MT9100

EasiLink - FX range

Fibre optic link systems for

structured /un-structured G.703 / E1

and synchronous DTE interfaces.

Information Manual

Introduction

The *EasiLink FX*^{tm} range of Fibre Optic link systems from Black Box are designed to enable the connection of data and voice systems over longer distances than is possible using conventional copper cable. They are also applicable to environments where noise immunity is of importance. The multi-mode fibre versions have a range of up to three kilometres and are suitable for campus and large building applications. The single mode versions have a range of up to thirty kilometres and are suitable for carrier and very larger campus applications.

There are type types of FX product. The FX-1 is a fibre to G.703 converter. The FX-2 is a fibre to synchronous data interface converter. The FX-IA is a fibre to TTL converter module designed for use in the Black Box SP-3 range of products and with other O.E.M. implementations. This manual is applicable to the FX-1 and the FX-2 product ranges. There is a separate manual for the FX-IA module.

Installation

On unpacking the FX product you should find the system itself, a mains lead, and this manual. If the 48V power supply option has been ordered then there will not be a mains lead and the power connector on the rear of the unit will not be of the I.E.C. type. Any data cables that have been ordered in conjunction with the FX product, synchronous interface adapter cables for instance, will be shipped separately. If there are any questions refer to your supplier.

Connection of the fibre cables

When ordering the unit you will have been asked to specify the fibre type required (multi or mono mode) and connector type required (SMA or ST) for the fibre optic interface. The connector type should match with connectors on your cable plant. Follow the connector manufacturers instructions to install the cable to the FX product and take particular care to observe the bend radius guidelines for the fibre optic cable.

Connection of the "D.T.E."

The "D.T.E.", in the case of the FX-1, is a G.703 device. It can be a clear channel interface (from a router or a network) or a structured interface (from a PBX, Multiplexor, or a network). The FX-1 is designed to terminate a 75 ohm un-balanced G.703 signal. A version configured for terminating a 120 ohm balanced signal is also available. The G.704 framing structure and timing information, if present, will be transported to the partner FX-1, and onto the target equipment, transparently. It is also legitimate to have a 75 ohm termination at one end of the link and a 120 ohm termination at the other.

The "D.T.E.", in the case of the FX-2, is a data communications system with a synchronous interface presented as either EIA530, X.21, V.35 or RS449. The interface is configured electrically via the switches six and seven on the switch panel adjacent to the fibre optic connectors on the rear panel.

Switch Six

Up (off)	X.21, EIA530, RS449
Down (on)	V.35

Switch Seven

Up (off)	X.21, EIA530, RS449
Down (on)	V.28 DCD (V.35 carrier detect)

The physical presentation of the interface is via a DB25. The connector supports a native EIA530 interface. Physical conversion to DB15 for X.21, DB37 for RS449, and Winchester connector for V.35, is via an adapter cable which should have been ordered and supplied separately.

Setting up the clocking options - FX-1

There are three clocking options available when setting up an FX-1 product. The FX-1 has two internal clocks, one for the G.703 interface and one for the fibre interface. Either (but not both) of these internal clocks can be used to control the FX-1 timing.

If either of the options above are selected then the D.T.E. G.703 interface needs to be set in clock slave mode. In a situation where a pair of FX-1s are running back to back over a fibre link only one of them should be set up as a master. The other FX-1 should be set up in slave mode, and the G.703 attached to it should also be set up in slave mode. Where the D.T.E. G.703 needs to be in master mode then the third alternative clock option must be used.

The third alternative is to set the FX-1 up in the slave mode. In this mode the recovered receive clock from the G.703 interface is used as the transmit clock on the fibre interface and the recovered clock from the fibre interface is used as the transmit clock for the G.703 interface. This is the mode that should be used when two FX-1s are used to interconnect two G.703 devices, such as a pair of PBXs, that are synchronised to a common carrier network. Both G.703 D.T.E.s will supply clock (master mode) for their transmit signals and this will be preserved through the fibre link. Any clock slippage or drift will be corrected by the slip buffers on the D.T.E.s G.703 receive side, as it would in a normal, non-extended, copper link scenario.

Switch settings for the clock options - FX-1

Switches one, two and three are used to control the clocking options. Only switches one and two are applicable to the FX-1. Switch three should be left in the Up (off) position.

	SW1	SW2	SW8
Slave mode	Up/off	Up/off	Up/off
Fibre slave / G.703 master	Up/off	Down/on	Up/off
Transparent mode	Down/on	Down/on	Down/on

Setting up the clocking options - FX-2

There are two clocking options available when setting up an FX-2 product. However, there are some sub-options associated with buffering and support of the single clock on an X.21 interface.

The FX-2 has one internal clock for the fibre interface. It can also take in external clock from the D.T.E. Either source can be used to control the FX-1 timing.

When used in conjunction with an FX-1, in an application to extend a G.703 link within a campus environment, the FX-2 should be set to slave mode. The FX-2 internal clock will only be required in end-to-end private network configurations where the D.T.E.s are unable to supply clock (such as is the case with X.21). The FX-2 internal buffer is also required when using X.21 to correct data phase shift caused by round trip delay of the clock.

Switch settings for the clock options - FX-2

Switches one, two and three are used to control the clocking options. All three switches are applicable to the FX-2.

	SW1	SW2	SW3
Slave mode Independent DTE clocks	Up/off	Up/off	Up/off
Slave mode Independent DTE clocks / sinking DTE TxC	Down/on	Up/off	Up/off
Slave mode Common DTE clock (X.21)	Up/off	Down/on	Up/off
Master mode Independent DTE clocks	Up/off	Up/off	Down/on
Master mode Independent DTE clocks / sinking DTE TxC	Down/on	Up/off	Down/on
Master mode Common DTE clock (X.21)	Up/off	Down/on	Down/on
External Master mode Independent DTE clocks / sinking DTE TxC and using as master clock.	Down/on	Down/on	Down/on

Additional configuration options

There are two additional configuration options.

Switch four in the down/on position inverts data on the D.T.E. receive interface.

Switch five in the down/on position implements an internal loop back at the D.T.E. and the fibre interfaces.

Extract from the G.703 Appliqué manual

This extract is reproduced herein as a requirement under the terms of the host independent approval regulations. Users of the SP-1 RA are advised that the approval is only valid when the SP-1 RA is used in the form in which it is delivered. The port defined as the "Input Port" is the internal interface between the G.703 Appliqué and the SP-1 RA host environment, and is within the SP-1 RA enclosure. The SP-1 RA host is an approved host within the terms of the General Approval.

Safety Warnings and Requirements

These warning notices apply to the **Input Port**, the port marked "SAFETY WARNING: see instructions for use".

Warning, the port marked "SAFETY WARNING: see instructions for use" does not provide isolation sufficient to satisfy the requirements of BS6301; apparatus connected directly to this port should either have been approved to BS6301 or have previously been evaluated against British Telecommunications plc (Post Office) Technical Guides 2 or 26 and given permission to attach. Any other usage will invalidate the approval of the Appliqué.

Interconnection of the Appliqué **Input Port** (the port marked "SAFETY WARNING: see instructions for use), directly, or by way of any other apparatus, with ports on other apparatus (marked or not so marked) may produce hazardous conditions on the network. Users should seek advice from a competent engineer before such a connection is made.

The Appliqué is approved as Independent of Host. As such the Appliqué is only approved for use with a host, and with host attachments, that are either type approved in their own right, or, if supplied after 1st March 1989, are covered by the terms of the General Approval number NS/G/1234/J/100003. A Host supplied under the terms of the General Approval number NS/G/1234/J/100003 satisfies the conditions of the paragraphs above. The SP-1 RA host is an approved host within the terms of the General Approval.

The Appliqué must not be modified in any way. Any form of modification invalidates the approval for connection, and the warranty of the unit. The Appliqué approval label must be visible externally. The approval label must not be detached from the Appliqué, nor attached to the host.

The terms of the approval require that there must be a minimum distance (5mm) between the Appliqué and any other part of the host, including other Appliqués. This condition is met by default when the Appliqué is installed in a MicroMux SP-1 RA enclosure.

If voltages greater than 250V are present in the host users should refer to a competent safety engineer for advice.

It is a condition of the approval that a copy of these user instructions and safety warnings must be supplied with the host. Failure to provide the Appliqué user instructions with the host will invalidate the Appliqué approval, hence their reproduction herein.

Failure to install the Appliqué in accordance with these instructions will invalidate the approval. If you experience difficulties, or are in any doubt, please contact your Black Box representative.