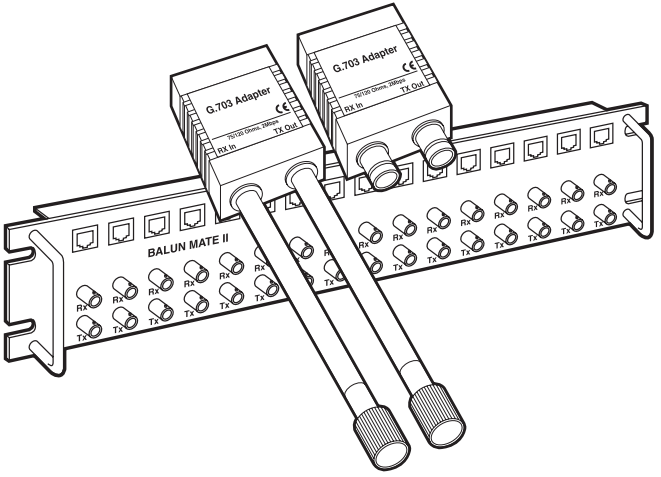
BLACK BOX®
NETWORK SERVICES

MAY 2001
MT255A-M
MT256A-F
MT257A

G.703 Adapters and Balun Mate II



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO-FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, might cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

EUROPEAN UNION DECLARATION OF CONFORMITY

The manufacturer declares that this equipment complies with the requirements of the EMC Directive 89/336/EEC, as well as the Low Voltage Directive (LVD).

CE

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

Contents

1. Specifications

Compliance: CE, FCC Part 15 Subpart J Class A, IC Class/ classe A

Interfaces: ITU CTR-12 G.703 (unstructured):
Coaxial: Unbalanced 75-ohm (RG-59 or 2002 cable);
Twisted-pair: Balanced 120-ohm (shielded or unshielded cable)

Data Rate: Up to 2.048 Mbps (E1)

User Controls: Internal jumpers for shield connection or disconnection:
MT255A-M, MT256A-F: (2);
MT257A: (2) for each of the (16) port-card modules

Indicators: None

Connectors:
Coaxial: Dual 1.6/5.6-mm:
MT255A-M: (1) Male (on 6" [15.2 cm] cable pigtails);
MT256A-F: (1) Female;
MT257A: (16) Female (one on each module);
Twisted-pair: Shielded RJ-45 female:
MT255A-M, MT256A-F: (1);
MT257A: (16), one on each module

Isolation: 500 volts AC/DC between coax and twisted-pair sides

Temperature Tolerance: 32 to 122˚F (0 to 50˚C)

Humidity Tolerance: 5 to 95% noncondensing

Power: From interfaces

Size:

MT255A-M (excluding cable pigtails), MT256A-F:
2.7"H x 1.7"W x 0.8"D (6.9 x 4.3 x 2 cm);
MT257A:
Rack chassis: 3.5"H x 19"W x 1.9"D
(8.9 x 48.3 x 4.8 cm);
Individual port-card modules: 3.4"H x 1"W x 1.75"D
(8.6 x 2.5 x 4.4 cm)

Weight:

MT255A-M: 2.7 oz. (77 g);
MT256A-F: 1.4 oz. (41 g);
MT257A:
Rack chassis: 2.6 lb. (1.2 kg);
Individual port-card modules: 0.4 oz. (10 g)

2. Introduction

The G.703 Adapters and the Balun Mate II enable 75-ohm coaxial G.703 equipment/networks to communicate with 120-ohm twisted-pair G.703 equipment/networks. They're specifically designed to address the Open Network Provision (ONP) requirement that European PTTs offer 120-ohm twisted-pair terminations to their customers. Some PTTs and private carriers had standardized on 75-ohm coax, or have customers whose CPE has only 75-ohm connections. The Adapters and the Balun Mate II help solve this termination mismatch by converting 75-ohm signals to 120-ohm signals and vice versa, at data rates up to full E1 speed (2.048 Mbps).

The MT255A-M model of the G.703 Adapter has a pair of 6" (15.2-cm) coaxial pigtails with male connectors that can plug into the female coaxial connectors of an existing device or termination.

The MT256A-F model of the G.703 Adapter has a pair of female coaxial connectors that existing coaxial cables can be plugged into.

The Balun Mate II (MT257A) is designed to be mounted in a 19" rack. It contains sixteen individual port-card modules, each of which has a pair of female coaxial connectors for existing cables.

The coaxial connectors on all of these models are the 1.6/5.6-mm types used extensively in telephone sites.

On the twisted-pair side, each G.703 Adapter and each of the Balun Mate II's port-card modules has a standard RJ-45 jack.

Here's a summary of the main features of the Adapters and the Balun Mate II:

- Connect 75-ohm dual-coax G.703 terminations to 120-ohm twisted-pair G.703 terminations.
- Bidirectional signal conversion.
- Uses 1.6/5.6-mm coaxial connectors and standard RJ-45 twisted-pair connectors, all of which have low insertion loss.
- Data rates up to 2.048 Mbps.

- Interface-powered—no AC or battery power required.

- Adapters are housed in low-profile, flame-retardant enclosures with either male or female coaxial connectors.

- Balun Mate II can be mounted in 2U of vertical space in a 19" rack and can patch as many as sixteen terminations.

Figures 2-1 and 2-2 on the next page show typical G.703 Adapter applications. The Balun Mate II will also be used for these kinds of applications.

For a block diagram of the circuitry of the Adapters and the Balun Mate II's port-card modules, see the **Appendix**.

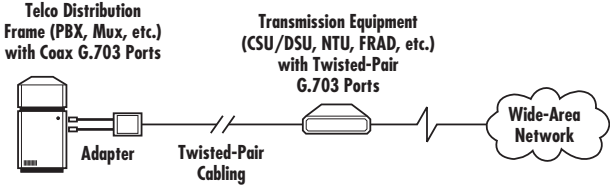


Figure 2-1. Using a single Adapter to connect a coaxial G.703 device to a twisted-pair G.703 device.

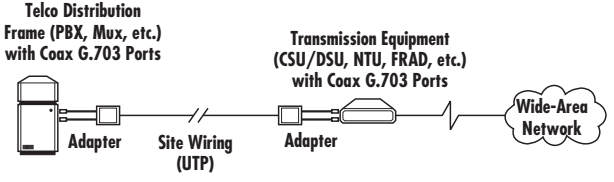


Figure 2-2. Using a pair of Adapters to run a G.703 link through twisted-pair site wiring.

3. Configuration

The G.703 Adapters and the Balun Mate II have only one user-settable configuration option. They express Transmit Data (TX) shield to the twisted-pair cabling on RJ-45 Pin 3 and Receive Data (RX) Shield on RJ-45 Pin 6. Pin 3 is always connected to the shield on the RJ-45 connector itself, but in the factory-default settings of the Adapters and the Balun Mate II, it's also connected to the shield of the coaxial TX cable, and RJ-45 Pin 6 is connected to the shield on the coaxial RX cable.

This should be acceptable in most cases; if it is, proceed with **Chapter 4**. But sometimes it's better for the twisted-pair and coaxial shields to be isolated from each other. For example, in order to avoid electrical "ground loop" problems, the two shields should be isolated on *one* of any pair of Adapters or modules connected back-to-back. So you might want to change this setting, which involves removing jumpers.

Both of the Adapter models have a pair of internal jumpers labeled JP1 and JP2, while the Balun Mate II has a pair of these jumpers mounted on each of its sixteen port-card modules. In their factory-default

installed settings, JP1 links RJ-45 Pin 3 to the coax TX shield, while JP2 links RJ-45 Pin 6 to the coax RX shield.

To remove these jumpers in order to break these links, you'll need to open the case of your Adapter or temporarily remove each port-card module from your Balun Mate II. Follow these steps, taking all reasonable precautions against static electricity:

1. Make sure that the Adapter or module is disconnected from all cables and from all other devices.

2A. *If you're setting the jumpers on an Adapter,* insert a flat-blade screwdriver into the slot on the side of the Adapter's case and twist. The case will pop open, exposing the circuit board.

2B. *If you're setting the jumpers on a Balun Mate II module,* unscrew the nuts and washers on the module from the two screwposts embedded in the chassis' front panel. (You might need a nutdriver to do this.) Once this is done, carefully slide the module out of the back of the rack chassis.

3. Looking down at the top of the circuit board with the RJ-45 jack facing to the left, you should be able to see both jumpers in the middle of the board: JP1 toward the back and JP2 toward the front. Move either or both of these jumpers so that they are sitting on just one jumper post instead of connecting both posts. The shield link that passes through each jumper you move will be broken.

4A. *If you've set the jumpers on an Adapter,* realign the case halves with the end inserts and snap the case halves back together.

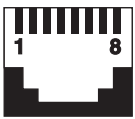
4B. *If you've set the jumpers on a Balun Mate II module,* carefully slide the module back into its slot in the rack chassis, guiding its coaxial connectors through their holes in the chassis' front panel. Then screw the module's nuts and washers back into the screwposts on the back of the front panel to reattach the module to the chassis.

4. Installation and Operation

To connect a G.703 Adapter or Balun Mate II to your G.703 devices and/or networks, take these steps:

1. If you are using an MT255A-M Adapter, connect its coaxial pigtails to your device's coaxial G.703 ports. If you are using an MT256A-F Adapter or Balun Mate II, connect your coaxial G.703 cables to its coaxial ports. Make sure to connect TX to TX and RX to RX. If the cables or device ports you want to attach have regular BNC connectors rather than 1.6/5.6-mm connectors, you'll need to use BNC-to-1.5/6.5-mm adapters or adapter cables (call Black Box Technical Support).

2. Connect your G.703 twisted-pair cabling to the Adapter's or Balun Mate II's RJ-45 jack(s). The plug of each cable you'll attach to these jacks should be pinned to match them:



RJ-45 jack
(female)

Pin 1: Transmit Data + (TX+)
Pin 2: Transmit Data – (TX–)
Pin 3: Transmit Data (TX) shield
Pin 4: Receive Data + (RX+)
Pin 5: Receive Data – (RX–)
Pin 6: Receive Data (RX) shield
Pins 7 and 8: No connection

As soon as you connect the Adapter or Balun Mate II to a working G.703 device/network on both the coaxial and twisted-pair sides, it will begin operating immediately, drawing power from the interfaces and translating between them. It has no ON/OFF switch.

5. Troubleshooting

5.1 Calling Black Box

If your G.703 Adapter or Balun Mate II seems to be malfunctioning, *do not attempt to alter or repair it.* It contains no user-serviceable parts. Call Black Box Technical Support at 724-746-5500; the problem might be solvable over the phone.

Before you call, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

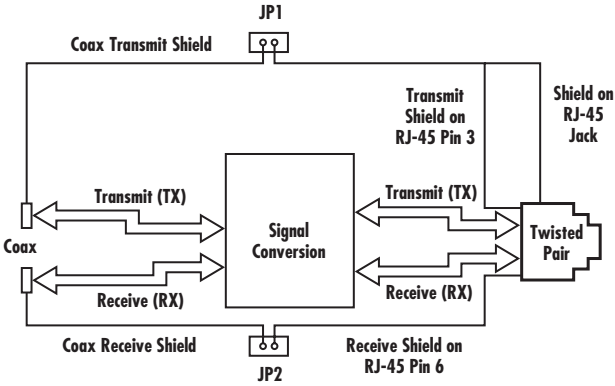
- the nature and duration of the problem;
- when the problem occurs;
- the components involved in the problem;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you might have already done.

5.2 Shipping and Packaging

If you need to transport or ship your G.703 Adapter or Balun Mate II:

- Package it carefully. We recommend that you use the original container.
- If the shipping is return- or repair-related, include everything you received with the Adapter or Balun Mate II when you pack it. Contact Black Box to get a Return Authorization (RA) number.

Appendix: Block Diagram



Although the arrows in this diagram showing data flow are bidirectional, and the Adapters and Balun Mate II *do* support bidirectional data transfer, the direction of flow on the transmit lines (coax TX, twisted-pair pins 1 and 2) will always be opposite to the direction of flow on the receive lines (coax RX, twisted-pair pins 4 and 5). Which signal is input and which is output on either interface will usually depend on the DTE/DCE configuration of the attached devices.

NOTES

1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746