Control Module for
16-Port Managed MicroRACK
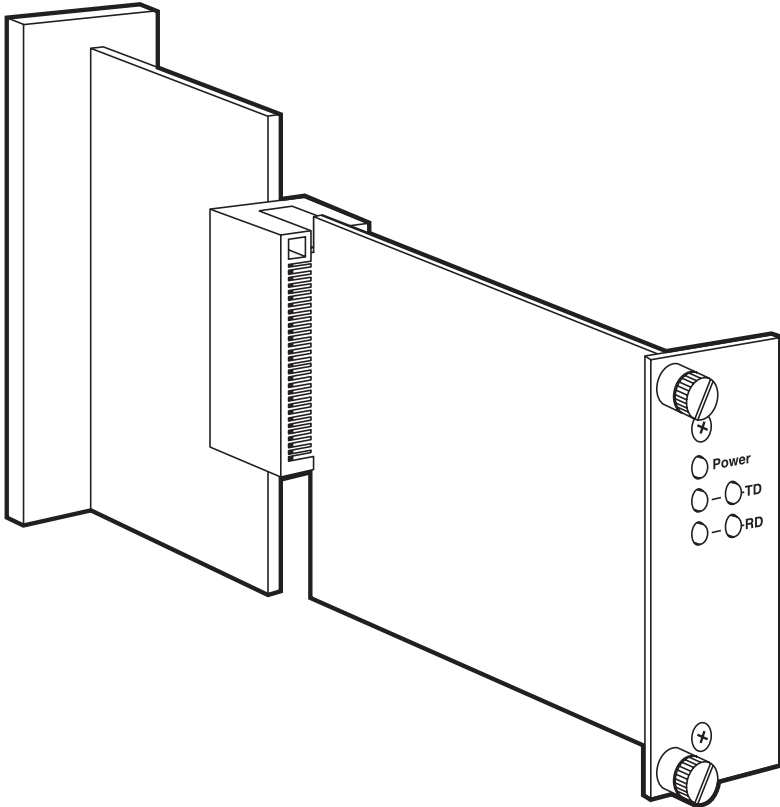
FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA RADIO-FREQUENCY INTERFERENCE STATEMENTS

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, may 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 B 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.

Shielded PC-equipment cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

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 la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

EUROPEAN UNION DECLARATION OF CONFORMITY

This equipment complies with the requirements of the European EMC Directive 89/336/EEC.

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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 B Class A, IC Class/classe A

Interfaces: EIA/TIA RS-232, proprietarily pinned on 10-pin RJ connectors in a manner similar to EIA/TIA-561; port A1 is DCE, port B1 is DTE; Proprietary MicroRACK power and data bus

Protocol: Asynchronous

Data Format: Transparent to data format (data bits, stop bits, and parity)

Data Rate: Transparent to data rates up to 19.2 kbps

Flow Control: Transparent to software flow control; RS-232 hardware flow-control leads are always ON (for continuous transmission)

User Controls: (5) Jumpers mounted on rear card:
  (1) for signal ground/frame ground connection or isolation;
  (4) not used

Indicators: (5) LEDs mounted on front panel of front card to show power, positive-state TD and RD activity, and negative-state TD and RD activity

Connectors: (2) 10-pin RJ female;
  (1) for output to terminal or another Module (port A1, DCE);
  (1) for input from another Module (port B1, DTE)

Leads/Signals Supported: See the **Appendix**

Maximum Altitude: 15,000 ft. (4572 m)

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

Humidity
Tolerance: Up to 95% noncondensing

Power: From the midplane bus of the MicroRACK it's installed
                          in

Size: Rear card: 3.3"H x 1"W x 2.8"D (8.4 x 2.5 x 7.1 cm);
                          Front card: 3.1"H x 1"W x 4.8"D (7.9 x 2.5 x 12.2 cm);
                          screws protrude an additional 0.4" (1 cm) from the
                          front panel

Weight: Rear card (net): 1.9 oz. (54 g);
                          Front card (net): 2.6 oz. (74 g);
                          Total (shipping): Approx. 0.8 lb. (0.4 kg)

2. Introduction

The Control Module for the Managed MicroRACK (product code RM262C) fits in the 16-Port Managed MicroRACK (RM260, shown in Figure 2-1). Use it to control the other cards in the rack from an asynchronous RS-232 terminal or a computer running terminal emulation.
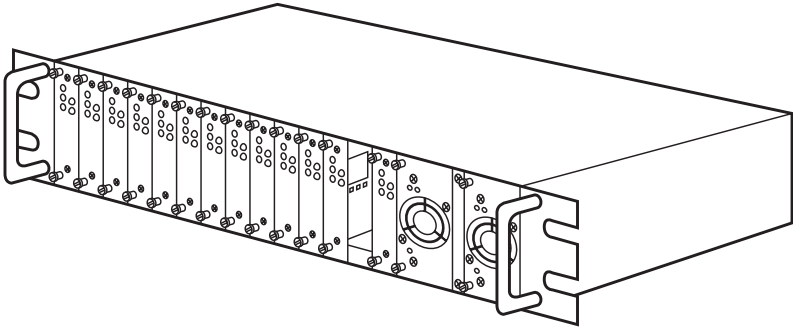

Figure 2-1. The MicroRACK chassis.

The Control Module takes up one card slot in the rack. It has a modular port for connection to an RS-232 terminal, and a serial port for daisychaining between racks. The user wishing to reach or configure a particular function card in a rack simply keys in an addressable command, which the Control Module passes along to all the cards in the rack. The appropriate card recognizes its address and responds to the command. Combining local and remote daisychaining, a single RS-232 terminal can control a whole network of rack-mounted DSL modems, line drivers, CSU/DSUs, or fiber modems.

Some of the Control Module's features include:

- Fits in the 16-Port Managed MicroRACK.

- Supports RS-232 terminal data rates to 19.2 kbps.

- Daisychain capability lets one terminal control many racks.

- Allows configuration and status monitoring of rack-installed DSL modems, line drivers, and fiber modems.

- Works in conjunction with rack-installed short-range modem cards to provide a remote daisychaining option.

- Has front-panel LED indicators for power and for the TD and RD signals.

3. Configuration

NOTE

The Control Module communicates with the function cards installed in a MicroRACK using the rack's internal bus. To ensure proper communication between the cards, we recommend that you configure the "rear card" component of all function cards, as well as the rear card of the Control Module, to have FGND and SGND connected through a 1000-ohm resistor. This is done by setting jumpers on the rear card. Please see the manuals associated with your function cards for more information on installing these jumpers.

Like the function cards designed for the 16-Port Managed MicroRACK, the Control Module consists of a front card and a rear card that meet in the middle of the rack. The rear card supplied with the Control Module is equipped with two modular 10-pin RJ jacks (see Figure 3-1). The jack labeled "A1" is for connection to the RS-232 terminal. If the Control Module is being used in a daisychained application, port "B1" provides the link to the next Control Module in the chain.
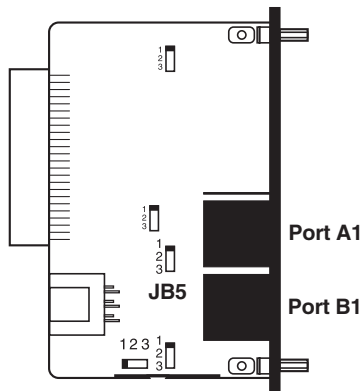

Figure 3-1. Jumper locations on the Control Module's rear card.

As shown in Figure 3-1, there are five jumpers on the Control Module's rear card, but only one of these (designated "JB5" but not labeled on the board) is meaningful. It controls the connection/isolation of the Module's frame ground (FGND) to/from signal ground (SGND). In the connected (closed) setting with the jumper on posts 1 and 2, jumper JB5 links signal ground (RJ pin 5) to frame ground. In the open (disconnected) setting with the jumper on posts 2 and 3, pin 1 is "lifted" from frame ground.

Leave the other jumpers in their default settings. The Control Module might not operate correctly if the settings of any of the other jumpers are changed.

Figure 3-2 shows the two possible settings for jumper JB5 (the numbers "1," "2," and "3" are labeled on the board).
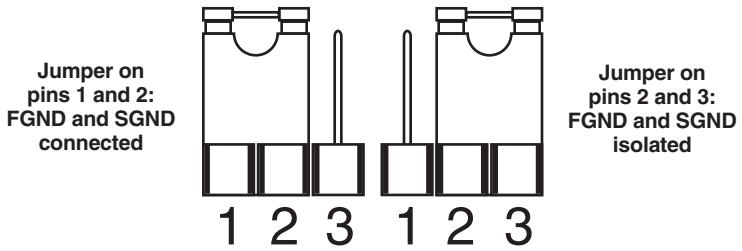
Jumper on pins 1 and 2: FGND and SGND connected

Jumper on pins 2 and 3: FGND and SGND isolated

1 2 3   1 2 3

Figure 3-2. The possible jumper settings.

4. Installation

4.1 Installing the Control Module in the MicroRACK

The Control Module, like the the 16-Port Managed MicroRACK's function cards, consists of a front card and a rear card that meet in the middle of the MicroRACK and plug into each other with mating 50-pin card-edge connectors.

The MicroRACK has sixteen slots that can be used for function cards if you use one power supply, or fourteen slots if you use two redundant power supplies. You can install the Control Module—which takes up only a single slot—in any free slot except slot #17, where a power supply needs to be. We recommend, however, that you use slot #14, the one next to the slot where the second power supply would go (slot #15) in a MicroRACK with redundant power supplies. This slot has an extra bus connection designed for use by the SNMP/HTTP Card (product code RM261C-SNMP), although the Control Module doesn't make use of it, and it's a good idea to reserve this slot for control cards rather than function cards.

NOTE

Do *not* install a Control Module in the same MicroRACK as an SNMP/ HTTP Card. The SNMP/HTTP Card will perform the control functions for that rack, and can be attached to the Control Modules in other racks in a daisychained system to provide full system control. See the SNMP/HTTP Card's manual for more information.

It doesn't matter whether a power supply is already installed and operating or not when you install the Control Module; like the function cards, the Module is hot-swappable and won't be damaged by installing or removing it when the MicroRACK is powered. If the rack is powered, the Module's front and rear cards will start operating as soon as they touch the midplane of the rack.

To install the Module in slot #14 or another chosen slot, take these steps:

1. Slide the rear card into the slot from the back of the rack chassis, along the metal rails.

2. Secure the rear card in place using the provided metal screws.

3. Slide the front card into the slot from the front of the chassis. It should meet the rear card when it's almost all the way into the chassis.

4. Push the front card *gently* into the rear card's card-edge receptacle. It should "click" into place.

5. Secure the front card in place using its captive thumbscrews.

4.2 Connecting Port A1 to a PC or RS-232 Terminal

The Control Module's 10-pin RJ port labeled "A1" is wired as an RS-232 DCE, and is designed to connect to either an RS-232 PC/terminal or to port B1 of another Control Module. Port A1 is proprietarily pinned (see the **Appendix** for the pinout), but the pinning is based on the EIA/TIA-561 standard for expressing RS-232 on an RJ-45 connector. Note that port A1's DSR, CTS, and CD outputs are always "high" (+5V).

When making a connection between port A1 and the serial port of an RS-232 terminal, use a cable with RJ-45 connectors on both ends such as product code EVMSL05; the RJ-45s will fit the Module's 10-pin ports. This cable should be wired straight-through (from Pin 1 to Pin 1, Pin 2 to Pin 2, and so on). If your PC or terminal doesn't have an RJ-45 serial port pinned to the EIA/TIA-561 standard (as will usually be the case), you'll need a serial-port adapter. If your PC or terminal has a DB25 male serial port, you can assemble an adapter yourself using the FA025 adapter kit, following the pinout in the **Appendix**. If you need a preassembled adapter, a different type of adapter, or other assistance, please call Black Box Technical Support.

4.3 Connecting Port A1 to Port B1 on Another Module (Daisychaining)

The Control Module's 10-pin RJ port labeled "B1" is wired as an RS-232 DTE, and is designed to connect to port A1 of another Module (or an SNMP/HTTP Card) in a different MicroRACK. (It is pinned the same way that port A1 is—see the **Appendix** for a pinout—except that it's DTE instead of DCE.) To make this kind of connection, use 8-pin modular (RJ-45) cabling wired straight-through, such as product code EVMSL05. (It can also be 10-pin RJ straight-through cabling, but this is very uncommon.)

For information about daisychaining a MicroRACK with an SNMP/HTTP Card installed in it to a rack with a Control Module, see the SNMP/HTTP Card's manual. There are two types of Module-to-Module daisychain connections: local (follow the directions in **Section 4.3.1**) or remote (follow the directions in **Section 4.3.2**). A maximum of eight Modules/racks can be interconnected in the same daisychain.

NOTES

DTR and RTS *outputs* are always "high" (+5V).
The DSR *input* must be "high" in order for port B1 to operate. This is provided automatically when the B1 port is connected to the A1 port of another Module.

4.3.1 LOCAL DAISYCHAINING

Figure 4-1 shows a typical daisychain connection using a remote terminal, two MicroRACKs, and two Control Modules. Using this type of topology, one terminal can control several racks in the same location. To wire up a local Control Module for a daisychain connection, follow these steps:

1. Using a straight-through modular cable, connect the serial port of the RS-232 terminal to Port A1 of the first Control Module in the chain.

2. Using another straight-through modular cable, connect Port B1 of the first Module in the chain to port A1 of the second Module in the chain. Follow the same procedure from the second to the third Module (and so on) if there are additional Modules in the chain.
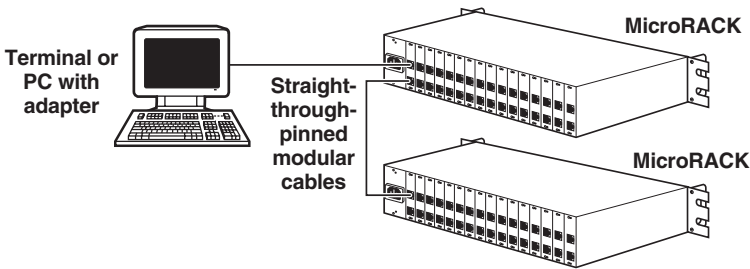
Figure 4-1. A local daisychain.

4.3.2 REMOTE DAISYCHAINING

In some applications it may be desirable to control both a local MicroRACK and a remote MicroRACK using the same local RS-232 terminal. This can be accomplished using short-range modem cards mounted in the rack (product code ME771C, for example) along with the Control Modules.

Figure 4-2 on the next page shows how a remote daisychain setup might look. It is also possible to combine this remote daisychaining method with the local daisychaining method described in **Section 4.3.1**.

To wire up a remote Control Module daisychain connection, follow these steps:

1. Using a straight-through modular cable, connect the serial port of the RS-232 terminal to Port A1 of the local Control Module.

2. Using another straight-through modular cable, connect Port B1 of the local Control Module to port A1 to the RS-232 serial port of an asynchronous short-range modem card installed in the MicroRACK.

3. Following the instructions in that modem's manual, connect the "line" port of the local modem card to the "line" port of the remote modem card. This connection should be made in the normal way, using another straight-through-pinned twisted-pair cable.

4. Connect the RS-232 serial port of the remote modem card to Port A1 of the remote Control Module. Since both ports are configured as DCE, you will need to use a cross-pinned RJ-45 cable pinned this way:

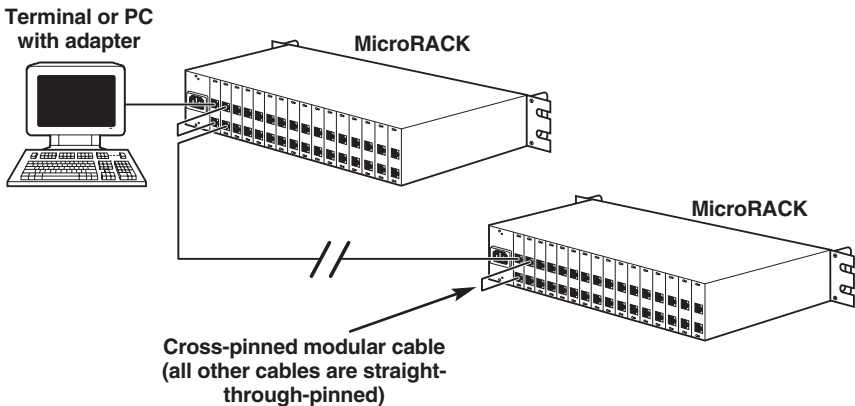| Signal	Pin -------Pin	Signal
DSR	2 ----------4	DTR
DTR	4 ----------2	DSR
SGND	5 ----------5	SGND
RD	6 ----------7	TD
TD	7 ----------6	RD

Figure 4-2. A remote daisychain.

5. Operation

Once you've configured a Control Module and installed it in a 16-Port Managed MicroRACK, it will begin operating immediately if the rack has a power supply installed and it's connected to a working power source. If not, the Module won't start operating until you apply power to the rack. The Module is hot-swappable; it won't be damaged by plugging it in or removing it while the rack is powered up.

Once you have the cables properly attached to the Module, check its front-panel LEDs (shown in Figure 5-1). They indicate the condition of the modem and the communication link:

- The green "Power" LED glows when power is applied to the Module through its mid-plane chassis connection.

- The green "TD" and "RD" LEDs show positive-state data activity.

- The red "TD" and "RD" LEDs show negative-state data activity. A solid red light indicates an idle state.
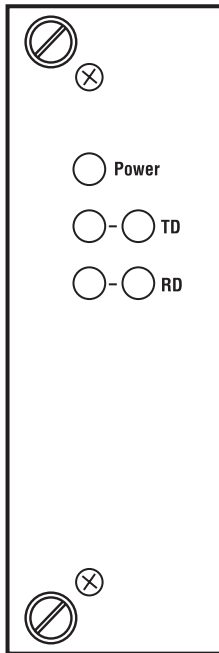
Figure 5-1. The Control Module's front panel.

6. Troubleshooting

6.1 Calling Black Box

If you determine that your Control Module for the 16-Port Managed MicroRACK is malfunctioning, *do not attempt to alter or repair it*. It is not user-serviceable. Contact Black Box Technical Support at 724-746-5500.

Before you do, 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've already done.

6.2 Shipping and Packaging

If you need to transport or ship your Control Module:

- Package it carefully. We recommend that you use the original container.

- If you are returning the unit, include everything you received with it. Before you ship the unit back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Appendix: Pinouts

Here's the pinout of Ports A1 and B1 of the Control Module, both 10-pin RJ connectors. Note that the pinning of pins 2 through 9 corresponds with the pinning of pins 1 through 8 of a TIA-561 compliant RJ-45 connector.

Pin	ITU V.24 Circuit	Signal
1	N/A	(Not used)
2	107	Data Set Ready (DSR)
3	109	Received Line Signal Detector (RLSD), a.k.a. Carrier Detect (CD)
4	108.2	Data Terminal Ready (DTR)
5	102	Signal Ground (SGND)
6	104	Received Data (RD)
7	103	Transmitted Data (TD)
8	106	Clear to Send (CTS)
9	105 or 133	Request to Send (RTS) or Ready for Receiving (RFR)
10	N/A	(Not used)

Here's the pinout for the adapter you would need to assemble from the FA025 kit to connect the modular cable from Port A1 on a Control Module to the DB25 serial port of a PC or terminal (You'll need a different adapter, or an additional adapter, to connect the modular cable to a PC's DB9 male serial port; call Black Box for technical support if you want to do this.)

Standard RS-232 on DB25 Male		TIA-561 on RJ-45 Female	
Signal	Pin	Pin	Signal
TD	2	3	TD
RD	3	2	RD
RTS	4	7	RTS
CTS	5	8	CTS
DSR	6	6	DSR
SGND	7	5	SGND
CD	8	1	CD
DTR	20	4	DTR

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