Electro-Magnetic Compatibility (EMC)
This product complies with Council Directive 89/336/EEC when installed and used in accordance with the relevant instructions.

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Wizard Applicator Control System

Installation, Calibration and Operation

Software Reference WZ410-000 rev.010

Contents

1. Overview

The *Wizard Applicator Control System* enables fully automatic control of the seed rate of the Stocks Turbo Jet pneumatic Applicator.

The RDS Wizard automatically maintains a preset application rate as forward speed varies, with on-the-go adjustment of rate. The instrument measures and indicates;

- Forward Speed
- Part Area and Total Area worked
- Seed Application Rate (kg/ha or Seed/m^2)
- Fan Status (On/Off)
- Low Hopper Level

There are also audible and display alarms for,

- Fan off
- Minimum / maximum forward speed (beyond which the programmed seed rate cannot be maintained).
- Feed motor stopped (no feedback)
- Feed motor stalled

The head unit is powered on and off via a toggle switch on the rear of the instrument.

A second switchbox in the cab is used to switch the fans on and off as well as the feed motor. The feed motor is also switched on and off *automatically* via the implement-mounted cutout finger switch as the implement is raised and lowered.

Area totals and all calibration data are automatically stored in memory when the instrument is powered off.

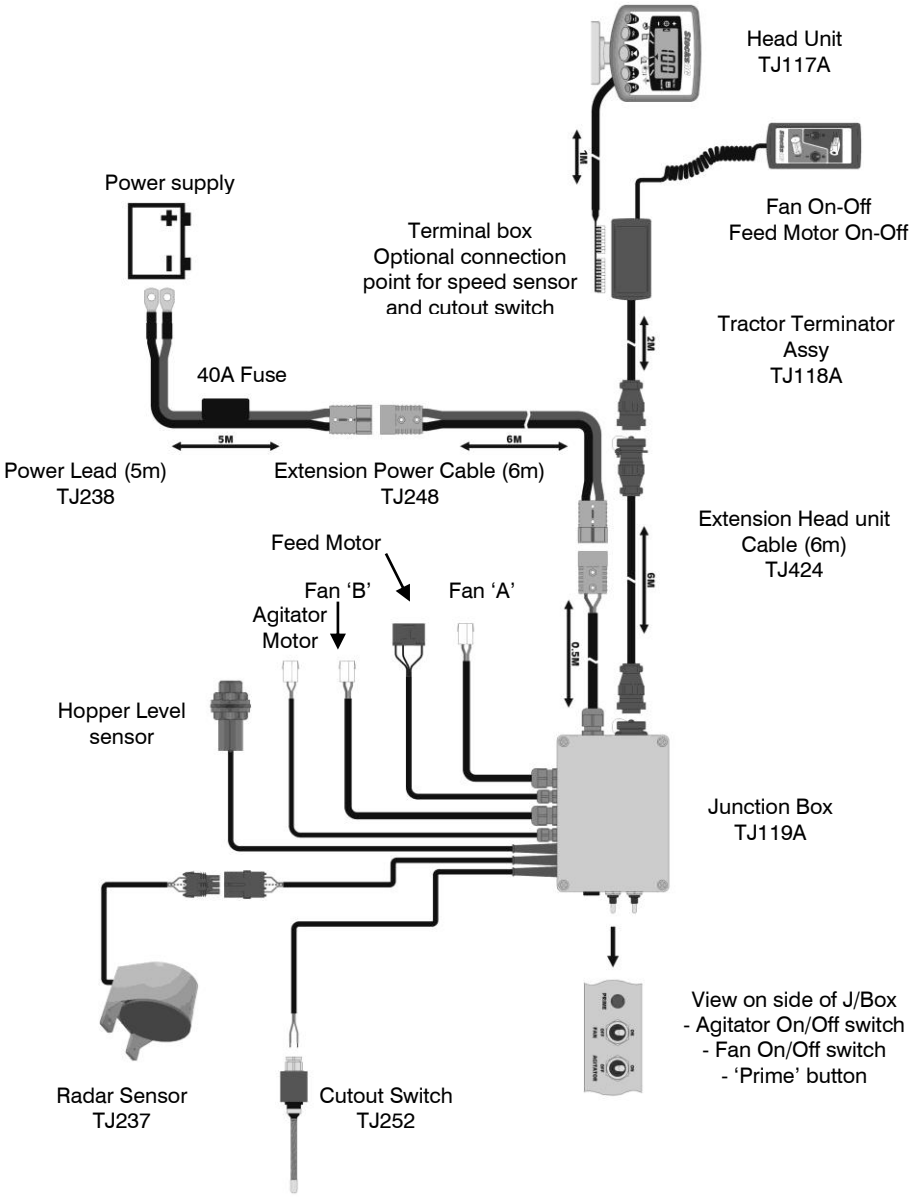
The system must be initially calibrated for the seed being applied. Seed calibration is very simple to undertake via a priming switch provided on the junction box fitted on the drill. The junction box has an on-off switch to switch the fans off during calibration, and an on-off switch to operate the agitator shaft when sowing grass.

1.1 Programming Modes

There are 4 programming modes with various calibration factors and default settings. Access to the programming modes is required for some settings which may be changed as part of the normal operating procedure. Changing these settings is described with the operation instructions (sections 4,5,6,7,and 8).

Other settings are made on installation and do not normally need to be changed. These settings are appended to in the back of this manual (section 9). The operator does not normally need to refer to them.

2. Installation



2.1 Parts List- Kit Ref. P/STOCKS/WACS

The kit contains the following parts,

RDS Part No.	Description	Qty
TJ117A	Stocks WACS Head Unit	1
TJ118A	Stocks Switch and Tractor Terminator Assy	1
TJ119A	Stocks WACS Junction Box Assembly	1
TJ242	Instrument Lead Extension – 6m	1
TJ238	Power lead Assy c/w 40A fuse – 5m	1
TJ248	Power Lead Extension – 6m (79A)	1
TJ237	Radar Sensor Kit	1
TJ252	Finger Cutout Switch Kit	1
TJ235	Head Unit Mounting Kit	2
	Cable Tie	30
Options		
TJ246	Power Lead Extension – 4m (79A)	
TJ250	Power Lead Extension – 10m (79A)	
TJ240	Instrument Lead Extension – 4m	
TJ244	Instrument Lead Extension – 10m	

All Wizard Applicator Control System (WACS) components integral to the Turbo Jet unit are factory fitted. The remaining components need to be installed in the field,

- Head Unit
- Tractor Terminator Assy
- Power cable from battery
- Radar Sensor (onto the drill or the tractor).
- Finger Cutout Switch (onto the drill or the tractor)

Separate heavy-duty power cable and head unit leads interconnect the tractor and the Turbo Jet. 4m and 10m versions are also available to suit the length of the implement train.

NOTE: The recommended maximum combined length of power cabling from battery to junction box is 30m.

2.1 The Head Unit

Confirm with the operator on where to mount the head unit in the cab. It must not restrict the view out of the cab, nor impede the use of the controls. The head unit is fitted with a 1-metre flying lead terminating with an 8/10-way IDC type connector, ready for connection into the "Terminator" junction box.

The head unit is supplied with mounting kit ref: TJ235 comprising the following parts (fig. 2):

1 Long Bracket
1 Short Bracket
3 Clamping Knobs
1 Cover Plate
1 Mounting Plate
2 Self Tapping Screws

Figure 2 : Head Unit Mounting Kit

1. Snap the cover plate into the recess of the long bracket (it only fits one way).
2. The instrument mount is designed to offer maximum flexibility in positioning the head unit, either from the right hand side of the cab, from the dashboard or from an overhead position.

   Assemble the two brackets, and mounting plate with clamping knobs, and attach to the head unit.

NOTE: Either the long or short bracket can be attached to the head unit, whichever gives the most suitable orientation.

Having established the orientation for the bracket, fix the mounting plate to the cab with the self tapping screws provided.

Do not drill into a ROPS or FOPS frame.

If you are fixing the mounting plate to plastic e.g. the dashboard or other cab moulding, it is recommended to use M4 screws with mudwing washers to strengthen the mounting point.

Do not attempt to adjust the mounting bracket assembly without first slackening off the clamping knobs sufficiently. You will only succeed in damaging the bracket otherwise.

2.2 The 'Tractor Terminator Assembly'

Mount the Fan/Metering Switch box in a convenient position using the second mounting kit ref. : TJ235 (see above).

Remove the lid of the terminal box by squeezing the sides and connect the head unit lead as shown in figure 3 below.

The Terminator is not a waterproof enclosure. Locate it where it is afforded protection from possible water ingress and for neatness e.g. behind a trim panel or console.

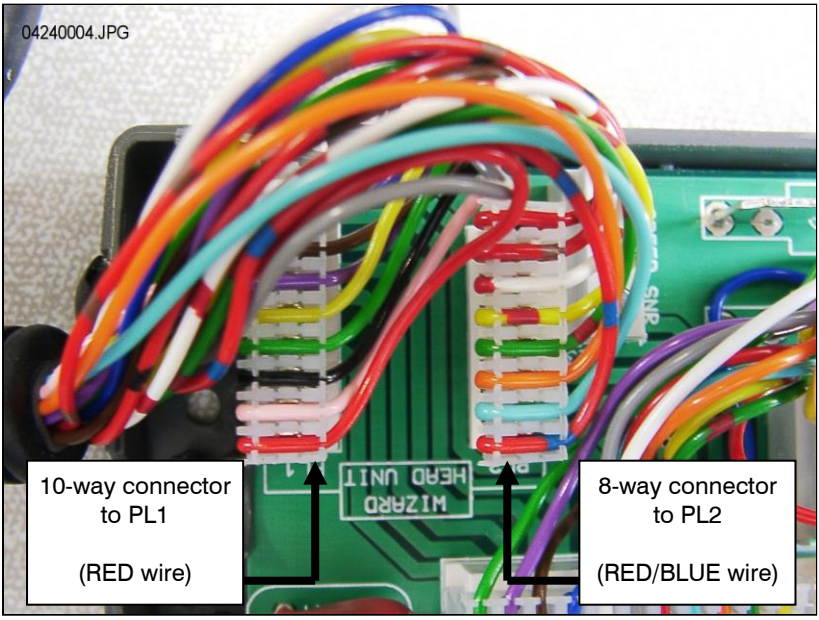


Figure 3 : Head unit connection

NOTE: The head unit receives its power supply from the junction box on the Turbo jet. The power supply terminals in the Terminator are not used. The circular (CPC) connector trails to the back of the tractor to connect up to the extension lead.

2.3 Power supply

Connect the power supply cable to the battery terminals and route the cable to the rear of the tractor. Where possible follow the existing wiring loom and secure at regular intervals using the cable ties provided.

NOTE: The system has reverse polarity protection. If by chance the battery connections are reversed, the system will simply not function.

The power cable is fitted with an inline 40-amp fuse. For spare fuse links specify DURITE Pt No. 0-378-40. They should be available from most automotive parts factors. Do NOT be tempted to fit a higher rated fuse!

2.4 Radar sensor

The radar sensor may be fitted either to the drill or to the tractor. For fitting instructions please refer to the separate instruction leaflet ref. S/DC/500-10-511 provided in the kit ref. TJ237.

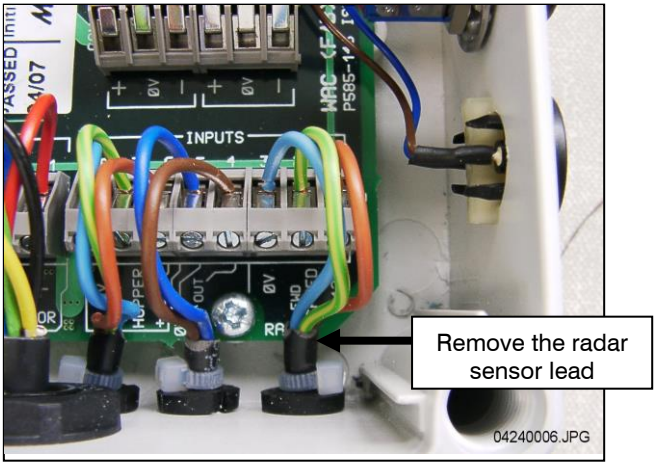
Connecting a drill-mounted radar sensor:

Simply connect the radar sensor lead to the lead from the Turbo Jet junction box (3-way Weatherpak connector). Coil any excess lead near the junction box and secure the lead from the sensor at regular intervals using the cable ties ***provided.***

Connecting a tractor-mounted radar sensor:

Open the Turbo Jet junction box and remove the sensor extension lead with the 3-way WeatherPak connector (fig. 4). Plug the hole to prevent water ingress.

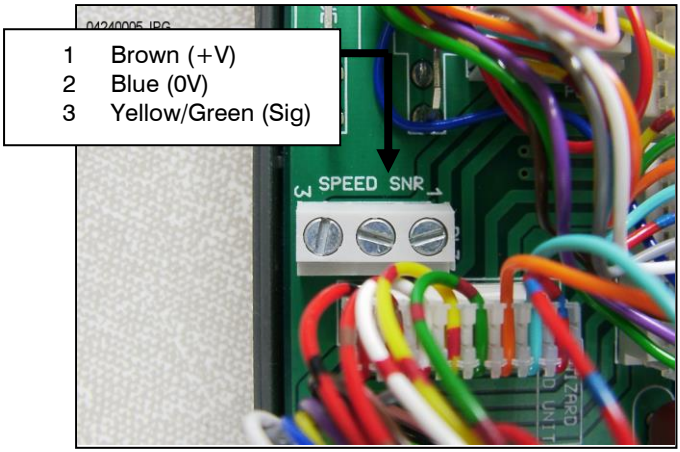
Figure 4



Connect the extension lead to the sensor and route back to the Terminator junction box. Where possible follow the existing wiring loom and secure at regular intervals using the cable ties provided.

Remove the lid of the terminal box by squeezing the sides, cut off excess cable length and connect the head unit lead as shown in figure 5 below.

Figure 5



The default speed sensor calibration factor (SSF) programmed in the head unit = '**7.78'** (millimeters/pulse). This is theoretically correct for the radar sensor when it is installed at exactly the specified angle to the ground. Often though, the sensor may not be exactly at the prescribed angle. It is therefore recommended that to ensure accurate speed measurement, you check the calibration value by performing an 'Autocal' procedure (please refer to section 4.4).

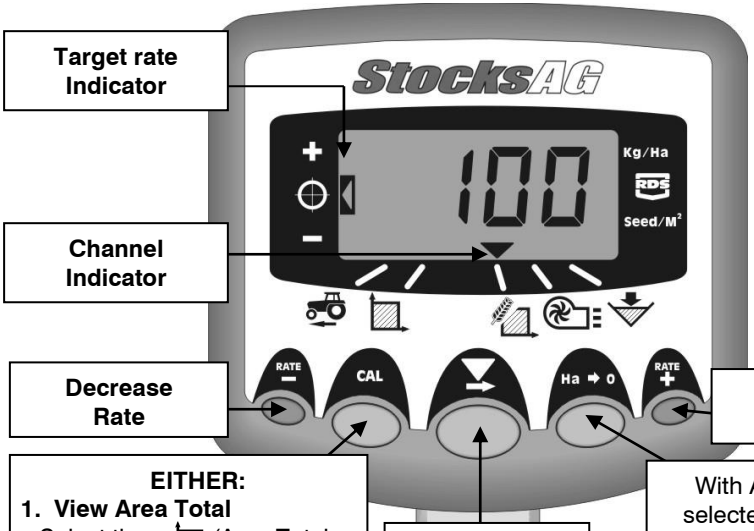
2.5 Cutout switch

The implement-mounted cutout finger switch enables the system to automatically start and stop operation as the drill is lifted and lowered. It therefore needs to be mounted in a suitable position to operate as the drill enters work.

NOTE: For fitting instructions please refer to the separate instruction leaflet ref. S/DC/500-10-121 provided in the kit ref. S/CUT/OUT/013.

3. Normal Operating Mode

3.1 Operating Summary



EITHER:

1. View Area Total
Select the (Area Total channel), then press the **CAL** button to switch between Area Total 1 and Area Total 2.

2. HOLD continuously for 10 seconds to enter CAL Mode 1 / CAL Mode 2 (Normal Mode is resumed when the button is released).

Press to select the Display Function

With Area display selected, press and HOLD for 5 secs to zero the selected area total
or,
HOLD whilst powering on to enter CAL Mode 3

CH	Function	Units
1	Forward Speed	km/h
2	Area Total 1 or 2	ha
3	(Not Used)	-
4	Seed Rate	kg/ha or seeds/m²
5	Fan Status	'On'/'Off'
6	Hopper level Status	-

These channels perform different functions when the instrument is set in to Programme Modes 1, 2, 3, or 4

3.2 Power On/Off

Switch the head unit on via the toggle switch on the rear of the instrument.

The instrument powers up and displays the software version installed e.g. 'A410' then 'E000' then 'R008' (software version WZ410-000 rev.008). It then enters its normal operating mode and displays the forward speed channel.

Select any other channel by pressing the ▼ (Channel Select) button once or more.

When the drill is out of work, the instrument will continue to display the selected channel.

3.3 Work Status Indicator

The ▼ indicator is used to indicate the channel to which the information on the display relates.

It also shows the working status of the drill. If the cursor is flashing then the drill is out of work, if the cursor is on continuously then the drill is in work.

3.4 Starting and Stopping the Seeder

The hand control is used,

(i) to switch the fans on and off.

NOTE: The fan switch on the Turbo-Jet junction box must be set in the 'I' position. This junction box switch is provided to disable the fan and enable product calibration using the 'PRIME' button.

(ii) to manually switch the feed motor on and off when the drill in work*.

The drill is also fitted with a cutout finger switch so that the feed motor starts and stops automatically when the drill is lowered and raised e.g. on the headlands.

* *The feed motor switch on the hand controller is not effective when the drill is raised out of work.*

3.5 Pre-start function

On commencing a bout, the seed motor only starts as you begin moving off, in proportion to your forward speed. However, it takes a short period for the seed to traverse the pipe to the coulter. The result is an unseeded area at the beginning of a bout.

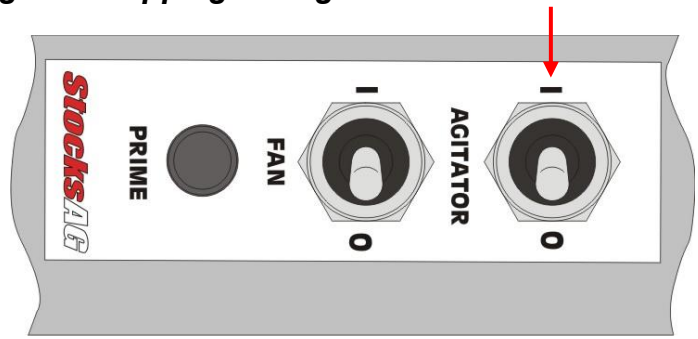
To avoid unseeded patches due to the delay in seed delivery, once positioned and stationary at the start of the bout, press the outside right switch ("**RATE +**"). The pre-start function is activated and the motor then runs at the calibration speed, so that seed is planted as you move off.

The pre-start function is timed to run the motor at the calibration speed for a number of seconds equal to the drill width in metres (e.g. 4m drill = 4 seconds pre-start). After this time and the drill is moving forwards, the system reverts to normal proportional control for the seed rate set. However, if after this time the drill is still stationary, the motor will automatically switch off.

3.6 Cutout Alarm

If the forward speed exceeds 2km/h with the drill 'out of work', the instrument will alarm by beeping and flashing '**C.out'** every 5 seconds. The alarm will continue until the drill is lowered into work.

3.7 Starting and Stopping the Agitator



Use the switch on the junction box to turn the agitator on or off as required. Use it for all grass seeds and mixes, or other seed that may bridge in the hopper, but it is not required for rape seeding or similar. If you use it in the field, also use it when calibrating.

With the agitator switch in the 'I' position, the agitator shaft will start and stop automatically when the drill is put into and taken out of work.

4 Forward Speed Display

4.1 View Forward Speed

The forward speed is derived from a radar sensor fitted either to the drill, or the tractor depending on your particular installation.

The speed is displayed in km/hr only.

Figure 6 : Select Fwd. Speed

4.2 Minimum Speed Alarm

As part of product calibration, based on the resulting calibration factor, the instrument automatically calculates the minimum forward speed below which the system cannot maintain the programmed seed rate.

With the drill in work, if the forward speed goes below this threshold the instrument display defaults to channel 1, flashes the actual speed and beeps continuously. The alarm will continue until speed is increased above the threshold. It may be cancelled temporarily by selecting another channel but will revert to channel 1 and repeat the alarm after 30 seconds until speed is increased.

NOTE: The application rate will not remain proportional below the minimum speed threshold. The feed motor cannot run below 3 rpm resulting in over-application.

4.3 Speed Sensor Calibration

The forward speed is derived from the speed sensor factor (SSF) – the distance travelled in millimetres for each pulse received from the radar speed sensor. The default factor is 7.8mm per pulse from the sensor, however this will only result in a correct speed display if the sensor has been mounted at the correct angle to the ground.

Failure to correctly programme the speed sensor factor will also result in the drilling rate being displayed incorrectly. Auto-calibration is likely to be more accurate than manual calibration and therefore it is recommended to perform an "Autocal" routine (see below).

4.4 'Autocal' Speed Calibration

Auto-calibrate in field conditions for maximum accuracy.

1. Place two markers 100 metres apart and position some reference point on the tractor (e.g. the cab step), opposite the first marker.

2. Select the forward speed channel.

3. Press and hold the **CAL** button until the cal factor appears on the display.

4. Continue holding the **CAL** button and press the **Ha>0** button.

   The display will show "**AUto**" ready to start the test run (fig. 2).

5. Drive up to the second marker and stop exactly opposite the marker. The instrument counts and displays the pulses received from the speed sensor over the measured distance.

NOTE: As the instrument only displays up to 9999. Beyond this number of pulses it displays the first 4 digits of a five digit number, however the pulses are still being counted internally.

6. Press the **Ha>0** button (fig. 8). The calibration factor is automatically calculated and stored in memory. The instrument then returns to the normal display mode.

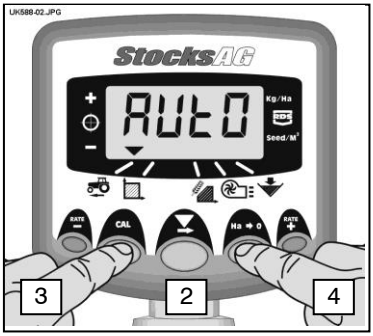
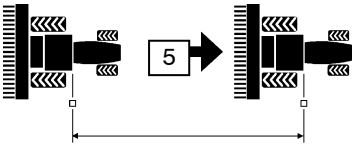


Figure 7 : Start AutoCal



100 metres

Figure 8 : Stop Autocal

5 Area Display

5.1 View Area Totals

The area display is derived from the forward speed input and the programmed implement width.

There are two area registers. Each can be independently reset to zero.

Press the **CAL** button to toggle between the two area registers '**tot.1**' and '**tot.2**'.

The display then shows the area accumulated since that total was last reset.

Figure 9 : Select Area Channel

5.2 Zero Area Total

1. Select the total 1 or total 2 and release.

2. HOLD the **Ha>0** button for 5 seconds.

The display flashes and the instrument gives 5 beeps, before the total resets to zero.

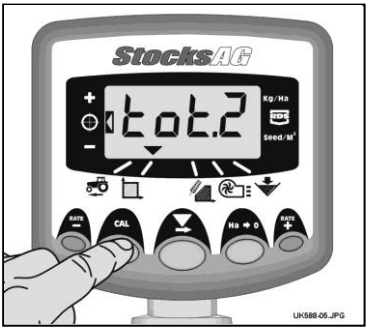


Figure 10 : Select Area Register 1 / 2

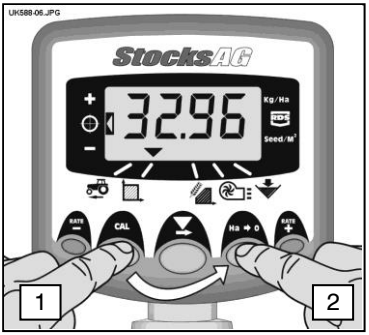


Figure 11 : Zero Area Total

5.3 Set Implement Width

1. Select the Area Total channel ( ).

2. Press and hold the **CAL** button for 5 seconds. The display will flash "**tot.1**", then "**tot.2**" then show the programmed implement width (fig. 12).

   Default width = 4 metres.

3. Continue holding the **CAL** button and PRESS to select the digit/decimal point to change.

4. HOLD to change the digit (or move the decimal point). Releasing the button selects the next digit (fig. 13).

5. Release the **CAL** button to return to the normal display mode.

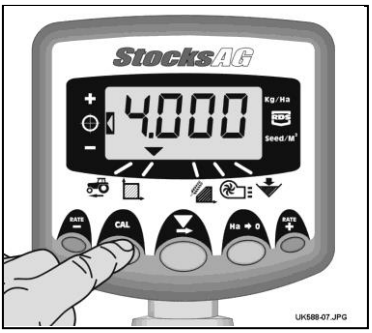


Figure 12 : View Implement

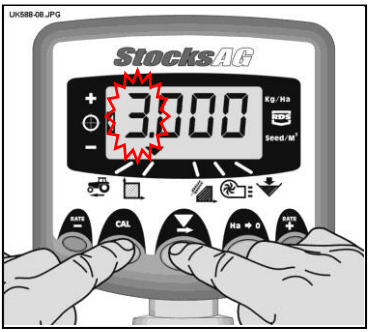


Figure13 : Change Implement Width

6. Drilling Rate Functions

6.1 View Drilling Rate

This channel displays the current drilling rate in either Kg/Ha or Seeds/m^2, depending upon the selection made in CAL Mode 3.
The resolution for Kg/Ha units is:

0 to 24.9	0.1 Kg
25 to 250	1 Kg
250 to 9995	5 Kg

The resolution for Seeds/m^2 is 1 Seeds/m^2

Figure 14 : View Drilling Rate (kg/ha)

6.2 Adjusting the Drilling Rate

Press the **RATE -** button to decrease the drilling rate.

Press the **RATE +** button to increase the drilling rate.

The rate adjusts by the % step programmed in programme mode 3, i.e. 5%, 10%, 15%, 20% or 25% of the programmed target or base drilling rate.

6.3 Drilling Rate Indicator

The left indicator is used to remind the operator of his drilling rate. When the indicator is in position 2, then the drill is operating at the target rate.

If the indicator is in position 1 then the actual rate is increased from the target rate.

If the indicator is in position 3 then the actual rate is decreased from the target rate.

Pos. 1

Pos. 2

Pos. 3

6.4 Changing the Target Rate

If the drilling rate is currently at the target rate (the rate indicator is in position 2), then:-

1. With the rate display selected, press and hold either the **RATE +** button or the **RATE -** button for 5 seconds (fig. 15), then release the button. The display will flash.

2. Press and hold either the **RATE +** button to increase the target rate, or the **RATE -** button to decrease the target rate (fig. 16). The longer the switch is held, the faster the number changes.

3. When the desired target rate is displayed, press and hold the ▼ button.

   The instrument will beep 5 times and the display will alternate between the set rate and the calculated minimum forward speed for that rate. After 5 seconds the instrument will display '**donE**' after which the button can be released to return to normal operating mode.

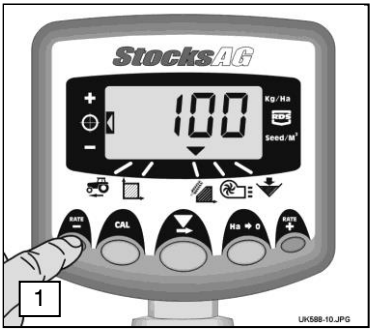


Figure 15 : View current Target Rate

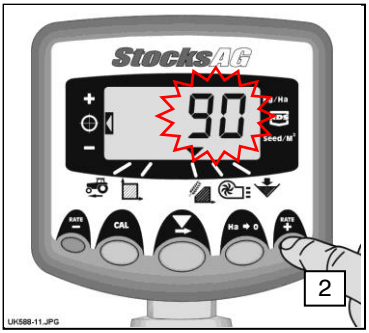
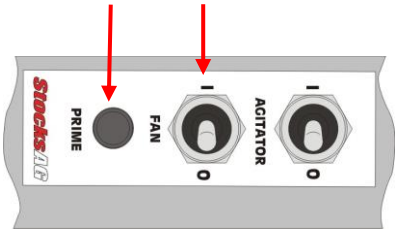


Figure 16: Adjust Target Rate

6.5 Product Calibration

Ensure the feed roll setup is appropriate for the intended seed type, application rate and forward speed range for application. Please refer to sections 5 and 6 of the Stocks Ag Fitting and Operating Instructions if necessary.

1. Switch the 'FAN' switch to the off ('O') position on the junction box. This automatically enables the product calibration function. Switch the 'AGITATOR' switch on ('I') for grass seeds that may bridge in the hopper – do not use for rape seed or similar.



2. Place a container under the seed outlet of the metering unit then press and hold the PRIME button to dispense the product.

3. The instrument automatically switches to the programme mode, and the display will count up the theoretical weight (in grams) of product based on the calibration factor currently stored in memory.

4. Once you have dispensed sufficient product, release the priming switch and weigh the product metered out. The theoretical weight will remain flashing on the display.

*NOTE: If the priming switch is held for long enough to exceed 9999 grams then the instrument will simply show '***HiGh***', informing the operator that he must re-test to ensure the weight does not exceed 9999 grams. Simply release the PRIME button and press again when ready to restart the count from zero.*

5. Adjust the displayed weight to match the measured weight using the **RATE +** or **RATE -** buttons.

6. Press the **Ha>0** button once to display the calculated minimum forward speed (see note 2 below).

7. Press the **Ha>0** button again to save the new calibration factor. The instrument displays '**donE**' to indicate the new factor is now stored. After 3 seconds the instrument reverts back to the normal operating mode.

8. Switch the 'FAN' switch back on.

NOTE 1: If you display the drilling rate in Seeds/m², check the T.G.W. (Thousand Grain Weight) setting is correct. (6.6).

NOTE 2: The Wizard makes the calculation from the entered working width, target application rate, and the metered weight delivered whilst calibrating. If you find that you cannot achieve your desired field speed, then re-configure the feed roll assembly and repeat the calibration procedure.

6.6 Set "Thousand Grain Weight"

The T.G.W. must be set in order enable the instrument to display a drilling rate in Seeds/m² correctly.

1. Press and hold the **Ha>0** button as you switch the instrument on. The instrument is then in programme mode 3 on channel 1 (fig. 17).

2. Press the **Ha>0** button to select channel 2 ( ).

   The display will show the Thousand Grain Weight in grams. *Default = 45 (gram)*

3. PRESS to select the digit/decimal point to change (fig. 18).

4. HOLD to change the digit (or move the decimal point). Releasing the button selects the next digit.

5. Switch off and on again resume normal operating mode.

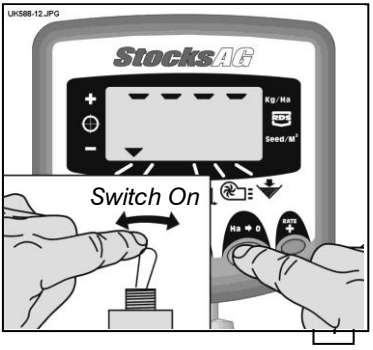


Figure 17 : Enter Cal Mode 3

Figure 18 : Adjust T.G.W. (Channel 2)

6.7 Select Unit

1. Press and hold the **Ha>0** button as you switch the instrument on. The instrument is then in programme mode 3 on channel 1 (fig. 17).

   The display shows either the top row of segments to indicate the *kg/ha* unit is selected, or the bottom row of segments to indicate that the *Seeds/m²* unit is selected.

2. Press the ▼ button to change units (fig. 19).

   If the *Seeds/m²* unit is set, check the T.G.W. setting is correct for the product being drilled (6.6).

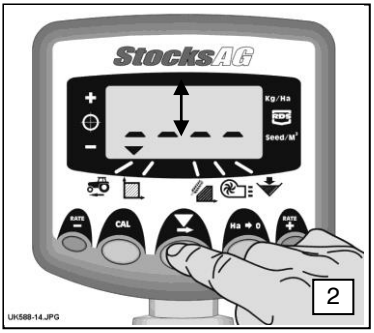


Figure 19: Change Units

3. Switch off and on again resume normal operating mode.

6.8 Set % Step for Rate Offset

This sets the amount by which the rate is adjusted away from the target rate when you press the **RATE +** or **RATE -** buttons.

1. Press and hold the **Ha>0** button as you switch the instrument on. The instrument is then in programme mode 3 on channel 1 (fig. 17).

2. Press the **Ha>0** button to select channel 3. The display will show a number indicating the % step (5 - 25% in 5% increments) (fig. 20).

3. PRESS ▼ to select the required % step.

4. Switch off and on again resume normal operating mode.

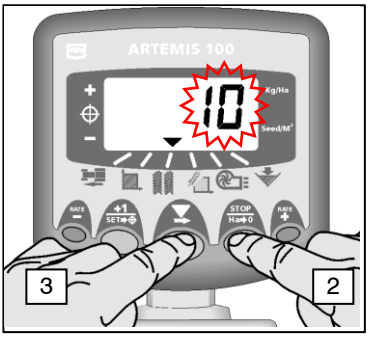


Figure 20: Set % Rate Step

7. Fan Display

7.1 View Fan Status

This channel simply indicates whether the fan is 'ON' or 'OFF'.

7.2 Fan Status Alarm

When the drill is in work and the fans are not switched on, the instrument will default to the fan status channel, beep 5 times and flashes '**Fan**' '**OFF**'.

8. Hopper level Alarm

When the hopper level sensor is uncovered, the instrument will default to the hopper level channel () beeps 5 times and flashes '**ALAr**' every 30 seconds.

The alarm may be cancelled temporarily by selecting another channel but will revert to the hopper level display and repeat the alarm after 30 seconds.

9. Programme Functions and Fault Diagnosis

9.1 Programme Modes 1 – 4

Some settings do not need to be accessed during normal operation, unless the system is transferred to another implement.

Those settings that need to be accessed during normal operation are explained in the operators' section (sections 3 - 8) of the manual.

	Mode 1	**Mode 2**	**Mode 3 (Product calibration)**	**Mode 4**
Mode Entry	From normal display mode, select channel and hold **CAL** button continuously	Press and hold **CAL** button for 10 seconds while switching instrument on	Press and hold **HA-0** button while switching instrument on	Press and hold **RATE+** button for 10 seconds while switching instrument on
Channel selection	-	Press **CAL** button	Press **HA-0** button	Press **RATE+** button
Channel 1	Speed Sensor Factor *[7.78 mm/pulse]* **(see section 4.3)**	Simulated Speed *[10 km/h]*	Unit Selection *[kg/ha]* **(see section 6.7)**	Pulses/metering unit rev. *[600]*
Channel 2	Implement Width *[4.0 m]* **(see section 5.3)**	Grand Total Area [ha]	T.G.W. *[45.00 g]* **(see section 6.6)**	Response *[1000]*
Channel 3	N/A	N/A	Rate - % Step *[5%]* **(see section 6.8)**	-------
Channel 4	Seed calibration factor *[0.5 kg/rev]*	-------	Expected Weight (0-9999 grams) **(see section 6.5)**	Motor Calibration Speed *[35 rpm]*
Channel 5	-------	Fan On/Off *[On]*	Minimum Fwd speed **(see section 6.5)**	Startup PWM *[20 %]*
Channel 6	Hopper Level Alarm On / Off *[On]*	-------	Calibration complete **(see section 6.5)**	Minimum Metering Speed *[3 rpm]*

9.2 Fault Diagnosis

Condition	Possible reasons
When in work and moving the Instrument displays '**C.out'** and beeps every 5 seconds	The forward speed is above 2km/h while the drill is out of work. The cutout switch is not operating correctly when the drill is lifted or lowered.
When in work the instrument defaults to the fan status channel, displays '**OFF**' and beeps every 30 seconds	You forgot to switch the fans on at the hand controller. The fans remain switched off. Check that the 'FAN' switch on the Turbo-Jet junction box is on.
When in work the instrument defaults to the fan status channel, and the display alternates between '**OFF**' and '**FaiL**' , and beeps every 30 seconds.	There is a fault with one or both the fan drive. Check the wiring connections.
When in work the instrument flashes '**ALAr**' and beeps.	Hopper level is low.
When in work the instrument defaults to the rate channel, displays '**FaiL**' and beeps every 30 seconds. The metering roll does not turn.	The metering motor is not working. It is automatically stopped. Switch the instrument off and back on to clear the fault. Check the wiring connections and try again.
When in work the instrument defaults to the rate channel, displays '**StAL**' and beeps every 30 seconds. The metering roll does not turn.	The metering motor has stalled. It is automatically stopped to prevent further damage. Investigate.
When in work the instrument defaults to the application rate channel, flashes a rate lower than the target and beeps continuously.	The application rate is low because the forward speed is too high and the target motor speed cannot be achieved. Reduce your speed or change the metering roll and recalibrate.
When in work the instrument defaults to the forward speed channel, the speed display flashes and beeps continuously.	Forward speed is too low. The metering roll is at its minimum possible rpm. Increase your speed, or if this would too fast, change the metering roll and recalibrate.
	If you find that the minimum forward speed is too high at low application rates you should change the feed roll to a lower volume roll and redo the product calibration.

10. Calibration Record

Drill Make/Model			
Instrument Serial No.			
Speed Sensor Factor *[mm/pulse]*			
Implement Width *[m]*			
Units *[kg/ha]*			
Seed Type	**Application Rate**	**No. of rolls**	**Seed Cal. Factor** *[kg/rev]*

Issue 1:	23/4/07	Original Issue
Issue 2:	17/8/07	Correction ref. Fig. 5 – p.11
Issue 3:	14/1/08	Edit page 21, sect. 6.5 para. 1 + Cal. Record
Issue 4:	19/1/09	Added Pre-start function (page 14)
Issue 5:	5/8/10	Changed icons throughout to text.