Standalone G-Converter:

MTU200-N64M

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Rev 1.0

Standalone G-Converter
G.703/G.704 to Nx64 X.21/V.35 Converter

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Standalone G-Converter
G.703/G.704 to Nx64 X.21/V.35 Converter

User Manual

CE

WARNING - BEFORE INSTALLATION, PLEASE REFER TO SAFETY INSTRUCTIONS IN APPENDIX A, AND EMC INSTRUCTIONS IN APPENDIX C

Certified Compliant in the EC, when fitted in accordance with the installation instructions, against the following directives/standards:

Low Voltage Directive (73/23/EEC and amendment 93/68/EEC)

EN60950 : 1992 (Safety)

Electromagnetic Compatibility directive (89/336/EEC and subsequent amendments to date):

EN55022 : 1994 (Emissions)
EN50082-1 : 1992 (Immunity)

Telecommunications Terminal Equipment directive (91/263/EEC and amendment 93/68/EEC) where indicated in approvals requirements section.

Contents

Introduction

This manual provides information covering installation and set-up procedures of the converter.

A full set of cable pin-outs and a PCB layout (showing the location of switches and link settings) are included in the appendices.

The G-Converter is an interface adapter that will convert between a G.703/G.704 link and an X.21/V.11 or V.35 interface. The intended use of this unit is to terminate a G.703/704 link; DCE rates between zero and 2048kbps in 64k steps. Selection of these DCE rates is conveyed across the G.703/G.704 link from the central site management unit by a proprietary in-band signalling scheme.

An external clock input is provided on the DCE port to enable the G-Converter to be clocked from the connected DTE.

Configuration of the G-Converter is achieved in two simple stages involving internal and external switches, and selection of internal links.

Local Control

When the converter is configured as **Local** (Internal switch: SW4, 1 = off) the DCE rates are selected by using the two rotary switches, identified as XIO and X1, located on the front of the unit. As each switch is rotated, using a screwdriver, the relative position sets the number "N" which is displayed on the seven-segment LED display. X10 selects tens, X1 selects units, permitting selection of N =0 to a maximum of 32. When local mode is selected the decimal point of the right hand digit of the seven-segment display is illuminated.

DCE rate allocation is N x 64kbps, so an indication of N = 23 signifies a DCE rate of 1472kbps. The information that N = 23 is encoded and transmitted across the link in time slot 31.

Remote Control

When the converter is configured as **Remote,** (Internal switch SW4, 1 = on) the DCE rate is controlled by the control information being received in time slot 31. Configuration of the DCE speed on this remote unit is controlled by the 'Local' unit since the front panel switches will be deactivated.

Operating Modes

The equipment has four operating modes: Refer to the Switch and link location diagram in **Appendix D -Location Of Switches and Links**.

Operating Mode 1

G.703 Transparent interface converter, data rate fixed at 2048kbps,

Remove the cover of the unit, locate Internal Switch 4 and set as follows:

SW4,1	SW4,2	SW4,3	SW4,4	SW4,5	SW4,6	SW4,7	SW4,8
NR	NR	NR	NR	NR	OFF	OFF	OFF

N.B. NR = Not Relevant.

The external Loop switch (front panel) should be set as Normal.

In this mode the data is routed directly from the G.703 interface to the X.21/V.11 interface. The rotary switch settings are ignored and time slot 31 is not monitored. In transparent mode the G-Converter may be connected to other suppliers G.703 to X.21/V.11 converters.

Operating Mode 2

G.703 Interface, data rate configurable between Zero and 2048kbps.

Remove the cover of the unit, locate Internal Switch 4 and set as follows:

SW4,1	SW4,2	SW4,3	SW4,4	SW4,5	SW4,6	SW4,7	SW4,8
✷	OFF	OFF	NR	NR	ON	OFF	OFF

N.B. NR = Not Relevant.

✷ When converters are to be set up as a pair, one unit MUST be configured as a Local unit (SW4, 1 = Off) and the other a Remote unit (SW4, 1=On)

The external Loop switch (front panel) should be set as Normal.

In this mode DCE data rates may be selected between 0bps and 2048kbps in 64kbps steps. A proprietary framing scheme is used to control the value of N.

It is recommended this mode is used only if data rates up to 2048kbps are required as a fault condition on the G.703 link could force the DCE clock to operate at 2048kbps. If the user equipment is only capable of running at say 256kbps then this may cause problems.

Operating Mode 3

G.703 Interface, data rate configurable between 0bps and 1984kbps

Remove the cover of the unit, locate Internal Switch 4 and set as follows:

SW4,1	SW4,2	SW4,3	SW4,4	SW4,5	SW4,6	SW4,7	SW4,8
✷	OFF	ON	NR	NR	ON	OFF	OFF

N.B. NR = Not Relevant.

✷ When converters are to be set up as a pair, one unit MUST be configured as a Local unit (SW4, 1 = Off) and the other a Remote unit (SW4, 1=On)

The external Loop switch (front panel) should be set as Normal.

In this mode, data rates may be selected between 0bps and 1984kbps in 64kbps steps. A proprietary framing scheme is used to control the value of N.

Use this mode if you are sure you will not want to use N = 32 (i.e. 2048kbps).

When operating in this mode, a fault condition on the G.703 link will force the DCE clock to operate at 0kbps and display “Er” on the display.

Operating Mode 4

G.704 Interface, data rate configurable between 0bps and 1984kbps

Remove the cover of the unit, locate Internal Switch 4 and set as follows:

SW4,1	SW4,2	SW4,3	SW4,4	SW4,5	SW4,6	SW4,7	SW4,8
✷	ON	NR	NR	NR	ON	OFF	OFF

N.B. NR = Not Relevant.

✷ When converters are to be set up as a pair, one unit MUST be configured as a Local unit (SW4, 1 = Off) and the other a Remote unit (SW4, 1=On)

The external Loop switch (front panel) should be set as Normal.

In this mode, all speeds are possible between 0bps and 1984kbps in 64kbps steps. A proprietary framing scheme is used to control the value of N.

Operating Mode 4 would be used if you were connected to a G.704 network. In this mode, a fault condition on the G.704 link could force the DCE clock to operate at 0kbps and flash “Er” on the display.

G.703 Interface Presentation

The converter may be configured to operate on either a 120 ohm balanced circuit impedance, presented on an RJ45 connector or with a 75 ohm unbalanced impedance, presented on two BNC connectors.

Selection of the interface is made by link settings – refer to **Appendix D -Location Of Switches and Links** for the location diagram and use in conjunction with the tables below.

75 ohm operation

LINK NUMBER	FUNCTION	SETTING
LK1	Connects BNC TX	Fitted (ensure shorted pins run front to back of unit)
LK5	Connects BNC RX	Fitted (ensure shorted pins run front to back of unit)
LK3	Determines TX transformer ratio	Positions 2 and 1
LK4	Determines RX transformer ratio	Positions 2 and 1
LK6	AC couples screen of RX BNC to gnd	Position 2 and 3 for coupling * Position 1 and 2 for no coupling*
LK2	AC couples screen of TX BNC to gnd	Position 2 and 3 for coupling* Position 1 and 2 for no coupling*

Notes:

*This setting is application dependent. Only one end of each link should be grounded to prevent ground loops, therefore the position of these links needs to made in conjunction with the installation grounding scheme.

120 ohm operation

LINK NUMBER	FUNCTION	LINK SETTING
LK1	Connects BNC TX	Remove
LK5	Connects BNC RX	Remove
LK3	Determines TX transformer ratio	Positions 2 and 3
LK4	Determines RX transformer ratio	Positions 2 and 3
LK6	AC couples screen of RX BNC to gnd	Position 1 and 2 for no coupling
LK2	AC couples screen of TX BNC to gnd	Position 1 and 2 for no coupling

Selection and Configuration Of DCE Interface

The DCE port of the G-Converter can be presented as either X.21/V.11 or V.35 Choice of interface is made by link setting. The X.21/V.11 interface is presented on a 15-way D type connector in accordance with ISO 4903. The V.35 interface is also presented on the same 15 way D-type connector. A converter cable is optionally available.

X.21/V.11 Interface

Selection of the interface is made by link settings – refer to **Appendix D -Location Of Switches and Links** for the location diagram. To select the X.21/V.11 interface Link 9 jumper must be in the X.21 position. The connector pin out for the X.21 interface is given in Appendix G

Control Of "I" Lead

When the X.21/V.11 interface is selected, the "I" lead function can be controlled. The "I" lead status is synthesised by the converter since no information about the "I" lead status is passed across the link. Status of the "I" lead is fixed. Four choices are available to the user.

Selection is made via switch settings. Refer to the location diagram in **Appendix D - Location Of Switches and Links**

SW4, 4	SW4, 5	FUNCTION OF I LEAD
OFF	OFF	I follows C lead
OFF	ON	I = active
ON	OFF	I = inactive
ON	ON	I follows carrier

V.35 Interface

Selection of the interface is made by link settings – refer to **Appendix D -Location Of Switches and Links** for the location diagram. To select the V.35 interface link 9 must be in the V.35 position. The V.35 interface is presented on the 15 way D-type connector. Two "control flags" are available as outputs and one "control flag" is available as an input. The V.35 specification calls for the following Control signals;

V.35 CONTROL FLAG SIGNALS			
Name	**Description**	**Type at Connector**	**Signal number**
RTS	Request To Send	Input	105
CTS	Clear To Send	Output	106
DSR	Data Set Ready	Output	107
DCD	Data Carrier Detect	Output	109

The G-Converters support one input flag and two output flags. It is up to the user which of the signals is to be implemented. RTS would normally be the definition for Flag 1 I/P (although is does not have to be) as this is the only I/P called up by the V.35 spec.

The two output flags, Flag 2 O/P and Flag 3 O/P can be assigned to either CTS, DSR or DCD, the choice is at the discretion of the user.

The connector pin out for the V.35 interface is given in Appendix H and a suggested stub cable converter to 34 pin MRAC is given in **Appendix I – V.35 Stub Cable**.

Configuration Of V.35 Control Flags

When the V.35 interface is selected the FLAG 1 O/P and FLAG 2 O/P can be individually controlled. Four choices are available to the user.

Selection is made via switch settings. Refer to the location diagram in **Appendix D - Location Of Switches and Links**.

SW4, 4	SW4, 5	FUNCTION OF O/P FLAG 1
OFF	OFF	FLAG 1 O/P follows FLAG 3 I/P
OFF	ON	FLAG 1 O/P = active
ON	OFF	FLAG 1 O/P = inactive
ON	ON	FLAG 1 O/P follows carrier

SW5, 2	SW5, 3	FUNCTION OF FLAG 2 O/P
OFF	OFF	FLAG 2 O/P follows FLAG 3 I/P
OFF	ON	FLAG 2 O/P = active
ON	OFF	FLAG 2 O/P = inactive
ON	ON	FLAG 2 O/P follows carrier

Remote Loopback Function

If the stand-alone G-Converter has SW5, 1 to off, the Manager card located in the card cage may select a remote loopback. Once this state has been entered, it will remain in loopback for approximately 3 minutes. Whilst in loop back, the LED display will flash “rL”, the data and clock being outputted through the DCE port will be suppressed and the data arriving at the X.21/V.35 drivers/receivers will be looped back to the central site.

External Clock

The G-Converters have the ability to use as its clock source a clock supplied from the connected DTE. An external clock is supplied externally to the converter via the EXT clock pins, of the 15 way D type connector (pins 7 and 14). Whenever an external clock is used, the rightmost decimal point of the seven-segment display is illuminated.

The two external clock modes are :-

External Clock without Autobauding

This mode is selected by switching SW4,7 to On and SW5,4 to OFF. In this mode the external clock being supplied must be 2048Kbps +/- 50 ppm and the jitter content compliant with the requirements of TBR12 and PD 7024. The function of the G-Converter in this mode is identical to operation with recovered clock (normal operation) with the exception that the clock source is from the external clock and not the G.703/4 link.

In this mode, if the received clock **F**requency is grossly **O**ut of spec (or absent) then the letters "Fo" will be alternately flashed with the N value on the LED display. At all times the assumption is made that the clock being supplied to the G-Converter from the G.703/4 network is as per TBR12/PD7024 requirement.

When this mode is selected and operating correctly, the display should be steady with the rightmost decimal point flashing.

External Clock with Autobauding

This mode is selected by switching SW4,7 to On and SW5,4 to ON. In this mode the external clock, being supplied must be Nx 64Kbps +/- 50 ppm and the jitter content compliant with the requirements of TBR12 and PD 7024. The function of the G-Converter in this mode will measure the external clock and set the operation of the G-Converter to this speed. In this mode, the unit will become a Local.

In this mode, if the received clock **F**requency is grossly **O**ut of spec (or absent) then the letters "Fo" will be alternately flashed with the N value on the LED display. The N value will still be derived from the external clock and the data will be clocked out of the DCE with this clock, however the G.703/4 link will be clocked from the G.703/4 recovered 2048Kbps clock. At all times the assumption is made that the clock being supplied to the G-Converter from the G.703/4 network is as per TBR12/PD7024 requirement.

When this mode is selected and operating correctly, the display should be steady (indicating the external clock speed) with the rightmost decimal point flashing.

Configuration

Configuration of the G-Converters is achieved in two simple stages involving internal and external switches, and setting of some internal links. Refer to **Appendix D -Location Of Switches and Links** for details of Internal Switch and link locations.

Selection of internal links permit the converters to operate either as a Local or Remote unit. Rotation of the two external switches release bandwidth in Nx64k allocations. An LED display will confirm the link rate selected.

Notes:

[1]Front panel switches are disabled when Remote is selected on a unit.

DIL switch settings

The mode of operation is set up using the DIL switches SW4 and SW5.

SW POSITION	FUNCTION	SETTING
SW4, 1	Selects either remote operation or local operation	Off = local On = remote
SW4, 2	Selects interface type	Off = G.703 On = G.704
SW4, 3	Allows unframed operation	On = unframed operation not permitted Off = unframed operation permitted[1]
SW4, 4 SW4, 5	Sets up operation of **X.** When X.21/V.11 interface set. **X**= I lead **Y**= C lead. When V.35 interface set **X**= FLAG 1 O/P, **Y**= FLAG 3 I/P	SW4, 4 = off, SW4, 5 = off, **X** follows **Y** SW4, 4 = on, SW4, 5 = on, **X** follows Carrier SW4, 4 = off, SW4, 5 = on, **X** = active SW4, 4 = on, SW4, 5 = off, **X** = inactive
SW4, 6	Sets G-Converter to permanent Transparent mode 2048kbps	Off = permanent straight through[2] On = framed/unframed
SW4, 7	Sets G.70x TX off if no G.703 RX detected	Off=G.703 TX enabled always. On = G.703 TX disabled in the event of G.703 RX not being present[4]
SW4, 8	Use External Clock[3]	On = Use external clock. Off = do not use external clock.
SW5,1	Enables Remote Loopback function	Off = Remote loop back enabled. On = Remote loop back disabled
SW5, 2 SW5, 3	Sets up operation of FLAG 2 O/P "**X** " when set for V.35 interface	SW5, 2 = off, SW5, 3 = off, **X** follows Flag3 I/P SW5, 2 = on, SW5, 3 = on, **X** follows Carrier SW5, 2 = off, SW5, 3 = on, **X** = active SW5, 2 = on, SW5, 3 = off **X** = inactive
SW5,4	Sets Autobauding on or off	Off = Autobauding not selected On = Autobauding selected N.B for Autobauding SW4,8 must be set to on

Factory default switch settings – 75 Ohm

Notes:

[1] Only allow unframed operation if a DCE speed of 2048Kbps will not "harm" the DTE.

[2] Use this mode if no in-band management is required and the link is required to run a permanent 2048Kbps. Also, use this mode if interfacing to another manufacturers G.703/X.21 interface converter.

[3]When an external clock is used it must be 2048Kbps +/- 50ppm as per TBR12/PD7024 for non Autobauding operation or Nx64Kbps +/- 50ppm for auto baud operation.

[4] Use this option if it is required to suppress TX data in the event of loss of RX data from the G.70x link.

Default Unit Set-Up

When delivered, the G-Converter is set to operate as follows:

Interface selected	:	X.21 (LK9 to X.21 position)
Local/Remote	:	Local (SW4, 1 = off)
G.703/G.704 Interface	:	G.703 (SW4, 2 = off)
Allow Unframed	:	Yes (SW4, 3 = on)
I Lead Control	:	Follow Carrier (SW4,4=SW4,5 = on)
Permanent Straight Through	:	Not selected (SW4, 6 = on)
G.70x TX	:	Always enabled (SW4, 7 = off)
External Clock	:	Not selected (SW4,8 = off)
Remote loopback	:	Enabled(SW5,1 = off)
Autobauding	:	Not selected (SW5,4 = off)
Interface Impedance	:	75 Ohms (Un-balanced) see table above in G.703 interface presentation section.
Front Panel loop switch enabled	:	Enabled (LK12 position 1 and 2)
Front panel loop switch	:	Off (centralised)

Front panel LED indicators

The G-Converter has 4 LED indicators: -

LED LABEL	CONDITION	NOTES
CARRIER	ON	RX Carrier established
	OFF	No RX Carrier established.
LOOP	ON	Either a Local loop or a remote loop mode has been entered. (check position of loop control switch SW)
	OFF	Normal Operation
ERROR	OFF	Normal operation
	Brief flash	CRC4 error detected
	ON	No framing synch found when Operating on a G.704 network.
POWER	ON	The G-Converter is receiving a regulated +5V from its power supply.
	OFF	The G-Converter is not receiving a regulated +5V from its power supply

Diagnostics

Front Panel LEDs

On the front panel, only the **CARRIER** LED and **POWER** should normally be illuminated. When the G-Converter is disconnected from the network or has lost carrier the CARRIER LED will extinguish.

Seven Segment Display

The seven segment LED display can reveal the state of the G-Converter. In normal operation, the display should be steady indicating the N value of the DCE data rate selected.

If the display flashes "Er" then either the G.703 carrier is lost or the framing can not be recovered from the incoming data stream. This will depend on the G-Converter set up and the type of network that it is connected to.

If the display flashes "rL", then a remote loopback has been initiated from a rack mounted G-Converter card. In this mode the clock and data are suppressed from the DCE connector. The DCE data being internally looped back to the rack mounted G-Converter card.

If the display flashes " Fo" this means that an external clock mode has been selected and the **F**requency of the external clock is grossly **O**ut of range.

If the right most decimal point is permanently on, then the G-Converter has either been set to be a local unit or it is in local loopback (front panel toggle switch set to the left). If this decimal point is flashing then the G-Coverter is in an external clock mode.

Loopbacks

The loopback switch is located on the front panel. This switch can be disabled by moving LK12 jumper to position 2-3. In normal operation, the switch is set in a central position, and the LOOP LED indicator is not illuminated.

When set to local loop back the received data and transmit data of the X.21 interface are looped. The DCE clock speed will always be determined by the rotary switch settings regardless if the unit is set for remote operation.

When set to network loop back the transmit data (TXD) of the G.70x interface is looped directly to the received data (RXD) of the G.70x interface. The DCE clock speed is determined by the rotary switches in the case of a local unit and by the data being received in time slot 31 in the case of a remote unit.

It is possible to apply loop backs either at the X.21 side of the converter or the G.703 link interface side of the converter. Simple functionality tests may be performed on a single G-Converter whilst disconnected from the Network.

A BERT tester configured, as a DTE capable of generating test patterns should be connected to the “DCE” port of the G-Converter.

With the link interface disconnected, the LOOP switch on the energised G-Converter set to Local, the BERT tester will detect the clock being generated by the G-Converter and if the unit is operating correctly the looped back data should be error free. The clock speed will be determined by the switch setting.

Ensure that the “DCE” port is providing data rates between 0 and 2048Kbps by selecting 0 to 31 with the front panel switches. Note that during switching of DCE speed errors may be generated. This is acceptable as long as when the speed setting is in a steady state no errors are detected.

Installation

Before installation, please refer to the safety warnings, approvals requirements and EMC requirements in the appendices.

Supply Voltage and Connection

240V AC.

The Converter is AC powered by a “plug in” switched mode power supply that is provided with the unit.

Environmental Considerations

The equipment must be operated under the following atmospheric conditions:

Temperature:	0 to 40 degrees centigrade.
Humidity:	0% to 90% non-condensing.

Mechanical Construction

The converter is housed in a plastic injection moulded enclosure. Four LEDs on the front panel indicate the current status of the converter.

The G-Converter MUST be disconnected from the power supply before opening the unit or changing any network connections.

Screws on the underside of the enclosure are removed using a Posidrive screwdriver to access the interior.

The rear panel accommodates the link interface connectors, the D type 15 way socket for the X.21 port and the regulated power supply connector.

For U.K. connection, screened BNC cables should be used, with the screen connected to chassis at the TX connector only.

For EUROPEAN connection, un-screened RJ45 cables are suitable. The screen to chassis links must be fitted in the *isolated* position.

Back-To-Back Demonstration Connection

For a simple demonstration, or local network use, two converters may be connected 'back to back', using a cross over cable arrangement, one unit will automatically adopt the role of clock master the other clock slave.

75 ohms BNC to PD7024 interfaces

For UK interfaces a pair of 75 Ohm BNC cables should be used, connecting TX on one unit to RX on the other and visa versa.

120 ohms RJ45 twisted pair to CTR 12 interfaces

For European interfaces an RJ45 crossover cable should be used, as described in the Appendices.

Set both units to X.21 interface (LK 9 to X.21 position).

Set one of the units to local (SW4, 1 = off) and the other to remote (SW4, 1 = on).

Select G.703 mode with unframed allowed and I lead following C. SW4, 2 = off, SW4, 3 = off, SW4, 4 = SW4, 5 = off, SW4, 6 = on, SW4, 7 = SW4, 8 = off.

Connect an X.21 loop back connector to the G-Converter that is set up as remote. Connect a Bert tester capable of running up to 2048Kbps configured as a X.21 DTE to the G-Converter that is configured as local.

Commence passing data. Notice that the data rate is controlled by the rotary switch position of the local unit and independent of the remote unit. Demonstrate all speeds from N = 0 (0bps) to N= 32 (2048Kbps).

Now change SW4, 2 = on, on both converters. This selects the link interface to be G.704. Framed data must always be present. Demonstrate that the maximum value for N is now 31 and that when the G.704 interface is disconnected the seven-segment display shows "Er" (because no framing is detected).

Appendix A - Warnings

WARNING: ***THIS EQUIPMENT MUST BE EARTHED/ GROUNDED VIA THE SCREEN OF THE X.21 DTE LEAD***

This equipment relies on the EARTH/GROUND connection to ensure EMC compliance. It must not under any circumstances be operated without an earth connection, which could nullify its approval.

WARNING: **INSTALLATION OF EQUIPMENT**

Installation of this equipment must only be performed by suitably trained service personnel.

This equipment allows connection only of suitably approved equipment to its ports, the safety status of which are defined below.

SELV Ports:

i) ***DC Power***
ii) ***"To DTE"***

The above named ports are classified as SELV (Safety Extra Low Voltage) in accordance with in Clause 2.3 of EN60950 (BS7002, IEC950 as applicable), and **must only** be connected to equipment which similarly complies with the SELV safety classification. *The DC power port **must only** be connected to the supplied power module.*

TNV Ports:

i) ***Euro 120 ohm RJ45***
ii) ***75 ohm BNC***

The above named ports are classified as TNV (Telecom Network Voltage) in accordance with Clause 6 of EN60950 (BS7002, IEC950 as applicable), and **must only** be connected to equipment which similarly complies with the TNV safety classification.

WARNUNG: **ZUR EINHALTUNG DER EMC BESTIMMUNGEN MUSS DIESES GERÄT ÜBER DEN SCHIRM DER X.21 SCHNITTSTELLE GEERDET WERDEN. DAS GERÄT DARF NICHT OHNE DIESE ERDUNG BETRIEBEN WERDEN..**

Das G-Converter wird von einer externen Stromversorgungseinheit versorgt – diese ist nur für die Verwendung zusammen mit einem G-Converter Konverter geprüft. Die Verwendung einer anderen Stromversorgung hat die Erlöschung der Sicherheits-/EMC zur Folge. Das G-Converter ist ein Klasse II Produkt und muss deswegen nicht über eine Schutzerdung zur Vermeidung von Stromschlägen verfügen. Dieser Schutz wird durch das Netzteil selbst gewährleistet. Trotzdem ist es aus EMC Erfordernissen her nötig, eine Erdung über den Schirm des X.21/V.11 Kabels heranzuführen. Das am G-Converter angeschlossene Datenendgerät muss eine Erdverbindung zum Schirm des X.21/V.11 Kabels bieten. Niemals sollte das G-Converter ohne diese Erdverbindung betrieben werden.

WARNUNG: **INSTALLATION DES GERÄTES**

Die Installation des Gerätes darf nur von entsprechend ausgebildetem und autorisiertem Personal durchgeführt werden.

Das Gerät ermöglicht den Anschluss von Endgeräten, deren Sicherheitsstatus den folgenden Definitionen zu entsprechen hat:

SELV Ports:

i) X.21/V.11 Endgeräteanschluss
ii) DC Stromversorgungsanschluss

Die oben aufgeführten Ports sind als SELV (Safety Extra Low Voltage) in Übereinstimmung mit Klasse 2.3 der Verordnung EN60950 (BS7002/IEC 950 soweit anwendbar) klassifiziert und dürfen nur mit Geräten zusammengeschaltet werden, die ebenfalls dieser Bestimmung entsprechen.

TNV – 1 Ports:

i) Euro 120 Ohm RJ45
ii) 75 Ohm BNC

Die oben aufgeführten Ports sind als TNV-1 (Telecoms Network Voltage) in Übereinstimmung mit Klasse 2.3 der EN60950 (BS7002/IEC 950 anwendbar) klassifiziert und *dürfen nur* mit Geräten zusammengeschaltet werden, die dieser Bestimmung entsprechen.

MISE EN GARDE: ***CET ÉQUIPEMENT DOIT ÊTRE RELIÉ A LA TERRE/MASSE PAR LE BLINDAGE DU FIL DTE X.21***

Pour garantir la conformité EMC de cet équipement, il doit impérativement relié à TERRE/MASSE. En aucun cas, il ne doit être utilisé sans connexion à la terre sous peine d'annuler sons agrément.

MISE EN GARDE: **INSTALLATION DE L'ÉQUIPMENT**

L'installation de cet équipment doit être assuré uniquement par un personnel formé pour ce type de matériel.

Ne connectez que des équipments agréés sur les ports de cet appareil en respectant les conditions de sécurité définies ci-après:

Ports SELV:

i) **Alimentation en courant continu**
ii) **"Vers DTE"**

Les ports désignés ci-dessous sont classifiés dans la catégorie SELV (Safety Extra Low Voltage = sécurité sous tension ultra-basse) conformement à la Clause 2.3 de la norme EN60950 (BS7002, IEC950 si applicable) et doivent être connectés uniquement sur des équipements pareillement conformes à la classification de sécurité SELV. ***L'alimentation en courant continu doit être connecté uniquement sur le module d'alimentation fourni.***

Ports TNV:

i) RJ45 120 ohms Euro
ii) BNC 75 ohms

Les ports ci-dessous sont classés dans la catégorie TNV (Telecom Network Voltage = tension réseau télécom) conformement à la Clause 6 de la norme EN60950 (BS7002, IEC950 si applicable) et doivent être connectés uniquement sur des équipements pareillement conformes à la classification de sécurité TNV.

Appendix –B Approval Requirements

The G-Converter carrying the BABT/CE168 assessment symbols and approval number, is approved for connection to the networks identified in this Appendix as follows:

G.703/G.704

In the UK, to PD7024 (75 Ohm Un-balanced) via 2 x BNC connectors. The internal jumper links must be set to the **75R** position, as detailed in the installation instructions.

Throughout Europe (Pan European) to CTR12 and CTR13 via RJ45 Connector (120 Ohms Balanced). The internal jumper links must be set to the **120R** position, as detailed in the installation instructions.

When using an external clock the frequency and jitter characteristics must be compliant with TBR12/PD7024.

Appendix C – EMC Requirements

To ensure compliance with the EMC directive, some care must be taken to ensure that the units are installed properly, using suitable cables and connections. The following must be observed:

Limitation of Emissions:

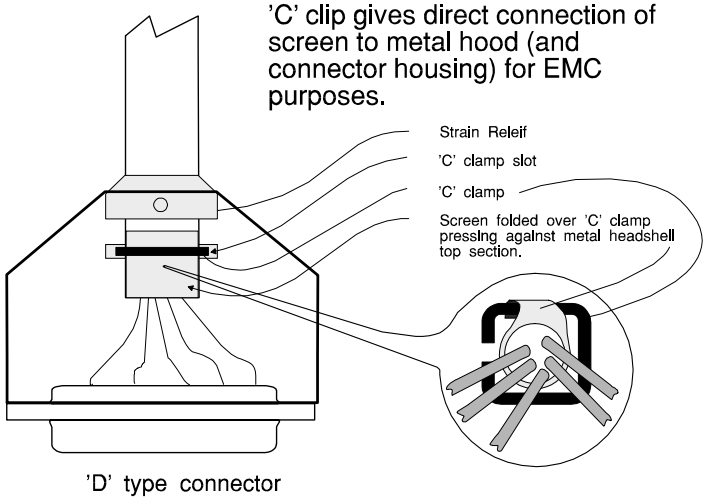
'D-Type' Connections

This product relies on the use of screened cables for connection to the 15 way 'D-Type' ports. The cables must have the foil or braid screen connected effectively to the metal headshell to ensure continued compliance. These headshells are available from Black Box under the following part numbers:

DB15 - FA033

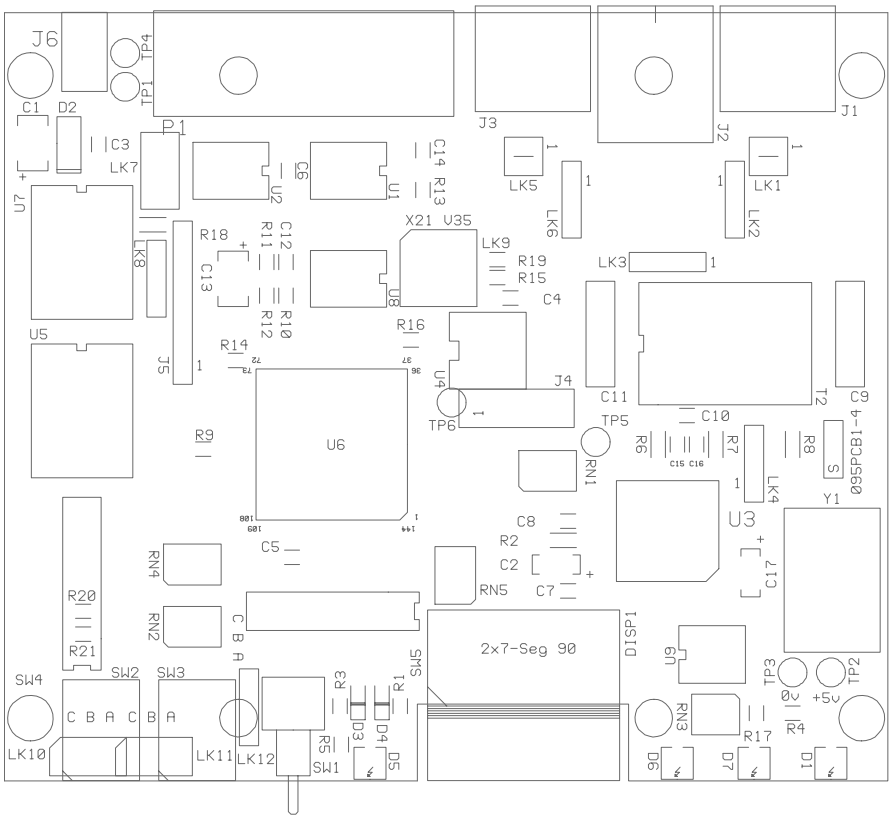
DB25 - FA031

The diagram below illustrates an example of a suitable screen connection. Note how the foil or braid screen is bent back over the 'C' clip to achieve a pressure contact of the screen against the shell:



It is important to keep the screen to shell connection as short as possible.

Appendix D -Location Of Switches and Links



Appendix E - G.703 Interface Pin Outs

COMPOSITE INTERFACE CONNECTIONS (EUROPE) USING 120 OHM BALANCED RJ45			
Name	**Description**	**Type at Connector**	**DTE – RJ45 Female**
RxA	RX Pair	Input	1
RxB	RX Pair	Input	2
TxA	TX Pair	Output	4
TxB	TX Pair	Output	5
S1	Shield Reference	-	3
S2	Shield Reference	-	6

COMPOSITE INTERFACE CONNECTIONS (UK) USING 75 OHM UN-BALANCED BNC			
Name	**Description**	**Type at Connector**	**DTE – BNC Female**
RxA	RX Pair	Input	Centre RX
RxB		Ground Reference	Outer RX
TxA	TX Pair	Output	Centre TX
TxB		Ground Reference	Outer TX

Appendix F - RJ45 E1 Crossover Cable

RJ45 CROSSOVER CABLE (EUROPE) USING 120 OHM BALANCED RJ45			
Name	**Description**	**DTE2 – RJ45 Male**	**DTE1 – RJ45 Male**
TxRxA	TXRX Pair	4	1
TxRxB		5	2
RxTxA	RXTX Pair	1	4
RxTxB		2	5
S1	Shield Reference	6	3
S2	Shield Reference	3	6

Notes:

Link strap must be fitted in 120 position and not in 75 position.

LK1 and LK5 **must** be removed (Isolated).

Appendix G- X.21/V.11 DCE Pinout

15 Way D Type female Configured as DCE

DATA CHANNEL CONNECTIONS			
Name	**Description**	**Type at Connector**	**DCE – DB15 Female**
Protective Ground		-	1
G	Signal Ground	-	8
T(A)	TxDa	Input	2
T(B)	TxDb	Input	9
R(A)	RxDa	Output	4
R(B)	RxDb	Output	11
S(A)	Clock a	Output	6
S(B)	Clock b	Output	13
I(A)	Indicate a	Output	5
I(B)	Indicate b	Output	12
C(A)	Control a	Input	3
C(B)	Control b	Input	10
X(A)	Ext Clock a	Input	7
X(B)	Ext Clock b	Input	14

Notes:

Connector shell and termination must be as specified in the EMC section contained in **Appendix C – EMC Requirements**.

Appendix H – V.35 DCE Pinout

15 Way female D type configured as DCE

DATA CHANNEL CONNECTIONS			
Number	**Name**	**Type at Connector**	**DCE – DB15 Female**
-	Protective Ground	-	1
102	Signal Ground	Bidirectional	8
See note 1	Flag 3 I/P	V.28 Input	15
113	ExtClk(A)	V.11 Input	7
113	ExtClk(B)	V.11 Input	14
115	RXClk(A)	V.11 Output	6
115	RXClk(B)	V.11 Output	13
114	TXClk(A)	V.11 Output	5
114	TXClk(B)	V.11 Output	12
104	RX(A)	V.11 Output	4
104	RX(B)	V.11 Output	11
See note 2	Flag 1 O/P	V.28 Output	3
See note 2	Flag 2 O/P	V.28 Output	10
103	TXD(A)	V.11 Input	2
103	TXD(B)	V.11 Input	9

Note 1. Input flag can be configured to be any V.28 input (to DCE) i.e. Request To Send RTS (105).

Note 2 Output Flags can be configured to any V.28 outputs (from DCE) i.e. Clear To Send CTS (106), Data Set Ready DSR (107) Data Carrier Detect DCD (109).

Connector shell and termination must be as specified in the EMC section contained in **Appendix C – EMC Requirements**

Appendix I – V.35 Stub Cable

V.35 Stub cable			
15 way D type connector Male	**Name**	**Type**	**MRAC 34 pin Female**
1	Protective Ground	-	Shield
8	Signal Ground	Bidirectional	B
15	RTS(Flag 3 I/P)	V.28 Input	C
7	ExtClk(A)	V.11 Input	U
14	ExtClk(B)	V.11 Input	W
6	RXClk(A)	V.11 Output	V
13	RXClk(B)	V.11 Output	X
5	TXClk(A)	V.11 Output	Y
12	TXClk(B)	V.11 Output	AA
4	RX(A)	V.11 Output	R
11	RX(B)	V.11 Output	T
3	RFS (Flag 1 O/P)	V.28 Output	D
10	DSR(Flag 2 O/P)	V.28 Output	E
2	TXD(A)	V.11 Input	P
9	TXD(B)	V.11 Input	S

Connector shell and termination must be as specified in the EMC section contained in **Appendix C – EMC Requirements**