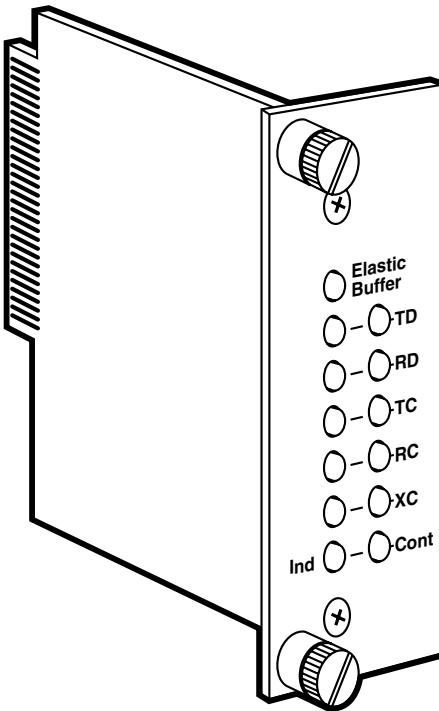




RS-232↔X.21 MicroRack Card

V.35↔X.21 MicroRack Card



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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 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.

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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.

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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 conectado 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 física 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 energía.
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 líquidos 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

External Interface—Dual UD-26 female high-density connectors

Internal Interface—Connection to RM216 rack chassis via male card edge

Electrical Interface—X.21: EIA RS-422/V.11 compatible; RS-232: RS-232/V.24 compatible; V.35 data and clock signals: receivers—V.35 compliant, drivers—0.55 V differential signal; V.35 control signals: RS-232/V.24 compatible

Data Rates—IC224C: Up to 128 kbps; IC225C: Up to 2.048 Mbps

Clocking—RS-232/V.35 DCE or DTE receiving timing from an X.21 DCE device

DCE to DCE buffering—Dual 16-bit buffers for full-duplex operation—set to 8 bits in case of underflow or overflow. Switchable, custom control settings (see **Chapter 3**)

Indicators—Bi-level LED indicators for TD, RD, TC, RC, and XC; single green indicator for INDICATION and CONTROL; single red indicator for elastic buffer status

Power Supply—Rackmount power supply is switchable between 120 V and 240 VAC; chassis supplies 10 VAC to the MicroRack Card, typical consumption is 1.2 watts

Temperature—32 to 122°F (0 to 50°C)

Humidity—5 to 95%, noncondensing

Size—3.1"H x 0.95"W x 5.4"D (7.8 x 2.4 x 13.7 cm)

Weight—1 lb. (2.2 kg)

2. Introduction

2.1 Description

The RS-232↔X.21 MicroRack Card (part number IC224C) lets an X.21 DCE communicate bi-directionally with an RS-232 DCE or DTE. The V.35↔X.21 MicroRack Card (part number IC225C) lets an X.21 DCE communicate bi-directionally with a V.35 DCE or DTE. Operating synchronously, full or half duplex, both MicroRack Cards are protocol-independent and incorporate two 16-bit elastic buffers. For extra flexibility, the MicroRack is DTE/DCE switchable on the RS-232/V.35 interface (the X.21 interface is configured as a DTE). Clocking is supplied by the X.21 DCE device.

This interface converter is available in two versions: The IC224C converts from X.21 to RS-232, and supports sync data rates to 128 kbps. The IC225C converts from X.21 to V.35 and supports sync data rates to 2.048 Mbps. Both versions use mid-plane architecture and are equipped with dual UD-26 connectors on the rear interface card (adapter cables are available from Black Box—call Technical Support for more information).

The MicroRack Card is designed to mount in a 2U-high 19" rack chassis (part number RM216) and 2-slot, 4-slot, or 8-slot card racks (part numbers RM202, RM204, and RM208). Available power supplies include 120/230V AC and 48/24/12V DC.

2.2 Features

- Synchronous operation, full or half-duplex
- Allows an X.21 DCE to communicate bi-directionally with an RS-232/V.35 DCE or DTE
- V.35 data rates up to 2.048 Mbps (Model IC225C)
- RS-232 data rates up to 128 kbps (Model IC224C)
- RS-232/V.35 interface is DTE/DCE switchable
- Built-in 16 bit elastic buffers
- Seven bi-color LED indicators on front card
- Receives timing from the X.21 DCE device

RS-232↔X.21 AND V.35↔X.21 MICRORACK CARDS

- Dual UD-26 connectors on rear card
- Fits in a rack chassis (part number RM216) and 2-slot, 4-slot, and 8-slot card racks (part numbers RM202, RM204, and RM208)

3. Configuration

This section describes the location and orientation of the MicroRack Card's configuration switches and jumpers, and details all possible settings. This section also identifies factory-default configuration settings.

3.1 Front Card Configuration

The IC224C/IC225C front card uses a single four-position DIP switch (S1), plus a DCE/DTE strap, to configure the unit for a wide range of applications. **Figure 3-1** shows the location of switch set S1 and the DCE/DTE strap on the IC224C/IC225C front card. **Figure 3-2** shows the orientation of DIP switch set S1.

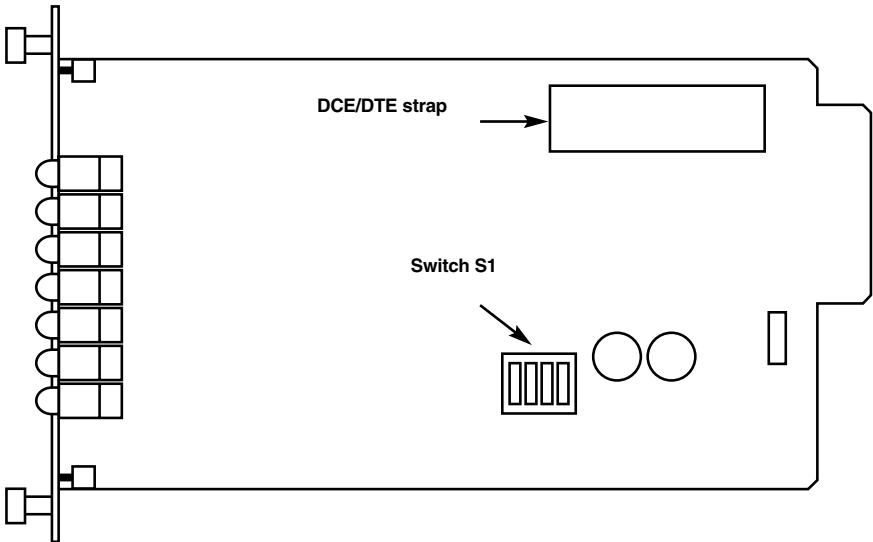


Figure 3-1. IC224C/IC225C front card, showing location of DIP switch and DCE/DTE strap.

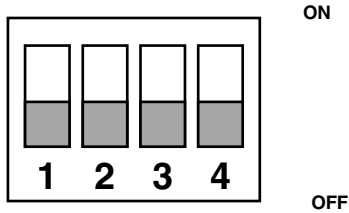


Figure 3-2. Orientation of switch set S1 on the front card.

3.1.1 SWITCH SET S1

DIP switch set S1 has 4 switches and is used to define which control signals will be passed between the two interfaces. Depending upon the setting of the DCE/DTE strap, the functions of the four switches will change. **Table 3-1** describes DIP switch S1 settings, including factory defaults.

Table 3-1. S1 Summary Table.

Position	RS-232/V.35=DCE	RS-232/V.35=DTE
S1-1	ON=DTR from the RS-232/V.35 DTE must be ON in order for the X.21 CONTROL signal to turn ON	ON=CD from the RS-232/V.35 DCE must be ON in order for the X.21 CONTROL signal to turn ON
	OFF =DTR from the RS-232/V.35 DTE has no effect on the CONTROL signal going to the X.21 DCE	OFF =CD from the RS-232/V.35 DCE has no effect on the CONTROL signal going to the X.21 DCE
S1-2	ON =RTS from the RS-232/V.35 DTE must be ON in order for the X.21 CONTROL signal to turn ON	ON =CTS from the RS-232/V.35 DCE must be ON in order for the X.21 CONTROL signal to turn ON
	OFF=RTS from the RS-232/V.35 DTE has no effect on the CONTROL signal going to the X.21 DCE	OFF=CTS from the RS-232/V.35 DCE has no effect on the CONTROL signal going to the X.21 DCE
S1-3	(not applicable) set to OFF	ON=DSR from the RS-232/V.35 DCE must be ON in order for the X.21 CONTROL signal to turn ON
		OFF =DSR from the RS-232/V.35 DCE has no effect on the CONTROL signal going to the X.21 DCE
S1-4	(not applicable) set to ON	ON =Indication from the X.21 DCE controls RTS and DTR going to the RS-232/V.35 DCE
		OFF=Indication from the X.21 DCE controls RTS only going to the RS-232/V.35 DCE. DTR is always ON.
NOTE: Bold indicates factory-default setting.		

3.1.2 SETTING THE DCE/DTE STRAP

The RS-232/V.35 interface on the IC224C/IC225C is DCE/DTE switchable. The default setting is RS-232/V.35 DCE to X.21 DTE, based upon how the converter sees its own orientation. When configured this way the IC224C/IC225C will want to connect to an RS-232/V.35 DTE device. Changing the DCE/DTE strap orientation will enable the IC224C/IC225C to connect to an RS-232/V.35 DCE device.

NOTE

The X.21 port on the IC224C/IC225C is always wired as a DTE and is not switchable. This port always wants to connect to an X.21 DCE device.

The RS-232/V.35 DCE/DTE strap is located near the rear of the IC224C/IC225C front card's PC board (see **Figure 3-3**). The arrows on the top of the strap indicate the configuration of the IC224C/IC225C. For example if the "DCE" arrows are pointing toward the edge of the card (up), then the IC224C/IC225C is wired as a DCE and wants to connect to an RS-232/V.35 DTE device.

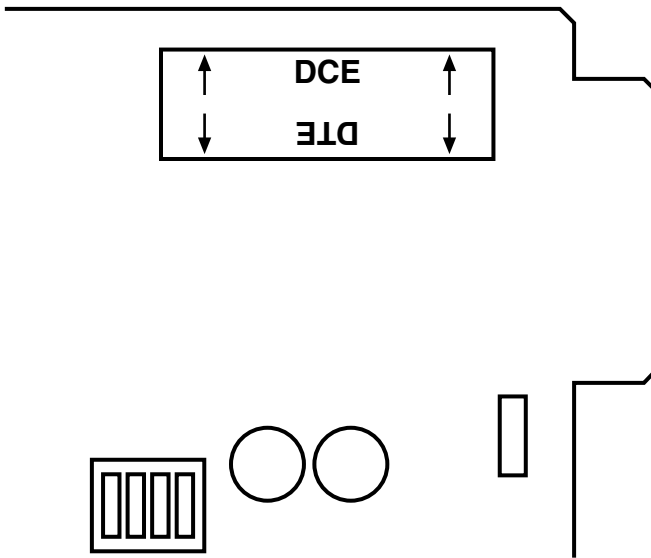


Figure 3-3. Model IC224C/IC225C front card with close-up of DCE/DTE strap.

To change the DCE/DTE orientation of the IC224C/IC225C's RS-232/V.35 interface, simply remove the strap and rotate it 180° so that the appropriate arrows are pointing toward the edge of the card.

3.3 Rear Card Configuration

The rear interface card for the IC224C/IC225C is equipped with two female UD-26 connectors: one for each port. This card has one configuration jumper (JB4). **Figure 3-4** shows the location of this jumper on the PC board.

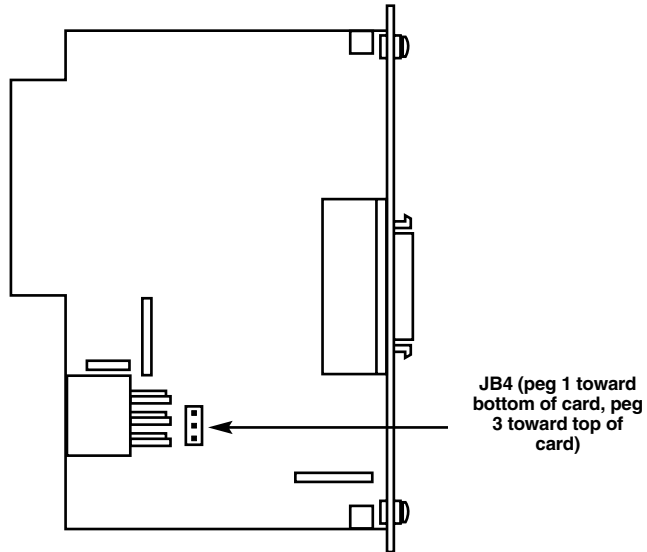


Figure 3-4. Rear-card jumper location.

As **Figure 3-5** shows, jumper JB4 has two possible positions: strap covering posts 1 and 2, or strap covering posts 2 and 3. The orientation of the jumper with respect to pin positions is shown in **Figure 3-4**.

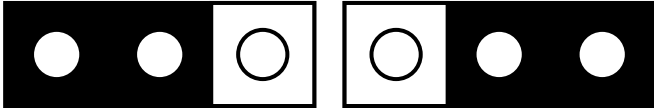


Figure 3-5. Possible function-card strap positions.

JB4

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

Position 2 and 3=SGND (UD-26 pin 7) and FRGND not connected

4. Installation

This section describes the functions of the Rack Chassis (part number RM216), tells how to install front and rear IC224C/IC225C cards into the chassis, and provides diagrams for wiring up the interface connections correctly.

4.1 The Model RM216 Rack Chassis

The Rack Chassis (shown in **Figure 4-1**) has sixteen slot for short-range modem cards, plus its own power supply. Measuring only 3.5" high, the Rack Chassis is designed to occupy only 2U in a 19" rack. Sturdy front handles allow the Rack Chassis to be extracted and transported conveniently.

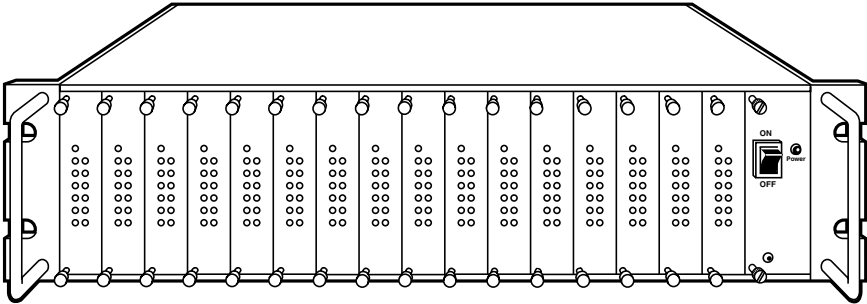


Figure 4-1. Model RM216 Rack Chassis with Power Supply.

4.1.1 THE RACK POWER SUPPLY

The power supply included in the RM216 rack 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 spring-loaded thumbscrews and the rear card by conventional metal screws.

WARNING

There are no user-serviceable parts in the power-supply section of the IC224C/IC225C. Voltage-setting changes and fuse replacement should only be performed by qualified service personnel.

Switching the Power Supply On and Off

The power switch is located on the front panel. When the power supply is plugged in and switched on, a red front panel LED will glow. Since the RM216 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.

4.2 Installing the IC224C/IC225C into the Chassis

The IC224C/IC225C is made up of a front Function card and a rear Interface card. The two cards connect in the rack chassis via mating 50-pin card edge connectors. Use the following steps as a guideline for installing each IC224C/IC225C into the RM216 Rack Chassis.

1. Slide the rear Interface card into the back of the chassis along the metal rails.
2. Secure the rear card using the metal screws provided.
3. Slide the Function 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 spring-loaded thumbscrews.

NOTE

Since the RM216 chassis allows “hot swapping” of cards, you don’t need to power down the rack when you install or remove a IC224C/IC225C.

4.3 DCE/DTE Connection

The IC224C/IC225C rear card has two UD-26 connectors, labeled “A1” and “B1” (see **Figure 4-2**). Port A1 connects to the RS-232 device (Model IC224C) or the V.35 device (Model IC225C). Port B1 connects to the X.21 device in all cases. Port A1 may be configured as either a DCE or DTE. Port B1 is always configured as a DTE.

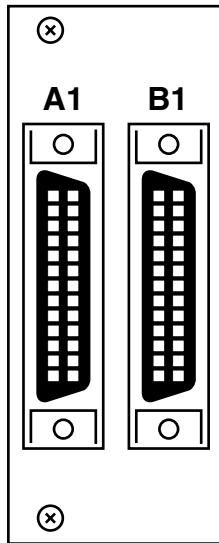


Figure 4-2. Model IC224C/IC225C rear interface card, showing connectors.

To connect computing devices to ports A1 and B1 on the IC224C/IC225C, follow these instructions:

1. Configure the IC224C/IC225C for your specific application according to the instructions in **Chapter 3**.
2. Connect computing devices to the IC224C/IC225C using multipair adapter cables. In all cases, the X.21 DCE must supply the system timing, and the RS-232/V.35 device must accept external clock. The wiring of your adapter cables should support this requirement.

NOTE

Any terminal cable connected to the IC224C/IC225C 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 each IC224C/IC225C and connected the cables, you are ready to operate the unit. This section describes the LED status monitors, the clocking requirements, and the power-on procedure.

5.1 LED Status Monitors

The IC224C/IC225C features seven front-panel LEDs that indicate the condition of the modem and communication link. **Figure 5-1** shows the positions of the LEDs, and the next page describes their functions.

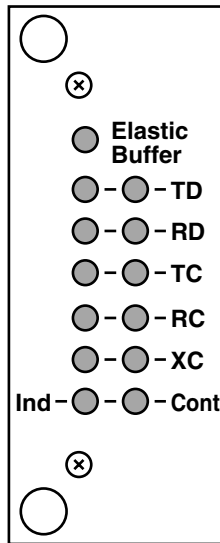


Figure 5-1. The IC224C/IC225C front panel, showing LED positions.

- **Elastic Buffer**—monitors elastic-buffer status, and operates only when the IC224C/IC225C's RS-232/V.35 port is configured as a DTE (i.e. the converter is connected between two DCE devices). When configured in this manner, the two internal 16-bit elastic buffers are enabled. If either of these buffers becomes full or empty (because of clock loss or slip), the LED will briefly glow red to indicate data loss. The buffer will then reset to half-full and the LED will stop glowing. When the IC224C/IC225C's RS-232/V.35 port is configured as a DTE, this LED has no function.
- **TD (Transmit Data)**—indicates status of transmit data at RS-232/V.35 interface. If the DCE/DTE strap is set for "Converter=DCE," then transmit data is an input to the converter. If the DCE/DTE strap is set for "Converter=DTE," then transmit data is an output from the converter. Red indicates a mark or idle state. Green indicates a space or active state.
- **RD (Receive Data)**—indicates status of receive data at RS-232/V.35 interface. If the DCE/DTE strap is set for "Converter=DCE," then receive data is an output from the converter. If the DCE/DTE strap is set for "Converter=DTE," then receive data is an input to the converter. Red indicates a mark or idle state. Green indicates a space or active state.
- **TC (Transmit Clock)**—indicates status of transmit clock at RS-232/V.35 interface. If the DCE/DTE strap is set for "Converter=DCE," then transmit clock is an output from the converter. If the DCE/DTE strap is set for "Converter=DTE," then transmit clock is an input to the converter. Red indicates a mark or idle state. Green indicates a space or active state.
- **RC (Receive Clock)**—indicates status of receive clock at RS-232/V.35 interface. If the DCE/DTE strap is set for "Converter=DCE," then receive clock is an output from the converter. If the DCE/DTE strap is set for "Converter=DTE," then receive clock is an input to the converter. Red indicates a mark or idle state. Green indicates a space or active state.
- **XC (External Clock)**—indicates status of external clock at RS-232/V.35 interface. If the DCE/DTE strap is set for "Converter=DCE," then external clock is an input to the converter (see Note 1). If the DCE/DTE strap is set for "Converter=DTE," then external clock is an output from the converter (see Note 2). Red indicates a mark or idle state. Green indicates a space or active state.

NOTE 1

When configured this way, an external clock output from the RS-232/V.35 DTE to the converter is not required.

NOTE 2

When configured this way, the external clock output from the converter must be used by the RS-232/V.35 DCE as the clock source.

- **IND (Indicate)**—glows green when **INDICATE** from the X.21 DCE is active.
- **CONT (Control)**—glows green when **CONTROL** to the X.21 DCE is active.

5.2 Clocking

The IC224C/IC225C always connects to an X.21 DCE device. In all applications, the X.21 DCE must supply the system timing. Consequently, the RS-232/V.35 device (DCE or DTE) must be configured to accept an external clock input. Any other equipment clock settings will likely cause clock slip and/or data loss.

5.2 Power-On

There is no power switch on the IC224C/IC225C: Power is automatically applied to the IC224C/IC225C when its card-edge connector touches the chassis' mid-plane socket, or when the chassis' power is turned on.

NOTE

The MicroRack Card is a “hot-swappable” card—it will not be damaged by plugging it in or removing it while the rack is powered on.

Appendix A: Interface Settings and Orientation

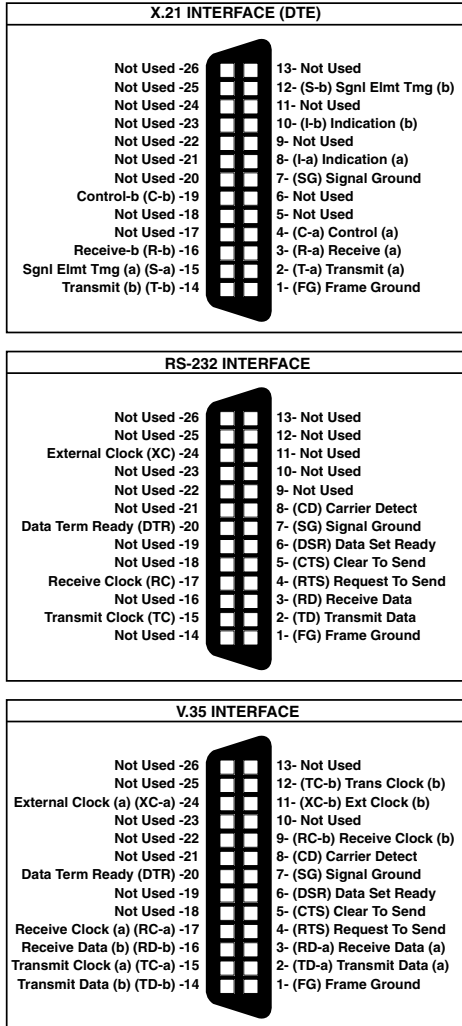


Figure A-1. Interface Settings and Orientation.

Appendix B: Block Diagram

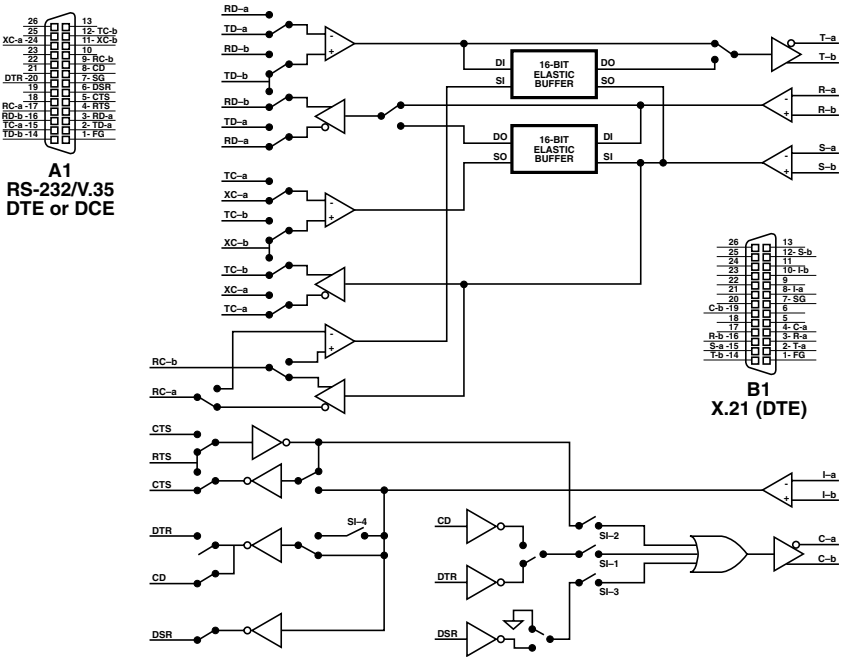


Figure B-1. Block Diagram



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