

FM4850

User
Manual

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Metrodata FM4850 User Manual

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1 INTRODUCTION

1.1 About The FM4850

The FM4850 Data Service Unit (DSU) is used to connect high performance bridges and routers to high speed 8 Mbit/s services.

The FM4850 interfaces a E2 service (8.448 Mbit/s) and Data Terminal Equipment presenting a High Speed Serial Interface (HSSI) port.

FM4850 DSU's are used in pairs, one at either end of a Wide Area Network (WAN) link. One end is called the LOCAL node, and the other the REMOTE node.

The FM4850 also provides extensive performance monitoring facilities. It can monitor degraded line performance and has extended alarm processing on the connection, giving the network manager extensive visibility and control of the wide-area link.

A record of all error conditions, including major and minor alarms and bit errors, is kept for the last 24 hours. Statistics are recorded every 15 minutes and processed into G.821 format. Ninety-six 15 minute periods are kept, which means that 24-hour coverage is maintained on a rolling basis.

Diagnostics are provided to localise a fault condition on the line. These are provided by various types of loopback.

The FM4850 may be managed by connecting a video terminal to the unit, either directly through a serial interface, or via a multiplexer or modem. With the optional LM1100 SNMP Enabler the FM4850 can be managed remotely with a Simple Network Management Protocol (SNMP) management system connected to the LAN. Telnet access can also be achieved through the LM1100.

Finally, with a video terminal connected to the serial interface port, the FM4850 doubles as a terminal adapter and connection may be made to remote Telnet-accessible devices via the LM1100 SNMP Enabler.

1.2 Typical FM4850 Installation

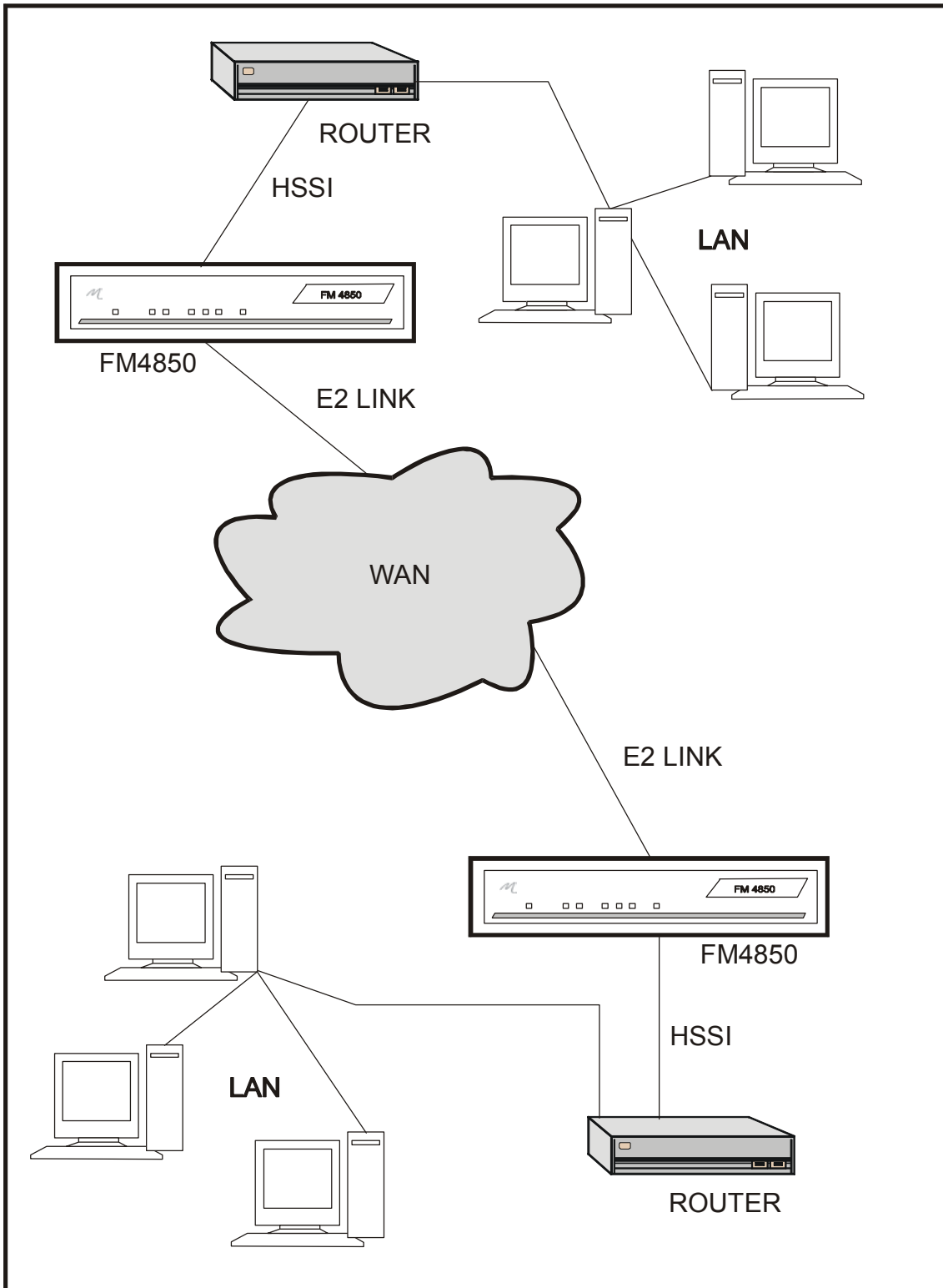


Figure 1. 1 FM4850 Deployment

1.3 About This Manual

This user manual describes the installation, commissioning and operation of the Metrodata FM4850 Data Service Unit. It describes the operational functions of the unit, as well as the extensive performance monitoring facilities. A glossary is provided at the rear which explains the abbreviations introduced by this manual.

It is important that you read and understand the performance and operating limitations in Section 2 and specifications in Section 10 of the FM4850 before attempting any connections.

Section 3, Technical Overview describes the G.703 standard which is applicable to the operation of the FM4850.

Section 4, Introducing FM4850, describes the front and rear panels of the FM4850 with details of connectors, connector layouts and alarm lights. It is worthwhile to study the detail of Sections 3 and 4 since this helps in installing and testing the unit.

Section 5, Installing & Setting-up, takes you through the basic steps of connecting the FM4850 to the external devices that you may have.

The structure of the menus is described in Section 6, Configuring the FM4850, as well as each of the options on every menu. Part of this Section describes a typical commissioning procedure, and acts as a checklist for both first-time and experienced users of the FM4850.

Section 7, Analysing Performance, shows you how to monitor the E2 link and change the summary report options for the FM4850.

Section 8 introduces the concept of remote management of the FM4850 using Simple Network Management Protocol with an LM1100 SNMP Enabler. However, this subject is too detailed to be described in this manual, and you should refer to the LM1100 SNMP Enabler User manual.

The extensive diagnostic testing and troubleshooting functions of the FM4850 are described in Section 9, including testing both local and remote connections. The troubleshooting subsection is provided to assist with isolating any errors or faults that may occur.

Section 10 lists the various specifications of the FM4850, and at the rear of the manual menu charts are included as an aid to installing the FM4850.

1.4 Conventions

Notes are used to provide the reader with either statutory information which must be observed for safety reasons, or additional information which may increase the FM4850's effectiveness.

A pair of arrows around a word indicates a key on the keyboard, such as

<space> or **<escape>**

There are two exceptions to this, which appear on some of the menus:

<display> indicates that selecting the option will lead to data being displayed on the screen.

<menu> indicates that the option leads to another menu, from which further options may be chosen.

Screen displays that contain variable information, such as the current date or time, show the variable in italics, surrounded by square brackets, i.e. *[time]*, or "*[nodename]*". The speechmarks indicate that the field contents can be specified by the user.

Where menu items are referred to in the text, these are shown in italics to help the reader to cross relate to menu information.

Screen examples: the FM4850 allows you to use one of three options for displaying the menus on a terminal - ANSI, VT100/VT220 or TTY.

The screen examples in this manual use VT100/VT220 and are shaded to allow easy identification by the reader.

2 STATUTORY INFORMATION

2.1 Performance

The FM4850 complies with the requirements of G.703 at 8.448 Mbit/s, British Telecom specification SIN219 and BS6328 Section 8.2 Clause 5.2.

It has a port defined as 5C (Unstructured operation) in the context of Oftel OTR.001.

These standards permit connection to the public 8.448 Mbit/s network network.

The FM4850 maintains bit integrity between the network port and the DTE port.

The FM4850 should not be connected to cabling which would be required by BS6701 to be equipped with over-voltage protection.

The worst case delay through the FM4850 is 2 microseconds, and the worst case round trip delay is 8 microseconds.

2.2 Safety

The following ports are designated SELV (Safety Extra Low Voltage) within the scope of EN41003:

- HSSI port (DTE port)
- Terminal port
- Management port
- Alarm extension port
- E2 Line port (WAN port)

These ports should only be connected to SELV ports on other equipment in accordance with EN60950 clause 2.3.

2.3 Electromagnetic Compatibility

In order to ensure EMC compliance all signal and data cables and connectors must use a screened connector shell with a screened cable. The cable screen must be terminated to the screened connector shell and not connected to any pins of the connector. Failure to use the correct connector may compromise EMC compliance.

2.4 EN55022 Declaration

The FM4800 is a Class A product. In a domestic environment it may cause radio interference in which case the user may be required to take adequate measures.

2.5 FCC Declaration

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at its own expense.

2.6 Power Supply

The FM4850 is powered by a mains power supply with an input voltage range 100-250 VAC/ 50-400 Hz. The maximum input current is approximately 0.2A rms. at 240V.

An alternative -48V DC power supply unit is available, the supply definition being minus 36 to minus 72VDC. The maximum input current is 1.0A. The -48V DC power supply provides cable ends for connection by the user to the main power source. The cable colour codes are:

Green/yellow	Earth
Blue	48V DC
Black	Zero

Figure 2.1 Connection of -48VDC outlet

Safety Notes:

Excessive voltages are present inside the unit. There are no user serviceable parts inside the unit, and the cover should not be removed by unqualified personnel. The unit must not be exposed to damp or condensing conditions. The FM4850 must be connected to safety earth for correct operation.

2.7 On board batteries

The user is reminded that Metrodata motherboards use Lithium/Thionyl Chloride 3.6 volt battery cells for the maintenance of RAM.

These batteries must be handled with care. There may be a risk of explosion if a battery is incorrectly replaced. Do not recharge, force open, heat or dispose of by fire. Replace only with the same type of battery. Disposal must be in accordance with the manufacturer's instructions. If in doubt about any aspect of battery replacement or disposal, please call Metrodata Technical Support Department.

3 TECHNICAL OVERVIEW

The FM4850 is used on unframed G.703 digital services, and can be used in either unframed G.703 or G.742 framed modes. Technical overviews of G.703 and G.742 are provided.

3.1 G.703 Signal Transmission

The signal is transmitted on 75 Ohm RG59 unbalanced coax. The signal has alternate mark inversion (AMI) characteristics in accordance with G.703. A mark is transmitted as a 0P5 unit interval (UI) wide pulse of amplitude 2.37V. Alternate marks have opposing polarity so that '111' is transmitted as a positive pulse, a negative one and then another positive one. The pulses have a duration of 50% so that strings of '1s' can be identified as a series of pulses. This is because clocking information is derived from the transmitted signal. In addition, strings of zeros are replaced with high-density binary 3 (HDB3) code words to ensure pulse density (and therefore clocking information) and an average DC potential of 0V. The transmission rate is 8.448 Mbit/s.

3.2 G.742 Framing

Groups of 836 bits are grouped into frames together with a 12-bit overhead at the start of the frame. The frame length is therefore 848 bits, and the frame repetition rate is 9P962 KHz. Data from the payload is presented to the HSSI DTE in bursted fashion. Bursted data comprises a sequence of bits with a bit rate equal to the line rate, followed by a gap in the data equivalent in length to the synchronisation pattern.

3.3 Path Overhead

The 12 bits are used for path overhead and provide framing, alarm information, error detection and management. The overhead bits are used as follows:

Bit No	Function
1 to 10	Frame alignment signal (FAS) 1111010000
11	Remote alarm indication (RAI)
12	National bit

Figure 3. 1 Path overhead

3.4 Payload

The FM4850 operates with a DTE port data rate of 8.448 Mbit/s in unframed mode, or 8P328 Mbit/s in G.742 framed mode.

4 INTRODUCING THE FM4850

The FM4850 is supplied in a metal enclosure for tabletop or 19" rack mounting using the optional rack mounting ears that bolt onto the side of the module.

4.1 Front panel

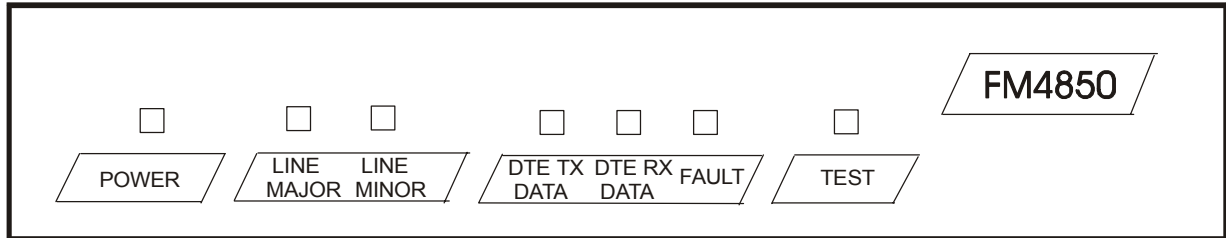


Figure 4.1 FM4850 Front panel

The FM4850 provides you with essential information through a series of LEDs on the front panel. The colour of some of these LEDs will depend on the type of data that is being handled at the time, and these are described in Figure 4.2 below.

LED	Colour	Meaning
Power	Red	Mains power is being received.
Line		
Major Minor	Red Yellow	LOS, LOF or SQ alarm is present AIS or RAI alarm is present.
DTE		
Fault	Red	The TT clock is out of specification or the FM4850 has a hardware timing fault.
TX Data and RX Data	Red Green Orange	Data being transmitted or received = 1 Data being transmitted or received = 0 The data is switching rapidly between 0 and 1.
Test		
	Red	The E2 port is looped locally or remotely; or the remote loop pattern has been sent.
	Green	The DTE port is looped, or the external DTE loop has been selected

Figure 4.2 FM4850 Front panel alarms

4.2 Rear panel

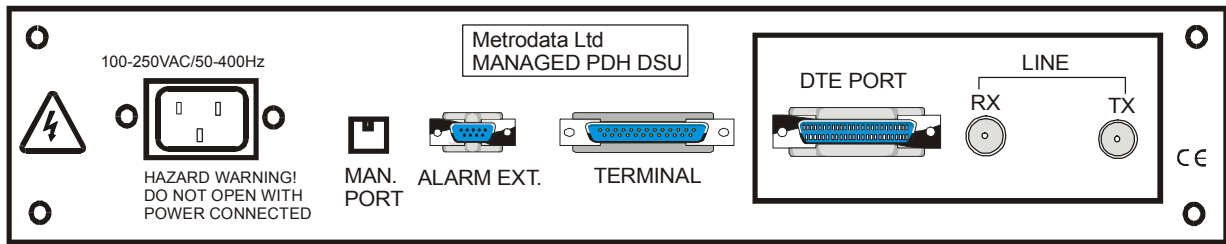


Figure 4.3 FM4850 Rear panel

4.3 Power Supply

The FM4850 is powered by a mains power supply with an input voltage range 100-250 VAC / 50-400 Hz. The maximum input current is 0.2A rms. at 240V.

An alternative -48VDC powered unit is available. The input voltage and current ranges are - minus 36 to minus 72 volts DC. A Buccaneer type socket is fitted to the rear panel, and a plug is provided with the unit for the customer's own wiring. The connections are labelled on the rear panel of the unit.

On some units, an additional Ground stud may be located on the rear panel to permit a separate Ground connection to be made.

Pin no	Connection
1	-48VDC
2	Ground
3	0VDC

Figure 4. 4 -48VDC connections

Note: The FM4850 must be connected to safety earth for correct operation.

4.4 Remote Management port

If you have chosen the LM1100 SNMP Enabler option this port will contain an RJ45 connector, otherwise it will contain a blanking plug. This port is labelled *MAN PORT* on the rear panel. The LM1100 SNMP Enabler option gives access to the SNMP network management system via an IEEE 802.3/10BaseT interface on the rear of the DSU.

Note: The Management port is regarded as a SELV port within the scope of EN 41003. The layout of this port's RJ45 connector is shown below:

Pin	Signal
1	Tx Data + ve
2	Tx Data - ve
3	Rx Data + ve
4	Not connected
5	Not connected
6	Rx Data - ve
7	Not connected
8	Not connected

Figure 4.5 Management port layout

4.5 Alarm Extension

This port contains either a 6-pin mini-DIN connector or a 9-pin D-type connector, allowing you to connect the major and minor alarm relay contacts within the FM4850 to a remote indicator, such as a bell or a lamp. The two types of connectors are described below. The Major alarm contacts are normally open, so that major alarm indication is given if the mains power supply to the DSU should fail. The Alarm Relay port is regarded as a SELV port within the scope of EN41003.

Pin	Function
1	Major common
2	Minor N/C
3	Major N/O
4	Minor N/O
5	Major N/C
6	Minor common

Figure 4.6 6-pin connector layout

Pin	Function
1	Shield
2	Major common
3	Minor N/O
4	Minor N/C
5	Not connected
6	Major N/C
7	Major N/O
8	Minor common
9	Not connected

Figure 4.7 9-pin D-type connector layout

4.6 Terminal Port

The terminal port is provided for local management of the FM4850. It is a female 25-pin D-type connector with a full RS232 layout which is shown below.

Note: The Terminal port is regarded as a SELV port within the scope of EN 41003.

Pin	Function
1	Chassis
2	Transmit
3	Receive
4	RTS
5	CTS
6	DSR
7	Ground
8	DCD
9-25	Not connected

Figure 4.8 Terminal port connector layout

If the *MODEM SUPPORT* item in the *V.24 SET-UP* menu is set to its default value *ON*, then RTS (pin 4 on the DSU terminal port) needs to be correctly driven, otherwise the user will be permanently logged out of the DSU. To drive the RTS correctly, a fully configured cable can be used together with a terminal which supports hardware handshaking. An alternative approach is to connect the RTS and DSR signals together (pins 4 and 6) at the DSU end of the cable. Obviously, the loopbacks should not be implemented if the management terminal is remote, and connected via a modem.

4 . 6. 1 Minimum RS232 connection

A cable to connect a local terminal to this port (without a modem) may have the minimum RS232 connection when this is suitable for the terminal being used, as shown in Figure 4.8.

Pin	Function	Connection
1		Not connected
2	Transmit	2
3	Receive	3
4		Loop to 6
5		Not connected
6		Loop to 4
7	Ground	7
8-25		Not connected

Figure 4.9 Local terminal cable pinout

4 . 6. 2 V.24 Terminal Cable 25 Way to 25 Way

A full RS232 connection via a 25-way cable is shown below:

25 Way D Male (DSU)	Function	25 Way D Female (Terminal)
2	Transmit	2
3	Receive	3
4	RTS	4
5	CTS	5
6	DSR	6
7	Ground	7
8	DCD	8
1,9-25	Not connected	1,9-25

Figure 4.10 Terminal port cable 25 way to 25 way

Note: To inhibit the modem control function for reasons explained earlier in this section, loop pins 4 and 6 at DSU end of cable.

The default settings for the terminal connected to the management port are given in the table below:

Item	Default
Terminal type	TTY
Baud rate	9600
Parity	None
Data bits	8
Stop bits	2
Modem support	On

Figure 4.11 Terminal port default settings

4 . 6. 3 Connecting to a PC COM port

A converter cable can be supplied to convert from the 25-way female D-type connector on the rear panel of the DSU to a 9-way D-type connector. This may be required if a PC is being used as the management terminal to connect to the PC's 9-pin COM port. The connections are given in the figure below.

25 Way D Male (DSU)	Function	9 Way D Female (PC)
2	Transmit	3
3	Receive	2
4	RTS Loopback to pin 6 (DSR)	7
5	CTS	8
6	DSR Loopback to Pin 4 (RTS)	6
7	Ground	5
8	DCD	1
1,9-25	Not connected	4,9

Figure 4.12 Terminal port converter cable 25 way to 9 way

Notes: To inhibit the modem control function for reasons explained earlier in this section, loop pins 4 and 6 at DSU end of cable.

If you are using Windows/Hyperterm as your terminal emulator, click on **View/Font** and activate **MSLinedraw** for optimum picture quality.

4.7 HSSI Port

The HSSI EIA613 DTE port is used to connect to the router. It consists of a female miniature 50-pin AMP connector, whose pins are described below.

AMP connector part number 749111-4 should be used for connections to this port.

Note: The HSSI port is regarded as a SELV port within the scope of EN 41003.

+VE Pin No	-VE Pin No	Function	CCT No.
1	26	SG	102
2	27	RT	115
3	28	CA	107
4	29	RD	104
5	30	LC	
6	31	ST	114
7	32	SG	102
8	33	TA	108.2
9	34	TT	113
10	35	LA	141
11	36	SD	103
12	37	LB	140
13	38	SG	102
14-18	39-43	Reserved	
19	44	SG	102
20-23	45-48	Reserved	
24	49	TM	
25	50	SG	102

Figure 4.13 HSSI port connector layout

4.8 Network Connection

The network connection is made to the BNC connectors at the rear of the unit. Connections are as follows:

Pin	Function
Tip	Signal
Ring	Shield

Figure 4.14 BNC connection

Cable lengths should be restricted to those defined below:

Cable	Max. Length (metres)
UR202	375
RG59/U	300
BT2002	330
BT2003	340

Figure 4.15 Cable lengths

Note: The total maximum attenuation of each of the cables attached to the network port must not exceed 6dB when measured at 4.224 MHz.

The frequency/attenuation characteristic of the cables attached to the network port shall follow a root frequency law.

The port type is classified as 5C (unstructured port) within the scope of OTR.001. The FM4850 provides bit integrity between the E2 port and the DTE port with a worst case round trip delay of 8 microseconds.

5 INSTALLING & SETTING-UP

This chapter describes how to set up the FM4850 ready for use. It covers the initial connections, powering on the unit, and how to access the software that controls the operating parameters.

Setting and changing these parameters is covered in Section 6, Configuring FM4850.

Safety Notice: Ports that are identified as SELV in this manual should only be connected to SELV ports on other equipment in accordance with EN 60950 clause 2.3.

5.1 Connections

Step 1: Mounting

The FM4850 is housed in a convenient 1U table top enclosure. The unit may also be installed in a 19" rack using the 1U rack mounting brackets supplied.

Step 2: DTE

Connect the FM4850 to the DTE, using the 50-way AMP connector labelled DTE on the rear panel of the unit. The DSU should ideally be placed close to the DTE, with no more than 2m of cable connecting the two.

Step 3: WAN

Connect the WAN by means of the two BNC bayonet connectors on the rear panel of the unit.

Note: Before connecting the network port, make sure that you have read the information under network connection in section 4.8.

Step 4: Terminal

Connect the management terminal (Teletype or VDU) using the 25-way D- type connector labelled TERMINAL on the rear panel of the unit.

Step 5: Alarm Extension

If you wish to use an external alarm device, connect this to the alarm extension port.

Step 6: SNMP Management Port

If you have the LM1100 SNMP Enabler option and wish to use it, connect the LAN to the port labelled MAN PORT using an RJ45 connector.

Step 7: Power Supply

Finally, connect the mains power lead (or DC power cable) and re-check all connections for security. See section 2.4 for connection details for the optional -48V DC power supply. Turn on the terminal and external alarm device if used, then turn on the power supply.

Warning: Do not connect the FM4850 to excessive voltages. Read the safety information before continuing.

5. 2 Power-Up Sequence

When the FM4850 is powered up, it performs several system tests. After a few seconds the start-up screen is shown on the terminal. Figure 5.1 below is an example only:

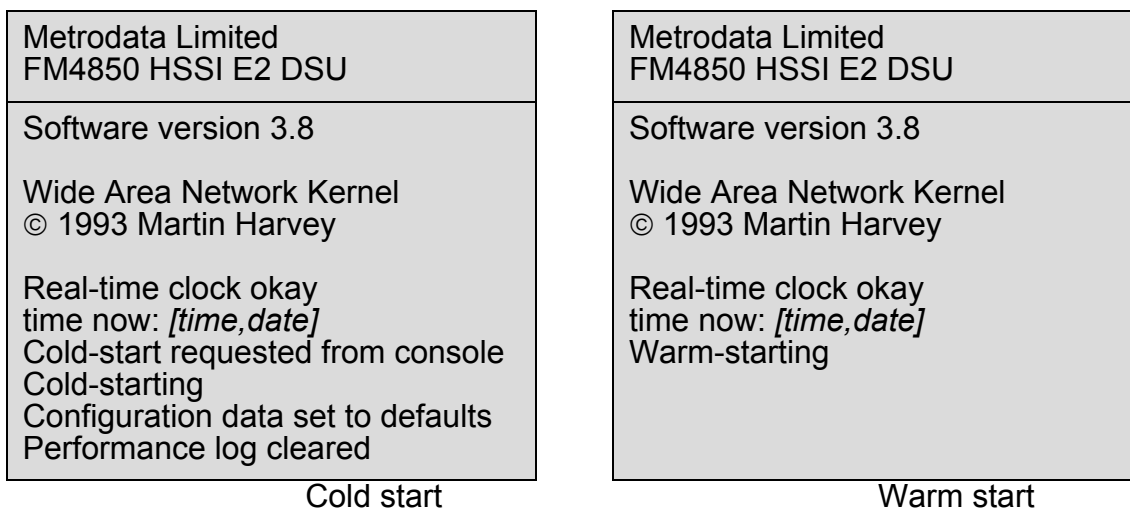


Figure 5.1 Start-up screens

In order to check or change any of the operating parameters, you will first need to gain access to the FM4850's software by logging in. Press any key, and a logon message will be displayed:

```

Metrodata FM4850: Local connection to "[nodename]"
password ('view' to view only)
>:
                    
```

Figure 5.2 Logon screen

There are two levels of user - Observer, or Operator. If you type *VIEW* as the password, you will only be able to look at the current settings, and will not be able to change any of them. If you enter the correct operator password, you can change any parameters that are not defined as read-only.

The default operator password is the same as the model number, i.e. *FM4850*. When you have entered this once, you will be able to change the password if you wish, as described in Section 6.3. When you enter the appropriate password, you will be presented with the *MAIN SET-UP* menu. All of the FM4850's operating parameters are accessed through this initial menu.

5.3 User Interface

The display of the menu, and the way you select menu options, will depend on which type of terminal you have connected to the unit, and which version of FM4850 firmware you have. This section describes the differences between the three main types of data display - how to change the display set-up is described at the end of this section.

5.3.1 TTY terminal

With a TTY terminal, options are selected by pressing the first capital letter in the name. Generally, this will be the first letter, but where two menu options start with the same letter one of them will have another letter capitalised. An example of a TTY display is shown below:

MAIN SET-UP	
alarm eXtension	<menu>
General set-up	<menu>
WAN port set-up	<menu>
DTE set-up	<menu>
V.24 set-up	<menu>
Management	<menu>
Remote logon	<display>
Testing	<menu>
Special	<menu>
Performance data	<menu>

Select item by using first CAPITAL letter of name
<escape> - exit menu

Figure 5.3 TTY Main set-up menu

When you press a letter which leads to a further menu, the screen will scroll up and the new menu will be displayed.

The highlighted menu item *REMOTE LOGON* only appears on the screen when G.742 framed mode is selected and *DATALINK* is enabled. The item *MANAGEMENT* only appears if the LM1100 SNMP Enabler has been fitted to the FM4850.

Pressing a letter corresponding to a menu option will lead to additional prompts at the bottom of the screen:

<space>	- change value
<enter>	- save new value
<escape>	- exit without saving

Figure 5.4 Prompt screen

The current value of that option will then be shown. Each time you press the space bar, the next value will be displayed, cycling through the available values. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to cancel your choice.

5 . 3. 2 VT100/VT220 and ANSI terminals

The displays you see on a VT100/VT220 or an ANSI terminal are very similar, and examples are shown below:

MAIN SET-UP	
alarm eXtension	<menu>
General set-up	<menu>
WAN port set-up	<menu>
DTE set-up	<menu>
V.24 set-up	<menu>
Management	<menu>
Remote logon	<display>
Testing	<menu>
Special	<menu>
Performance data	<menu>

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 5.5 VT/ANSI Main set-up menu

When you press a letter which leads to a further menu, the screen will be refreshed without scrolling, displaying the new menu. The highlighted menu item *REMOTE LOGON* only appears on the screen when G.742 framed mode is selected and *DATALINK* is enabled. The item *MANAGEMENT* only appears if the LM1100 SNMP Enabler has been fitted to the FM4850.

If you press a letter corresponding to a menu option, the value opposite that option will be highlighted. You will also see the prompts at the bottom of the screen, similar to the TTY display:

<space> - change value
<enter> - save new value
<escape> - exit without saving

Figure 5.6 Prompt screen

Pressing the space bar will cause the next available value to be displayed opposite the option. When the required value is displayed, simply press the <enter> key to accept the value or press <escape> to leave the existing value unchanged.

5. 4 Default settings

The default settings for the terminal connected to the management port are given in the table below.

The terminal must be set to the FM4850's default values after performing a cold start. Once this is done, the FM4850's V.24 settings can be changed using the *V.24 SET-UP* menu, which is accessed from the *MAIN SET-UP* menu described in the next section.

The default terminal is a Teletype (*TTY*), but the vast majority of users will employ a *VT100/220* or an *ANSI* terminal either directly or on a PC via a terminal emulator. The TTY output screens do not have graphic capability, and are therefore not so easy to read when setting up the system.

After a making change in the FM4850's stored terminal set-up (with the terminal on default settings), select *LOAD NEW CONFIG* on the menu screen. The physical terminal must then be re-set to correspond to the new values stored in the unit.

V.24 Item	Defaults	Options
Terminal type	TTY	TTY, VT100/220, ANSI
Baud rate	9600	2400, 4800, 9600, 19200
Parity	None	Odd, Even
Data bits	8	7 or 8
Stop bits	1	1 or 2
Flow control	Xon/Xoff	

Figure 5.7 V.24 Terminal set-up defaults and options

6 CONFIGURING THE FM4850

6.1 Menu Structure

When you have completed the installation, and have successfully logged in, you will be presented with the *MAIN SET-UP* menu. In order to view or change a parameter, you need to know which menus or options to display. This section describes how to navigate your way through the menus. In Figure 6.1 below, the shaded boxes represent screens that lead to further menus.

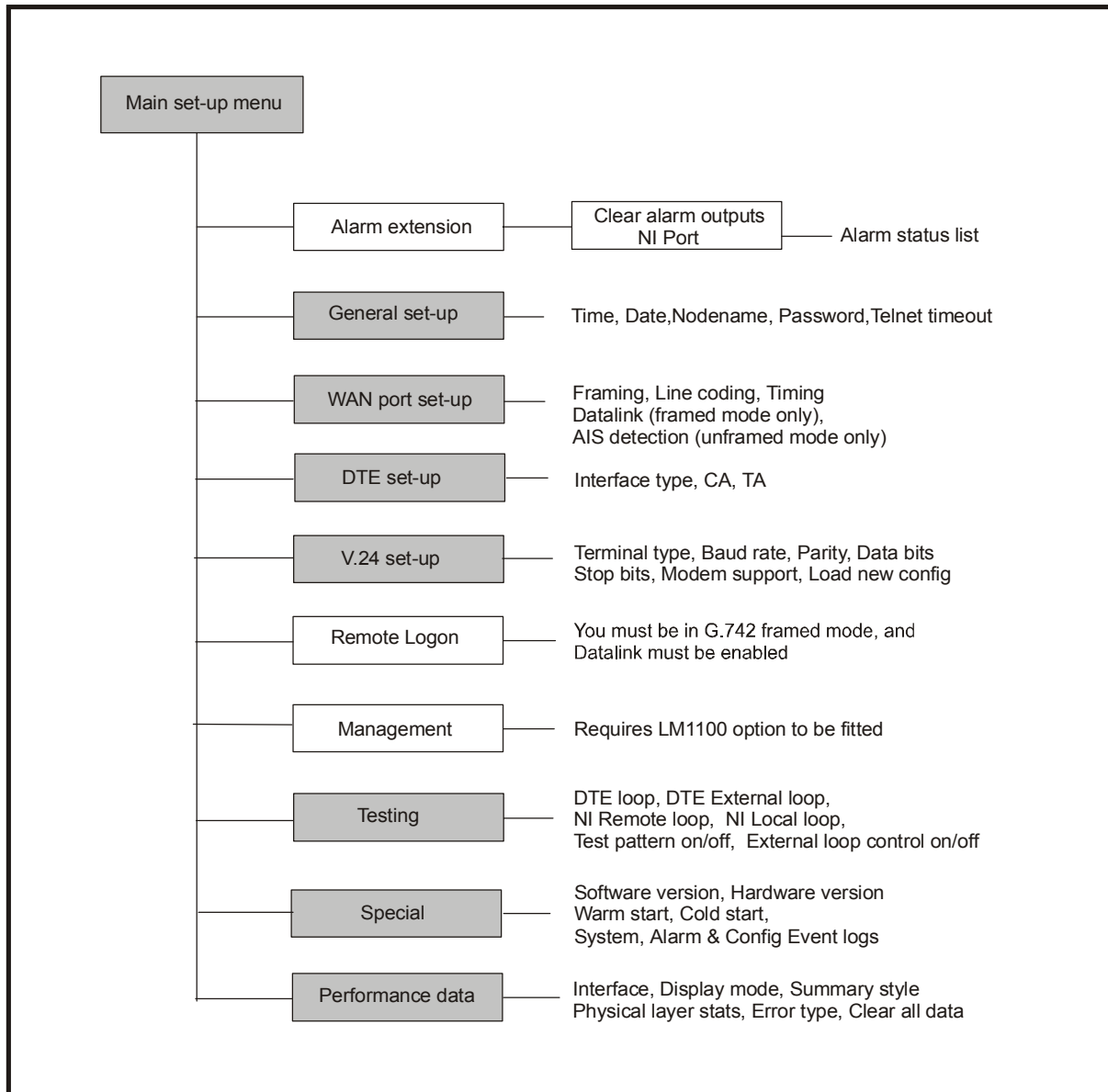


Figure 6.1 FM4850 Menu structure

Pressing the <escape> key on any screen will return you to the previous screen in the structure.

6.2 Main Set-up Menu

MAIN SET-UP	
alarm eXtension	<menu>
General set-up	<menu>
WAN port set-up	<menu>
DTE set-up	<menu>
V.24 set-up	<menu>
Management	<menu>
Remote logon	<display>
Testing	<menu>
Special	<menu>
Performance data	<menu>

HIGHLIGHTED letter - select item <escape> - exit menu
--

Figure 6.2 Main set-up menu

The menu item *MANAGEMENT* only appears if the LM1100 SNMP Enabler has been fitted. The highlighted menu item *REMOTE LOGON* only appears on the screen when G.742 framed mode is selected and *DATALINK* is enabled.

6.2.1 Alarm extension

Selecting the menu item *ALARM EXTENSION* on the *MAIN SET-UP* menu leads to a further menu.

ALARM EXTENSION	
Clear alarm outputs	<display>
NI port	<menu>

HIGHLIGHTED letter - select item <escape> - exit menu
--

Figure 6.3 Alarm extension screen

6 . 2. 2 Clear Alarm Outputs

If the FM4850 has detected a major or minor alarm condition the alarm extension is activated. The alarm extension device may be muted by selecting *CLEAR ALARM OUTPUTS*. When this option is selected the alarm extension status (prior to the clear command) is shown below the menu.

```
Alarms cleared
NI Phys: LOS
Press any key to continue
```

Figure 6.4 Alarm status screen

Note: If the alarm extension has been cancelled with the *CLEAR ALARM OUTPUTS* option, the alarm is still indicated on the front panel indicator lights and in the performance statistics.

The *NI PORT* option shown below provides a display of all the alarms which are valid for the FM4850. in each operating mode. The alarms are labelled from 0 to 9 and A to Z in the firmware, and can be selected by their label.

NI PORT		NI PORT	
0 - LOS	Major	0 - LOS	Major
1 - LOF	Major	2 - PSYN	Minor
2 - PSYN	Minor	3 - AIS	Minor
3 - AIS	Minor		
4 - RAI	Major		
5 - SQS	Minor		

Unframed mode

Framed mode

```
HIGHLIGHTED letter - select item
<escape> - exit menu
```

Figure 6.5 NI Port alarm config

Notes:

AIS only appears as an alarm in *UNFRAMED* mode with *AIS DETECTION* set to *ENABLED*.

PSYN only appears as an alarm if *TEST PATTERN* has been turned *ON* from the *TESTING* menu.

Toggling the space bar permits the alarm to be configured by the user to *MAJOR*, *MINOR* or *NONE*. This affects which alarm extension relay is affected by an alarm. The configuration rules are:

MAJOR	major relay
MINOR	minor relay
NONE	no relay

Figure 6.6 Alarm relay config

Even if the alarm extension menu item is set to *NONE*, the performance reports described in Section 7 will continue to count alarms.

6.3 General Set-up Menu

GENERAL SET-UP	
Time	16:25:23
Date	Mon 15/10/01
Node name	"nodename"
Password	
telNet timeout	60

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 6.7 General set-up menu

Note: the *TELNET TIMEOUT* option appears only if you are using *SNMP* or *DATALINK* facilities.

6.3.1 Time

When you select Time, you will be prompted to enter the current time in the format hh:mm:ss. Note that this format uses the 24-hour clock. For example:

Enter time (hh:mm:ss)> 14:30:00

Figure 6.8 Time prompt

6 . 3. 2 Date

Enter the current date in the format dd/mm/yyyy. For example, October 15th 2001 would be entered as 15/10/2001. The corresponding day of the week is also displayed when you press <enter>. Leading zeros are suppressed by the date display.

```
Enter date "[dd/mm/yyyy]"
> 15/10/2001
```

Figure 6.9 Date prompt

The year is entered as an explicit 4 digit number (e.g. 2004), and processed as such in the firmware. Dates between 01/01/1980 and 31/12/2047 are valid.

6 . 3. 3 Node name

This is the name of the unit to which you are connected. The top of the screen indicates the current node by displaying

```
Local connection to "[nodename]"
```

At the *ENTER NEW NAME* prompt, you can enter the name you wish to give this node. The name may be up to 16 characters with no spaces permitted.

6 . 3. 4 Password

This option is used to change the current password. The supervisory password, which allows you to change settings, is initially set to the model number, i.e. *FM4850*. If you wish to change the password, select this item and then enter the new password. The password may be up to 16 characters with no spaces permitted.

The password is not case-sensitive, which means that if you enter the password as upper case letters, the unit will accept either upper or lower case, or a mixture of both, when you next log on.

```
Enter new password
Password> *****
Verify>
```

Figure 6.10 Password prompt

For security, the characters you type are displayed on the screen as asterisks. You will also be asked to re-enter the password as a check.

6 . 3. 5 Telnet Timeout

If you have the LM1100 SNMP Enabler installed, then the *TELNET TIMEOUT* option appears in the menu. It is used to close automatically the Telnet session if there is no activity or if the Telnet session was incorrectly ended. This is useful since the timeout prevents lockout of other operators by leaving telnet sessions open inadvertently. Two concurrent telnet sessions are permitted, but with a single timeout setting. The value is in seconds (the default is 60), with a maximum value of 3600. If 0 is entered then the timeout is disabled. For the reasons above, timeout disabling is not recommended.

6.4 WAN (Line) Port Set-up Menu

The menu is shown below:

WAN PORT SET-UP	
Framing	G.742
Line coding	HDB3
Timing	Internal
dataLink	Enabled

G.742 Framed mode

WAN PORT SET-UP	
Framing	Unframed
Line coding	HDB3
Timing	Internal
als detection	Enabled

Unframed mode

HIGHLIGHTED letter - select item
 <escape> - exit menu

Figure 6.11 WAN Port set-up menu

6.4.1 Framing

This option can be set to either *G.742* or *UNFRAMED* mode.

In *UNFRAMED mode*, 8.448 Mbit/s of bandwidth is available to the DTE.

In *G.742 Framed mode*, 8.328 Mbit/s of bandwidth is available to the DTE.

6.4.2 Line coding

This setting cannot be altered, and is for information only. The value is *HDB3* (High Density Binary 3)

6.4.3 Timing

This details the clocking employed in the FM4850, and the values are *INTERNAL* and *LOOP*.

The E2 Line Tx clock is derived from the DTE using CCT 113 (TT: terminal timing).

The HSSI specification requires this signal to be a non-gated version of CCT 114 (ST: send timing).

The E2 Line Rx clock is always used to generate the CCT 115 timing (RT: receive timing).

We recommend that one end is set to *INTERNAL* timing and the other end is set to *LOOP* timing, although they will operate with both set to *INTERNAL* timing. The units may operate with both set to *LOOP* timing but this is not recommended. The clocking diagram is shown in Figure 6.12 below.

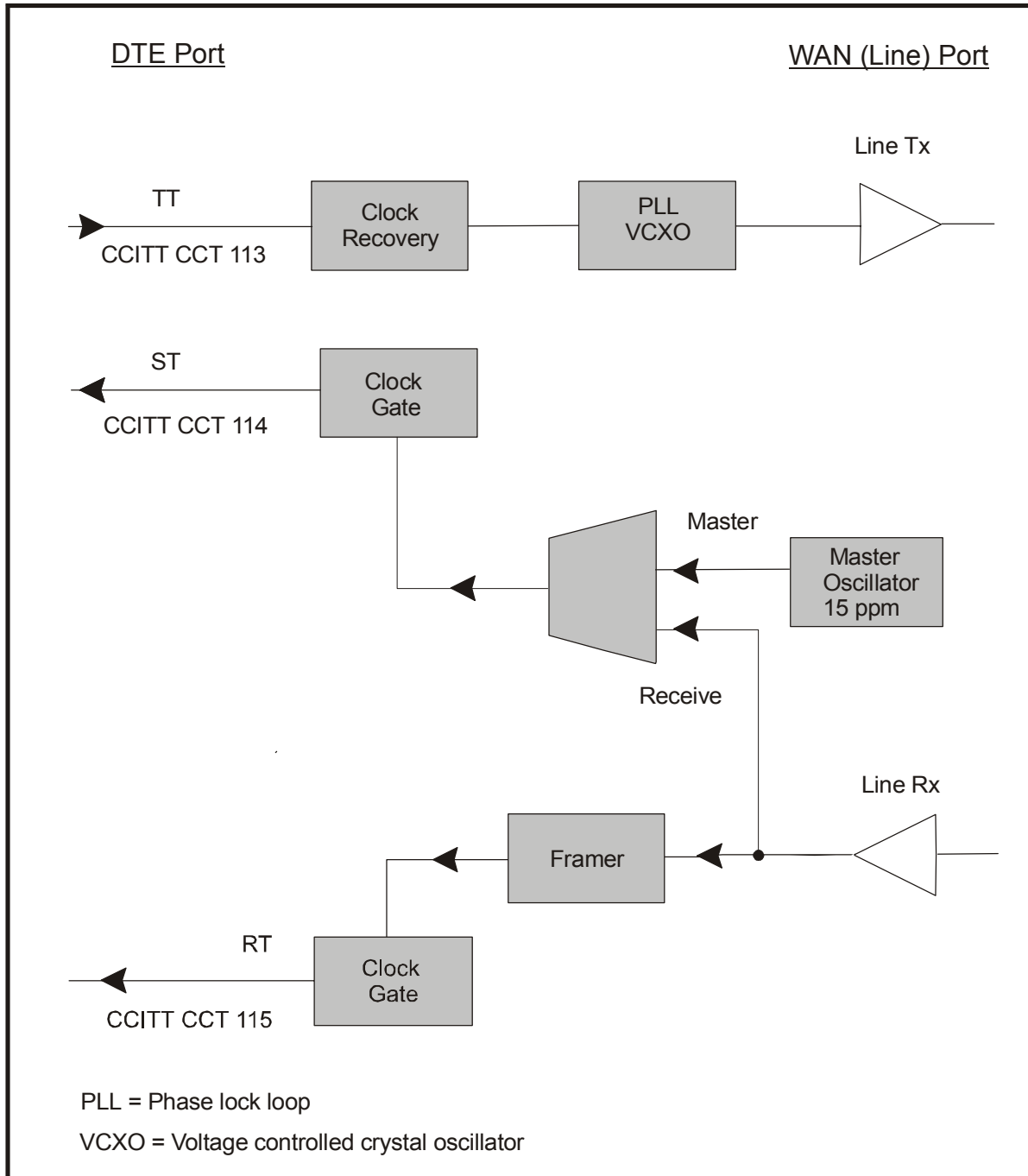


Figure 6.12 Clocking diagram

6 . 4. 4 Datalink

The *DATALINK* facility is only available in G.742 Framed mode. It enables you to control and monitor statistics from the remote FM4850. The options are *ON* or *OFF*. The National bit is used to provide 9.962 Kbit/sec of datalink bandwidth. When datalink is set to *OFF*, the National bit is set to 1.

When *FRAMED* mode is selected and *DATALINK* enabled, the *REMOTE LOGON* option appears on the *MAIN SET-UP* menu. When you select *REMOTE LOGON*, the local FM4850 telnets across the datalink to the remote unit and allows you to logon to the remote unit directly.

Note: This assumes that the remote unit's datalink facility has also been enabled.

When the datalink is in use, the display will show as one of those below, depending on which unit has been selected:

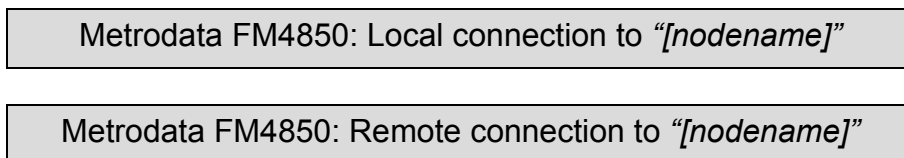


Figure 6.13 Datalink messages

It is advisable to give each unit an unique nodename to make identification easier. To log out of the remote unit and return to the local unit, press:

<CTRL> and <J>

6 . 4. 5 AIS Detection

This option will only appear on the menu screen when the mode is set to *UNFRAMED*.

It allows *AIS DETECTION* to be *ENABLED* or *DISABLED*. The AIS detector should always remain enabled under normal datacomms conditions, and should only be disabled when there is a very low zero density in the traffic.

6.5 DTE Set-up Menu

This menu is presented as below:

DTE SET-UP	
Interface type	HSSI
CA	On
TA	On

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 6.14 DTE set-up menu

6.5.1 Interface type

This shows the type of DTE port fitted to the FM4850 - *HSSI*- and is for information only.

6.5.2 CA

This controls the *CA* (Control Available) signal. It can be set to *ON*, *OFF*, or *THROUGH*.

When set to *THROUGH*, the control signal reflects the current state of the E2 receive port.

6.5.3 TA

This displays the current state of the *TA* signal (DTE Terminal Available), and is for information only. Its state is either *ON* or *OFF*.

6.6 V.24 Set-up Menu

This screen allows you to set up the communications parameters for the terminal management port.

V.24 SET-UP	
Terminal type	VT100/VT220
Baud rate	9600 bps
Parity	None
Data bits	8
Stop bits	2
Modem support	On
Load new config	

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 6.15 V.24 set-up menu

6.6.1 Terminal type

The terminal type can be *ANSI*, *VT100/VT220* or *TTY*.

The ANSI and VT100/VT220 options give you a graphical presentation of the menus, whereas TTY is used where a dumb device such as a Teletype is used for configuration and data presentation. The screen displays for these terminal types are shown in Section 5.

6.6.2 Baud rate

The baud rates supported are *2400*, *4800*, *9600* and *19200* baud.

6.6.3 Parity

Parity may be set to *NONE*, *ODD* or *EVEN*.

6.6.4 Data bits

The number of data bits may be 7 or 8.

6.6.5 Stop bits

The number of stop bits may be 1 or 2.

6.6.6 Modem support

Modem support causes you to be logged-out if the Ready-to-send (RTS) signal is dropped on the terminal port. This means that if the modem goes off-line your current logon session is terminated, preventing unauthorised access to the software. The RTS line needs to be driven for V.24 operation if modem support is on, so we recommend using a fully configured 25-way cable. Section 4 includes details of cable layouts.

6 . 6. 7 Load new config

Except for the *TERMINAL TYPE*, the changes you make on the V.24 Set-up screen do not take effect until you register the changes in the FM4850. This is done by selecting *LOAD NEW CONFIG* after making the necessary changes to the other values on this screen. You should then change your terminal settings to match these new values.

6. 7 Testing

This option gives you access to the FM4850's diagnostic functions, which are explained in detail in Section 9, Testing & Troubleshooting.

6.8 Special

SPECIAL	
Software version	3.8
Hardware version	3.8
Warm start	
Cold start	
system Event log	<display>
alarM event log	<display>
cOnfig event log	<display>

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 6.16 Special menu

This menu handles equipment version status and start-up modes, and also event logs.

6.8.1 Software version

This option displays the current version of the software on your FM4850. This is provided for information only. The format of the Version is 3.xx.

6.8.2 Hardware version

This option displays the current version of the hardware on your FM4850. This is also provided for information only.

6.8.3 Warm start

Selecting *WARM START* simulates turning the mains power off then on again. This may be necessary if a network component hangs up. A warm start does not adversely affect the FM4850's configuration parameters, performance statistics database or event log.

6.8.4 Cold start (Caution!)

Selecting *COLD START* returns the FM4850's software configuration to the default settings. All configuration parameters will be reset to their defaults, and the performance statistics database and event log will be cleared. The "[nodename]" will be erased, but the real-time clock will not be affected. For security, you will be asked to confirm this request. Pressing Y will perform the cold start, pressing any other key will cancel the request.

Note: This option should only be selected when absolutely necessary, since it may cause disruption to the network.

Operational reasons for needing to *COLD START* include real time clock problems when the RTC must be reset; a change of firmware version number in the FM4850 owing to carrying out an upgrade; an invalid configuration, probably caused by corruption of the FM4850 RAM. The management terminal may need to be reset to default settings before you can communicate with the FM4850 after a cold start.

6 . 8. 5 Event logs

Event logs are intended to provide a long term history of major occurrences on the system. They can be the first port of call for a network manager when investigating a problem, and serve to confirm the status of the FM4850 at any point in time from the last cold start. If a cold start is performed, this log will be cleared and the first entry in the log will be the date and time of that cold start.

The logs are all accessed from the *SPECIAL* menu. The logs record the most recent events at the top of the screen, with events sorted into backwards order of time. The log is divided into three separate logs on separate screens: *SYSTEM EVENT LOG*, *ALARM EVENT LOG* and *CONFIG EVENT LOG*. The *SYSTEM EVENT LOG* records system level events

--- System Event Log ---		
16/8/2001	23:27:35	power restored
16/8/2001	23:19:07	illegal interrupt
15/8/2001	00:09:33	power restored
15/8/2001	00:09:28	power-down
Press any key to continue		

Figure 6.17 System event log

Note: If the system event log contains either the message *SPURIOUS RESET* or *ILLEGAL INTERRUPT*, please register this occurrence with your Supplier or Distributor of the product.

The *ALARM EVENT LOG* records alarms that have arisen since the last cold start. They are recorded simply as MAJOR or MINOR alarms with *ON* or *OFF* status.

--- Alarm Event Log ---		
17/2/2001	08:20:23	Major ON NI
16/2/2001	13:21:00	Minor OFF NI
16/2/2001	12:52:38	Minor ON NI
Press any key to continue		

Figure 6.18 Alarm event log

The *CONFIG EVENT LOG* records any configuration changes on the system. This can be very useful since configuration actions may have been taken remotely, without the knowledge of the local user of a node

--- Config Event Log ---		
16/7/2001	08:20:23	Config updated
16/1/2001	13:21:00	Config updated
14/1/2001	11:32:38	Config updated
Press any key to continue		

Figure 6.19 Config event log

6.9 Performance Data

This option gives you access to the FM4850's performance monitoring functions. These are described in detail in Section 7, *Analysing Performance*.

6.10 Unit Set-up Checklist

The FM4850 DSUs are used in pairs, one at each end of the WAN link. This section acts as a checklist for setting up each unit to establish a valid configuration for a particular application. It assumes that you have already connected the unit as required, and logged in with the Operator password.

Note: The following procedure should be performed on both units.

Step 1: Set Terminal

Set your terminal's communication parameters to the V.24 default values, then turn on the power to the FM4850.

Step 2: Local Node - General Set-up Menu

Check the current time and date, and change them if necessary as described. Check the "[nodename]" of the local FM4850. If it needs entering or changing, do this as described.

Check the password. If you wish to change the Operator password from the default setting, select Password from the menu and change it.

Step 3: V.24 Set-up Menu

Establish the communication parameters so that the FM4850 and the terminal are using the same settings. Set the terminal parameters first so that they correspond to the FM4850's default settings - see Section 10.1.

Change the FM4850's *BAUD RATE*, *PARITY*, *DATA BITS* and *STOP BITS* if necessary, then select *LOAD NEW CONFIG*.

If you have changed any of the default settings, you will now need to change the terminal parameters so that the FM4850 and the terminal are still on identical settings.

Step 4: WAN Set-up Menu

From the *MAIN SET-UP* menu, select the WAN Set-up option and set the *TIMING* and *AIS DETECTION* parameters as appropriate.

The AIS detector should always remain enabled under normal datacomms conditions, and should only be disabled when there is a very low zero density in the traffic.

TIMING: We recommend that one FM4850 is set to *INTERNAL* timing and the other is set to *LOOP* timing. The units will operate with both set to Internal timing. The units may work if both are set to *LOOP* timing but this is not recommended.

Step 5: DTE Set-up Menu

From the *MAIN SET-UP* menu, select the *DTE SET-UP* option and set the parameters as appropriate.

Note: After steps 1 to 4 have been successfully carried out, basic operation of the link should now be possible.

7 ANALYSING PERFORMANCE

7.1 Introduction

The FM4850 provides you with extensive performance analysis functions, which allow you to monitor and record service information about the E2 link.

The first part of this section describes the Errors and Alarms that are valid for the modes of operation of the FM4850.

Performance data is displayed in the form of an on-screen report or summary. Information is grouped into periods of 15 minutes. Examples of the screens are shown in later subsections.

7.2 Errors and Alarms

7.2.1 Error types

The following error types are reported:

Code Errors	Indicate bipolar violations leading to HDB3 code errors. This is the only type of Error shown in unframed mode.
FAS Errors	Frame Alignment Signal which indicates a fault in the frame alignment pattern. This error is only valid in G.742 framed mode.
PRBS Errors	An error has been received in the Test Pattern Detector. This type of error is only valid when the Test Pattern Detector is enabled in G.742 framed mode.

Figure 7.1 FM4850 Error types

7.2.2 DTE Port responses

If there is an operational problem on the DTE port, TA is set to *OFF*

Condition	Response
DTE port not responding	<i>DTE SET-UP</i> shows TA off

Figure 7.2 DTE port response

7 . 2. 3 WAN (Line) Port alarm responses

The default responses in Figure 7.2 below are established in the presence of an alarm condition on the E2 port. An alarm or alarms can be cancelled by selecting the *ALARM EXTENSION / CLEAR ALARM OUTPUTS* option from the *MAIN SET-UP* menu.

After the alarm has been cancelled as above, it is still indicated on the front panel indicators and in the performance statistics.

Alarm	Response
LOS	MAJOR alarm lamp lights CA cleared if THROUGH E2 port transmits RAI if in framed mode
LOF (Framed mode only)	MINOR alarm lamp lights CA cleared if THROUGH E2 port transmits RAI if in framed mode
SQ (Framed mode only)	MAJOR alarm lamp lights CA cleared if THROUGH E2 port transmits RAI if in framed mode
AIS (Only if in Framed mode, or if AIS is <i>ENABLED</i> in Unframed mode)	MINOR alarm lamp lights CA cleared if THROUGH E2 port transmits RAI if in framed mode
RAI (Framed mode only)	MINOR alarm lamp lights
PSYN (only if Test Pattern is <i>ON</i>)	MINOR alarm lamp lights

Figure 7.3 WAN Port alarm responses

7.2.4 Summary of Errors and Alarms by mode

The options described above are given in the table below to show which of them appear on the performance summary screens for each operating mode.

Error Types	Unframed	G.742
		PRBS Valid if Test Pattern <i>ON</i>
	CODE	CODE
		FAS
Alarms	Unframed	G.742
	PSYN Appears if Test Pattern <i>ON</i>	PSYN Appears if Test Pattern <i>ON</i>
	LOS	LOS
	AIS if AIS enabled	AIS
		LOF
		RAI
		SQ

Figure 7.4 Errors & Alarms by mode

Notes:

- a) The item *PRBS Errors* can be selected, and will appear on the Performance Summary screen even if it is invalid, but the *TOTAL SECS* time counters in the PRBS Error section will not update unless the *TEST PATTERN* is *ON*.
- b) The PSYN alarm will only appear in the Alarms section of the Performance reports or summaries if the *TEST PATTERN* is *ON*.
- c) The AIS alarm only appears in the Alarms section of the Performance reports/summaries in Framed mode or if AIS has been *ENABLED* in Unframed mode.
- d) The *CLEAR ALL DATA* option clears the complete performance statistics database. This may be necessary if the FM4850 contains data that is invalid, perhaps because the data was obtained from a different circuit or the unit has been powered down, or reconfigured. You will be prompted to confirm this option. It is performed automatically on a *COLD START*

7 . 2. 5 Error and Alarm definitions

The definitions corresponding to Performance reporting are given below:

Errors	Definition
Code	Indicate bipolar violations leading to HDB3 code errors.
FAS	Frame Alignment Signal which indicates a fault in the frame alignment pattern. This error is only valid in G.742 framed mode.
PRBS	An error has been received in the Test Pattern Detector. This error is only valid when the T P Detector is enabled in G.742 framed mode.
G.821 Errors	Definition
Err. Count	The number of errors in the interval.
Total secs	Valid number of seconds in the interval (less than 900 means that the 15 min. period was incomplete).
EFS	Error-free seconds.
ES	Errored seconds: seconds with an error.
BES	Bursty errored seconds: seconds ≥ 2 errors, <1 in 10^3 errors
SES	Severely errored seconds: seconds >1 in 10^3 errors.
UAS	Unavailable seconds: declared after SES for 10 consecutive seconds.
DM	Degraded minutes: >1 in 10^6 errors/minute.
Alarms	Definition
LOS	Loss Of Signal: No data and therefore no clocking information. The units are alarm seconds if the summary style is G.821, or events if the style is set to counts.
LOF	Loss of frame: Clocking information is there but the frame alignment pattern is faulty. The units are alarm seconds if the summary style is G.821, or events if the style is set to counts.
SQ	Signal Quality : >1 in 10^3 FAS errors. The units are alarm seconds if the summary style is G.821, or events if the style is set to counts.
AIS	Alarm Indication Signal: All '1s' being received. The units are alarm seconds if the summary style is G.821, or events if the style is set to counts.
RAI	Remote Alarm Indication: the Remote FM4850 has detected a problem. The units are seconds if the summary style is G.821, or events if the style is set to counts.
PSYN	Test pattern synchronisation lost. Too many errors have been detected by the test pattern receiver. The units are alarm seconds if the summary style is G.821, or events if the style is set to counts.

Figure 7.5 Error & Alarm definitions

7.3 Performance menu

PERFORMANCE DATA	
Interface	NI
Display mode	Static summary
Summary style	G.821
Phys. Layer stats	<display>
Error type	LOS
Clear all data	

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 7.6 Performance data menu

7.3.1 Interface

This field is for the selection of the interface for which statistics are to be displayed. This option is fixed at *NI*.

7.3.2 Display mode

This sets the type of display and the options are:

Full report and Rolling report

Static summary, Updated summary and 15 minute summaries

These modes are described in the subsections below describing reports and summaries. Reports and summaries are dealt with separately since they have different characteristics.

The *SUMMARY STYLE* menu item only appears when a Summary has been selected (as opposed to a Report) from the *DISPLAY MODE* menu item, and this is therefore described in section 7.5.3.

7.4 Physical layer statistics – Reports

7.4.1 Full Report

This presentation gives six sequential screens of information extending over the previous 24 hours for each type of error. The entries show the performance statistics for each 15-minute interval, referenced from the current real-time clock time. The alarm columns displayed are in accordance with the table in Figure 7.2.

Note: If the real-time clock is altered then the relative times of this database are also modified.

Metrodata FM4850: Local connection to "[nodename]"															
NI Interface										1 of 6					
Period Starting	Count	LOS Errors:							Alarmed seconds:						
		Valid	EF	ES	BES	SES	UAS	DM	Valid	LOS	LOF	PS YN	AIS	RAI	SQ
14:09:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
14:24:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
14:39:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
14:54:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
15:09:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
15:24:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
15:39:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
15:54:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
16:09:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
16:24:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
16:39:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
16:54:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
17:09:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
17:24:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
17:39:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
17:54:23	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0
18:09:23:	0	900	0	0	0	0	0	0	900	0	0	0	0	0	0

<Escape> to exit, any other key to continue

Figure 7.7 Full report screen

7 . 4. 2 Rolling report

The *Rolling report* option gives a single line summary of the statistics at the end of each 15 minute period. This option is a more economic version of the *15 minute summaries* option where a line printer is used, since only one report line is added to the printout every 15 minutes.

Metrodata FM4850: Local connection to "[nodename]"																
NI Interface										1 of 6						
Period Starting	I	LOS Errors:							Valid	Alarmed seconds:						
		Count	Valid	EF	ES	BES	SES	UAS		DM	LOS	LOF	PS YN	AIS	RAI	SQ
14:09:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
14:24:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
14:39:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
14:54:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
15:09:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
15:24:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
15:39:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0
15:54:23	0	900	0	0	0	0	0	0	0	900	0	0	0	0	0	0

<Escape> to exit, any other key to continue

Figure 7.8 Rolling report screen

7.5 Physical layer statistics - Summaries

7.5.1 Screen presentation

The summary report screens are designed to give a view of the alarm and error status on a single screen. There is a choice of update frequencies of the data so that the user can choose the optimum presentation at any time.

The type of Alarm or Error being monitored is shown in the left hand column of the screen. Always check this when viewing a screen for the first time. If a diagnostic test is being run, its name appears at the top right of the screen entitled *DIAGS*.

The *Temporary counts* column is used to obtain error counts over a user definable test period, the duration of which need not be time related to anything else, without erasing the entire statistics database. You can reset the *Temporary counts* by pressing *C*. This means that a measurement may be started after a 15 minute interval has partly elapsed. The counts are displayed for the temporary measurement period from its start until you clear it down by pressing *C*.

Pressing any key other than *C* or <esc> will instantly refresh the display. This applies to each of the display styles - *Static*, *Updated* and *15-minute* displays.

The *Current 15-mins* column gives the error counts for the current partial 15 minute period. Therefore the duration of statistics within this column varies between 0 and 15 minutes in a cyclical fashion as time passes.

The *Previous 15-mins* column gives the error counts for the previous complete 15 minute period, assuming that there has been one.

The *Last 24 hours* column gives the error counts for the previous 24 hour period, as an accumulation of the last 96 complete *Previous 15-mins* periods.

7.5.2 Presentation display modes

The three *DISPLAY MODES* for summaries define the frequency with which the display data is updated.

Static summary

This option presents the data as a single screen display, giving a snapshot of the current status. The information in the display may be updated by pressing any key except <escape>.

Updated summary

This is similar to a static summary except that the screen is refreshed approximately every 5 seconds, and provides a dynamic display of events.

15-minute summaries

This updates the information in a summary at the end of each 15-minute period. This mode is useful where a printer is connected to the terminal port and a detailed log is required.

Once one of these summary types has been selected for display, three styles of display are available for selection, as described below.

7 . 5. 3 Summary style

This option determines the method of presenting the error information in the summaries. These options are not available for the full or rolling reports, which have a fixed style. The *SUMMARY STYLE* option only shows on the menu when a *SUMMARY* has been selected in the *DISPLAY MODE*. The styles available are:

COUNTS	Errors and alarms accumulate and are quoted as an absolute count.
G.821	Errors and alarms are expressed as G.821 parameters per second.
%G.821	Errors and alarms are shown in terms of normalised percentage G.821 parameters.

Figure 7.9 Summary styles

7 . 5. 4 Summary display - COUNTS style

Metrodata FM4850: Local connection to "[nodename]"				
13:32:54 Mon 15/10/2001		PERFORMANCE SUMMARY		NI
Current Alarms: None		-----		Diag: None
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarm counts				
Total Secs	856	510	900	86400
PSYN	0	0	0	0
LOS	0	0	0	0
LOF	0	0	0	0
AIS	0	0	0	0
RAI	0	0	0	0
SQ	0	0	0	0
FAS Errors:	0	0	0	0
Total secs	856	510	900	86400
Err Count	0	0	0	0
Error rate	0	0	0	0
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 7.10 Performance summary screen - COUNTS style (framed mode)

Note that if an alarm appears in Counts style, it appears only once as a single event, and is recorded in the Temporary Counts column only. It may be best to confirm an alarm situation by setting the summary screen to G.821 style when an alarm is present.

7 . 5. 5 Summary display - G.821 style

Metrodata FM4850: Local connection to "[nodename]"				
13:32:54 Mon 15/10/2001		PERFORMANCE SUMMARY		NI
Current Alarms: None			----- Diag: None	
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarm counts				
Total Secs	856	510	900	86400
PSYN	500	500	0	0
LOS	0	0	0	0
LOF	0	0	0	0
AIS	0	0	0	0
RAI	0	0	0	0
SQ	0	0	0	0
FASErrors:	0	0	0	0
Total secs	856	510	900	86400
ES	0	0	0	0
BES	0	0	0	0
SES	0	0	0	0
UAS	500	500	0	0
DM	0	0	0	0
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 7.11 Performance summary screen - G.821 style (framed mode)

Note that if an alarm appears in G.821 style, it is updated incrementally in the Temporary Counts and other columns as appropriate for its duration. The definition of G.821 as parameters per second gives a different summary layout than that for Counts style. In Counts style, an event is recorded once only.

7 . 5. 6 Summary display - Percent G.821 style

Metrodata FM4850: Local connection to "[nodename]"				
13:32:54 Mon 15/10/2001		PERFORMANCE SUMMARY		NI
Current Alarms: None -----			Diag: None	
	Temporary	Current	Previous	Last
	Counts	15 mins	15 mins	24 hours
Alarmed time:				
Total secs	856	510	900	86400
%PSYN	00.0000%	00.0000%	00.0000%	00.0000%
%LOS	0.0000%	0.0000%	0.0000%	0.0000%
%LOF	0.0000%	0.0000%	0.0000%	0.0000%
%AIS	0.0000%	0.0000%	0.0000%	0.0000%
%RAI	0.0000%	0.0000%	0.0000%	0.0000%
%SQ	0.0000%	0.0000%	0.0000%	0.0000%
FAS Errors:	0.0000%	0.0000%	0.0000%	0.0000%
%EFS	100.0000%	100.0000%	100.0000%	100.0000%
%ES	0.0000%	0.0000%	0.0000%	0.0000%
%BES	0.0000%	0.0000%	0.0000%	0.0000%
%SES	0.0000%	0.0000%	0.0000%	0.0000%
%UAS	0.0000%	0.0000%	0.0000%	0.0000%
%DM	0.0000%	0.0000%	0.0000%	0.0000%
<Escape> - exit, N - next interface, C - clear temp, other key - refresh				

Figure 7.12 Performance summary screen - Percent G.821 style (framed mode)

8 REMOTE MANAGEMENT

In addition to using the terminal port, the FM4850 may be managed remotely by using a LAN-based network management system. In order to do this, the LM1100 SNMP Enabler option must be fitted to the FM4850.

The operating parameters, event log, performance statistics database and diagnostics functions are known collectively as the Management Information Base (MIB). The FM4850's MIB can be accessed remotely by using a Network Management System (NMS) connected to the LAN. The NMS should use SNMP (Simple Network Management Protocol), and could be located on the local LAN or on a remote LAN connected to the local LAN via a LAN bridge or IP router.

When the LM1100 SNMP Enabler is fitted to the FM4850, the *MAIN SET-UP* menu contains the option *MANAGEMENT*. In framed mode with *DATALINK* set to *ON* the item *REMOTE MANAGEMENT* appears on the menu.

MAIN SET-UP	
alarm eXtension	<menu>
General set-up	<menu>
WAN port set-up	<menu>
DTE set-up	<menu>
V.24 set-up	<menu>
Remote logon	<display>
Management	<menu>
Testing	<menu>
Special	<menu>
Performance data	<menu>

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 8. 1 Main set-up menu

The *MANAGEMENT* menu leads to a series of menus which permit you to configure the various system management protocols and parameters.

MANAGEMENT	
Ethernet	<menu>
Data-link	<menu>
IP	<menu>
UDP	<menu>
tCp	<menu>
sNmp	<menu>
tFtp	<menu>
telnet	<display>

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 8. 2 Management menu

The item *TFTP* is shown unshaded because it is a future release item, but is shown here to indicate its forthcoming availability.

For further information on the management interface and the MIB definition, refer to the LM1100 SNMP Enabler user manual.

The MIB definitions supported have been placed in the public domain by Metrodata and can be parsed in to any NMS supporting an ASN.1 MIB parser.

9 TEST & TROUBLESHOOTING

Several diagnostic tests are supported by the FM4850. The fact that the E2 signal is framed is used to identify a faulty or failed connection. These may be used to identify the source of a transmission problem. In addition loop-backs may be activated to segment the link, and test patterns may be generated or monitored to validate signal flow along the path of the link.

Four types of test loops are available:

DTE Loop
DTE External Loop
NI Remote Loop
NI Local Loop

Diagrams showing the functioning of these test loops are given in Figures 9.2 and 9.3, and should be reviewed in conjunction with the descriptions below.

9.1 Testing Menu

When you select the *TESTING* option from the *MAIN SET-UP* menu, the *TESTING* menu is displayed.

TESTING	
DTE	Loop
NI	Local loop
test Pattern	Off
Ext loop control	Enabled

HIGHLIGHTED letter - select item
<escape> - exit menu

Figure 9.1 Testing menu

The interface to be tested and the type of test to carry out are selected using this screen. Definitions of the menu items are given below.

9 . 1 . 1 DTE

When *DTE* is selected, you can toggle between *LOOP*, *EXTERNAL LOOP*, and *NONE*.

9 . 1 . 2 NI

When *NI* is selected, you can toggle between *LOCAL LOOP*, *REMOTE LOOP*, and *NONE*.

9 . 1 . 3 Test pattern

The FM4850 has a built in PRBS (Pseudo Random Binary Sequence) generator which provides a $2^{15}-1$ inverted test pattern as specified by the CCITT. The options are *ON*, *OFF* or *Rx ONLY*. In this last mode the FM4850 does not affect the data being passed but monitors for the test pattern.

9 . 1 . 4 External loop control

This item is either *ENABLED* or *DISABLED*. When *DISABLED*, the remote loop code receiver in the DSU is inhibited, so the FM4850 will not accept remote loop commands from other DSU's on the network. The HSSI control lines LA and LB are also inhibited.

9.2 DTE interface

9 . 2 . 1 DTE Loop

When *DTE LOOP* is activated the signal received from the local DTE is passed directly back to the DTE at the DTE interface. The signal from the remote DTE passes through both the FM4850's and is looped adjacent to the local FM4850's DTE port.

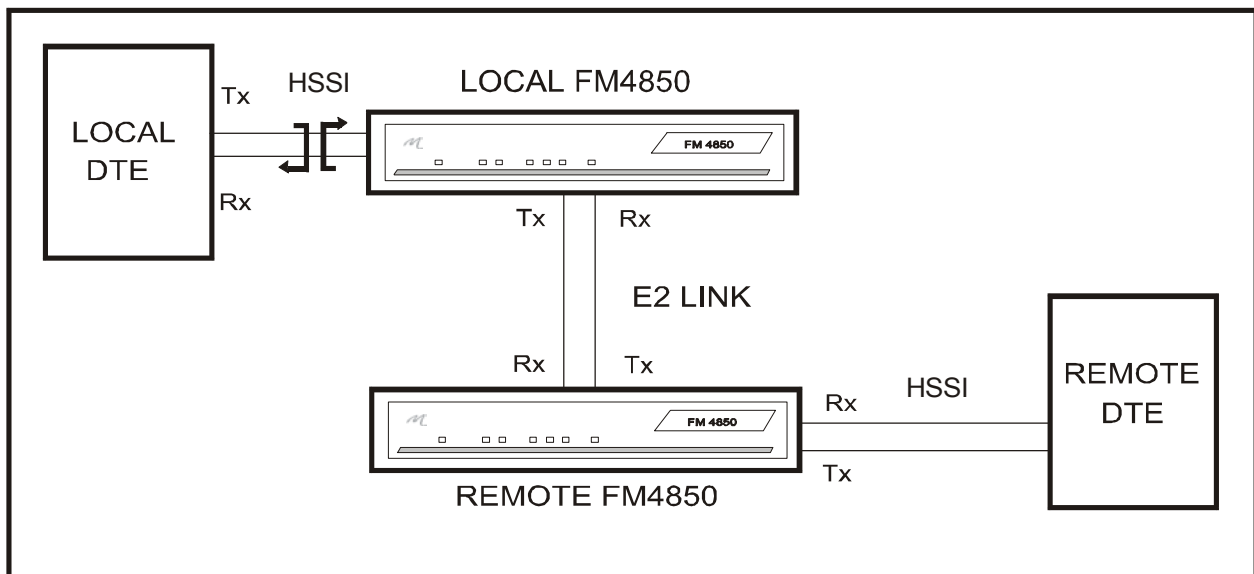


Figure 9.2 DTE Loop test

This therefore validates:

- the local DTE cable (without the effect of the FM4850) if the local DTE recognises its own transmissions.
- the remote DTE cable, the E2 link and both FM4850's if the remote DTE recognises its own transmissions.

9 . 2 . 2 DTE External Loop

When the *EXTERNAL LOOP* is activated the FM4850 uses one of the HSSI control lines (LC) to put the local DTE into loop.

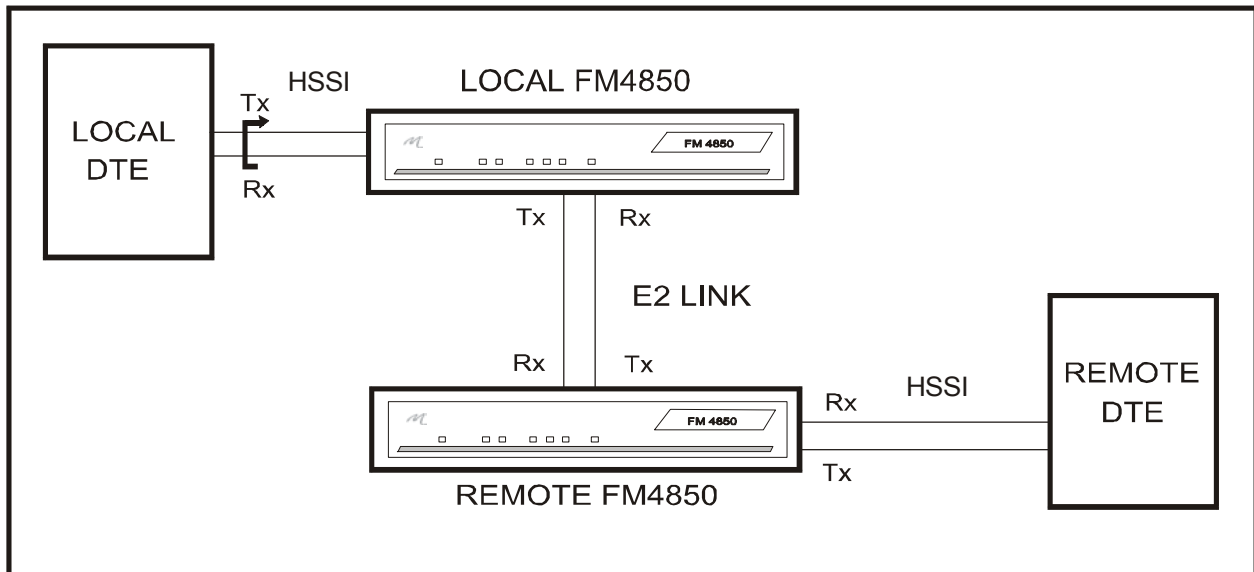


Figure 9.3 DTE External loop Test

This validates the E2 link, both FM4850's and both sets of DTE cables if the remote DTE recognises its own signals.

9.3 Network Interface (NI)

9.3.1 NI Remote Loop

When the *REMOTE LOOP* is activated, a loop-up code is transmitted to the remote FM4850, switching it in to Loop. Therefore a Loop may be performed at the remote end without any need for maintenance staff to attend the remote site.

Remote Loop-Up is transmitted as repeated '10000' while Remote Loop-Down is transmitted as repeated '100'. The Loop-Up code is transmitted for 5.5 seconds with the remote FM4850 going into Loop after 4.5 seconds. The remote FM4850 stays in this mode until Loop-Down is transmitted from the local unit.

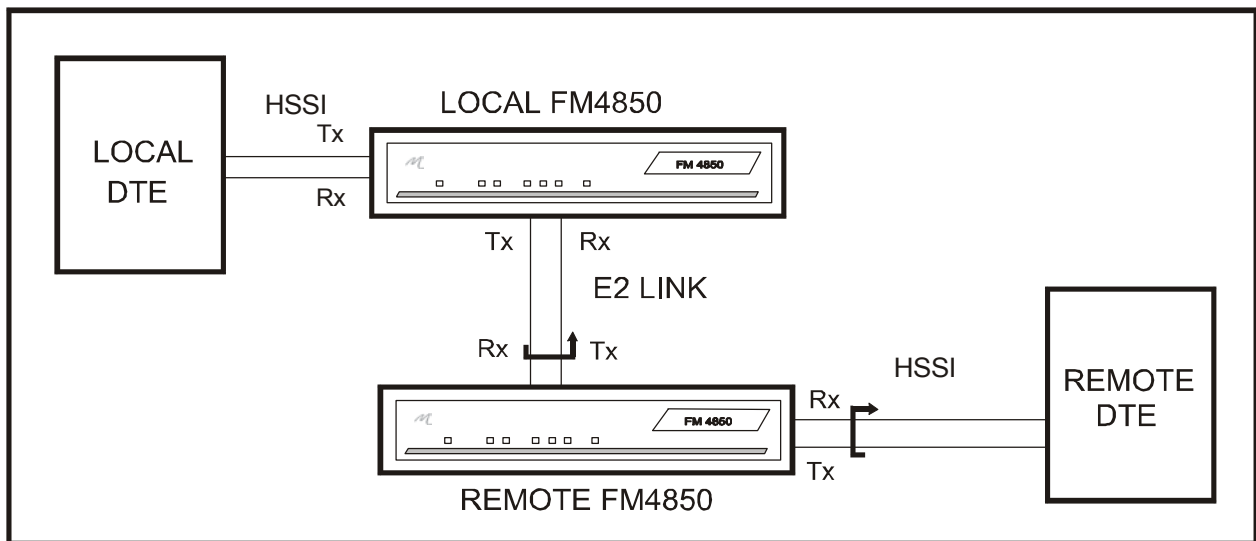


Figure 9.4 NI Remote loop test

The unit receiving the remote Loop-Up signal loops both the E2 and DTE ports adjacent to each of those ports, therefore removing its own influence. This therefore validates:

- the remote DTE cable if the remote DTE recognises its own transmissions
- the local DTE cable, the local FM4850 and the E2 link if the local DTE recognises its own transmissions.

9.3.2 NI Local Loop

When the Local Loop is activated the signal received from the local E2 transmit port is passed directly back to the local E2 receive port. The signal from the remote DTE passes through the remote FM4850 and is looped at the local E2 port.

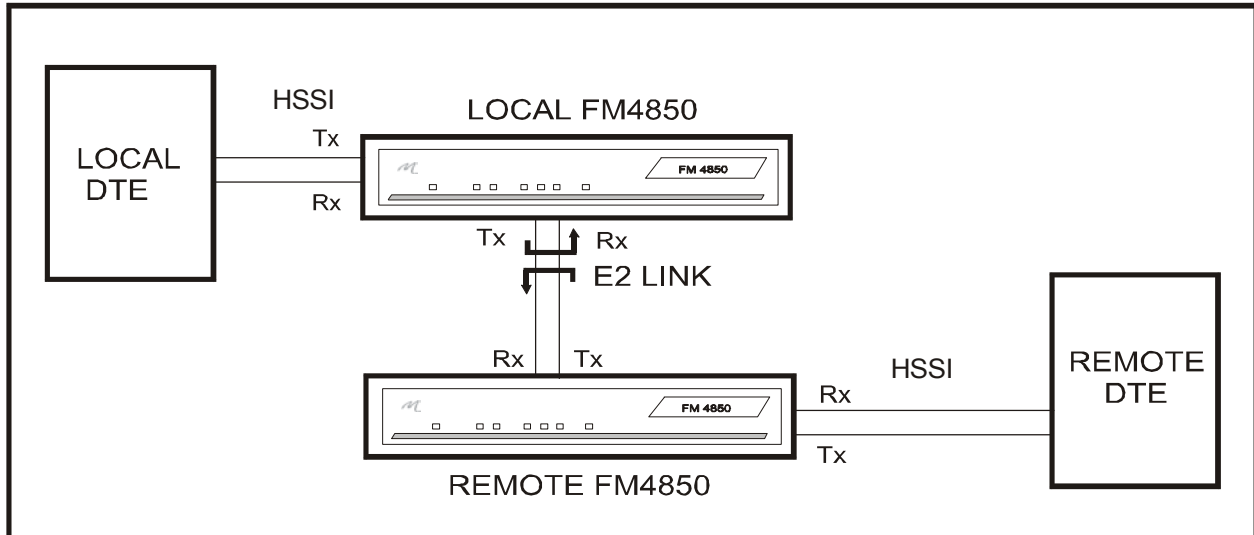


Figure 9.5 NI Local loop test

This therefore validates:

- the local DTE cable and the local FM4850 if the local DTE recognises its own signals
- the remote DTE cable, the remote FM4850 and the E2 link if the remote DTE recognises its own signals.

Notes:

The DTE may also instigate the *DTE (LOCAL)*, *NI LOCAL* or *NI REMOTE LOOPS* using two of the HSSI control lines (LA and LB). These loops may also be activated from the *TESTING* menu.

The *DTE EXTERNAL LOOP* action may only be activated via the *TESTING* menu.

9.4 Remote management during testing

Care must be taken when testing. If the FM4850 is managed with SNMP or Telnet, and if the LAN to which the NMS is connected passes over the wide-area link to which the FM4850 is interfacing. It may be possible to lose contact with the FM4850.

For example, if a local NMS is in contact with a remote FM4850 via a remote segment of LAN and a router, and the remote FM4850 is set to loopback, then connection with the remote router (and therefore the remote FM4850) is lost.

It is therefore important to ensure that control of FM4850 testing is exercised on a local basis, or that there are alternative paths available for management when remote testing is performed.

9.5 Troubleshooting

This section describes procedures to deal with common problems that may occur when setting up a unit.

Step 1: Establish And Verify The E2 Link

Check the power LED at both ends. If power is not present, check the mains fuse. Set both units to *UNFRAMED* mode using the *WAN PORT SET-UP* menu:

If the MAJOR alarm LED is on, try swapping the BNC connections at one end.

If the MAJOR alarm remains on, try looping the BNC connections on the unit with a short piece of cable. If the MAJOR alarm LED goes off then the cabling is faulty. Check for cable continuity and network connections, etc.

If the MAJOR alarm LED goes off, you may now enable framing if required. Make sure you do it at both ends or the MAJOR alarm will come on again.

Step 2: Establish And Verify The DTE Links

If the MINOR alarm LED is on, check that the Bridges/Routers are switched on.

If the MINOR alarm LED remains on, check that the DTE connections are in place and secure. If the MINOR alarm LED is still on check the Bridge/Router configuration. Check to see whether the Bridge/Router's port status is up or down.

If the MINOR alarm LED goes out but problems persist, check the DTE cabling configuration. Transmit and Receive data connections may be crossed, as may any of the handshaking or signalling lines. Also check that line protocol, data scrambling or data/clock inversion are correct at both ends.

Step 3: Bridge/Router Configuration

As the FM 4850 is used in a variety of locations and with many different manufacturer's equipment it is impossible for us to cover all eventualities here, so please consult other manufacturer's operating manual for further information.

10 FM4850 SPECIFICATIONS

Parameter	Definition
E2 interface	G.703 compliant, Sensitivity: -10dB. Line coding: HDB3. <u>Interface type</u> : 75 Ohm unbalanced coax (BNC)
Jitter Tolerance:	Per G.823.
Barrier:	EN 41003 compliant barrier provided on NI interface.
Framing:	G.742, Unframed.
DTE Interface:	HSSI: 50 way miniature AMP connector.
Clocking modes	<u>E2 WAN port</u> : Circuit 113 (normally slaved to Circuit 114 by DTE) <u>DTE port (Circuit 114)</u> : INTERNAL, LOOP <u>DTE Receive timing RT</u> : (Circuit 115) is always sourced from the E2 Receive clock
Diagnostics	DTE loop, DTE External loop, NI Local loop, NI Remote loop.
Display Style	Counts, G.821, percent G.821
Error type	<u>G.703 & G.742 modes</u> : Code Errors <u>G.742 Framed mode only</u> : FAS, PRBS Errors.
Management	V.24 terminal through terminal port. SNMP and Telnet through management port. Management port can also be used for outgoing Telnet sessions. Mgmt port complies with IEEE 802.3 / 10 Base T.
Statistics database	Real time statistics time-stamped and logged in a database accumulating over 15 minutes. 96 x 15 minute buckets are stored for rolling 24 hour database.
General	Definition
Power supply	100-250 VAC 50-400 Hz or -36 to -72 VDC, Buccaneer connector
Dimensions	1U x 19": 436 x 213 x 44 mm (w x d x h) with 19" mounting flanges
Environmental	Range
Ambient Temperature:	0 degC to +50 degC
Storage Temperature:	-20 degC to +70 degC
Relative Humidity:	0% - 95% non condensing
Barometric Pressure	86 KPa - 106 KPa

10.1 FM4850 Clocking modes

The DTE should fully comply with the HSSI specification EIA613 with respect to the signal presented on Circuit 113 (TT). This should be directly connected to Circuit 114 (ST) with a fixed delay of less than 150ns between the two signals.

Timing presented on circuit 114 is derived from a master oscillator or from the received E2 signal with an accuracy of ± 15 ppm. E2 transmit timing is phase-locked to the clock presented on circuit 113.

Installation and configuration to be performed in accordance with this manual to ensure compatibility with BS6328 Section 8.1 Clauses 5.2.3.3.1 (a and b) and 5.2.3.3.2 (a, b and c) defined in BS6328 Section 8.1 Table 8.

RT (circuit 115) is always sourced from E2 Receive clock.

10.2 FM4850 Default Settings

When a cold start is performed, all values are returned to their default settings. The table below lists the default values.

Option	Default
Node name	This field cleared
Password	FM4850
Telnet Timeout	60 seconds
Framing	G.742
Timing	Internal
Datalink	On
CA	On
Terminal type	TTY
Baud rate	9600 bps
Parity	None
Data bits	8
Stop bits	2
Modem support	On
External loop control	Disabled

10.3 Glossary

AIS	Alarm Indication Signal
AMI	Alternate Mark Inversion
ATM	Asynchronous Transfer Mode
BES	Bursty errored seconds
CA	Control Available
DM	Degraded minutes
DSU	Data Service Unit
DTE	Data Terminal Equipment
EFS	Error-free seconds
ES	Errored seconds
FEBE	Far End Block Error
HDB3	High Density Binary 3
LAN	Local Area Network
LOF	Loss of Frame alarm
LOS	Loss of Signal alarm
MIB	Management Information Base
NI	Network Interface
NMS	Network Management System
REBE	Remote End Block Error
RT	Receive Timing
SELV	Safety Extra Low Voltage
SES	Severely Errored seconds
SNMP	Simple Network Management Protocol
SQ	Signal Quality alarm
ST	Send Timing
TA	Terminal Available
TT	Terminal Timing
UAS	Unavailable seconds
UI	Unit Interval
WAN	Wide Area Network

