IDS

ELECTRONIC MEASURING MONITORING & CONTROL SYSTEMS

MFDC 100
Multi-Function Drill Control

Calibration and Operation

Software Ref: UDJ308-7

CE

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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Document number
S/DC/500-10-266 : Issue 2d : 9/8/02

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User Guide

MFDC 100 Multi-Function Drill Control

Calibration and Operation

Software Ref: WZ 304-001 rev.01

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1. Overview

The *Multi-function Drill Control* monitors the operation and controls the tramlining function of both conventional and pneumatic type seed drills.

The instrument has an illuminated 4 digit display with 6 display functions and alarm functions for forward speed, fan rpm and seed distribution shaft rpm. The speed and area functions can be displayed in either metric or imperial units.

The instrument indicates;

- Forward Speed (plus low speed alarm)
- Part Area and Total Area worked
- The current bout number and tramline bouts for the selected tramlining sequence.
- Fan rpm (plus low/high speed alarm)
- Seed Distribution Shaft rpm (plus low speed alarm)
- Hopper level low

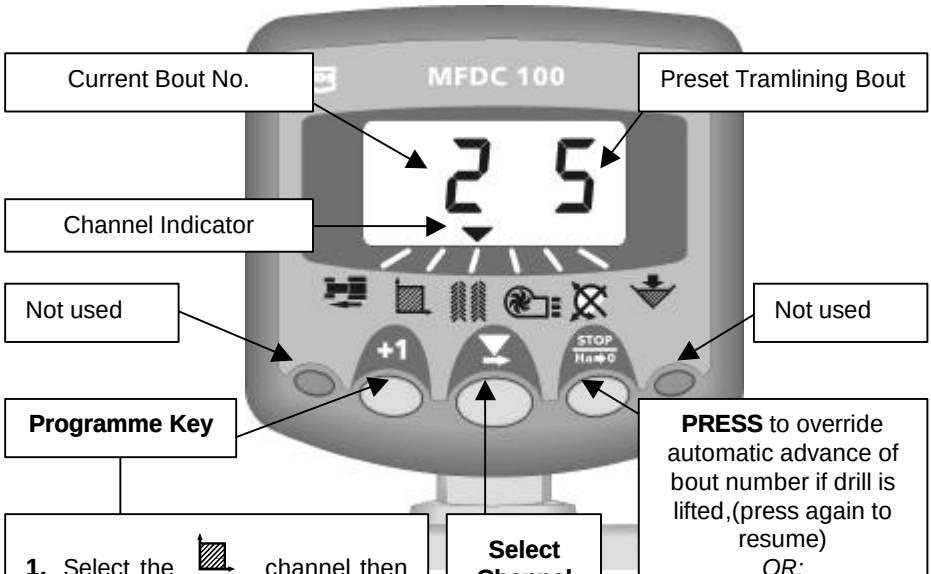
The tramlining function is the priority display. The instrument will default to this channel display 10 seconds after selecting another display function (with the exception of displaying area)

It has two memory registers (Total 1 and Total 2) to record area worked. The area is accumulated to both memory registers. Area totals and all calibration data are automatically stored in memory when the instrument is powered off.

The instrument must be initially calibrated to suit the implement being controlled. Three programme modes allow the default settings to be altered as required. Most of these settings do not need to be accessed in normal use.

2. The Control Switches

There are three active switches on the front panel used individually or in combination to programme, set/reset or select a function. The two small outer buttons have no function.



Channel Indicator

The ▼ indicator indicates the channel to which the information on the display relates.

Normal Display Mode

The instrument has a normal display mode displaying six work functions. Select a channel by pressing the ▼ button once or more.

When the drill is moving, the selected channel is displayed for 10 seconds before defaulting back to the tramline bout display (channel). When the drill is stationary the instrument will flash between the forward speed and the Tramline channel. If the tramline option is turned off, the instrument will simply default to the Forward Speed channel.

Programming Modes

There are 3 programming modes with various calibration factors and default settings.

Many of these settings are made on installation and do not normally need to be changed unless the instrument is switched onto a different drill. These settings are appended to the back of this manual. The operator does not normally need to refer to them.

Units

The instrument can be set to display metric or imperial units. To see which is selected, select either the forward speed ( ) channel or the area channel ( ) , then press and hold the +1 button.

Either the top row of horizontal segments or the bottom row of horizontal segments will briefly display, indicating the units selected.

NOTE: 'MET' and 'IMP' are printed on the instrument front panel on most instrument variants.

3. Forward Speed

Display Forward Speed

Select the channel.

Forward Speed displays for 10 seconds before returning to the tramline display.

Figure 1: Display Forward Speed

Forward Speed Alarm

If you stop while the drill is in work or move at a speed less than 2.6 km/hr (1.6 miles/hr), then the instrument will beep twice, and the display will alternate between the currently selected channel and the forward speed channel.

This continues until the speed is increased above the 2.6 km/hr threshold.

NOTE: The forward speed alarm can be disabled in in programme mode 2.

Speed Sensor Calibration

The forward speed sensor is magnetically operated and senses the land wheel rotation. In order to display the correct speed and accumulate area correctly, the instrument must be programmed with the correct Speed Sensor Factor (SSF). This is the distance travelled between two signal pulses received from the sensor.

The S.S.F. can be calculated theoretically and then manually programmed, or the instrument can automatically calculate it via the “Autocal” function.

Manual Speed Calibration

The theoretical calibration figure equals the circumference of the land wheel (diameter x 3.142) either in inches if the instrument is set for imperial units, or in metres if it is set for metric units.

Default = 2.000m (78.78 inches)

NOTE: An 'Autocal' is more accurate in field conditions

1. Select the channel.

2. HOLD +1 to enter programme mode 1. The top/bottom horizontal segments indicating metric/imperial units are displayed briefly before the calibration factor appears. Continue holding the button and…

3. PRESS to select the digit or decimal point to change.

4. HOLD to change the selected digit (or move the decimal point).

5. RELEASE to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

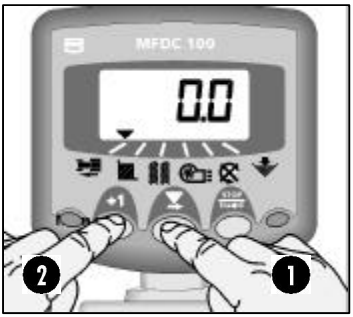


Figure 2: Enter Cal Mode 1 (S.S.F)

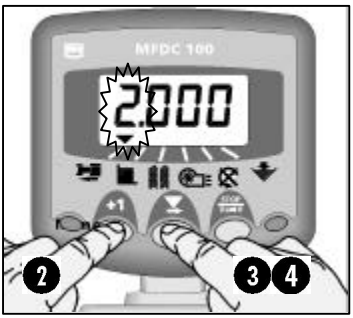


Figure 3: Change S.S.F.

‘Autocal’

For maximum accuracy, perform an auto-calibration in field conditions.

1. Set two markers at 100 metres apart (328 feet). Choose a convenient reference point on the tractor/implement and position this point opposite the first marker.

2. Select the channel.

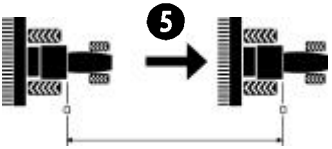
3. HOLD **+1** until the calibration factor is displayed.

4. Continue holding this button and press STOP Ha→0.
   The display flashes ‘Auto’ ready for calibration.

5. Drive the vehicle until the chosen reference point on the tractor/implement is opposite the second marker.
   The instrument counts and displays the sensor pulses received over the distance travelled.

6. Press the STOP Ha→0 button to complete the Autocal routine (fig. 6).
   The calibration factor is automatically calculated and stored in memory.

Figure 4: Start ‘Autocal’



100m (328ft)

Figure 5: ‘Autocal’ distance

Figure 6: Stop ‘Autocal’

4. Area Total / Implement Width

The area is derived from the forward speed and the programmed implement width and is accumulated to whichever total is selected on the display – total 1 or total 2.

Area will only accumulate while the drill is in work, i.e. forward speed is being registered.

The two separate area totals can be independently reset to zero.

Figure 7: Display Area Total

Display Area Total

1. Select the channel.

2. Press **+1** to cycle between the two area totals.

*The display will then show **'tot.1'** or **'tot.2'** before displaying the area accumulated since that total was last reset.*

Figure 8: Select Total 1 or Total 2

Reset Totals

1. Select the channel.

2. Press **+1** to cycle between the two area totals.

3. Hold STOP Ha→0 for 5 seconds to zero that total.

Figure 9: Reset Total

Set Implement Width

In order for the instrument to accumulate area correctly, the implement working width must be programmed. The units are either in inches if the instrument is set for imperial units, or in metres if it is set for metric units.

Figure 10: View Implement Width

1. Select the channel.

2. HOLD +1 to enter programme mode 1.
   The top/bottom horizontal segments indicating metric/imperial units are displayed briefly before the calibration factor appears. Continue holding the button and…

3. PRESS to select the digit or decimal point to change.

4. HOLD to change the selected digit (or move the decimal point).

5. RELEASE to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

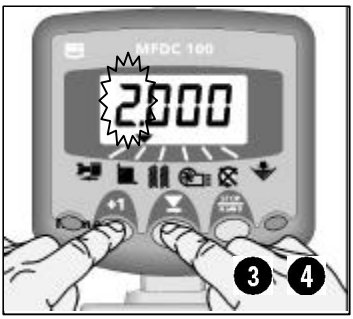


Figure 11: Set Implement Width

5. Tramlining

The display defaults to the channel after 10 seconds (unless the Area Total was selected).

There are five systems of tramlining - symmetric, asymmetric left, asymmetric right, 10 bout and 18 bout. The tramline bout is programmable from 1 to 15 in symmetric, asymmetric left and asymmetric right sequences.

Selection of asymmetric tramlining is denoted by a decimal point on the display between the current bout number on the left and the tramline bout number on the right. Left or right asymmetric tramlining is selected in the programming mode.

NOTE: There is an option in the programme mode to disable the tramline function altogether.

Manually advance the bout number

Press **+1** to advance the current bout number by 1.

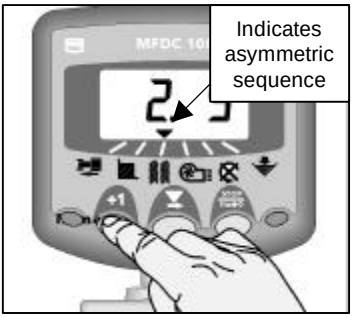


Figure 12: Advance bout number

Hold the bout number

Press STOP Ha➔0 to 'hold' the current bout when the drill goes out of work.

The display will flash '**StOP**'.

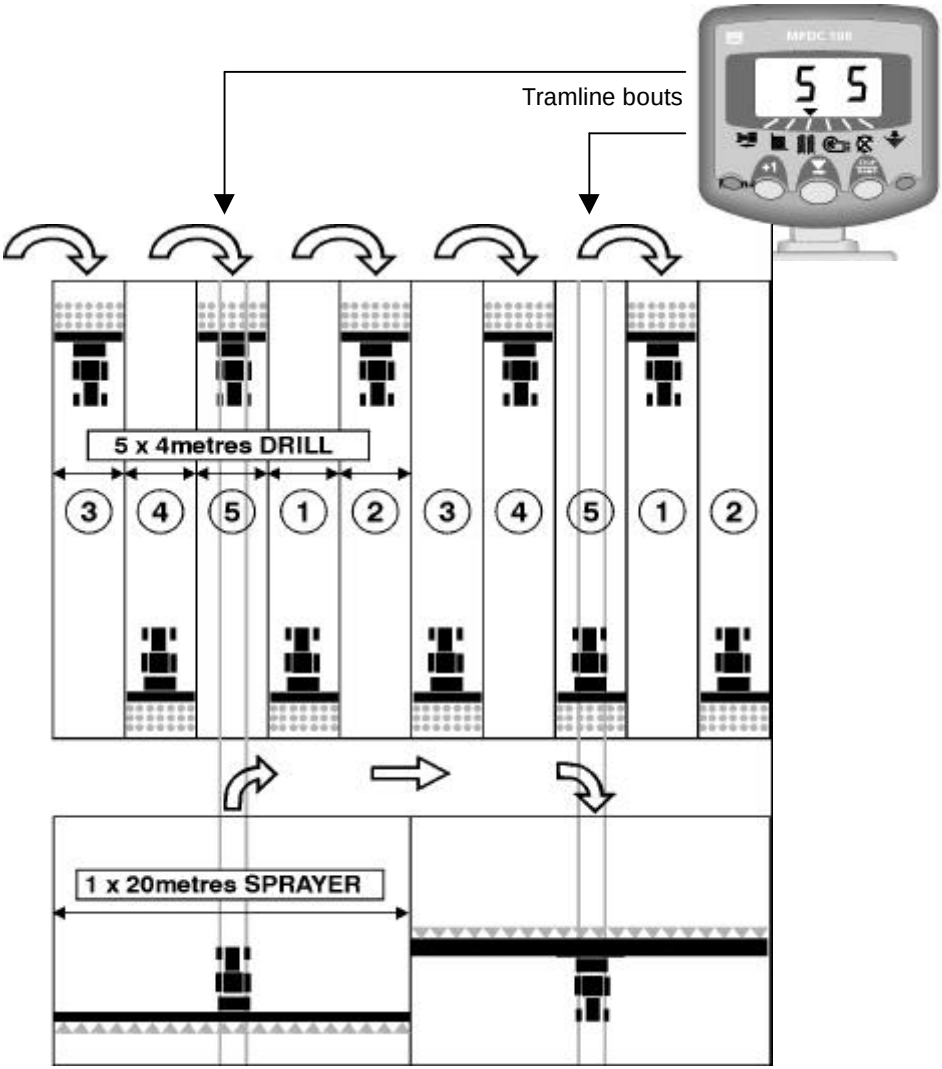
Press STOP Ha➔0 again to resume the normal bout sequence.

Figure 13: Hold bout number

Symmetric Tramlining Sequence

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

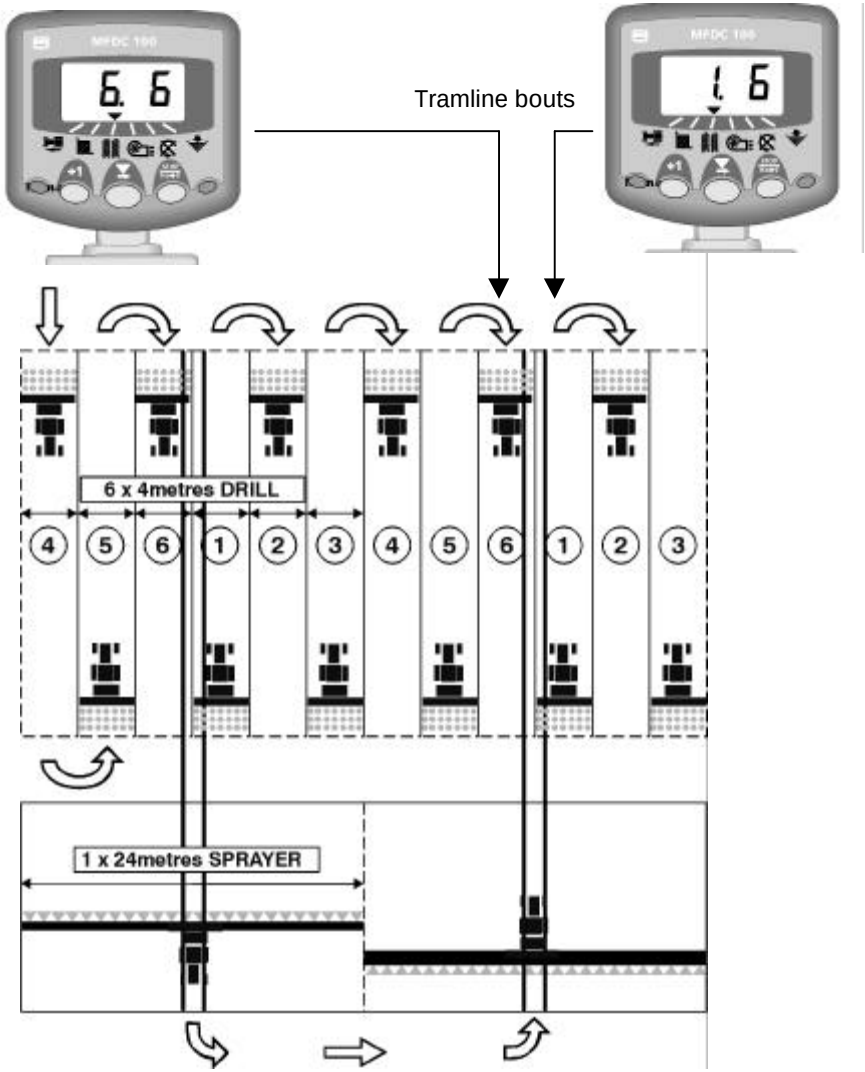
The instrument will beep once at the beginning of the tramline bout, and the display will continue flashing for the duration of the bout.



Asymmetric Left Tramlining Sequence

Two seed spouts are closed on the **left hand side** of the drill on the tramline bouts.

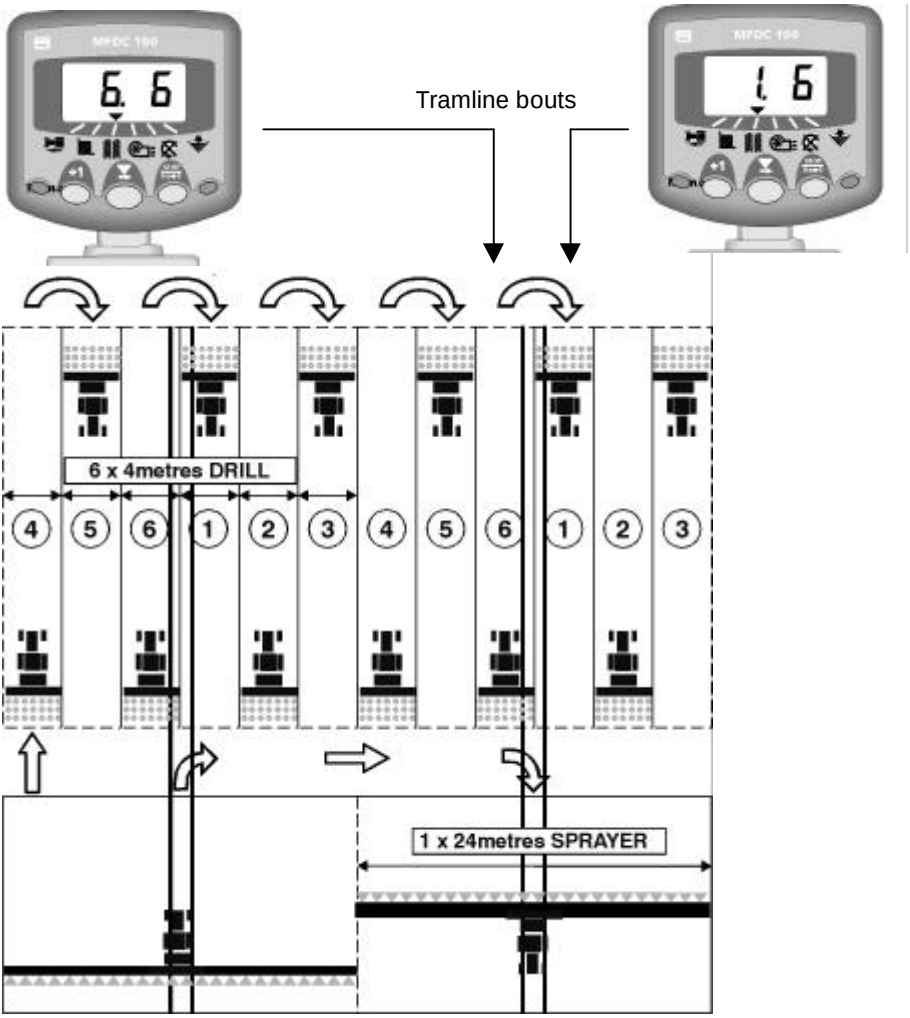
The instrument will beep once at the beginning of each tramline bout, and the display will continue flashing for the duration of the bout.



Asymmetric Right Tramlining Sequence

Two seed spouts are closed on the **right hand side** of the drill on the tramline bouts.

The instrument will beep once at the beginning of each tramline bout, and the display will continue flashing for the duration of the bout.

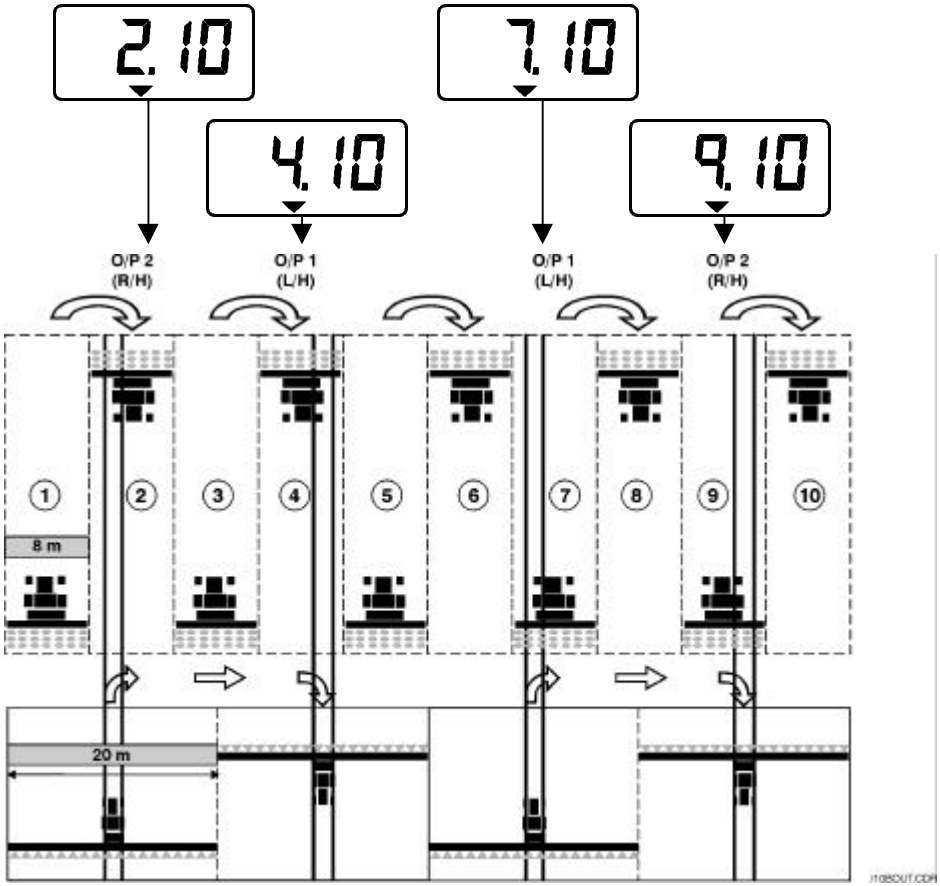


10 Bout Tramlining Sequence

For use with 4 metre drill/10 metre sprayer, or 8 metre drill/20 metre sprayer combinations. (2 x 2 left hand seed spouts are closed on bouts 4 and 7, and 2 x 2 right hand seed spouts closed on bouts 2 and 9). Starting on bout 1 requires turning **RIGHT** at the end of the first bout.

NOTE: To turn LEFT at the end of the first bout, advance the bout number to 6 before commencing drilling.

The instrument will beep once at the beginning of each tramline bout and the display will flash for the duration of the tramline bout.

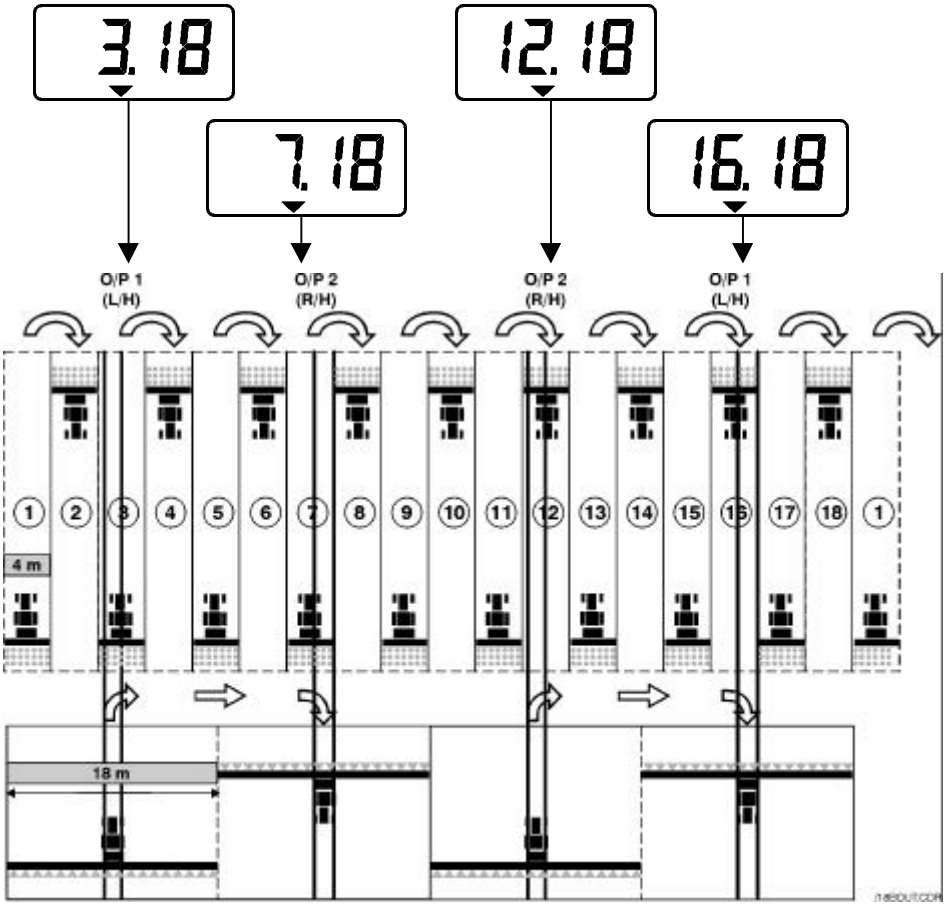


18 Bout Tramlining Sequence

For use with a 4 metre drill and an 18 metre sprayer. (2 x 2 left hand seed spouts are closed on bouts 3 and 16, and 2 x 2 right hand seed spouts closed on bouts 7 and 12). Starting on bout 1 requires turning **RIGHT** at the end of the first bout.

NOTE: To turn LEFT at the end of the first bout, advance the bout number to 10 before commencing drilling.

The instrument will beep once at the beginning of each tramline bout and the display will flash for the duration of the tramline bout.



Selecting the Tramline Sequence

1. Select the channel.

2. Hold +1 to enter programme mode 1.
   After 3 seconds the first two digits flash, indicating the tramline sequence currently set:-
   'SY' = Symmetric
   'AL' = Asymmetric Left
   'Ar' = Asymmetric Right
   'AS' = Special Asymmetric sequences e.g. 10 bout and 18 bout.

3. Continue holding the +1 button and press and HOLD the button to select the required sequence.

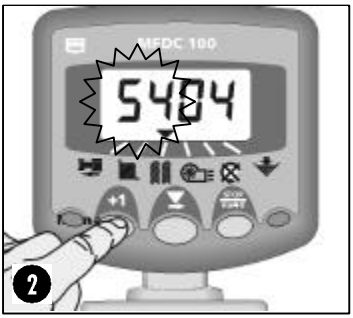


Figure 14: Tramline Sequence

Setting the Tramline Bout

4. PRESS and RELEASE the button to toggle between the tramline sequence and tramline bout number display.
   The 3rd and 4th digits flash indicating the tramline bout number currently set.

5. PRESS and HOLD the button to cycle the tramline bout from 1 to 15.
   NOTE: If either asymmetric left ('AL') or asymmetric right ('Ar') sequences are selected, the tramline output is also switched on for the bout following the target bout (i.e. bout 1).
   If the special asymmetric sequence ('AS') is selected, the only options for the tramline bout number are 10 and 18.

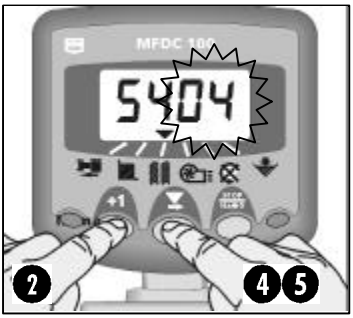


Figure 15: Tramline Bout Number

6. Fan Speed / Speed Alarms

Display Fan Speed

Select the channel.

Fan Speed displays for 10 seconds before returning to the tramline display.

Figure 16: Display Fan Speed

Fan Speed Alarms

There is a programmable high speed alarm and a programmable low speed alarm. An alarm condition causes the instrument to default to the fan speed channel, sound 5 beeps and flash the actual fan speed. Cancel the alarm by restoring the fan speed within the programmed limits.

NOTE: The alarm is inhibited if the forward speed is less than 2 km/hr.

Defaults Alarm Thresholds: Low speed = 2700 rpm, High speed = 4500 rpm

Set Low Fan Speed Alarm

1. Select the channel.

2. Hold +1 to enter programme mode 1.
   The alarm threshold is displayed after 3 seconds. Continue holding the button and…

3. PRESS to select the digit or decimal point to change.

Figure 17: Low speed alarm threshold

4. HOLD ▼→ to change the selected digit (or move the decimal point).

5. RELEASE ▼→ to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

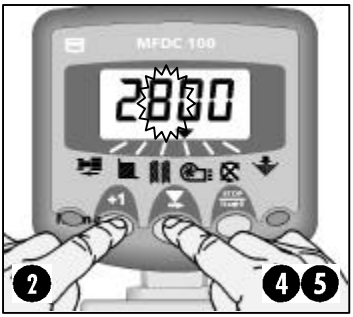


Figure 18: Set low speed alarm threshold

Set High Fan Speed Alarm

1. Press and hold the **+1** button whilst switching the instrument on, to enter programme mode 2.

2. Press **+1** to select the channel.

3. PRESS ▼→ to select the digit or decimal point to change.

4. HOLD ▼→ to change the selected digit (or move the decimal point).

5. RELEASE ▼→ to select the next digit and repeat as above, otherwise switch the instrument off and then back on again to resume the normal display mode.

7. Seed Distribution Shaft Speed

Display Shaft Speed

Select the channel.

Shaft Speed displays for 10 seconds before returning to the tramline display.

Figure 19: Distribution Shaft speed

Distribution Shaft Speed Alarm

With the default alarm setting, if the seed distribution shaft stops for more than 40 seconds the instrument will sound 5 beeps and will default to the channel from the current channel selected. The audible alarm will sound every 30 seconds until the alarm condition is resolved.

NOTE: The alarm can be cancelled - either by restoring shaft rotation, or switching the instrument off and then on again.

The alarm is inhibited if forward speed is less than 2 km/hr.

Set Alarm Speed for Distribution Shaft

1. Select the channel.
2. Hold +1 to enter programme mode 1.
   The alarm threshold is displayed after 3 seconds. Continue holding the button and…
3. PRESS to select the digit to change.

4. HOLD to change the selected digit.

5. RELEASE to select the next digit and repeat as above, otherwise simply release both buttons. The instrument will then return to the normal display mode.

Half Width Drilling – Disabling the Shaft Speed Alarm

Some drills have a half width facility. Disengaging the metering shaft will result in the shaft speed alarm being triggered. In this case you must set the instrument to disable the metering shaft alarm, and also to accumulate area based on half width.

After the alarm has triggered, the instrument defaults to the shaft speed channel ( ). At this time simply press and hold the STOP Ha➡0 button for 2 seconds. The display will show "**HaLF**", indicating that the shaft alarm will be ignored and the area accumulation reduced by 50%.

The instrument will revert back to normal operation when either a shaft speed signal is received (i.e. the seed shaft has been mechanically re-engaged for full width operation), or the instrument is turned off and on again.

Disabling the Distribution Shaft Alarm

Alternatively, you can turn off the alarm by pressing and holding the STOP Ha➡0 button for 5 seconds with the shaft speed channel selected. The display will then show 'OFF' when this channel is selected. The alarm function will stay off until the instrument is switched off and back on again.

Alarm Delay Time

Some crops – notably oilseed rape (canola) are drilled at very low rates so the seed shaft runs extremely slowly and the instrument may sense that the shaft has actually stopped, thus triggering the shaft speed alarm. The programmable delay time can prevent the alarm being triggered needlessly in such a situation.

When drilling larger seed/at higher rates, a long time delay is equally undesirable. In this case a shorter time delay can be programmed.

Default delay time = 40 seconds

Minimum delay time = 5 seconds

Set Alarm Delay Time

1. Press and hold the +1 button whilst switching the instrument on, to enter programme mode 2.
2. Press +1 to select the channel.
3. PRESS to select the digit to change.
4. HOLD to change the selected digit.
5. RELEASE to select the next digit and repeat as above, otherwise switch the instrument off and then back on again to resume the normal display mode.

8. Hopper Level

When the seed level drops below the sensor fitted in the side of the hopper, the instrument defaults to this channel and sounds 5 beeps

Figure 20: Hopper Low Alarm

Enable / Disable Hopper Level Alarm

1. Select the channel.
2. Hold +1 to enter programme mode 1. Continue holding the button and…
3. PRESS to select 0 (Off) / 1 (On).

   The display will stay blank on this channel when the alarm is disabled.
4. Release both buttons. The instrument will then return to the normal display mode.

Figure 21: Disable Alarm

9. Summary of Programme Modes 1 – 3

Most settings do not need to be accessed during normal operation, unless perhaps the instrument is transferred to another tractor/implement. Default values shown in *[brackets]*.

	Mode 1	**Mode 2**	**Mode 3**
Mode Entry	From normal display mode, select channel and hold +1 button continuously	Press and hold +1 button while switching instrument on	Press and hold STOP button while switching instrument on
Channel Selection	As Above	Press **+1** button	Press STOP Ha➡0 button
Channel 1	Speed Sensor Factor *[2.000]* ***see page 8***	Forward Speed Alarm On (1) / Off (0) *[1]*	No function
Channel 2	Implement Width *[2m]* ***see page 11***	Metric/Imperial Selection *[Metric]* ***see page 26***	Display Grand Total Area (non-resettable)
Channel 3	Tramline Sequence /Target Bout *[SY04]* ***see page 18***	Tramline Option On (1) / Off (0) *[1]*	Tramline Option On (1) / Off (0) *[1]*
Channel 4	Low Fan Speed Alarm *[2700rpm]* ***see page 19***	High Fan Speed Alarm *[4500 rpm]* ***see page 20***	Fan speed Sensor – pulses per rev. Set 0 to inhibit fan speed channel *[1.000]*
Channel 5	Distribution Shaft – Alarm Speed *[0]* ***see page 22***	Distribution Shaft - Alarm Delay *[40 sec]* ***see page 23***	Dist. Shaft Sensor – pulses per rev. Set 0 to inhibit Shaft Speed channel *[1.000]*
Channel 6	Hopper Level Alarm On (1) / Off (0) *[1]* ***see page 24***	No function	No function

Select Metric/Imperial Units

1. Press and hold the +1 button whilst switching the instrument on, to enter programme mode 2.

2. Press +1 to select the channel.

3. PRESS to switch between metric and imperial.

   The top row of horizontal segments indicates metric units are selected and the bottom row indicates imperial units are selected.

4. Switch the instrument off and then back on again to resume the normal display mode.

Function	**Metric**	**Imperial**
Fwd Speed	mph	kph
Area	Ha	acres
Width/S.S.F.	metres	inches

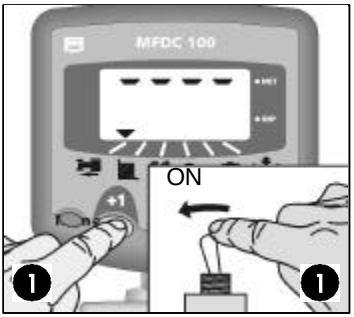


Figure 22: Enter Cal Mode 2

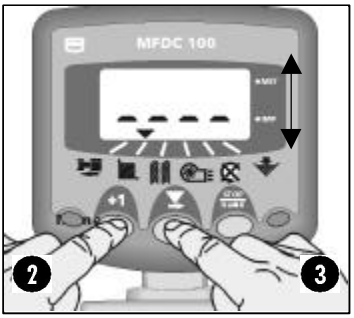


Figure 23: Change Units

Document History

Issue 2b	17/7/02	Amendments to para. 1, p.6 and para.2, p.22
Issue 2c:	24/7/02	Ref: S/Ware Ver WZ304-001rev.1 p.10,para. 2; p.21 - Dist. Shaft Speed Alarm p.22 - Half Width accumulation/Alarm Delay Time
Issue 2d	9/8/02	p.22 - Half Width accumulation/Alarm Delay Time Reworded para.2.