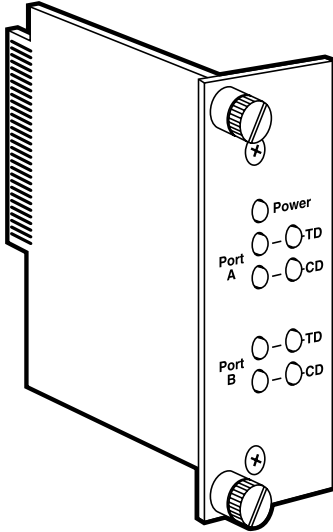




X.21 Sync Modem Eliminator Card



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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.

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.

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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.

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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 líneas 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 objetos 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: Objetos 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.

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1. Specifications

Transmission Format	Synchronous, CCITT X.21
Data Rates	32, 48, 56, 64, 72, 112, 128, and 144 kbps
Clocking	Internal, external, or receive loopback
External Interface	UD-26 female, ports A1 and B1
Internal Interface	Connection to MicroRack 2, 4, 8, or 16 chassis via male card edge
Distance	300 feet (91.4 m), DTE to DTE
Indicators	Independent bi-color LED indicators for each port: TD, CD, and common “Power” indicator
Fuse	400 mA for 120V applications; 200 mA for 240V applications

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Power Supply	<i>PS460A</i> : Rackmount power supply is switchable between 120 and 240 VAC; Chassis supplies 10 VAC to the Card, typical consumption is 700 mW/2.4 amps <i>PS461A</i> : 48-VDC rackmount power supply; typical consumption is 700 mW/2.4 amps
MTBF	111,647 hours
MTTR	1 hour
Temperature	32 to 122°F (0 to 50°C)
Humidity	5 to 95%, noncondensing
Altitude	Up to 10,000 feet (3048 m)
Size	3.1"H x 0.95"W x 5.4"D (7.9 x 2.4 x 13.7 cm)

2. Introduction

2.1 Description

The X.21 Sync Modem Eliminator Card lets two synchronous X.21 hosts communicate with each other in the same room for a fraction of the cost of a pair of high-speed modems. Supporting synchronous data rates of 32, 48, 56, 64, 72, 112, 128, and 144 kbps, the X.21 Sync Modem Eliminator Card can be configured for internal, external, or receive loopback clock. Maximum distance between the connected hosts is 300 feet (91.4 m), and all necessary data, clocking, and control signals are supported.

The X.21 Sync Modem Eliminator Card is designed to mount in a 2U-high, 16-slot rack chassis (MicroRack 16, part number RM216), as well as in the 2-, 4-, or 8-slot desktop MicroRack (RM202, RM204, and RM208). The MicroRack 16 features a switchable 120/240-VAC power supply (or optional 48-VDC, part number PS461A) and hot-swappable function/interface cards mounted in a mid-plane architecture. (MicroRacks 2, 4, and 8 do not come with a power supply. You must order the PS460A or PS461A. See **Chapter 1** for more information.)

Front-panel LEDs show TD and CD activity for both ports, as well as power. The rear interface card has two UD-26 connectors for patching to the host devices.

2.2 Features

- X.21 operation.
- Synchronous data rates from 32 to 144 kbps.
- Host-to-host distances up to 300 feet (91.4 m).
- Internal, external, or receive loopback clocking.
- All necessary data, clocking, and control signals supported.
- Front-panel LEDs show TD and CD activity for each port.
- Two UD-26 (ultra-density) connectors on the rear interface card.
- Switchable 120- or 240-VAC power supply.
- Optional 48-VDC power supply.

3. Configuration

The X.21 Sync Modem Eliminator Card uses a combination of DIP switches and jumpers that allow configuration to an extremely wide range of applications. Designed around a mid-plane architecture, the X.21 Sync Modem Eliminator Card incorporates both front and rear cards.

Configuration of both may be necessary. The switches/jumpers are accessible when the Cards are slid out of the rack chassis. Once configured, the X.21 Sync Modem Eliminator Card is designed to operate transparently, without need for frequent re-configuration: Just set it and forget it.

3.1 Function-Card Configuration

All switches and jumpers are located on the X.21 Sync Modem Eliminator Card's PC board. To access the PC board, loosen the two thumbscrews on the front panel and slide the card out of the chassis. As Figure 3-1 illustrates, the DIP switches are located on the daughterboard and the jumpers are located on the main PC board.

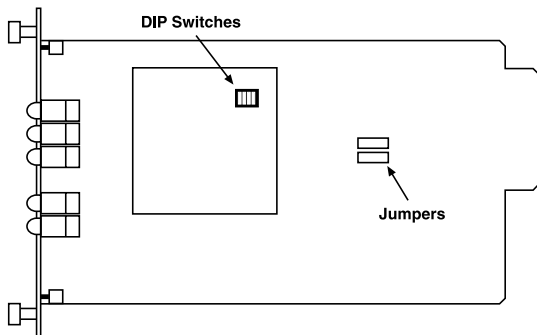


Figure 3-1. Locating switches and jumpers.

3.2 Function-Card DIP Switch

The X.21 Sync Modem Eliminator Card has one four-position DIP switch mounted on the daughterboard. Figure 3-2 shows the numbering of the individual switches and their ON/OFF positions relative to the daughterboard.

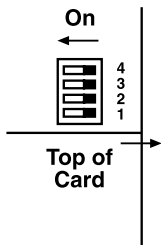


Figure 3-2. DIP-switch orientation on the daughterboard.

S1 through S3: Data Rate Setting

Switches S1 through S3 are set in combination to determine the synchronous data rate for the X.21 Sync Modem Eliminator Card. Switch S4 is not active.

S1	S2	S3	S4	Setting
Off	Off	Off	N/A	32 kbps
On	Off	Off	N/A	48 kbps
Off	On	Off	N/A	56 kbps
On	On	Off	N/A	64 kbps
Off	Off	On	N/A	72 kbps
On	Off	On	N/A	112 kbps
Off	On	On	N/A	128 kbps
On	On	On	N/A	144 kbps

3.3 Function-Card Jumpers

The X.21 Sync Modem Eliminator Card has two ports (Port A and Port B), and each must be configured independently. Therefore, every function (such as clocking) has *two* jumpers associated with it. As Figure 3-3 shows, each jumper has three possible positions: strap covering posts 1 and 2, strap covering posts 2 and 3, or strap removed altogether. The detailed description for jumpers JP4 and JP5 presents all valid strap positions.

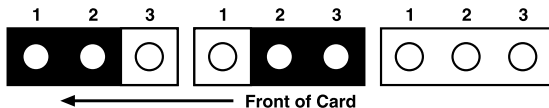


Figure 3-3. Possible function-card strap positions.

Figure 3-4 shows the location of jumpers JP4 and JP5 on the X.21 Sync Modem Eliminator Card.

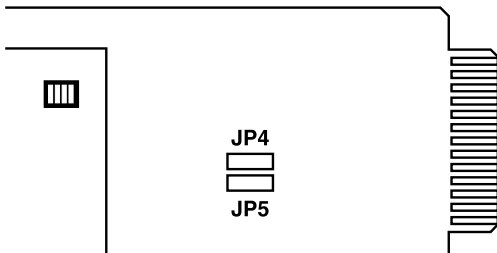


Figure 3-4. Jumper locations on the PC board.

JP5: Clock Source (Port A)

The setting for jumper JP5 determines—with respect to Port A—whether clocking is internal or external.

NOTE

Only Port A may be set for external clock.

<u>JP5 (Port A)</u>	<u>Setting</u>
Position 1 and 2	External Clock
Position 2 and 3	Internal Clock (factory default)
Strap Removed	Not a valid setting

JP4: Clock Source (Port B)

The setting for jumper JP4 determines—with respect to Port B—whether clocking is internal or receive loopback.

NOTE

If Port B is set for receive loopback clock, Port A *must* be set for external clock.

Port B may *not* be set for external clock.

<u>JP4 (Port B)</u>	<u>Setting</u>
Position 1 and 2	Received Loopback Clock
Position 2 and 3	Internal Clock (factory default)
Strap Removed	Not a valid setting

3.4 Rear-Card Configuration

The rear interface card for the X.21 Sync Modem Eliminator Card is equipped with two female UD-26 connectors, one for each DTE host port. This card has one configuration jumper (JB4). Figure 3-5 shows the location of this jumper on the PC board.

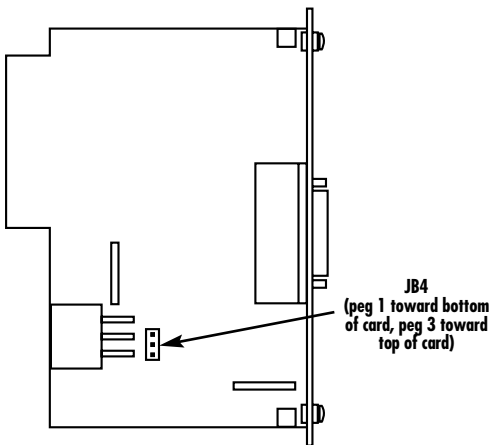


Figure 3-5. Rear-card jumper location.

SGND & FRGND (JB4)

In the connected position, this jumper links UD-26 pin 7 (Signal Ground) and frame ground. In the open position, pin 1 is “lifted” from frame ground.

JP4

Position 1 & 2 = SGND (UD-26 pin 7) and FRGND Connected

Position 2 & 3 = SGND (UD-26 pin 7) and FRGND Not Connected

4. Installation

This chapter describes the functions of the MicroRack 2, 4, 8, and 16 chassis, tells how to install front and rear X.21 Sync Modem Eliminator Cards into the chassis, and provides diagrams for wiring the interface connections correctly.

4.1 The MicroRack and Power Supplies

The MicroRack comes with two, four, eight, or sixteen card slots. The MicroRack 16 includes its own power supply. If you will be using the MicroRack 2, 4, or 8, you must order a power supply (see **Chapter 1** for more information on PS460A and PS461A). Measuring only 3.5 inches high, the MicroRack is designed to occupy only 2U in a 19-inch rack. Sturdy front handles allow the MicroRack 16 to be extracted and transported conveniently.

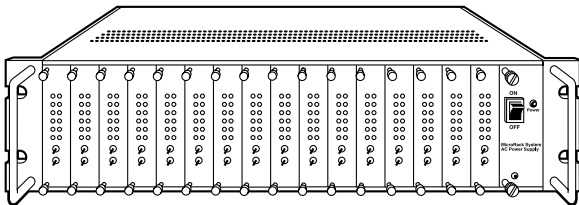


Figure 4-1. The MicroRack 16.

The power supply (PS460A or PS461A) used in the MicroRack uses the same mid-plane architecture as the modem cards. The front card of the power supply slides in from the front, and the rear card slides in from the rear. They plug into one another in the middle of the rack. The front card is then secured by thumbscrews and the rear card by conventional metal screws.

WARNING

There are no user-serviceable parts in the power supply section of the Card. Voltage setting changes and fuse replacement should only be performed by qualified service personnel.

Switching the Power Supply On and Off

The power supply on/off switch is located on the front panel. When plugged in and switched on, a red front-panel LED will glow.

Since the MicroRack is a “hot swappable” rack, it is not necessary for any cards to be installed before switching on the power supply. The power supply may be switched off at any time without harming the installed cards.

Replacing the Power-Supply Fuse

The rack-chassis power supply uses a 400-mA fuse for 120-VAC circuits, and a 200-mA fuse for 240-VAC circuits. The fuse compartment is located just below the AC socket on the rear card. To replace the fuse, follow these steps:

- 1) Turn the power switch off and remove the power cord.
- 2) Using a small screwdriver, pop the compartment open (it will slide open like a drawer).

Depending upon the exact part used, the drawer may slide completely out of the fuse holder or it may stop partway out.

- 3) Note that there are two fuses in the drawer. The front fuse is the spare, and the rear fuse is the “active” fuse.
- 4) If the active fuse appears to be blown, remove it from the clips and replace it with the spare from the front compartment. Note the size and rating of the blown fuse before discarding it.
- 5) Buy a replacement fuse at an electronics store. (Note: For continued protection against the risk of fire, replace only with the same type and rating of fuse.)

Switching the Power Supply Between 120 and 240 Volts

Although the MicroRack is shipped from the factory with a customer-specified power-supply configuration, you may change the configuration yourself. Here are the steps to switch the configuration of the power supply between 120 and 240 VAC:

X.21 SYNC MODEM ELIMINATOR CARD

- 1) Remove the front power-supply card and locate the two-position switch near the back of the card. Slide the switch to the desired voltage. (Note: The actual values on the switch may be “110/220” or “115/230.”)
- 2) Verify that the existing fuse is the correct value (400 mA for the 120-volt, 200 mA for the 240-volt).
- 3) Connect the power-supply cord.

4.2 Installing the X.21 Sync Modem Eliminator Card into the MicroRack Chassis

The X.21 Sync Modem Eliminator Card is made up of a front card and a rear card. The two cards meet inside the MicroRack chassis and plug into each other by way of mating 50-pin card edge connectors. Use the following steps as a guideline for installing each X.21 Sync Modem Eliminator Card into the chassis.

- 1) Slide the rear card into the back of the chassis along the metal rails provided.

- 2) Secure the rear card using the metal screws provided.
- 3) Slide the card into 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 card-edge receptacle of the rear card. It should click into place.
- 5) Secure the front card using the thumbscrews.

NOTE

Since the MicroRack chassis allows hot-swapping of cards, it is not necessary to power down the rack when you install or remove a X.21 Sync Modem Eliminator Card.

4.3 Host (DTE) Connection

The X.21 Sync Modem Eliminator Card rear card has two UD-26 connectors, labeled “A1” and “B1” (see Figure 4-2). These correspond to host (DTE) connection Port A and Port B.

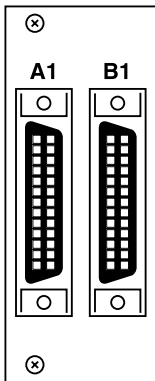


Figure 4-2. The rear interface card, showing connectors.

To connect X.21 host (DTE) devices A and B to the X.21 Sync Modem Eliminator Card:

1. Configure the X.21 Sync Modem Eliminator Card for your specific application according to the instructions in **Chapter 3**.
2. Connect host devices A and B to the X.21 Sync Modem Eliminator Card using multipair adapter

cables (call your supplier for information on EHN1206-03 and EHN1206-04). Note the following conditions when making connections.

- a) Each multipair cable *must not exceed 150 feet (45.7 m) in length* (see Figure 4-3).
- b) If external clock is used, the host (DTE) device supplying the clock *must* be connected to Port A. The X.21 Sync Modem Eliminator Card *can't* receive an external clock on Port B.
- c) If receive clock is used on Port B, Port A *must* supply an external clock.

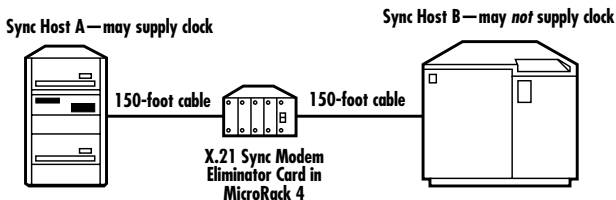


Figure 4-3. Maximum allowable cable distances.

NOTE

Any terminal cable connected to the Card must be shielded cable, and the outer shield must be 360 degree bonded—at both ends—to a metal or metalized backshell.

5. Operation

Once you have configured the X.21 Sync Modem Eliminator Card and connected the cables to host A and host B, you are ready to operate the unit. This section describes the LED status monitors and power-up procedure.

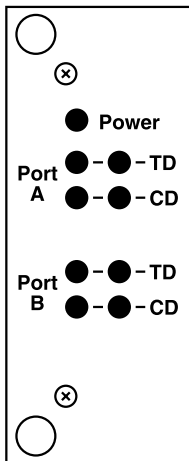


Figure 5-1. The Card's front panel, showing LEDs.

5.1 LED Status Monitors

The X.21 Sync Modem Eliminator Card has 9 front-panel status LEDs that indicate the condition of the Card and Ports A and B (see Figure 5-1).

- PWR glows green when power is applied to the X.21 Sync Modem Eliminator Card through its mid-plane-chassis connection.
- Two TD LEDs monitor the status of each port's data transmission. The red LED glows when the signal is in an idle (negative) state. The green LED glows when the signal is in a transmitting (positive) state. Both LEDs will normally blink when data transmission is occurring.
- Two CD LEDs monitor the status of each port's carrier-detect signal. The red LED glows when the receive channel is not active (negative condition). The green LED glows when the receive channel is active (positive condition).

5.2 Power-Up

There is no power switch on the X.21 Sync Modem Eliminator Card: Power is automatically applied to the Card when its card-edge connector makes contact with the chassis's mid-plane socket, or when the chassis's power supply is turned on.

NOTE

The X.21 Sync Modem Eliminator Card is a “hot-swappable” card. It will not be damaged by plugging it in or removing it while the rack is powered up.

When the X.21 Sync Modem Eliminator Card is powered up, and both ports are passing data normally, the following LED conditions will exist:

- PWR will glow green.
- TD will be blinking red and green.
- CD will glow green.

Appendix. Interface Standards

X.21 INTERFACE (DCE Wiring)

Not Used -26	<input type="checkbox"/>	<input type="checkbox"/>	13- Not Used
Not Used -25	<input type="checkbox"/>	<input type="checkbox"/>	12-(TC/) Transmit Clock
Network Clock (XTC) -24	<input type="checkbox"/>	<input type="checkbox"/>	11-(XTC/) Network Clock
Not Used -23	<input type="checkbox"/>	<input type="checkbox"/>	10-(CD/) Carrier Detect
Not Used -22	<input type="checkbox"/>	<input type="checkbox"/>	9- (RC/) Receive Clock
Not Used -21	<input type="checkbox"/>	<input type="checkbox"/>	8- (CD) Carrier Detect
Not Used -20	<input type="checkbox"/>	<input type="checkbox"/>	7- (SG) Signal Ground
Request to Send (RTS/) -19	<input type="checkbox"/>	<input type="checkbox"/>	6- Not Used
Not Used -18	<input type="checkbox"/>	<input type="checkbox"/>	5- Not Used
Receive Clock (RC) -17	<input type="checkbox"/>	<input type="checkbox"/>	4- (RTS) Request to Send
Receive Data (RD) -16	<input type="checkbox"/>	<input type="checkbox"/>	3- (RD) Receive Data
Transmit Clock (TC) -15	<input type="checkbox"/>	<input type="checkbox"/>	2- (TD) Transmit Data
Transmit Data (TD)/-14	<input type="checkbox"/>	<input type="checkbox"/>	1- (FG) Frame Ground



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