User Manual

ASeries A1400DL*plus*

RS-232 Data Logger

with Battery Backup

ALFATRON

the interfacing specialists

A1400DL*plus* User Manual

Version 1.30

November 2000

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Alfatron Pty Ltd ACN: 005 410 819
P.O. Box 4161
Unit 9/36 New St.
Ringwood VIC 3134
AUSTRALIA

Web Site: www.alfatron.com.au

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1.0 PRODUCT DESCRIPTION

The ASeries A1400DL*plus* Data Logger has one Serial Input, one Serial Output, a battery backed in-line data buffer. It will accept data through its independent input port, store the data in its buffer and send it to the independent output port. It has been specially designed to handle Call Accounting infromation which is output from PABX equipment but its generic design makes it suitable for many other applications.

The physical layout of the ASeries A1400DL*plus* is as follows:

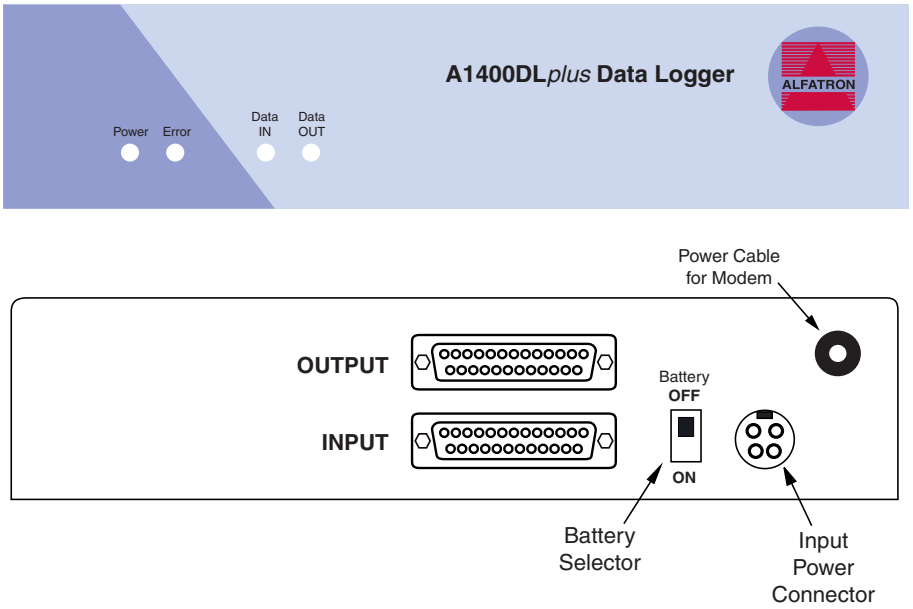


Figure 1 - A1400DL viewed front & rear

The A1400DL*plus* uses 72-pin SIMM memory for its internal data buffer. The Input and Output RS-232 Serial ports support baud rate speeds from 300bps to 115,200bps. Each port may be configured independently and both ports support Hardware (DTR/DSR) and Software (Robust Xon/Xoff) handshaking protocols. The Input port may also be switch selected to either DCE or DTE to simplify cabling requirements.

1.1 How it works with a PABX Telephone System

It addresses two major issues encountered in PABX buffer situations:

1. What happens if equipment collecting the information (lets say a PC) loses its power. Will the A1400DL*plus* continue sending out data which will then be lost?
2. What happens if the PC is powered up after a power loss? When does the A1400DL*plus* start sending data to the PC?

A simple in-line buffer does not address either of these problems but the A1400DL*plus* has been specifically designed to handle these issues.

1.2 Operation after Loss of Power

Our standard buffer uses a 10K pull up resistor on the 'DSR' line (Pin 20) of its Output port to keep this line 'high', enabling transmission of data at all times. When a PC is connected, this resistor is over-ridden by the 'DTR' line on the PC, which controls data transmission from the buffer. When the PC is powered off, the resistor on the buffer takes over again inadvertently enabling the transmitter and therefore losing data.

The A1400DL*plus* does not use this resistor on the 'DSR' line, instead it passes control to its internal driver/receiver chip. This guarantees that the A1400DL*plus* transmitter will be disabled when the PC connected to the output port is powered off.

1.3 Operation after Resumption of Power

This issue is overcome in the firmware of the A1400DL*plus*. *This will only work if the A1400 Output port is used in Xon/Xoff handshaking mode,* (refer to DIP switch settings in this manual).

When a PC is powered off, the 'DTR' line will go to a 'low' state and disable the A1400DL*plus* transmitter, as discussed above. When the PC is powered on again, one of two things will happen:

(a) If the last character received was an 'Xoff' there is no problem because the 'Xoff' would disable the A1400DL*plus* from sending data.

(b) If the last character was an ‘Xon’ then the problem arises that the PC cannot guarantee that, on power up, it will keep its serial port handhaking level in a state which will keep the A1400DL*plus* transmitter disabled. During the PC power up procedure, its 'DTR' line will remain in a 'high' state from anywhere between 2 to 30 seconds, depending on the speed of the PC and how long it takes to boot up. At 9600bps this means that approximately 1 to 30K bytes of data would be lost.

The A1400DL*plus* addresses this problem by introducing a special 'Xon Monitor Timer' feature. This special feature means that it must receive an 'Xon' at least once every 10 seconds, otherwise it will disable its transmission.

1.4 Other Considerations

It is advisable to read data out of the buffer in small lots, say 100 bytes or one line at a time. Every access to the buffer will start with an 'Xon' and finish with an 'Xoff', ensuring that the buffer stays disabled for most of the time when the application does not access it. This creates a smaller margin for data loss due to loss of power by the PC.

2.0 INSTALLATION

To prevent battery discharge the A1400DL*plus* is factory shipped with the backup battery 'disabled'. For normal operation simply slide the switch at the rear of the unit to the 'Battery ON' position.

If a 'Modem Power Cable' is installed then connect this to the Modem first. Then insert the 4-pin power plug into the power jack socket. Turn the power ON and observe the LEDs. The ‘Power’ LED should light up and remain alight, all other LEDs should light up and then extinguish within 2 seconds. After this sequence the A1400DL*plus* is ready for operation.

Power OFF the A1400DL*plus* and connect the correct cables between it and the target devices. Use only cables which you know to have the correct pin configurations. Pin assignments and Cable requirements are discussed in Sections 4 and 5.

WARNING: *All devices must be powered OFF before connecting cables to them. Incorrect cabling may cause damage to either the* A1400DL*plus or your equipment and is not covered by warranty.*

2.1 How to RESET the A1400DL*plus*

Once the battery has been enabled the A1400DL*plus* cannot be hardware reset by disconnecting the power adapter. The following procedure must be used instead:

- Move the Battery Selector to the 'Disable' position (factory setting)
- Remove power jack from the unit and wait for 5 seconds
- Move the Battery Selector to the 'Enable' position and insert power jack

2.2 Power Up Self Test Feature

During power up sequence described above the A1400DL*plus* performs a Power Up Self Test:

- The Static RAM (SRAM) is checked for any errors. If an error occurs during this test the unit will enter ‘SRAM Error Mode’ and is indicated by the LEDs ‘Receive Data’, ‘Transmit Data’ and ‘Data Error’ all flashing simultaneously. This indicates that the A1400DL*plus* has a fault.

At the end of a normal Power Up Self Test the ‘Power’ LED only will remain alight and the unit is ready for normal operation.

3.0 CONFIGURATION OF RS-232 SERIAL PORTS

3.1 Location of Serial Configuration Switches

The following diagram shows the location of the various switches on the A1400DL*plus* Printed Circuit Board (PCB). These switches can only be accessed with the cover removed as shown here:

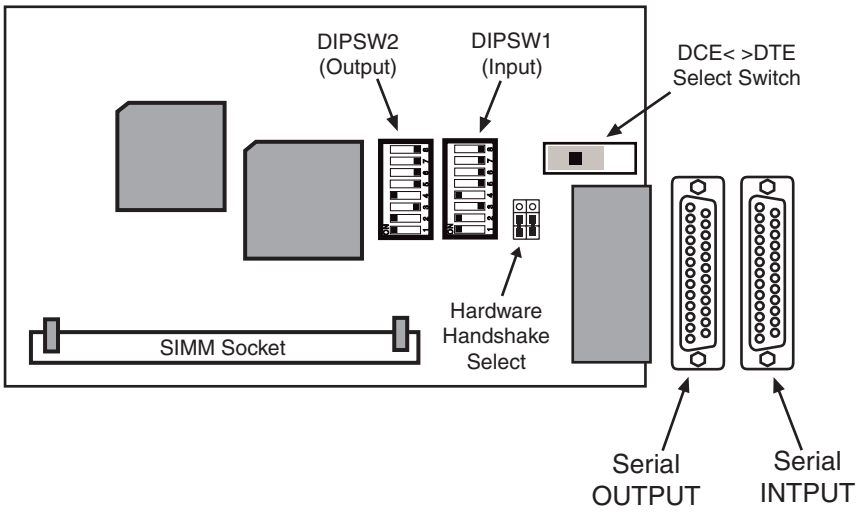


Figure 3-1. Location of Switches on Printed Circuit Board

3.2 Setting the DIP Switch

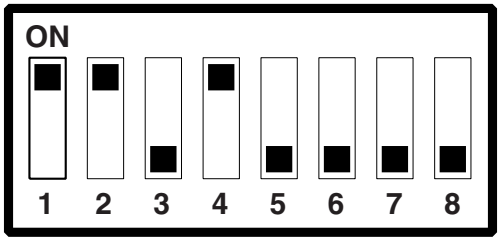
The A1400DL*plus* has an independent DIP switch bank on the PCB for each of the ports, see Figure 3-1 above.

Before changing the DIP switch settings, move the 'Battery Selector' to the 'Disable' position and disconnect the power supply. Change the settings as required and then 'Enable' the battery and re-insert the supply

3.3 Factory DIP Switch Settings

INPUT and OUTPUT DIP Switches are factory pre-set as follows

9600 bps
8 Data Bits
No Parity
DTR/DSR Hardware Handshaking
1 Stop Bit



3.4 DIP SWITCH SETTINGS

Table 3-1

Switch	Function	OFF	ON
1	Baud Rate Setting	See Table 3-2 below	
2			
3			
4	Data Bits	7	8
5	Parity & Test Mode	See Table 3-3 below	
6			
7	Handshaking	Hardware	Xon/Xoff
8	Stop Bits	1	2

Table 3-2

Switch	300	1200	2400	9600	19,200	38,000	57,600	115,200
1	Off	On	Off	On	Off	On	Off	On
2	Off	Off	On	On	Off	Off	On	On
3	Off	Off	Off	Off	On	On	On	On

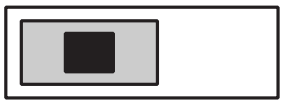
Table 3-3

Switch	Odd	Even	None	Test
5	Off	On	Off	On
6	On	On	Off	Off

3.5 DCE / DTE Input Port Selection

To make cabling easier the Input Serial port may be switch selected as either DCE or DTE. The slide switch is located on the printed circuit board behind the serial port connector. The diagram below shows the switch set to the DCE selection:

DCE < > DTE



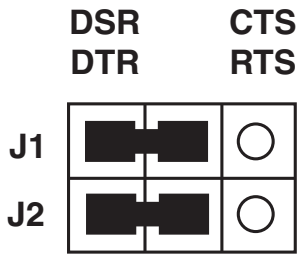
3.6 Hardware Handshake Selection

The hardware handshake pair on the INPUT serial port may be jumper selected as either DTR/DSR or RTS/CTS.

4.2.1 Input Port

The jumpers J1 and J2 are located directly behind the Input serial port connector.

- J1 is used to select either CTS or DSR
- J2 is used to select either RTS or DTR



The diagram above shows the selection of the DTR/DSR handshake pair.

3.7 EXPLAINING SERIAL FLOW CONTROL (Handshaking)

3.7.1 Hardware (DTR/DSR) Handshaking

Hardware DTR/DSR handshaking uses the Data Terminal Ready (DTR) and Data Set Ready (DSR) signal lines to control the flow of data between devices.

On the A1400DL*plus*, DTR is an output signal line which is ready to receive data when the RS-232 level is 'high', greater than +3Volts. Conversely, a DTR 'low', less than -3Volts, indicates that the unit is temporarily unable to receive data.

DSR is an input signal line which controls the output of the A1400DL*plus*. A 'high' RS-232 level, greater than +3Volts, indicates that data may be sent to the connected device. A 'low' RS-232 level, less than -3Volts, indicates that data cannot be sent to the connected device. Hardware DTR/DSR is the preferred method of handshaking under the DOS operating system.

3.7.2 Software (Xon/Xoff) Handshaking

Software Xon/Xoff handshaking uses the 'Xon', HEX(11), and 'Xoff', HEX(13), ASCII characters to control the flow of data. When using Xon/Xoff with RS-232 levels, always leave DTR/DSR disconnected on the A1400DL*plus*.

Standard Xon/Xoff performs handshaking in both directions by sending 'Xon' and 'Xoff' to the connected device and detecting these characters being sent from the connected device. The 'Xon' and 'Xoff' are sent only once. If a device connected to the A1400DL*plus* misses an 'Xoff' (due to corruption by electrical noise), this device will continue to send its data and overflow the buffer of the A1400DL*plus*. Alternately, if this device misses an 'Xon' from the A1400DL*plus*, a 'lock-up' situation will occur whereby the A1400DL*plus* is ready to receive data, the device is ready to send data but the 'Xon' character was missed. In this 'lock up' state, both devices are waiting for each other to send something. To overcome this 'lock up' state, Robust Xon/Xoff handshaking is used.

3.7.3 ROBUST Xon/Xoff

Robust Xon/Xoff handshaking overcomes limitations in the Standard Xon/Xoff protocol by repeatedly sending the 'Xon' or 'Xoff' character.

For example, if an 'Xoff' is sent from the A1400DL*plus* to a connected device and it is corrupted, it will not matter. In Robust Xon/Xoff mode the 'Xoff' character will be sent to that device each time a character is received past the cut-off point of the A1400DL*plus*'s buffer.

When the A1400DL*plus* is ready to receive data, an 'Xon' character will be sent repeatedly to ensure that the connected device may resume data transmission. If only a single 'Xon' character is sent, as in Standard Xon/Xoff, there is the possibility of corruption and the 'lock up' state would occur, the A1400DL*plus* having sent an 'Xon' and awaiting data and the connected device awaiting an 'Xon' before sending data.

Due to the UNIDIRECTIONAL nature of the A1400DL*plus*, Robust Xon/Xoff is implemented only on the INPUT port (Port 1).

4.0 SERIAL PORT PIN ASSIGNMENTS

4.1 RS-232 Pin Assignments

Pin	*Status*	*DCE*	*DTE*
1	Ground	FG	FG
2	Input / Output	RD	TD
3	Output / Input	TD	RD
4	Used - Pulled High	CTS	RTS
5	Used - Pulled High	RTS	CTS
6	Used - Pulled High	DTR	DSR
7	Ground	SG	SG
8	Not Used - Pulled High	DCD	DCD
20	Used	DSR	DTR
22	Not Used - Pulled High	RI	RI

Note: Output Port is fixed as DCE

5.0 CABLE REQUIREMENTS

5.1 Cable Shielding

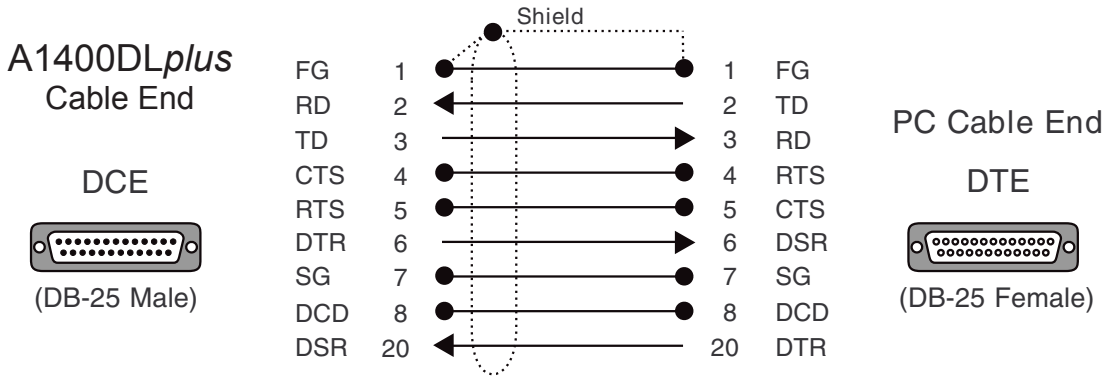
Alfatron recommends using shielded cable with all its products. Shielding reduces Electro Magnetic Radiation and improves noise immunity. This helps minimise interference to other equipment and will improve communications reliability.

The recommended cable construction is as follows:

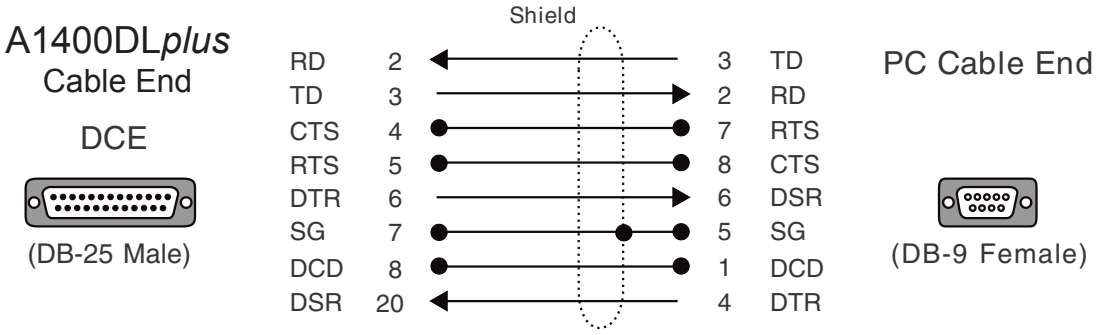
- Take the shield (surrounding cable wires) and solder it to the Frame Ground (FG) pin. If FG is not available, use Signal Ground (SG) but in this case always use a separate wire for ground which is connected at both ends.
- The shield must be connected at both ends of the cable.

5.2 Cable Examples

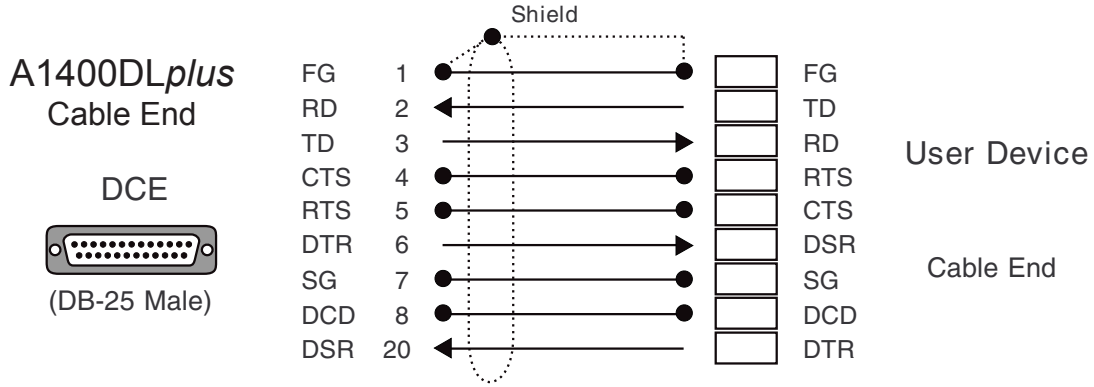
5.2.1 RS-232 Connection to a PC with a DB-25 Serial Connector



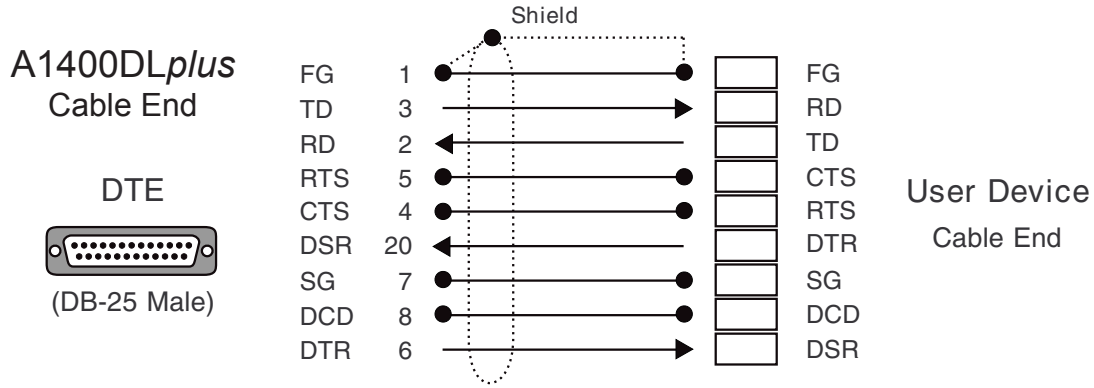
5.2.2 RS-232 Connection to a PC with a DB-9 Serial Connector



5.2.3 A1400DL as DCE - Serial Cable to Other Devices



5.2.4 A1400DL as DTE - Serial Cable to Other Devices



6.0 CONFIDENCE TESTING THE A1400DL

The A1400DL*plus* incorporates two Self Diagnostic features designed to assist with an installation when troubleshooting is required. These features will assist in establishing the correct operation of the A1400DL*plus* before connecting to other equipment. Both tests are described below.

6.1 Character Generation Function Test

The Character Generation Function Test will output a continuous stream of printable ASCII characters from both the Input and Output ports. This function may be used to confidence test both ports of the A1400DL*plus* or test the operation of attached devices. It is activated in the following manner:

1. Power OFF the unit, "disable' the battery and then make a note of the original DIP Switch settings of the A1400DL*plus*.

2. Select 'Test Mode' on the DIP Switch of the INPUT port only. Refer to tables 3-1 and 3-3 in this manual for these switch settings.

3. Configure the Input and Output serial ports via the DIP Switches. Ensure that the cable pinouts are correct for all attached equipment. Ensure that attached equipment is configured to match the port of the A1400DL*plus* and is able to receive ASCII characters.

4. Power ON the A1400DL*plus*. The Yellow Power LED and the Green Transmit LED will light and the A1400DL*plus* will produce a continuous stream of output as follows:

```
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
01234567890:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_’abcedfghijklmnopqrstuvwxyz{|}~
```

This output will continue for as long as the A1400DL*plus* is powered ON. To stop the continuous output stream simply power OFF the A1400DL*plus*.

5. Power OFF the A1400DL*plus* and re-configure it for normal use using the DIP Switch settings noted in Step 1 above. 'Enable' the battery and restore power for normal operation.

6.2 DRAM Confidence Test

This test will detect and display the buffer memory (SIMM) size and then proceed to perform a memory test, taking approximately ten minutes for each 4MB. Therefore this test is not recommended unless the buffer memory is suspected of being faulty.

Test results will be sent to the INPUT serial port and will repeat as long as the A1400DL*plus* is powered on. The test is activated in the following manner:

1. Power OFF the unit, "disable' the battery and then make a note of the original DIP Switch settings of the A1400DL*plus*.

2. Select 'Test Mode' on the DIP Switch of the OUTPUT port only. Refer to tables 3-1 and 3-3 in this manual for these switch settings.

3. Configure the INPUT serial port via the DIP Switches. Ensure that cable pinouts are correct for all attached equipment. Ensure that attached equipment is configured to match the port of the A1400DL*plus* and is able to receive ASCII characters.

4. Power ON the A1400DL*plus*. The Yellow Power LED and the Green Transmit LED will flash for each 64KB of buffer memory tested. The following message will be output from the INPUT serial port and displayed/printed on any attached equipment:

Random DRAM test DRAM_SIZE = *'size'* KB

Where *'size'* is the total size of SIMM Memory installed. If no SIMM Memory is installed then the displayed size will be '0'. This message will be repeated.

The Memory Test has four distinct stages. First the buffer memory is cleared, then loaded with random test values, held for 5 seconds and finally verified. This cycle is then repeated. The INPUT serial port will display this information with one line of data for each 64KB of buffer memory tested.

If a problem is detected with the memory the INPUT serial port will display the memory location, expected contents and corrupted value. The test will continue until the end of that stage and the INPUT serial port will display:

`Self test failed on pass 'XX'`

Where *'XX'* is the number of times the buffer test has completed. The test will stop and the Transmit and Error LEDs will flash rapidly. This test will continue for as long as the A1400DL*plus* is powered ON. To stop the Buffer Memory Test simply power OFF the A1400DL*plus*.

5. Power OFF the A1400DL and re-configure it for normal use using the DIP Switch settings noted in Step 1 above. 'Enable' the battery and restore power for normal operation.

7.0 SPECIFICATIONS

CPU: Z8S180 Microprocessor @ 18.432MHz

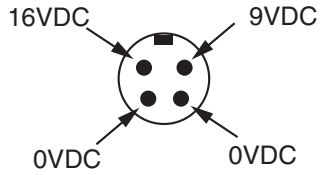
Buffer Size: 4Mb, 8Mb, 16Mb and 32Mb via 72-pin SIMMs, STD/EDO, No Parity

RS-232 Serial Ports:
RS-232C (CCITT V.24)
Input is switch selectable DTE / DCE
Input is jumper selectable DTR / DSR or CTS / RTS
Output port is fixed as DCE
DB-25 Female connector
DIP Switch selection of:
- 300 to 115,200 bps baud rate
- 7 or 8 Data Bits
- None, Odd or Even Parity
- Hardware or Xon/Xoff handshaking

LED Indicators:

Power On	(Yellow)
Receive Data	(Green)
Transmit Data	(Green)
Data Error	(Red)

Power Supply:
Dual Power Supply 16V (750mA) DC
and 9V (500mA) DC
PCB is fuse & reverse polarity protected
Plug jack - 4-pin mini power DIN



Battery:
Rechargeable Sealed Lead-Acid
12V, 2.2Ah/20HR
Intelligent battery charging circuit
12 hour memory storage time

Dimensions: 47mm x 199mm x 201mm

Weight: 1850 grams

Operating Temperature: 10° to 35° C

Storage Temperature: 0° to 45° C

All specifications subject to change without notice

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DECLARATION OF CONFORMITY

according to the European Commissions EMC Directive 89/336/EEC

We,	Name of Manufacturer:	ALFATRON PTY. LTD
of,	Address of Manufacturer:	UNIT 9, 36 NEW ST. RINGWOOD VIC 3134 AUSTRALIA
	Australian Company Number:	ACN: 005 410 819

declare under sole responsibility that the product:

Product Name:	ASeries A1400DL*plus* Data Logger with Battery Backup
Model Number:	A1400DL*plus*

to which this declaration relates is in conformity with the following standards:

CISPR-22 / EN 55022 class B	EMI from Information Technology Equipment (ITE)
IEC 801-2 / prEN55024-2	Electro Static Discharge Immunity
IEC 801-3 / prEN55024-3	Radiated RF Immunity
IEC 801-4 / prEN55024-4	Electrical Fast Transients Immunity