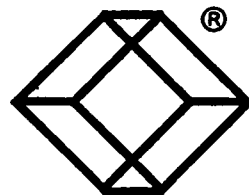


# **Black Box**

## **MicroConverter G.703**

### **User Guide**



**BLACK BOX®**

## Introduction

The Black Box MicroConverter G.703 is a derivative of the highly successful MicroMux SP-1 RA. The MicroConverter G.703 has been engineered to reduce cost and increase functionality in this expanding sector of the market for G.703 Data Service Units (DSUs).

It is designed to enable the connection of data communication systems to carrier services, or private services, such as microwave links, that are presented as G.703 at 2Mbit/s. The standard model, the MicroConverter G.703-X.21, supports X.21 DTE. The enhanced version, the MicroConverter G.703-V.35, can support both X.21 and V.35 DTE. Both versions support 75-ohm un-balanced termination and 120-ohm balanced termination of a G.703 network.

The default configuration of the MicroConverter G.703-V.35 is V.35 and 75-ohm operation. To change the MicroConverter G.703-V.35 to X.21 operation please refer to the Black Box Support Desk / Help Line.

## Installation

On unpacking the MicroConverter G.703 you should find the unit and this manual. If an RS449 or V.35 unit has been ordered you may have also ordered an additional DTE cable. All units have an integral power supply. Mains powered units have an IEC connector and are delivered with a mains lead with a fused plug. DC powered units are available as an option. If there are any questions please refer to the Black Box Support Desk / Help Line.

### Connection to a 75-ohm un-balanced G.703 / E1 network.

If the unit is being used on a 75-ohm un-balanced service then it should be connected using the two B.N.C. connectors on the rear panel of the MicroConverter G.703. These are labelled as "Rx" and "Tx". Your G.703 carrier service equipment may be labelled with transmit and receive. The MicroConverter G.703 "RX" port should be connected to the receive side of the carrier equipment. The MicroConverter G.703 "TX" port transmits carrier and this should be connected to the out-bound port of the carrier service. Switches two and three on the SW1 switch bank should be in the down/on position. All switches of the SW2 switch bank should be set to the up/off position at this time.

### G.703 75-ohm Cable Schedule

Connections should be made using 75-ohm co-axial cables with B.N.C. connectors. The co-ax cables required are two off, 75-ohm co-ax cables, of 5mm diameter, which must be terminated in male B.N.C. connectors. The maximum cable attenuation must be 6db at 1024kHz. The attenuation characteristics should follow the "root f" law. Cable type RG59, or 2002, or equivalent, should meet this specification.

### Connection to a 120-ohm balanced G.703 / E1 network.

If the unit is being used on a 120-ohm balanced service then it should be connected using the RJ45 connector on the rear panel of the MicroConverter G.703. This is labelled as RJ45. Units are shipped with the interface set up for 75-ohm operation. To enable the 120-ohm balanced operation set the middle two switches (switches two and three) of the SW1 switch bank to the up/off position. At this stage all switches on the SW2 switch bank should also be in the up/off position. The pin out for the RJ-45 is as defined for ONP/CTR-12 and is given in the specification section.

## Status Indicators

There are five LED status indicators on the front panel of the MicroConverter G.703. These are labelled "TT Clock", "Loop Back", "ClockMaster", "Network" and "Power". The "TT Clock" LED will illuminate when the use of the Terminal Timing option is selected using switch seven on the SW2 switch bank.

The "Loop Back" LED will illuminate when the loop-back condition is selected using switch four on the SW2 switch bank. The "Clock-Master" LED will illuminate when the MicroConverter G.703 is set to clock master mode, using switch one on the SW2 switch bank. The "Network" indicator is illuminated when the MicroConverter G.703 is receiving correctly encoded data from the line interface equipment.

### Clock master / clock slave settings

When using a pair of MicroConverter G.703 systems at either end of a 2048kbit/s circuit in clear channel operation, one of the units should be set to clock master, using switch one on the SW2 switch bank.

### Data polarity and clock polarity settings

The data transmitted and received on the G.703 side of the MicroConverter G.703 could have originated on another piece of equipment. It is not uncommon for the data to be inverted by G.703 terminating equipment. The MicroConverter G.703 has the option to invert or not invert the data transmitted and received on the G.703 port. The invert G.703 data option is selected using switch five on the SW2 switch bank.

In some cases, when using an X.21 interface, the data received from the DTE may be mis-aligned with the X.21 timing signal, and this can cause errors. This situation can usually be overcome by changing the polarity of the clock used to clock in the received data, with respect to the X.21 timing signal. The MicroConverter G.703 has the option to change the polarity of the clock used to clock in received data. This option is selected using switch eight on the SW2 switch bank.

#### Switch functions and default settings

<u>Switch Bank SW1</u>		<u>Default</u>
Switch 1	Optional ground for RJ45 Receive Shield	Up/Off
Switch 2	Enable 75-ohm operation on Tx on BNC	On/Down
Switch 3	Enable 75-ohm operation on Rx on BNC	On/Down
Switch 4	Not used / no function	Up/Off
<u>Switch Bank SW2</u>		<u>Default</u>
Switch 1	Enable Clock master	Up/Off
Switch 2	Change clock edge of DCE Tx Data	Up/Off
Switch 3	Not used / no function	Up/Off
Switch 4	Enable local and remote loop back	Up/Off
Switch 5	Enable G.703 data inversion	Up/Off
Switch 6	Not used / no function	Up/Off
Switch 7	Clock DCE Rx Data from external Terminal Timing signal	Up/Off
Switch 8	Change clock edge of DCE Rx Data	Up/Off

#### CE Mark

##### Electromagnetic Compatibility

This device complies with the following standards in accordance with the European Directives 89/336/EEC and amending directives 91/263/EEC, 92/31/EEC, 93/68/EEC

Immunity EN 50082-1 06/92

Emission EN 55022 class B 08/87

#### Safety

In accordance with European Low Voltage Directives 73/23/EEC, 93/68/EEC and Telecommunication Terminal Equipment Directive 91/263/EEC amending directive 93/68/EEC, this device complies with the following standards: EN 60950:1992 + A5 and EN 41003 08/93

The ports on this unit have the following safety status:

DTE (X.21 / V.35) = SELV

Network Interfaces (G.703) = SELV (SELV = Safety Extra Low Voltage)

These definitions are classified as per standard EN 60950:1992 + A5.

#### DTE Port

This product is approved to EN 55022, connection of unapproved cables or equipment may affect EMC product performance. Interconnection circuits must comply with the requirements of EN 60950:1992 + A5 for SELV circuits.

#### BABT Approval

Approved by BABT for connection to:

Private Circuits and Interfaces in the European Economic Area compatible with G.703 (120Ω) at 2,048 kbps Unstructured.

Private Circuits and Interfaces in the United Kingdom compatible with G.703 (75Ω) at 2,048 kbps.

**BABT Approval number: 608176**

## Specifications

### On Board Master Clock

Operating Frequency: 2.048 MHz + 50 PPM @ 25 deg. C

### Network Interface Signals Specification

The Network Interface conforms to CCITT specification G.703 and ETSI Open Network Provision for digital unstructured leased line (D2048U).

#### Transmit.

Output Pulse amplitude	2.37 V into 75R $\pm$ 10%
	3.00 V into 120R $\pm$ 10 %
Return Loss	Min 8 dB - Max 14 dB

#### Receive.

Sensitivity Below ( 0dB = 2.4 V)	- 10dB
Loss of Signal Threshold	0.3V
Return Loss	18 dB

Allowable consecutive Zeros before LOS 190 bits.

## Mechanical

The network signals are offered up to the network on two 75R Coax sockets or an RJ45.

Pin on RJ45Function

1 & 2	Rx pair from network
3	Shield reference point
4 & 5	Transmit pair to network
6	Shield reference point

Note that the Receive Shield reference point is taken to ground via switch one of the SW1 switch bank. Moving switch one to the down/on position connects Receive Shield to ground.

## Environmental

The MicroConverter G.703 is designed to operate under the following conditions.

Ambient temperature in the range of 5 to 45 degrees Celsius.

Relative humidity of 10 to 90 percent (non-condensing).

Atmospheric pressure 86kPa to 106kPa.

Power Options: 220 - 250VAC, 50Hz, 100mA or 90 - 260VAC, 50Hz, 100mA or 36 - 72 V DC, 100mA

## SAFETY WARNINGS

Check that the input voltage marked on the rear of the unit is suitable for the intended installation. If in any doubt, consult your supplier.

**Mains powered units:-** In the event of a problem the unit must be disconnected from the mains by isolation at the mains socket. The unit must therefore be connected only to an easily accessible mains outlet.

**DC powered units:-** In the event of a problem the unit must be disconnected from the DC supply by removing the DC input connector on the rear of the unit.

The unit contains no user serviceable parts. All servicing must be carried out by qualified personnel only.

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