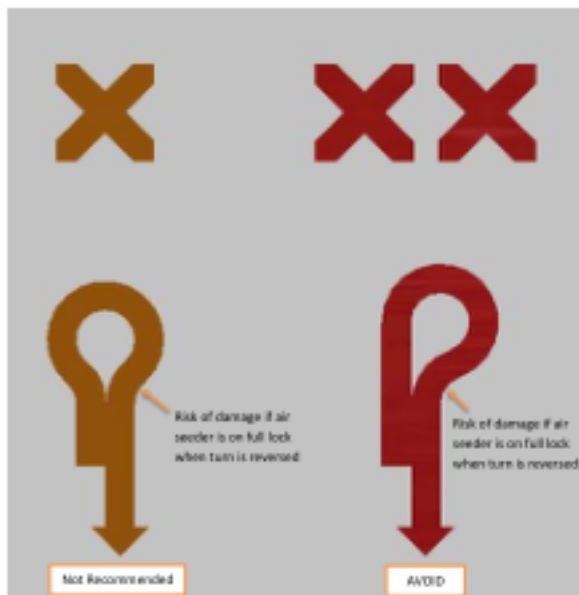
4.6 Headland Turns

Good headland turning technique will minimise the strain placed on steerable air seeder components while negotiating tight headland turns, and prevent overloading the drawbar and associated components. It is important to understand the behaviour of the planter rear cart pull during a turn and while reversing the turn direction, as illustrated below:



In cases where the air seeder minimum turning radius is greater than half the planter width, conventional up & back turns cannot be used - instead one of the following patterns must be adopted:





5 SERVICE AND MAINTENANCE

SERVICING & MAINTENANCE REQUIREMENTS:



SHUT OFF THE TRACTOR ENGINE, REMOVE THE KEY FROM THE IGNITION AND BE CERTAIN THAT ALL MOVING PARTS HAVE STOPPED BEFORE SERVICING.

BEFORE SERVICING MAKE SURE WHEELS ARE CHOCKED AND SAFETY PINS ARE IN PLACE.

5.1 Maintenance during the Break in Period

After the first 5 hours of field operation –

- Check & tighten all bolts.
- Check & tighten all wheel nuts and wheel bearing caps.
- Check hydraulic hoses.
- Check air lines, bin lids etc. for air leaks

5.2 Daily Maintenance

- Ensure bin lids are closed tightly before operation
- Check for air leaks before operation
- Check metering rollers for product buildup
- Visually inspect bolts and tighten any that have become loose
- Ensure that ladder[s] are stowed and pinned before operating machine



5.3 Periodic Maintenance – every 100 hours

- Every 100 hours grease metering unit bearings, driveshafts and chains with 2 pumps of grease only (excessive use of grease will unseat seals).



- Every 100 hours grease steering rod ball joints (steerable carts only)



Every 100 hours grease auger pivots with 2 pumps of grease only (excessive use of grease will pop the seals out).

- Visually inspect bolts and tighten any that have become loose.
- Check metering rollers and locking grub screws, adjust or tighten as required.

5.4 Annual Maintenance/every 250 hrs (whichever comes first)

- Grease the wheel assemblies until old grease is purged



- Check bearings for excessive play and tighten or replace if necessary.
- Change hydraulic filter cartridge



- Check all pins and bushes for wear and replace as required.
- Clean and wash the machine down touching up any areas where paint has been removed.

5.5 Checking for air leaks

With the blower fan operating, the air seeder bins are pressure-equalised via the metering units. Air leaks can cause loss of pressure or pressure imbalance and as a result sowing rates may become erratic or stall. It is therefore very important that air leaks are eliminated from the air delivery system.

To avoid problems with the sowing rates regular checks are recommended following the steps below:

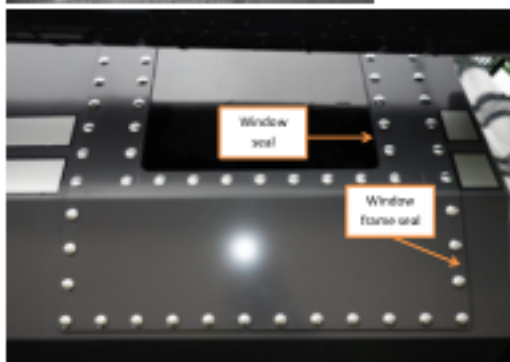
- Block off all primary lines, apart from one at the front manifold. The air restriction will result in back pressure in the bins and metering units.
- Run the blower at approx. 3500 rpm. Air leaks, with the exception of bin dividers, can be detected by looking, listening, and running hands around the sealing areas feeling for any air escaping around the seals.

Check the following areas for leaks:

- Bin lid seals and between coaming and bin



If air leaks are detected around the bin lids, stop the blower, open the lids and check the condition of the seals. Repair and adjust if necessary.



- Check bin window seals



- Sealing between metering units and bins.
- Metering unit windows.
- Metering shaft and agitator shaft seals.
- Bin dividers
- Bottom door



Unlike other areas, bin dividers cannot be checked with the fan running. Check for tell-tale signs of air movement, such as small areas blown clean of dust. Repairs should be carried out according to section 3.2, but with the leaking divider re-sealed and returned to the same place.

A spray bottle and warm soapy water can be helpful if leaks are suspected



6 TROUBLESHOOTING:

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
a) Application Rates Below Target Rate	Bin lid leaking	a) Check bin lid is closed and latched b) Check condition of lid seal and replace if necessary c) Check for broken or loose bin lid latch or hinge d) Check and adjust bin lid for air tight seal
	Slide Gate incorrectly adjusted	Check and adjust as appropriate for product being metered (see Section 3.3.2)
	Metering roller blocked or product buildup	Check and clean metering rollers
	Metering rollers damaged	Check condition of metering rollers. Check roller type is appropriate for product.
	Air leak between bins	Look for 'tell-tale' signs of bin divider air leaks and, if necessary, reseal the bin dividers
	Air Seeder metering calibration incorrect	Check calibration (see Section 3.6)
	Scale calibration incorrect	Check load cell/scale with a known mass. Ensure load cell is tared out with empty container before metering unit calibration commences
	Differing rates of airflow required to move fertiliser and seed	Fit air restrictors to low rate lines (see Section 3.3.3)
b) Application Rates Below Target Rate	Air leak between bins	Look for 'tell-tale' signs of bin divider air leaks and, if necessary, reseal the bin dividers
	External Air leak	Check metering unit bottom doors, windows etc. (see Section 3.5)
	Slide Gate incorrectly adjusted	Check and adjust as appropriate for product being metered (see Section 3.3.2)

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
	Metering rollers damaged	Check condition of metering rollers. Check roller type is appropriate for product.
	Air Seeder calibration incorrect	Check calibration (see Section 3.6)
	Scale calibration incorrect	Check load cell with a known mass. Ensure load cell is tared out with empty catch bag before metering unit calibration commences
	Blower air volume is too high	Check and adjust blower air volume to the minimum required especially with small seeds.
c) Seed Bounce	Airflow rate too high	Check and adjust blower air volume to the minimum required especially with small seeds.
	Differing rates of airflow required to move fertiliser and seed	Fit air restrictors to low rate lines (see Section 3.3.3)
d) Seed Damage	Airflow rate too high	Check and adjust blower air volume to the minimum required especially with small seeds.
	Differing rates of airflow required to move fertiliser and seed	Fit air restrictors to low rate lines (see Section 3.3.3)
	Incorrect metering roller type	Ensure metering rollers are appropriate for application (see Section 3.3)
e) Tube Blockages	Air Volume too low	Check and adjust blower air volume to the minimum required especially with small seeds.
	Sowing tube restrictions	a) Check for, and repair any airline restrictions e.g. kinked hoses, sowing boot blockage etc. b) Check planter air tube for any abrupt changes in direction etc.
	Hydraulic blower motor speed not constant	a) Check oil supply from the tractor is constant and not erratic b) Check blower motor supply line is correctly coupled to priority hydraulic coupling on the tractor
	Moisture in product being applied	Ensure that any seed or fertilizer used is clean and dry

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
f) Inconsistent product delivery to metering unit	Bin lid leaking	a) Check bin lid is closed and latched b) Check condition of lid seal and replace if necessary c) Check for broken or loose bin lid latch or hinge d) Check and adjust bin lid for air tight seal
	Product bridging	Ensure product is dry and that product coatings aren't causing the product to 'hang' in the bins. Check operation of agitator shaft.
	Slide Gate incorrectly adjusted	Check and adjust as appropriate for product being metered [see Section 3.3.2]
g) Blower not operating correctly	Tractor hydraulic system surging or failed	Consult the authorised Tractor Dealer
	Hydraulic line from the tractor to the blower motor not connected correctly	Check hydraulic lines
h) Blower hydraulic system running hot	Restriction in motor return line	Check all breakaway hydraulic couplings between the Air Seeder Hydraulic blower motor and the tractor are correctly matched
	Blower running too fast	a) Check blower speed is not too fast for the sowing operation. Max fan speed 4500rpm (4000 rpm for 22s fans). b) Check seeding kit is set up correctly with no restrictions.
	Hydraulic filter blocked	Change cartridge. Replace with 20 micron element.
i) Hydraulic metering drives not operating correctly	Metering roller obstruction	Check that there are no obstructions above roller and that roller rotates freely (it may be necessary to remove driveshaft/drivechain)

PROBLEM	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
i) Hydraulic metering drives not operating correctly	Hydraulic line from the tractor to the drive motor not connected correctly	Check hydraulic lines. If necessary operate override thumb screw to confirm correct oil supply (Section 3.3)
	Hydraulic lock	Check that all hydraulic couplings are fully seated and that all poppets are open
	Rate controller speed source	Check that an appropriate speed source is used and functioning (i.e. GPS, radar, manual speed). The rate controller will not apply product unless a speed source is registered.
j) Rates fluctuate excessively	Valve calibration required	An up to date valve calibration sets the correct relationship between control solenoid percentage and oil flow to the drive motor. Should be performed at least once per season or any time a different tractor is used.
	Speed source not stable	Check that GPS, radar etc. is giving a stable output when moving at constant planting speed
	Oil supply insufficient	Increase remote flow percentage to allow min 15Lpm per drive plus 10% allowance
	Metering shaft speed too slow	a) Check if the appropriate roller is being used for the product type and application rate (see section 3.3) b) Consider fitting 1/3 or 2/3 window spool covers to restrict application and increase shaft speed (see section 3.2)

7 AIR SEEDER OPTIONS:

- + Tyre upgrades available
- + Loading/unloading auger or elevator
- + Oil Cooler
- + Stainless steel metering units
- + Stainless steel auger
- + 450L small seeds box (9000L models only)
- + 600L small seeds box (4500L, 12000L models)
- + 1200L small seeds box (20000L models only)
- + Metering rollers configured to your requirements
Summer or winter planting, small seeds etc.
- + Spare rollers pre-configured for various conditions
A simple slide in/slide out changeover
- + Rear pull – floating or fixed
- + Oversize Sign
- + Beacon, running lights and tail lights
- + Section control
- + Load cell systems
- + 8- or 16-line metering units
- + Dual fans optional
- + Compatible with third party rate controllers

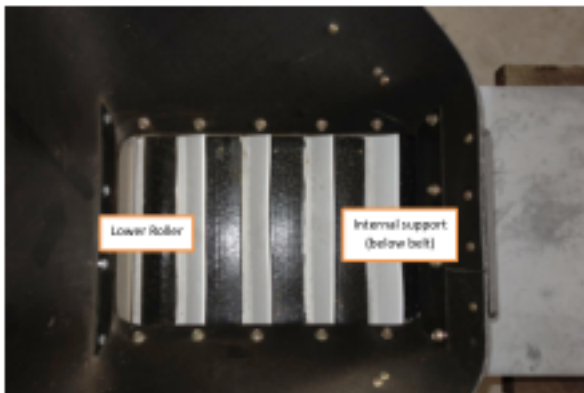
Appendix A – Optional Elevator

An upgrade option exists to replace the auger with a cleated belt elevator. Operational principles remain as per the standard auger (see section 4.2), but special setup and maintenance procedures must be adhered to.

A.1 Belt Tension

In order to determine belt tension, the midpoint between the lower roller and internal belt support must be located (image below).

With a 5 kg force applied to the midpoint between the lower roller and internal support, the belt should deflect 5mm. Do not operate the elevator with the belt too loose or too tight.



A.2 Conveyor rpm

Conveyor rpm can be controlled via the needle valve mounted on the main control valve. Do not run the conveyor at speeds exceeding 3

