AIRTEC MB2

SPRAYER CONTROLLER

Operation

RDS Part.No.:	S/DC/500-10-253
Doc. Issue:	3 : 29/11/01
Software Issue:	PS512-011 rev. 0

Electromagnetic Compatibility (EMC)

CE

This product complies with Council Directive 89/336/EEC when installed and used in accordance with the relevant instructions.

IMPORTANT, READ THIS BEFORE USING THE MB2

The *AIRTEC MB2* instrument can be configured for Variable Rate Treatment ("VRT mode") as part of an RDS Precision Farming System ("the System"). It is very important that you follow the described calibration procedures before operating the instrument in VRT mode. Calibration and operation must be in accordance with these instructions. Use of the System is subject to the following disclaimer;

1. *So far as is legally permissible RDS Technology ("RDS"), shall not be liable, whatever the cause, for any increased costs, loss of profits, business, contracts, income, or anticipate savings or for any special, indirect or inconsequential damage whatsover (death or personal injury excluded).*

2. *The capabilities and functions of the Precision Farming System ("the System") are limited as set out in the specification of the System, details of which are contained in the Help files and product literature and which must be read before using the System.*

3. *Without prejudice to the generality of the above it is hereby acknowledged that the System is not designed nor intended to a) originate variable treatment plans or b) achieve or avoid any application rate outside application parameters, which in both cases shall be the responsibility of the operator.*

4. *The standard terms and conditions of RDS (except clause 7), a copy of which is available on request, apply to the supply and operation of this System.*

Service and Technical Support

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1 Overview

1.1 The Sprayer Control System

The *Airtec MB2* is a fully DGPS compatible, pressure-based sprayer controller which enables either manual control, automatic control or automatic variable rate control of the application rate, with either Airtec nozzles or any type of conventional nozzles fitted. When any of the three new types of Airtec plastic nozzles are fitted, the system also regulates spray quality at a chosen setting:- Extra Coarse, Very Coarse, Coarse, Medium, Fine or Very Fine. The operator can also change the quality setting manually during the bout to suit localised conditions.

1.2 Sprayer Control Modes

Manual Control Mode

This gives simple manual control of application rate using the up and down arrow keys. This gives simple manual control of application rate. Field data ("job summaries") can be logged and are stored in the instrument memory. Up to 75 summaries can be stored.

NOTE: Spray quality is not regulated and the spray quality screen cannot be selected.

Automatic Control Mode

This gives fully automatic rate control. Flow / pressure is automatically regulated as forward speed varies, to ensure that the actual application rate constantly matches a preset target rate. The air pressure is also regulated to maintain the set spray quality. The application rate can be manually nudged up and down (in preset steps) from the target rate as required for spot application in specific areas. A programmable forward speed alarm gives an audible and visual warning when the forward speed goes above or below the threshold for acceptable nozzle performance. Field data ("job summaries") can be logged and are stored in the instrument memory. Up to 75 summaries can be stored. If you have a GPS receiver and RDS Data Card Module connected, as well as creating a job summary, you can also log the vehicle route and application data to a "dynamic log" file on the PCMCIA card. The job summary data is also appended to this file, which can be viewed in PLOT/PLAN.

VRT (Variable-rate treatment) Control Mode

This enables the system to be controlled via treatment instructions prepared using RDS PLOT/PLAN or similarly capable Precision Farming software programs, in conjunction with DGPS position data. To enable fully automatic variable-rate treatment for Precision Farming applications, the *Pro-Series 8000* requires a suitable DGPS receiver and the RDS PCMCIA Card Module to implement treatment plans generated in RDS PLOT/PLAN.

A work record file is automatically created on the card module to log data confirming the actual treatment. The job summary data is also appended to this file, which can be viewed in PLOT/PLAN.

Please refer to the 'Precision Farming Supplement' Pt No. S/DC/500-10-202 for details of DGPS installation, setup and data transfer with the Data Card Module.

1.3 Calibration Mode

The instrument must be calibrated before commencing normal operation. Many settings are made only on initial installation. Other calibration settings may need to be altered according to the liquid being sprayed, nozzle types fitted etc.

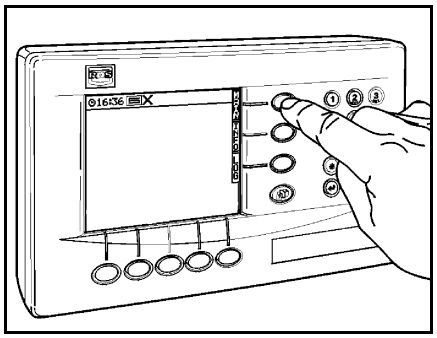
Please refer to the Calibration manual' supplied with your instrument

1.4 The Operating Screens

1.4.1 Menu keys

All instrument functions are accessed by nine menu keys adjacent to the LCD display.

Figure 1
The functions are controlled via the menu keys next to the display



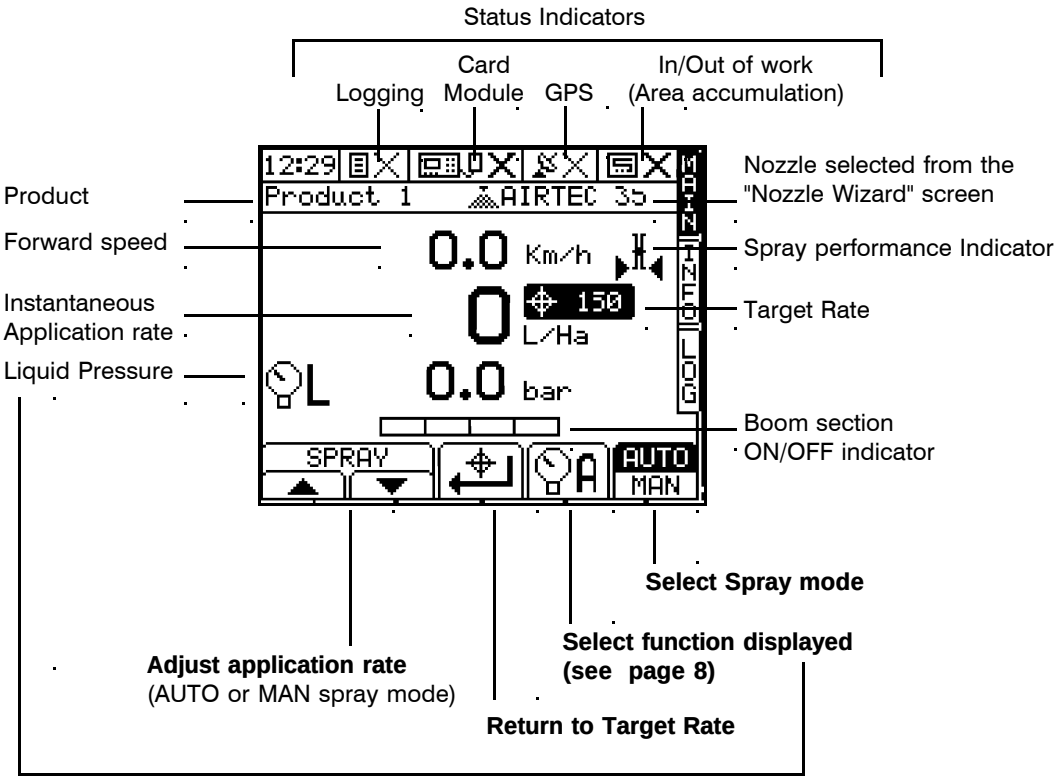
The four menu keys to the right of the screen (figure 1) access the primary screen pages (those viewed during normal operation). There are three primary screens MAIN, INFO and LOG for normal operating functions, and a SETUP screen for calibration functions and settings specific to particular products.

The five sub-menu keys below the screen control the various display functions and settings for each of the primary screen pages. Text or icons are displayed adjacent to the sub-menu keys to denote their function.

1.4.2 The MAIN screen page

The instrument will always default to the MAIN screen on startup. The MAIN screen displays the following information (figure 2).

Figure 2
The information displayed on the MAIN screen



1.4.3 MAIN screen Display Options

You can select which function is displayed on the third line of the MAIN screen. Press the sub-menu key (fig.3) to cycle through the following functions:

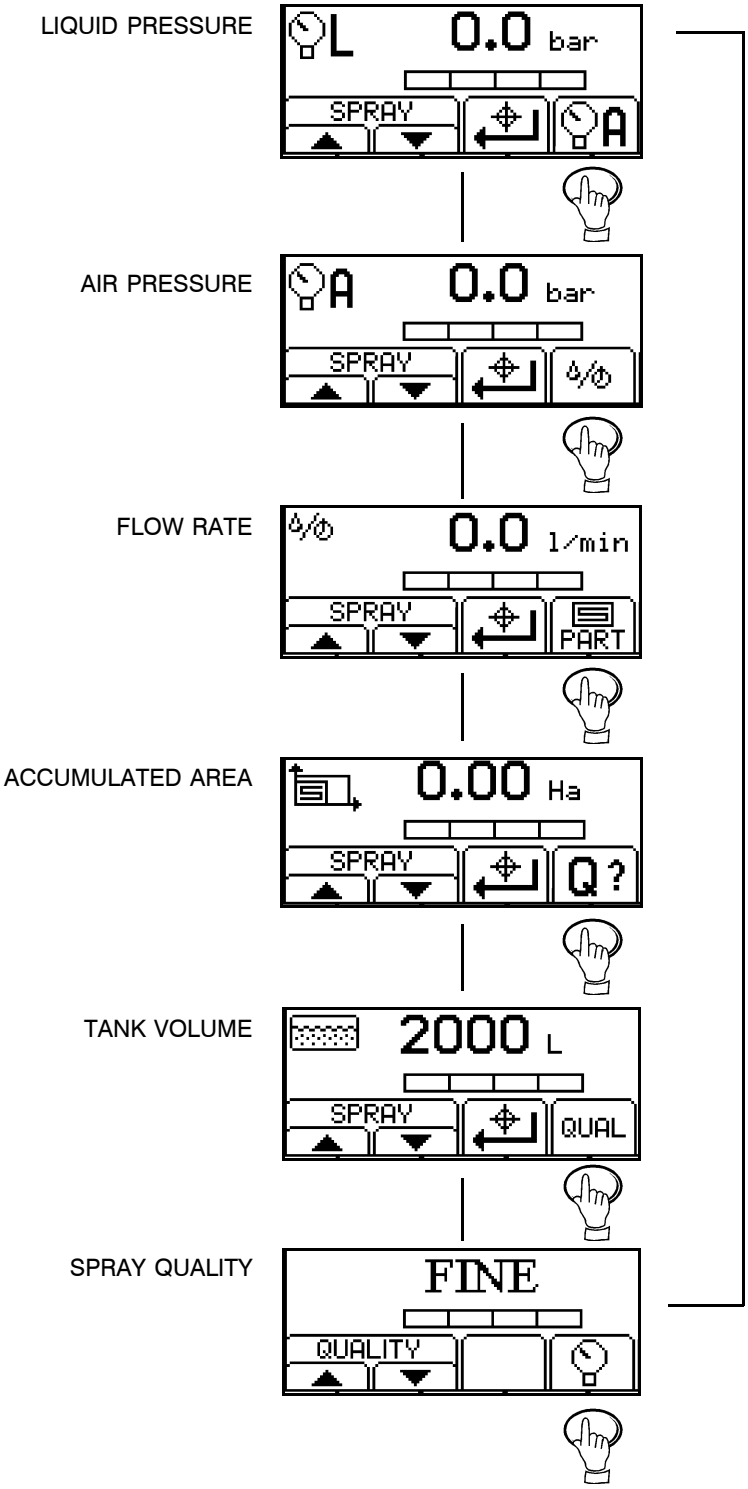


Figure 3
Cycling through the Display Options on the MAIN screen

With any function selected (except SPRAY QUALITY), the two left-hand keys are used to adjust the application rate away from the target rate.

With QUALITY selected, these buttons select the spray quality setting between "EXTRA COARSE", "VERY COARSE", "COARSE", "MEDIUM", "FINE" or "VERY FINE".

NOTE: *Target Rate and Spray Quality may also be set from the "Nozzle Wizard" screen.*

1.4.4 Spray Quality - LERAP Low Drift Rating

LERAP (Local Environmental Risk Assessments for Pesticides).

The *Airtec MB2* will automatically display "LERAP**" or "LERAP***" on the MAIN operating screen in place of the normal spray quality setting (fig. 3), when the operating parameters (forward speed, air pressure, liquid pressure and nozzle flow rate) are within the necessary range for LERAP low drift application.

LERAP** is achievable when using Airtec nozzles with either 35 or 40 restrictors and a "VERY COARSE" quality setting.

LERAP*** is achievable when using Airtec nozzles with 35, 40 or 50 restrictors and an "EXTRA COARSE" quality setting.

More information on LERAPS can be found at <www.pesticides.gov.uk>

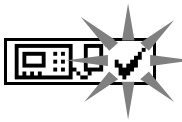
1.4.5 Status Indicators

The row of icons at the top of the page show the following;

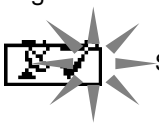
(i) if logging is in progress or not :-

 Logging stopped  Logging started

(ii) if the Card Module is connected and whether a card is inserted :-

 No Module  Module but no card  OK

(iii) if a GPS signal is being received :-

 No Position  Standalone (No Diff.)  Full DGPS

(iv) if the area / distance is being accumulated :-

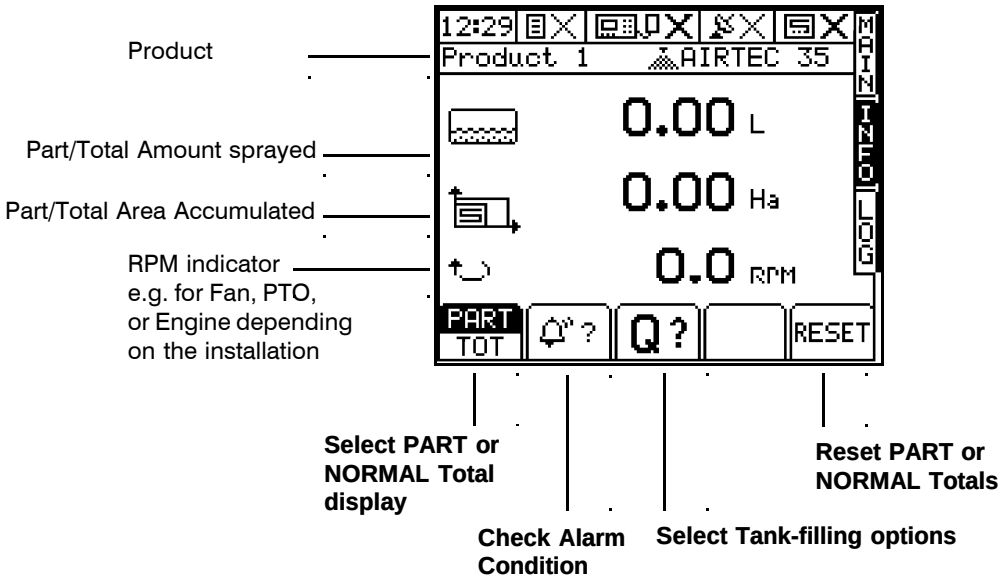
 No accumulation  Accumulation

NOTE: *The GPS icon and the Data module status icons will only appear if the GPS / Data Module settings are selected in the "PORTS SETUP" menu (refer to the calibration manual).*

1.4.6 The INFO screen page

Additional work measurement functions are displayed on this page.

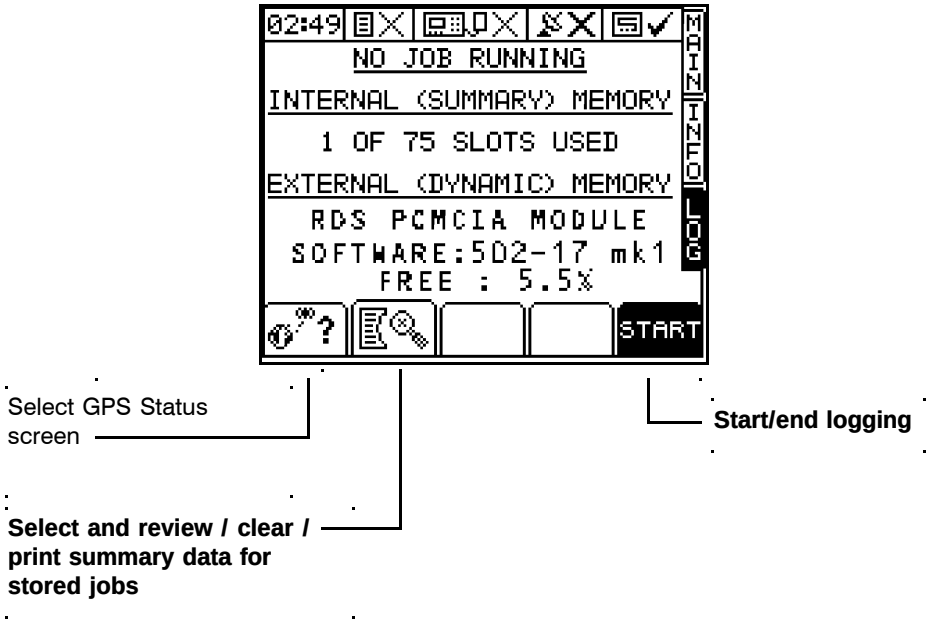
Figure 4
The information displayed on the INFO screen



1.4.7 The LOG screen page

This page controls datalogging (and PF functions when enabled) and data transfer (e.g. printing a job summary).

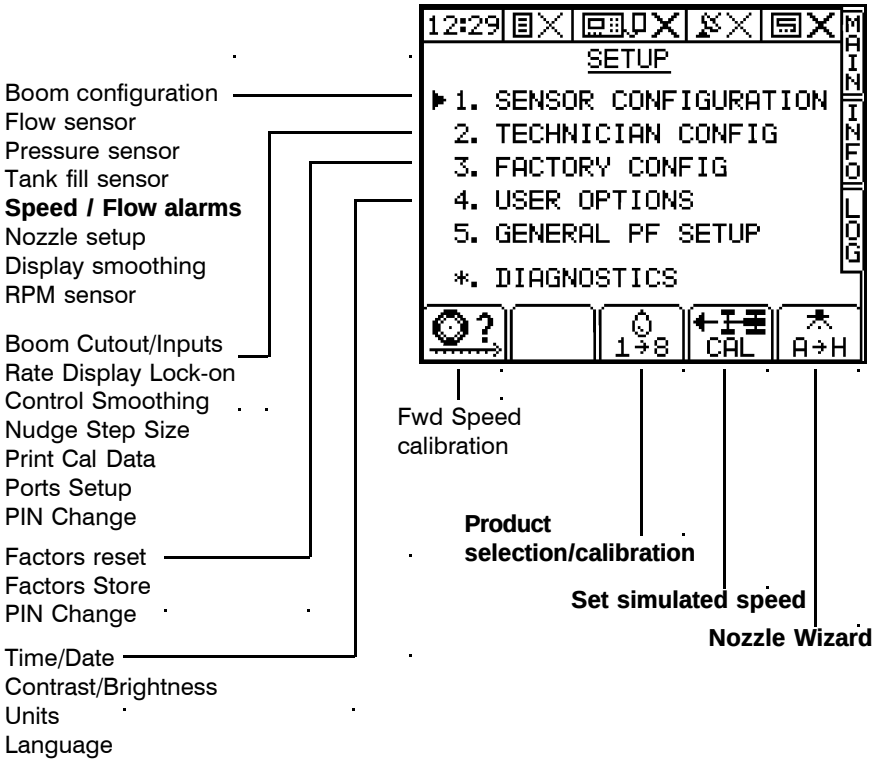
Figure 5
The information displayed on the LOG screen



1.4.8 The SETUP screen page

The key selects the SETUP menu for calibration factors and calibration settings specific to particular products being sprayed and nozzle types fitted.

Figure 6
The information displayed on the SETUP screen



Calibration on installation

The majority of the parameters listed in Figure 6 are factory set, mostly via the "TECHNICIAN CONFIG" and "FACTORY CONFIG" menus. Each of these menus can be protected by a user-programmable security code (PIN) to prevent inadvertent alteration to the settings. The factory default PIN is 1234.

Normally the operator should not need to access or change these settings however, should it become necessary, please refer to the calibration manual.

Calibration in normal use

Calibration settings that need checking and/or adjusting more frequently are highlighted in bold type on figure 6. These settings include;

Product selection and density
Nozzle selection (using the "Nozzle Wizard")
Liquid calibration ("CAL TEST" Wizard)
Alarm thresholds

NOTE: *Liquid calibration is described in the Calibration manual -section 3.*

1.4.9 Data Entry

Alpha-numeric values are entered via the right hand keypad. You must press the key from 2 to 5 times to select the required letter. (Some keys have additional special characters not shown on the key legend).

The (*) key will either toggle between lower and upper case characters or when preceeding a numerical entry, will set a MINUS value.

The (0) key will toggle between 0 and a SPACE.

The (←) key will BACKSPACE the screen cursor if you need to re-enter a character.

The (↵) key is the RETURN key and is normally pressed to confirm the data entry into memory.

1.4.10 Units

Information can be displayed in Metric or Imperial units by selecting the desired option via the SETUP menu. Please refer to the Calibration manual.

The units are:-

Function	Units	
	Metric	U K Imperial
Forward Speed	km/hr	miles/hr
Application rate	litres/ha	gallons/acre
Flow rate	litres/min	gallons/min
Part/Total Area	hectares	acres
Tank volume, Part/Total volume applied	litres	gallons
Spray pressure	bar	lbs/in^2

2 Operation

2.1 Startup

Press the ⏻ key. The startup screen, which shows the software version, will display for about 8 seconds then the MAIN screen is displayed.

2.2 Selecting the Product

You can programme any of 8 different products and the product density.

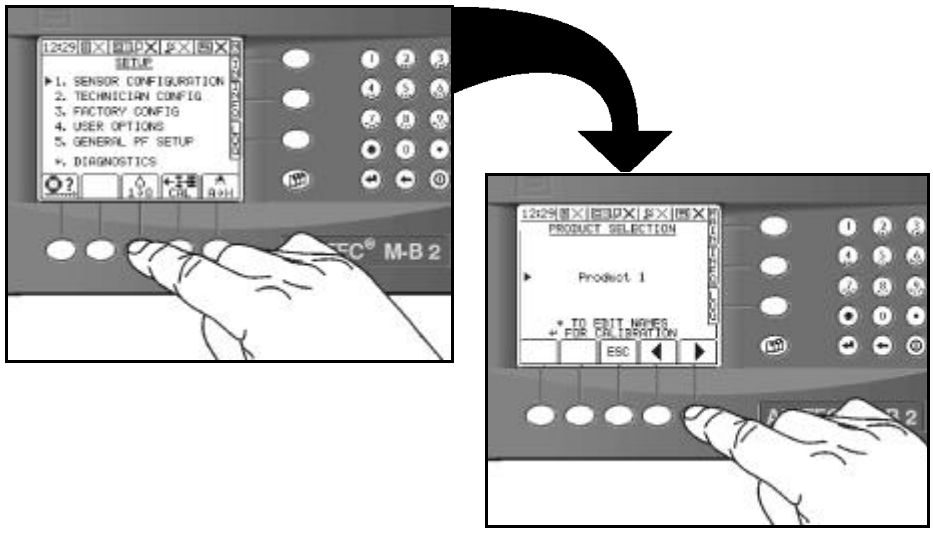


Figure 7
Selecting the PRODUCT SELECTION screen

1 Select the 'PRODUCT SELECTION ' screen (fig. 7).

2 Select the product using the arrow keys and press the MAIN key to return to the operating screen.

2.2.1 Editing Product Names

From the 'PRODUCT SELECTION' screen, press the ✱ key to select the 'PRODUCT NAMES' screen.

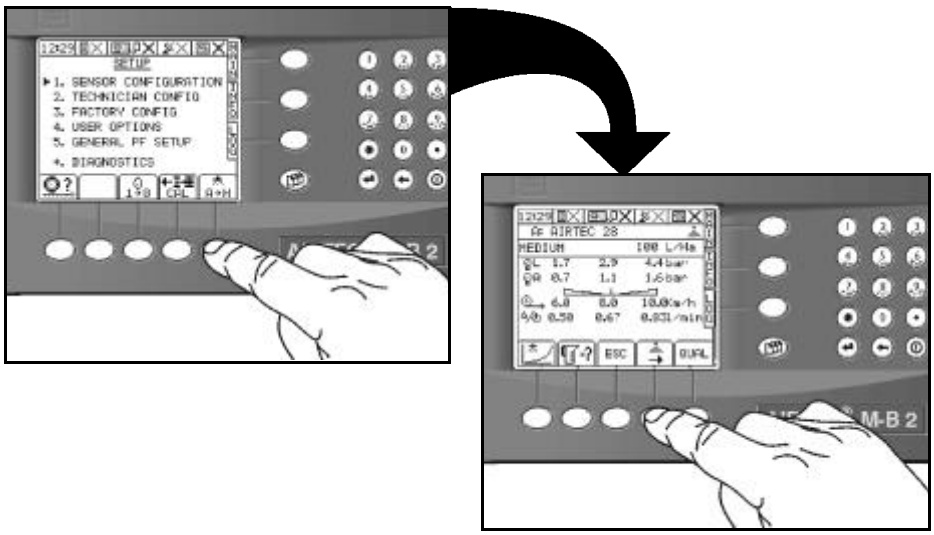
The product name and density are factory-set as "**Product 1**" to "**Product 8**" with a default density of 1.00.

Select the product name using the arrow keys, and edit the name using the alpha-numeric key pad.

2.3 Nozzle settings - the "Nozzle Wizard"

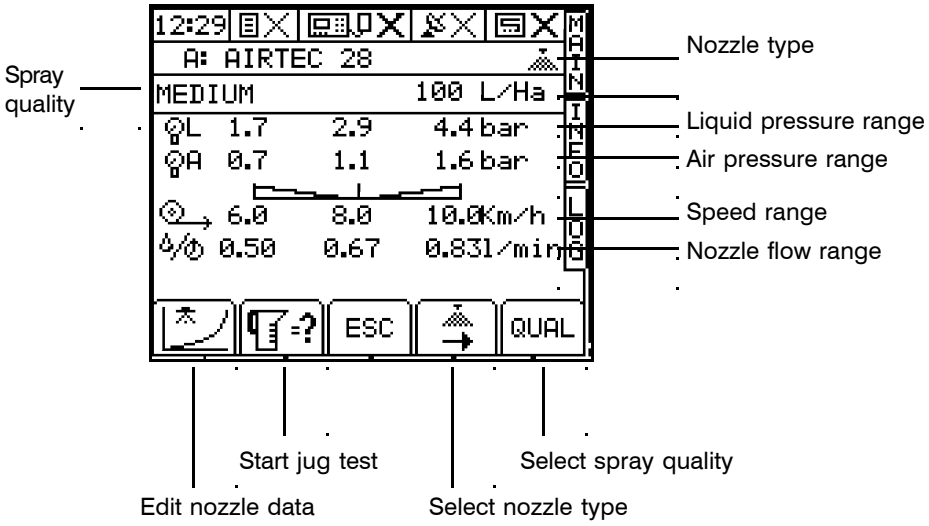
The "Nozzle Wizard" will help you to select the appropriate nozzles for a chosen forward speed, application rate, and in the case of Airtec nozzles - spray quality.

Figure 8
Selecting the "Nozzle Wizard" screen



The "Nozzle Wizard" displays the following;

Figure 9
The "Nozzle Wizard" screen



The Nozzle Wizard page shows you how a selected nozzle will perform in order to achieve the Target Application Rate at a programmed Target Speed.

The centre of the "bow tie" display indicates the target speed for optimum nozzle performance. The operating range of the nozzle is based around the target speed.

The Wizard is pre-programmed with data for Airtec nozzles 28, 35, 40 and 50, (nozzles A to D) and 8 conventional nozzle types E to L ;

Nozzle Ref.	**ISO Ref.**
E	Orange
F	Green
G	Yellow
H	Blue
I	Red
J	Brown
K	Grey
L	White

The Nozzle wizard works differently for Airtec nozzles and conventional nozzles. Refer to the appropriate section below.

2.3.1 Using the Nozzle Wizard (Airtec nozzles)

1 **Set the Target speed.** The default target speed is set to 8km/h. This appears in the central column of figures on the Wizard screen. If your normal speed is going to be much different from this, then change the target speed setting from the CALIBRATION SPEED screen (see section 2.3.4).

2 **Key-in the target application rate**. (this may also be set from the MAIN screen beforehand) and press ↵.

3 **Select the spray quality.**

4 **Select the Airtec nozzle with the**  **key** until the Wizard displays a *liquid pressure* closest to the desired spraying pressure (fig. 10), and press the ENTER key. Fit the nozzle type displayed.

Figure 10
Selecting the Airtec nozzle closest to the desired spraying pressure

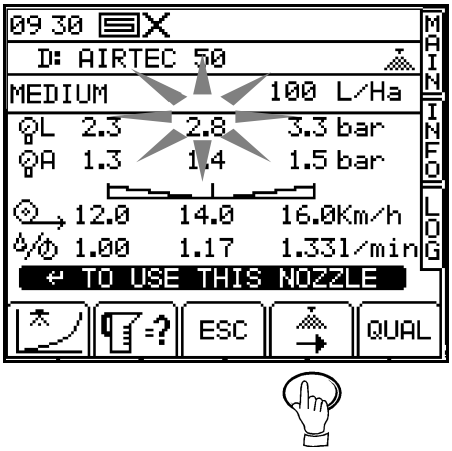
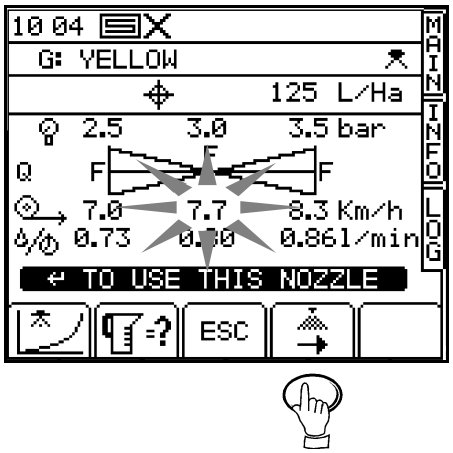


Figure 11
Selecting a conventional nozzle closest to the desired forward speed



2.3.2 Using the Nozzle Wizard (Conventional nozzles)

1 **Key-in the target application rate**. (this may also be set from the MAIN screen beforehand) and press ↵.

2 **Nozzle pressure.** The factory default setting for the reference pressure is 3.0 bar for all 8 nozzles.

3 **Select the nozzle with the**  **key** until the Wizard displays a *target speed* closest to the desired forward speed. (fig. 11), and press the ENTER key. Fit the nozzle type displayed.

NOTE: *Please refer to section 3 of the Calibration manual for Nozzle Calibration.*

2.3.3 Editing the preset Nozzle type

You may want to re-programme nozzle data in the Nozzle Wizard to suit alternative nozzles. Press the key, or via 'Nozzle Setup' in the 'SENSOR CONFIGURATION' menu to access the nozzle data screen. Enter the nozzle manufacturer's data.

2.3.4 Set the Target spraying speed

1 From the SETUP menu press SIM .

2 Key-in the speed and press to start speed simulation. The CAL icon will flash on the MAIN screen.

NOTE: *To stop speed simulation re-select the screen page and press , or move the vehicle a short distance, or press .*

2.3.5 Programming the Product Density (Specific Gravity) for liquid fertilisers

You must programme the density when spraying fertilisers. The system will then automatically compensate and increase the spraying pressure in relation to the density of the liquid in order to maintain the correct application rate and spray performance.

Whenever the programmed density for the selected product is greater than 1.00 the instrument will display the icon on the main screen.

1 Press to select the "**SETUP**" screen.

2 Press to select the "**PRODUCT SELECTION**" screen (fig 7).

3 Press to select the "**PRODUCT CALIBRATION**" screen then "1" or to select "CALIBRATION FACTORS".

4 Select the product using the arrow keys then move to the line "DENSITY" and enter the correct value.

5 Use the "ESC" key or press to return to the "**SETUP**" screen, (or press the MAIN key to return to the operation screen).

2.4 Automatic Rate Control 

With 'AUTO' selected on the 'MAIN' screen, the flow rate is automatically adjusted as forward speed varies, to ensure that the application rate constantly matches the preset target rate.

2.4.1 Setting the Target Rate

From the "MAIN" screen simply key-in the desired target rate and press  .

2.4.2 Overriding the Target rate

Press 

to override the target rate.

The preset target rate can be overidden in ±5% steps while spraying, e.g. over localised weed infestation or other crop conditions.

While overidden, the target rate indicator e.g. 

will flash.

Press  t o return to the target rate.

NOTE : *The instrument will automatically alarm if any of the following parameters go above or below the limits programmed via the 'SETUP' menu:-*

Forward Speed
Flow
Liquid pressure (Airtec nozzles)
Air Pressure (Airtec nozzles)

When the alarm threshold is reached first of all the screen will change to show the alarm screen and the appropriate alarm message is displayed e.g. "**FLOW LOW**" or "**FLOW HIGH**". The instrument will beep continuously. Pressing any of the lower 'OK' keys cancels the alarm screen and returns to the 'MAIN' operating screen. An alarm bell icon in the upper right hand corner of the screen will continue to flash and the instrument will beep every 5 seconds to remind you of the alarm condition.

NOTE: *If the instrument flashes the alarm bell icon as above, at any time you can re-identify the cause of the alarm by pressing the*  *key on the INFO screen.*

2.5 Manual Rate Control 

You do not normally need to select this mode, however in the event you experience a problem with automatic control (if for example the forward speed sensor had stopped working), you can still control the application rate manually.

Select 'MAN' from the 'MAIN' screen. However, to maintain the required application rate, you must maintain a constant forward speed. You can also log and store field data ("job memos") as you go, and print out job summaries or transfer data to a PC when convenient.

Press  to adjust the application rate.

NOTE : *The spray performance indicator functions as normal, however there is no forward speed or flow rate alarm in manual mode.*

2.6 Tank Contents

The *MB2* automatically calculates the volume of liquid remaining in the tank. The calculation is based on the full tank volume which is programmed via the "INFO" screen. You can also programme an alarm threshold so that the instrument will warn you when the tank volume is getting low.

When the alarm threshold is reached (e.g. 200 litres), first of all the screen will change to show the alarm screen and the message '**TANK 1 LOW**'. The instrument will beep continuously. Press any of the lower 'OK' keys to cancel the alarm screen and return to the 'MAIN' operating screen. An alarm bell icon in the upper right hand corner of the screen will continue to flash and the instrument will beep every 5 seconds to remind you of the alarm condition.

NOTE: *If the instrument flashes the alarm bell icon as above, at any time you can re-identify the cause of the alarm by pressing the*  *key on the INFO screen.*

The screen will change to show the alarm screen and the message '**TANK 1 EMPTY**' once the tank contents register reaches zero. Again, press any of the lower 'OK' keys to cancel the alarm screen to return to the 'MAIN' operating screen, and the alarm will continue as above.

The tank contents register must be reset manually after re-filling the tank unless your system incorporates a *Tank Inflow Sensor and Flow Shutoff Valve*. When fitted this enables the instrument to automatically monitor re-filling and cut off the inflow when the tank is full.

2.6.1 Tank filling (Manual)

1 INFO" screen and press  to access the TANK FILL screen (fig. 13). The screen will display,

*"**MAX**" - the full tank volume*
*"**NOW**" - the volume remaining in the tank*
*"**TO ADD**" - volume to replenish*

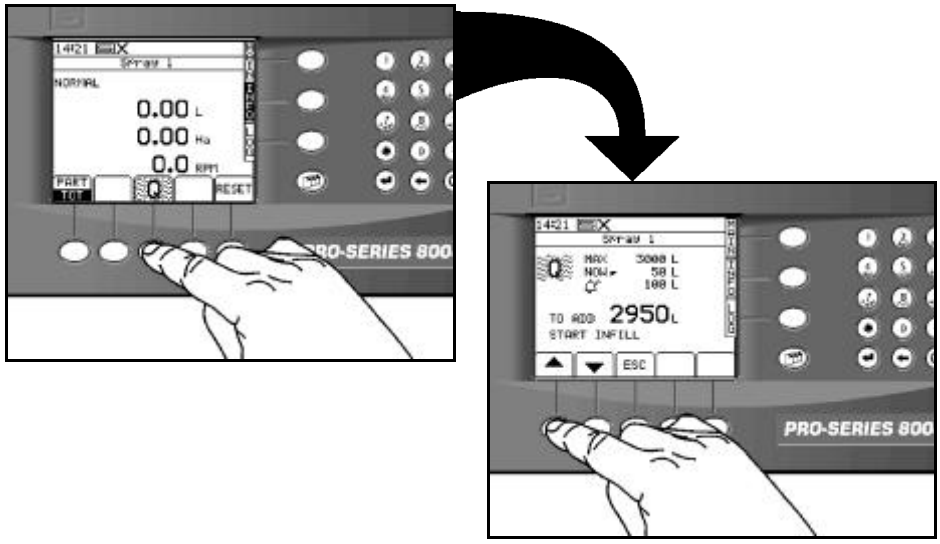


Figure 13
Selecting the TANK FILL screen

NOTE: *Move the screen cursor using the arrow keys and enter values via the numeric keypad.*

2 Fill the tank to the desired level.

3 Confirm that "**MAX**" corresponds to the quantity in the tank. Adjust as necessary.

NOTE: *Move the screen cursor using the arrow keys and enter values via the numeric keypad.*

4 Press ↵ to reset to the full tank volume.

5 Confirm the alarm volume (🔔) is OK (typically the volume needed to spray a single bout). Adjust as necessary.

2.6.2 Tank filling (Automatic)

A Tank Inflow Sensor must be installed to measure the inflow. A Shutoff Valve must be installed to stop the filling automatically.

1 Connect the inflow hose.

2 Select the "TANK FILL" screen as above.

3 Confirm that "**MAX**" corresponds to the quantity you want in the tank after filling. Adjust as necessary.

4 Confirm that the "**NOW**" volume is the volume currently in the tank. Adjust as necessary.

5 Confirm the alarm volume as above. Move the cursor opposite "**START INFILL**" and press ↵ .

The "**TO ADD**" volume will then count down and the screen will display "**STOP INFILL**". If a Shutoff Valve is fitted, filling will cease automatically when the "**TO ADD**" volume reaches zero. You can also press ↵ at any time to stop filling. An audible alarm will sound and filling will stop.

2.7 Part / Total Accumulation and RPM display

You can record the area and volume sprayed for a particular job using the "**PART**" Total function. In addition the area and volume will be recorded to the "**TOTAL**" memory register.

1 Select the "**INFO**" screen to display the accumulated totals and the RPM display.

2 Select '**PART**' to display the Part Area and Part Volume accumulation or select "**TOTAL**" to display the Total Area and Total Volume accumulation.

2.7.1 Reset Totals

1 Select the **PART**" or "**TOTAL**" display.

2 Press the **RESET** key.

3 Press ↵ to reset the totals, or press **ESC** to return to the "**INFO**" screen.

2.8 Forward Speed and Flow Rate Alarms

You can preset upper and lower thresholds for forward speed and flow rate based on data from the manufacturers nozzle charts of the acceptable flow/pressure operating range. Also the system can regulate correctly only within a certain range depending on the size of the control valve and flow sensor fitted.

If these limits are exceeded then the instrument will automatically alarm. First of all the screen will change to show the alarm screen and the message '**FLOW LOW'** or '**FLOW HIGH'.** The instrument will beep continuously.

'**FLOW HIGH'** may be caused by the control valve being unable to dump sufficient flow back to the sprayer tank as a result of:- speed too slow or stationary, too small or too few nozzles in use - sections off or blocked nozzles, pump capacity too large or control valve too small. '**FLOW LOW'** may be caused by:- forward speed too high, insufficient pump capacity, low pump speed, low or empty tank, blocked filters or incorrect jets.

Press any of the lower 'OK' keys to cancel the alarm screen and return to the 'MAIN' operating screen. An alarm bell icon in the upper right hand corner of the screen will continue to flash and the instrument will beep every 5 seconds to remind you of the alarm condition, until the forward speed and/or flow rate return within the preset limits.

2.8.1 Spray performance Indicator

The Spray performance Indicator shows the nozzle performance within the minimum and maximum parameters displayed on the Nozzle Wizard page. The "Target" for optimum spray performance is the middle point.

Too slow | On "Target" (for optimum spray performance) | Too fast

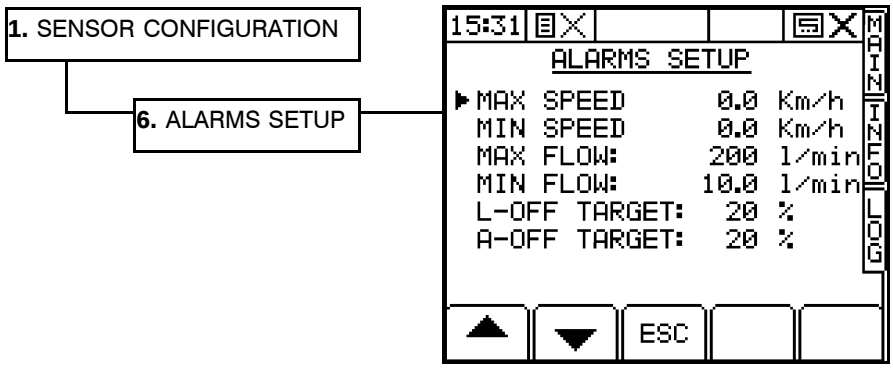
For optimum nozzle performance and spray pattern you should maintain your forward speed as close to the "target (calibration) speed" as possible.

2.8.2 Setting the Alarm thresholds

1 Press  to select the "SETUP" menu.

2 Select the "ALARMS SETUP" screen (fig.15).

Figure 15
Selecting the ALARMS SETUP screen



3 Select the appropriate alarm threshold using the arrow keys and enter the value via the numeric keypad.

2.8.3 Off Target Alarm for Liquid and Air Pressure

The instrument will alarm if the sprayer, for whatever reason, is unable to deliver a satisfactory air or liquid pressure, e.g. the delivered pressure is under or over the pressure calculated for the target application rate at the current forward speed. An UNDER TARGET alarm suggests that the forward speed is too great and the output of the pump/compressor is insufficient. This is more likely to occur at greater application rates, therefore reduce the forward speed accordingly.

First of all the screen will change to show the alarm screen and either the message:-

"AIR - UNDER TARGET" / "AIR - OVER TARGET",

or

"LIQUID - UNDER TARGET" / LIQUID - OVER TARGET"

The instrument will beep continuously. Press any of the lower 'OK' keys to cancel the alarm screen and return to the 'MAIN' operating screen. An alarm bell icon in the upper right hand corner of the screen will continue to flash and the instrument will beep every 5 seconds to remind you of the alarm condition, until the difference between the actual air / liquid pressure and the calculated, required pressure is back within the preset limits. The difference between the actual pressure and the required pressure before the instrument alarms, are the "L-OFF TARGET" (for liquid pressure) and A-OFF TARGET" (for air pressure) settings, preset by default at ±20%. These settings may be reduced or increased as desired (fig. 15).

NOTE: *A setting of 0% will disable the Off Target alarms.*

3 Logging Options

The Pro-Series has a separate LOG screen. Data is logged to internal (summary) memory and/or external (dynamic) memory (fig. 16) depending on the logging option. You can choose from three logging options. They are;

(i) APPLY FROM PLAN (Variable-Rate Treatment)

A variable-rate (or fixed-rate) treatment plan is imported from the RDS Data Card Module, allowing the operator to commence a full VRT application. A full spray application record of the *actual* application is generated and saved on the Data Module. The associated work record file can be viewed in PLOT/PLAN. Job summary data (iii) is also appended to the work record file.

(ii) LOG TREATMENT (Dynamic Data Logging)

A full spray application record is generated, logging rate and other parameters (e.g. "tags") in real time, attributing this data to a specific location. The associated "Dynamic Logging" file is viewed in PLOT/PLAN. A large amount of data is generated by dynamic logging and therefore must be saved onto an RDS Data Card Module. Job summary data (iii) is also appended to the dynamic logging file.

(iii) LOG SUMMARY ONLY (Field Data Logging)

For farm record keeping and traceability purposes, you can record a summary of each job or work session in the internal memory, and subsequently download directly to a PC, or print to an RDS ICP200 In-Cab Printer. The amount of summary data for each job is small, and it is saved in the internal memory. The instrument can store up to 75 individual job summaries. Options (i) and (ii) also require a GPS receiver to be connected.

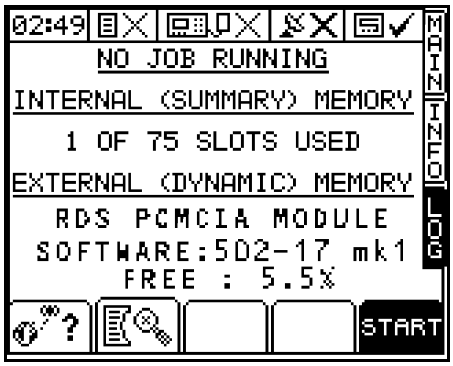


Figure 16
The LOG page

3.1 Hardware Setup

Connect the PCMCIA Card Module to the **top** serial port on the rear of the instrument, and connect the DGPS receiver to the **bottom** port. The PS8000 must be configured to recognise the Data Module and GPS Input (sections 4.5.1 and 4.6.1 respectively of the calibration manual). For information on connecting and configuring RDS PF *hardware* e.g. the Data Card Module, Secondary Software Module, DGPS Receiver, cables etc, and data transfer to your PC, please refer to the "Precision Farming Supplement".

NOTE: ***Mark I Data Modules:*** *If you have a Mark I Data Module, always power it off before inserting or removing a PCMCIA card, otherwise you risk corrupting data stored on the card.*

Mark II Data Modules: *Mark II modules are only powered up when a PCMCIA card is inserted. If there is no card in the module when it is connected to the instrument, the module will not be detected. The PCMCIA card can be inserted or removed without any risk of corrupting stored data. he module type, software, and free space is identified on the LOG screen when the module is detected.*

3.2 Variable Rate Treatment (VRT)

An RDS Data Card Module and a GPS receiver must be connected.

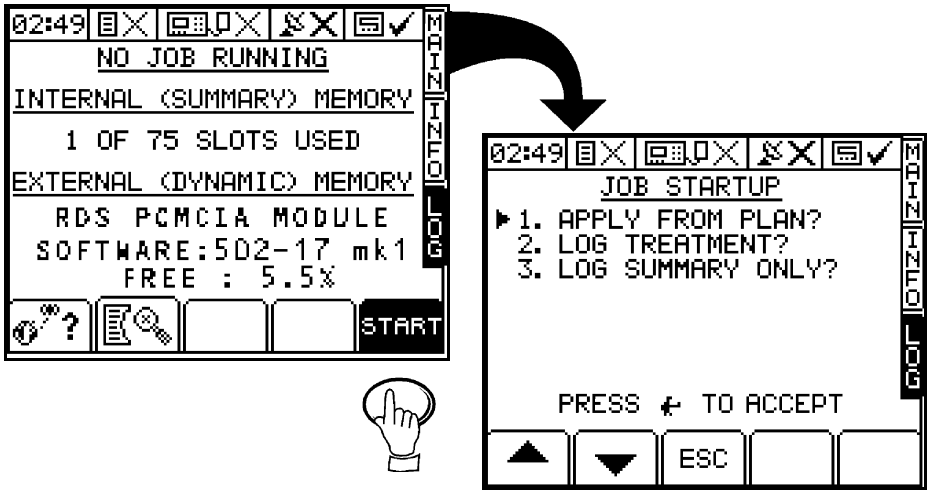
3.2.1 Running a Variable Rate Treatment plan

1 Press the LOG key.

The screen will display the current logging status, the number of jobs (job summaries) stored in memory, and the status of the PCMCIA card if found (fig. 17). If the module is not detected the message "NO MODULE FOUND" is displayed. When successfully connected, the icon appears at the top of the screen.

2 Press the START key. The JOB STARTUP page is displayed.

Figure 17
Select the JOB STARTUP page



3 Select the logging option "APPLY FROM PLAN".

4 If known, key in the FARM NUMBER and FIELD NUMBER of the treatment plan. If not, then press the LIST key, and the display will list all the farm / fields for which there are plan files on the datacard. Simply select the appropriate farm / field description in turn from the lists.

NOTE: *If a treatment plan is to be loaded and there is more than one "machine" (i.e. distribution system) enabled, the "SELECT MACHINE" page is now displayed. Scroll the cursor to the correct machine and press ↵ to confirm.*

5 SELECT THE APPROPRIATE PLAN and press ↵.

NOTE: *If there is more than one "machine" enabled, the display will revert to the "SELECT MACHINE" page. If required, select another "machine" , press ↵ to confirm, and then select a plan as in step 4 and 5 above.*

6 Press the START key. The "EXTENDED DATA FUNCTIONS" page is displayed. If you don't wish to programme any extended functions. then press SKIP FUNCS.

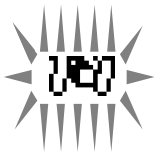
NOTE: *If you want to programme extended functions, refer to section 3.2.5.*

Wait while the work plan file is loaded and a work record file is created on the Data Module. Once the plan is loaded, the "RUNNING A PLANNED JOB" page appears, and displays the tag list (fig. 18). See section 3.2.4 about tagging.

Figure 18
Running a Treatment Plan

While VRT mode is in operation a flashing satellite symbol (fig. 19) is displayed alongside the Target Rate on the MAIN screen. The icon appears animated at the top of the screen while logging is in progress.

Figure 19
Indication that variable-rate treatment is in progress



The target rate on the MAIN screen now becomes the application rate according to the treatment plan data (Base rate x Multiplier) and the position in the field. The treatment rectangle size is defined in PLOT/PLAN.

Plan Status Display

Press the  key to display the current application rate according to the treatment plan, for each distribution system in operation. This is displayed as "Base Rate x Multiplier = App. Rate"

Application Rate without a GPS Signal

If you lose the DGPS signal the treatment rate will revert to the "Base Rate" specified in the plan.

Application Rate Outside the Field Boundary

If you go outside the field boundary but are still within the treatment rectangle, a  icon flashes on the display and the instrument beeps continuously. The application rate reverts to the base rate.

If you are outside the field boundary and treatment rectangle, then the application rate automatically goes to zero.

3.2.2 Overriding the VRT application rate

You can vary the actual application rate at any time using the  keys.

The target rate display will flash until you press  to return to the target rate.

3.2.3 Stop a VRT job

To stop running a job, simply press the "STOP" key on the LOG screen. The job summary is appended to the work record file on the data module, and saved to the internal memory.

3.2.4 Tagging

During application, you can log the presence of up to eight different features in the field, e.g. different weed infestations, pest damage etc. To switch a tag on or off, simply press the appropriate number key.

indicates a tag is off

indicates a tag is on

Figure 20
Setting Tags

Tags 1 to 4 are preset for Blackgrass, Wild Oats, Cleavers and Thistles. You can however, edit the tag names from the "GENERAL PF SETUP" menu.

3.2.5 Extended Data Functions

Dynamic log files and simple job summaries can include up to 12 additional data. All 12 data items can be user-defined to suit individual requirements e.g. Operator name, Wind Speed, Air Temperature, Growth Stage, Product etc.

Entering extended data is optional.

Figure 21
Setting Extended Functions

The functions are "F1" to "F12" by default. You can re-programme the default function names and function values from the "GENERAL PF SETUP" menu (please refer to the calibration manual). If you do not want to change the default, simply press ↵ to accept it, and then the next "F" function appears (fig. 21).

Enter the data (up to 20 alpha-numeric characters) via the alpha-numeric keypad. The existing data will be over-typed. Press ↵ to confirm the data entry.

You can repeat the data entry procedure for up to 12 'F' functions, however, if you do not need to programme any of them, simply press SKIP FUNCS at any time to start logging.

3.2.6 Display vehicle track - "MAP"

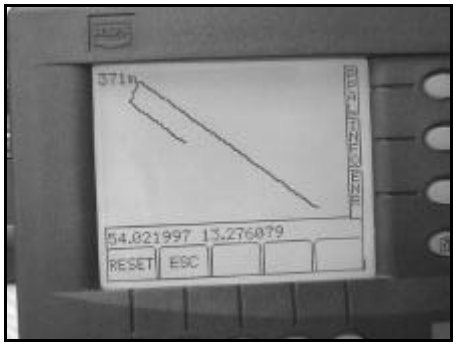
From the LOG screen (fig. 20), press the "MAP" key.

The screen displays the real time position of the vehicle (the "+" cursor), and the vehicle track for the last 100 logged data points.

The screen also displays the latitude and longitude in decimal degrees, and the number of points. As the vehicle proceeds from the start of the job, the screen plots and automatically zooms out to display up to a maximum of 100 logged data points. Beyond this, as the job progresses, the display pans in the direction of movement to keep the previous 100 data points on screen.

Press the 'RESET' key to start the plot again from the current position.

Figure 22
Displaying the vehicle track

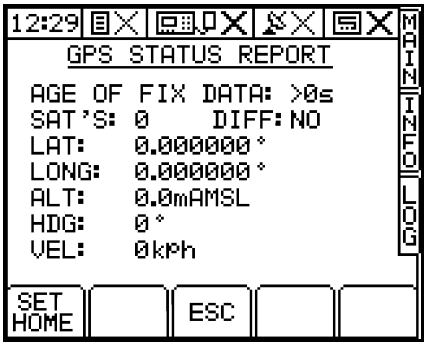


If you selected the "LOG TREATMENT" option from the LOG screen page, the track data is saved to a dynamic logging file on the data module, which can then be viewed in PLOT/PLAN.

3.2.7 Display GPS Status

From either the LOG page, "RUNNING TREATMENT PLAN" page or "RECORDING A DYNAMIC JOB" page, press the  key to view the current GPS status.

Figure 23
GPS Status



This page displays;

Age of Fix Data (when reception is good, the time should not be more than 1 second); Number of Satellites (minimum of 4 for full differential fix); Differential Status; Latitude and Longitude (in decimal degrees); Altitude; Heading and Velocity.

All this data is read directly from the NMEA GGA and VTG messages. You can also set the "Home Position" from this screen (for a full explanation of "Home Position", please refer to the calibration manual).

3.3 Dynamic Data Logging

When spraying conventionally (i.e. not VRT mode), you have an option to generate a full spray application record, logging rate and other parameters (e.g. "tags") in real time, attributing this data to a specific location. The associated "Dynamic Logging" file is saved onto the Data Card Module and can subsequently be viewed in PLOT/PLAN.

An RDS Data Card Module and a GPS receiver must be connected.

3.3.1 Start recording a Dynamic Job

1 Press the LOG key.

The screen will display the current logging status, the number of jobs (job summaries) stored in memory, and the status of the PCMCIA card if found (fig. 17). If the module is not detected the message "NO MODULE FOUND" is displayed. When successfully connected, the icon appears at the top of the screen.

2 Press the START key. The JOB STARTUP page is displayed (fig.17)

3 Select the logging option "LOG TREATMENT".

4 When prompted, enter the FARM NUMBER and FIELD NUMBER reference. The "EXTENDED DATA FUNCTIONS" page is then displayed. If you don't wish to programme any extended functions. then press SKIP FUNCS .

5 If you want to programme extended functions, refer to section 3.2.5.

The screen will display "NEGOTIATING FILE STORAGE - JOB NUMBER #" as it creates the dynamic log file on the data module. Once the plan is loaded, the "RECORDING A DYNAMIC JOB" page appears, and displays the tag list (fig. 24).

Figure 24
Dynamic Logging

While dynamic logging is in progress, the icon appears animated at the top of the screen.

6 You can at any time apply the Tag functions to log features in the field. Please refer to section 3.2.4 overleaf.

NOTE: *If more than one machine is enabled, the summary job record will include data for each machine.*

3.3.2 Stop recording a Dynamic Job

To stop running a job, simply press the "STOP" key on the LOG screen. The job summary is appended to the dynamic log file on the data module, and saved to the internal memory.

3.4 Field Data Logging

For farm record keeping and traceability purposes, you can record a summary of each job or work session in the internal memory, and subsequently download directly to a PC, or print to an RDS ICP200 In-Cab Printer. You can store up to 75 job summaries.

3.4.1 Start recording Field Data

1 Press the LOG key.

The screen will display the current logging status, the number of jobs (job summaries) stored in memory, and the status of the PCMCIA card if found (fig. 10a).

2 Press the START key. The JOB STARTUP page is displayed (fig.17)

3 Select the logging option "LOG SUMMARY ONLY".

4 When prompted, enter the FARM NUMBER and FIELD NUMBER reference. The "EXTENDED DATA FUNCTIONS" page is then displayed. If you don't wish to programme any extended functions. then press SKIP FUNCS .

5 If you want to programme extended functions, refer to section 3.2.5.

The "RECORDING A JOB SUMMARY" page appears (fig. 25). While field data logging is in progress, the icon appears animated at the top of the screen.

Figure 25
Field Data Logging

NOTE: *If more than one machine is enabled, the summary job record will include data for each machine.*

3.4.2 Stop recording Field Data

To stop running a job, simply press the "STOP" key on the LOG screen. The job summary is saved to the internal memory.

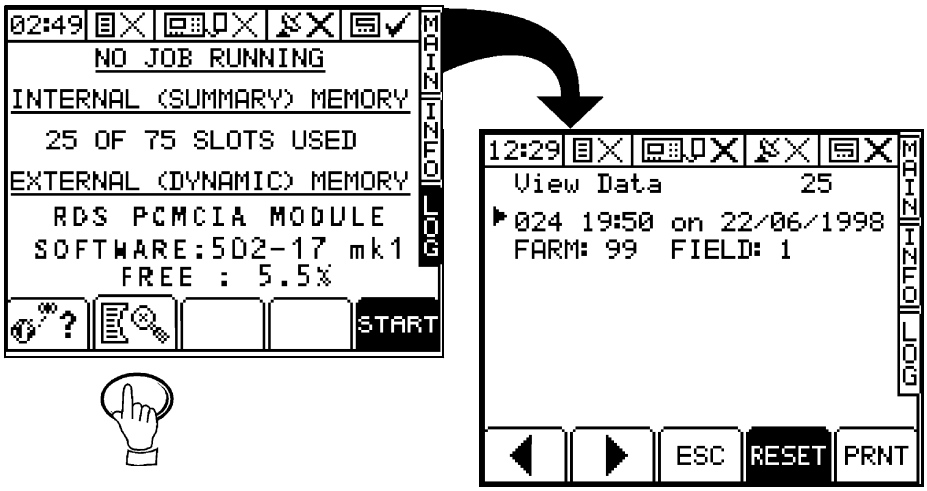
3.5 Review, Reset or Download a Job Summary

You can view, delete, print or download the job summaries. The summary prints out as a job ticket and includes space for comments and signature. It includes all the basic data listed in section 3.5.2 along with any extended data that was programmed, for each tank that is enabled.

3.5.1 Review / Reset Job Summaries

1 Press the  key from the LOG page.

Figure 26
Review / Reset Job Summaries



2 Scroll through the individual summaries using the arrow keys.

3 Press the RESET key to delete the selected summary.

3.5.2 Summary Data Formats

You can download the data to;

Data Card Module - Each summary is saved as a text file e.g. "JOB0001.TXT", and is formatted the same as a printed job ticket.

ICP 100 or ICP 200 In-Cab Printer - prints in .TXT format as a job ticket with space for written comments and a signature.

Directly onto a PC - via the "Pro-Series PC Upload Lead" ref: RDS Pt. No. S/CB/268-1-032. Data can be output in .CSV format for import into a spreadsheet or database.

The top port should be configured as follows;

Data Card Module - "RDS PF MODULE"

ICP 100 In-Cab Printer - "RDS PRINTER ICP 100"

ICP 200 In-Cab Printer - "RDS PRINTER ICP 100"

Directly onto a PC - "PC DOWNLOAD"

Job summaries from the Magic Box 2 Sprayer Controller contains the following data;

Job Number
Start Date
Start Time
End Time
Job Duration
Channel No.
Machine ID / Name
Farm No.
Field No.
Product / Crop
Cal Factor
Area
Work Rate
Quantity spread
Quantity loaded
Average Application Rate
Extended Functions F1 to F12 values

Comments*
Operator*
Transmit Time and Date

* Not included in .CSV format

3.5.3 Select and Print / Download Job Summaries

1 From the "View Data" page (fig. 26, 27), press the PRNT key.

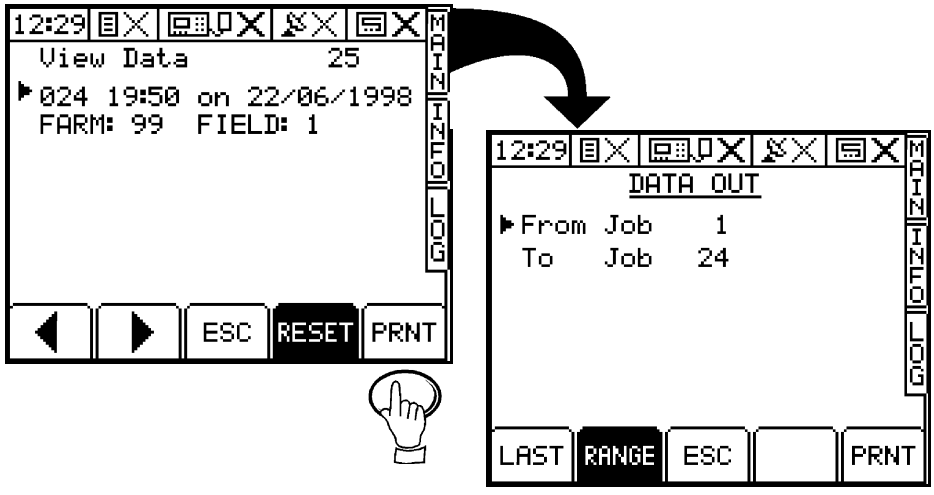


Figure 27
Download Job Summaries

2 Press LAST to select the last summary recorded or press RANGE to select a number of individual summaries.

3 If downloading a range of job summaries, simply type the job numbers on the "DATA OUT" page, then press PRNT.

4 Select the printout style:- TEXT MODE for ASCII text output or CSV MODE for import into an Excel spreadsheet.

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Issue 3:	29/11/01	Updated for S/W. Ver. 512-011 rev. 0