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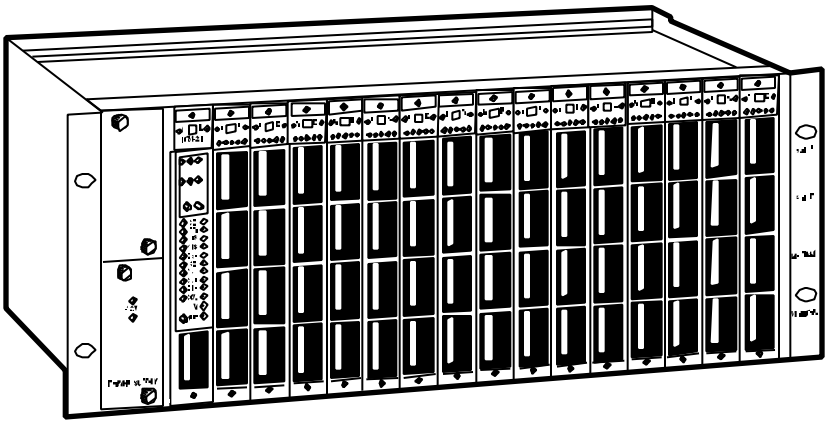
JANUARY 2002

SM900A SM906C SM910C
SM901A SM907C SM911C
SM903C SM908C SM950A
SM905C SM909C SM950A-220

Pro Switching System II with Terminal-Based Management



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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.

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.

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.

UL

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1. Specifications

Standards: FCC Part 15 Class A; EN 50081, 50082, and 60950; UL® 1950; CE

Control Signals: Send Data, Receive Data, Serial Clock Transmit, Serial Clock Receive, Request to Send, Data Terminal Ready, Data Carrier Detect, Data Set Ready

Data Format: 8-bit data, 1 stop bit, no parity

Interface: SM903C: RS-232 (DB25); SM905C: RS-232/V.24 (DB25); SM906C: RS-530-422 (DB25); SM907C: V.35 (M/34): SM908C: RS-530 (DB25); SM909C: X.21 (DB15); SM910C: Blank card cover; SM911C: Blank power supply cover

Connectors: SM900A: (48) DB25 female, (3) per circuit; (2) DB25 female for monitor; (1) DB25 female for I/A test; (1) DB25 female for control in/out; SM901A: (48) M/34 female, (3) per circuit; (2) DB25 female for monitor; (1) DB25 female for I/A test; (1) DB25 female for control in/out

Indicators: SM903C, SM905C: SD, RD, RTS, CTS, DSR, CD, SCT, SCR, DTR, RI, SCTE; SM906C–SM908C: SD, RD, CD, DTR, RTS; SM909C: T, R, I, C, S

Protocols: Transparent to all protocols

Control Interface: Any ASCII-capable terminal or PC

System Capacity: (1) control/test module per chassis; (16) circuit modules per chassis

Signal Activity Indicators: (1) set of LEDs per control/test module; (1) set of LEDs per circuit module

Operating Environment's Relative Humidity: 10 to 80%, noncondensing

Power: SM950A: 110 VAC input; SM950A-220: 220 VAC input; Both models: (2) power supplies (redundant); AC Fusing: Two fuses: 0.5 amp at 115 VAC; One fuse: 0.25 amp at 220 VAC; One fuse: 0.16 amp at 220 VAC; Frequency: 50/60 Hz; Receptacle: 3-prong, grounding; Energy Rate: 50 VA

Size: SM900A, SM901A: 7"H (4 Rack Units) x 19"W x 14"D (17.8 x 48.3 x 35.6 cm)

Loaded Weight: SM900A (DB25 connectors): 29 lb. (13.2 kg); SM901A (V.35 connectors): 39 lb. (17.7 kg)

2. Introduction

2.1 Overview

The Pro Switching System II is a series of rackmount modular components used for managing EIA RS-232/V.24, V.35, X.21, and RS-530 data interfaces.

The main component of the system is a Rack Chassis for either RS-232 (part number SM900A) or V.35 (part number SM901A). Each Rack Chassis fits in a standard 19" equipment rack.

Two power supplies of the same voltage (part number SM950A for 110-VAC operation, or part number SM950A-220 for 220-VAC operation) fit into the leftmost slot of the the Rack Chassis when viewed from the front (one on the top, one on the bottom). (A primary power supply is standard; a secondary supply is optional.) If the secondary supply is installed, failure of either supply will cause a console alarm.

A Control Module goes into the second slot on the Chassis (when viewed from the left front). The module can be remotely controlled by a single management console (an ASCII terminal). Install just one Control Module per chassis. There are two models to choose from for terminal-based management: SM903C for RS-232, SM905C for V.35.

The remaining 16 slots can be filled with your choice of Front Interface Cards (ISP modules). Available models include SM906C for RS-232, SM907C for V.35, SM908C for RS-530, or SM909C for X.21. The Front Interface Cards (ISPs) are installed between Data Terminal Equipment (DTE) and Data Communications Equipment (DCE) and provide patching, A/B switching (single or multiple channels, single or multiple racks), interactive test and data monitor access, circuit status display, and alarm definition/detection/reaction.

Product Code	Product Name / Description
SM900A	Pro Switching System II Chassis RS-232, RS-530, X.21, V.35
SM901A	Pro Switching System II Chassis V.35 Only
SM903C	Terminal Display Card RS-232 Only
SM905C	Terminal Display Card V.35, RS-530, X.21
SM906C	Front Interface Card RS-232
SM907C	Front Interface Card V.35
SM908C	Front Interface Card RS-530
SM909C	Front Interface Card X.21
SM910C	Blank Cover for Unused Slot (Interface)
SM911C	Blank Cover for Unused Slot (Power Supply)
SM950A	Power Supply Module 110-VAC
SM950A-220	Power Supply Module 220-VAC

2.1.1 Supported Data Line Interfaces

The chassis supports the following data line interfaces:

- RS-232 / V.24 (DB25)
- RS-530 / 422 (DB25)
- V.35 (DB25 or M / 34)
- X.21 (DB15)

2.1.2 System Capabilities

Depending upon the configuration, the system can provide:

- Data line patching
- Data line A / B switching for single lines, multiple lines, single chassis, and / or multiple chassis
- Intrusive interactive data line test access
- Non-intrusive monitor data line test access
- Data line circuit status displays
- Data line alarm definition, detection, and reaction
- Master / Slave chassis control hierarchies

2.1.3 System Architecture

There are up to three active buses connecting the control module with the circuit modules within a chassis: control, monitor, or I/A test bus.

Control Bus

The control bus system transports commands and responses. External control signals are passed through the Control In/Out port.

Monitor Bus

The monitor bus transports non-intrusive monitor information in TTL format from a specified circuit module to the control module. It also converts the TTL format to either RS-232 or V.35 signal levels (regardless of its original interface) before delivery to the rear-mounted "Monitor" ports.

I/A Test Bus

The I/A (interactive) test bus transports information either directly from a specified circuit module to the rear-mounted I/A test port or to the control module and then to the rear-mounted "Monitor"ports.

NOTE

The signal levels output from the I/A bus depend upon the type of circuit and the destination port.

2.2 Hardware Summary

2.2.1 Chassis

Each chassis contains front-access slots that support up to one control/test module, 16 circuit (line) modules, and two power-supply modules

The left-most full-length slot in the chassis is the only position that supports a control or test module.

A control/test module connects to some or all of the following rear-chassis ports (DB25 connectors): Control In/Out, Monitor (two available), and/or I/A Test (see Figure 2-2 on the next page).

Circuit modules are numbered from left to right, 1–16 inclusive. The patch cavity rows are labeled on the right mounting ear. Each open line module (EQP A, EQP B, or MODEM) patch cavity corresponds to a rear-chassis port of the same name and number. Figure 2-1 illustrates the module-numbering convention.

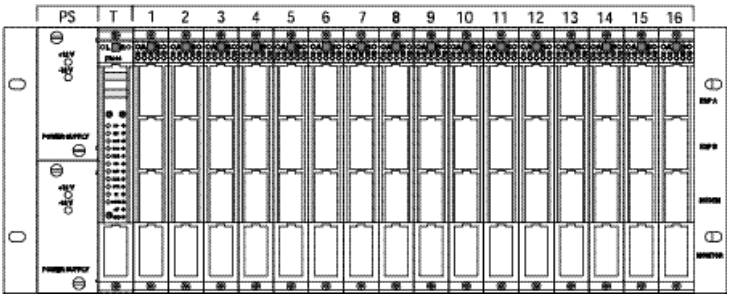

Figure 2-1. Module-numbering scheme.

Power jacks on the rear of all chassis include one AC and one Aux DC In (for future use).

Data line ports on the rear of the chassis can be in the following configurations:

- DB25 female/female
- M/34 female/female

For illustrations of some of the rear data-line port configurations, see Figures 2-2 and 2-3.

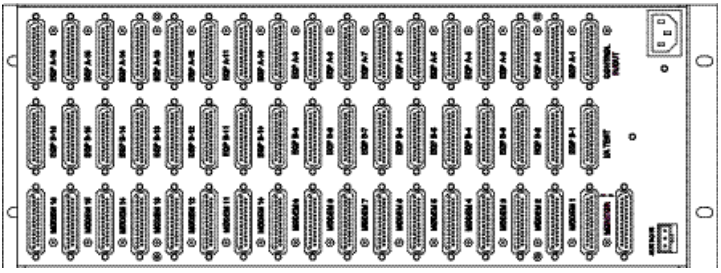

Figure 2-2. Rear chassis for RS-232, RS-530, or V.35 DB25 (female/female).

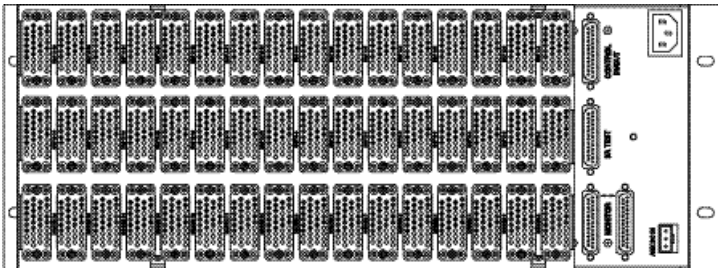

Figure 2-3. Rear chassis for V.35 M/34 (female/female).

2.2.2 Control Converter Components

Control converter kits facilitate:

- A control connection between the rear-chassis Control In / Out port and the controlling console.
- The cabling of multi-chassis control hierarchies.

See Figures 2-4 through 2-7 for illustrations of the control converter components.

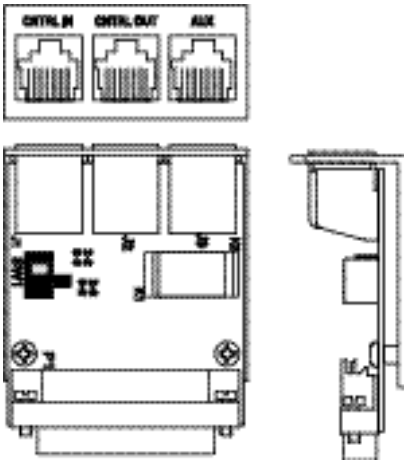

Figure 2-4. Control converter for chassis with DB25 data-line ports.

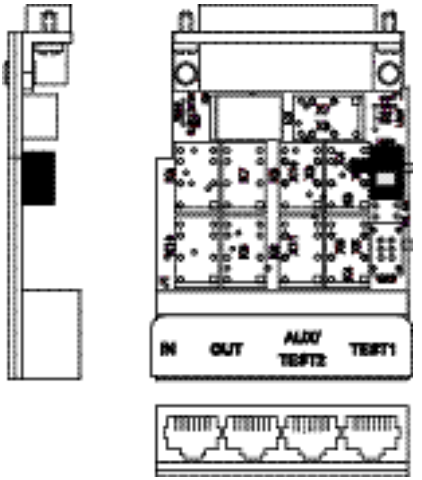

Figure 2-5. Control converter for chassis with M/34 data-line ports.

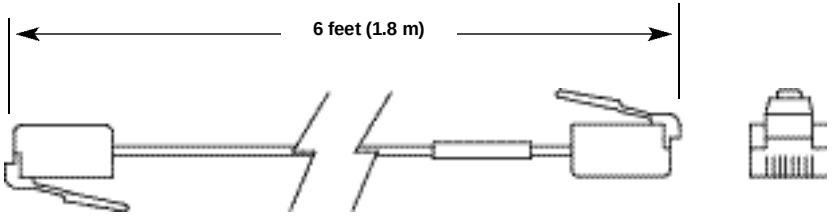

Figure 2-6. RJ-45 male to RJ-45 male cable.

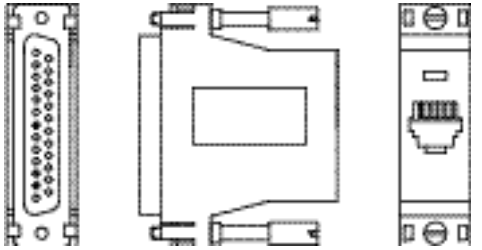

Figure 2-7. DB25 male to RJ-45 control adapter.

2.2.3 MODULES

Each chassis supports up to one control/test module and up to 16 circuit (line) modules. All modules are inserted from the front of the chassis. For a module's functional schematic and a description of each module's front panel, see **Chapters 3** and **4**.

2.2.4 POWER SUPPLIES

The two redundant power supplies provide DC voltage power to the chassis. They are front-loaded and come with a 6-foot (1.8-m) power cord. Two AC power supply versions are available, one for 110-volt input and one for 220-volt input. When both LEDs are lit, the unit is functioning correctly.

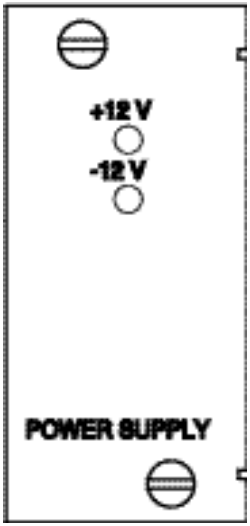

Figure 2-8. Power supply front panel.

2.3 Software Summary

Firmware can be upgraded with the replacement of the PROM on the control/test module.

The remote control of a chassis is performed via any ASCII-capable terminal either through a direct or modem connection. A master chassis can also be configured to facilitate the control of multiple slave chassis.

3. Control and Test Modules

Control and test module topics include LEDs, test points, A/B gang switching, displays, and front-panel and schematic illustrations.

3.1 LEDs

Control/test modules contain LEDs that indicate signal activity for any data line patched from a circuit module to a control/test module Monitor cavity.

3.2 Test Points

Adjacent to the signal LEDs are voltage test points. Unbalanced signals have a single point per signal, while balanced signals have dual points per signal. Positive test voltage (+12 VDC) and signal ground points are also provided.

3.3 A/B Gang Switching

Use the A/B Gang Switch button to switch all circuit modules to the alternative A/B position. The switch button must be pressed and held for two seconds before switching takes place. This prevents inadvertent operation.

The A/B gang switch function can also be operated by a control console command (control modules only).

CAUTION

Control/test modules are designed to work with circuit modules of the same interface type. If the interface types of the modules are different, the LEDs may not report correctly and the signal nomenclature may be inaccurate.

3.4 Displays

The upper display normally shows the address of the chassis. In configuration mode, both the upper and the lower displays are used in conjunction with the “A” and “B” buttons for configuration tasks.

3.5 Front-Panel and Schematic Illustrations

All schematic drawings in this section are shown without connections to the patch cavities. See Figures 3-1 through 3-7.

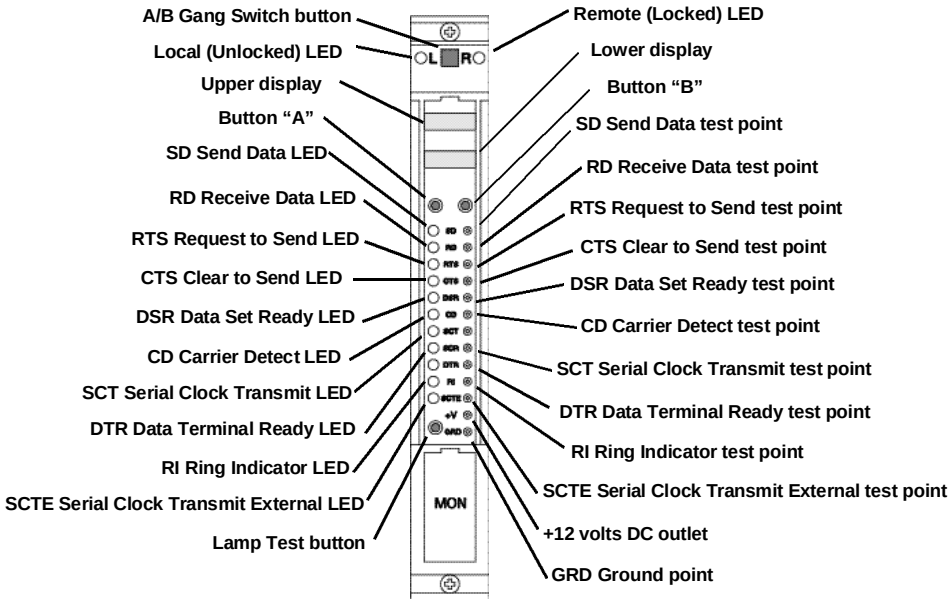

Figure 3-1. Control module front panel for RS-232 interface.

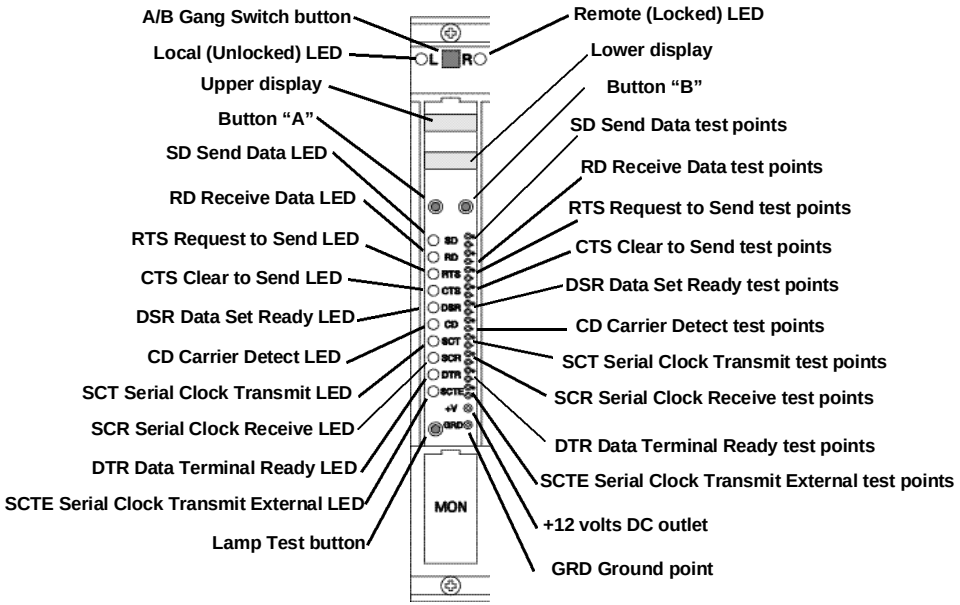

Figure 3-2. Control module front-panel for RS-530 interface (special order only, call Black Box Technical Support).

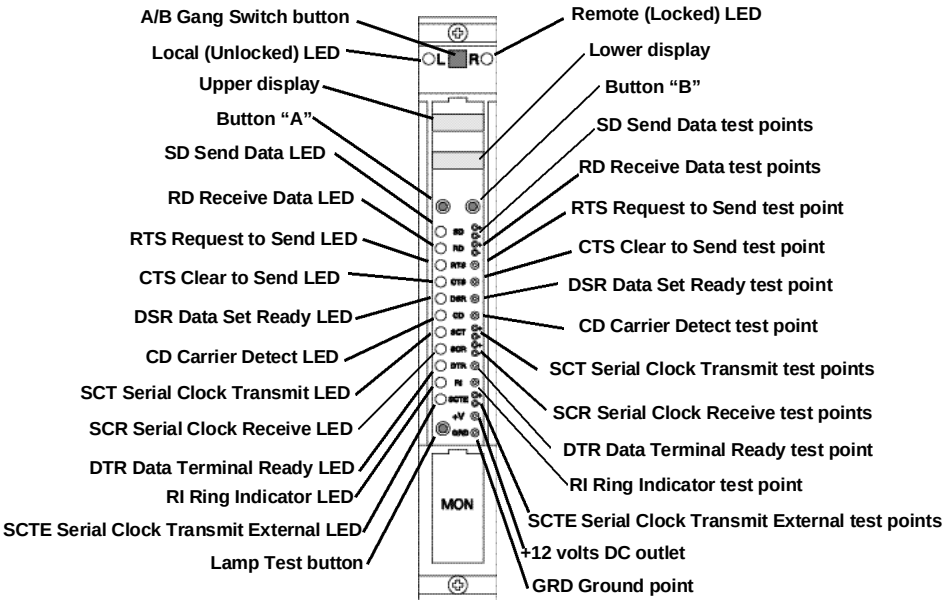

Figure 3-3. Control module front panel for V.35 interface.

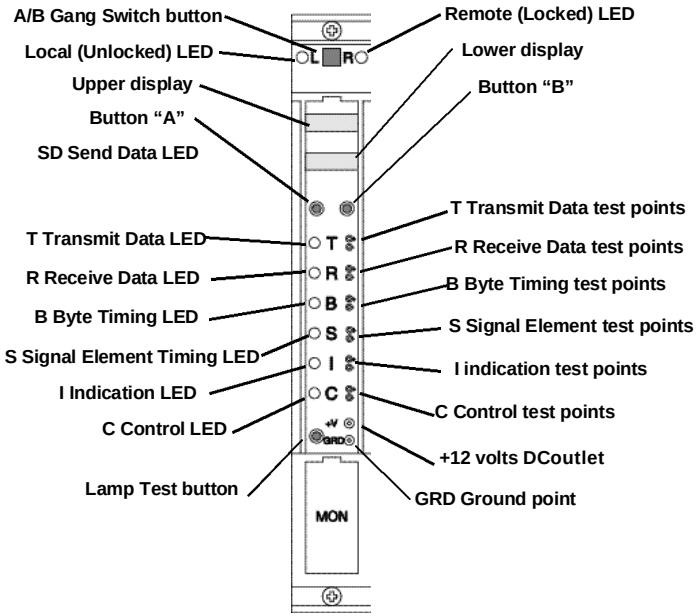

Figure 3-4. Control module front panel for X.21 interface (special order only, call Black Box Technical Support).

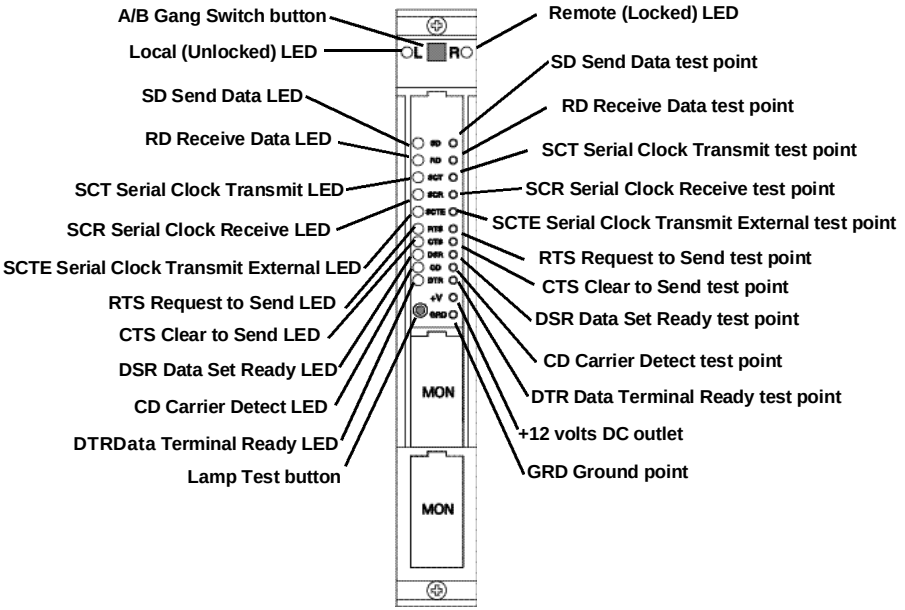

Figure 3-5. Test module front panel for RS-232 interface.

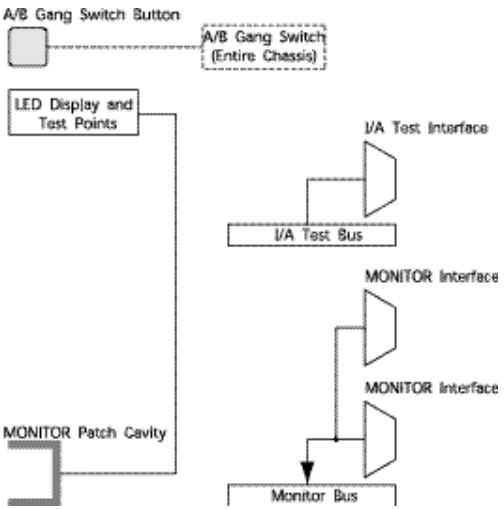

Figure 3-6. Control module schematic.

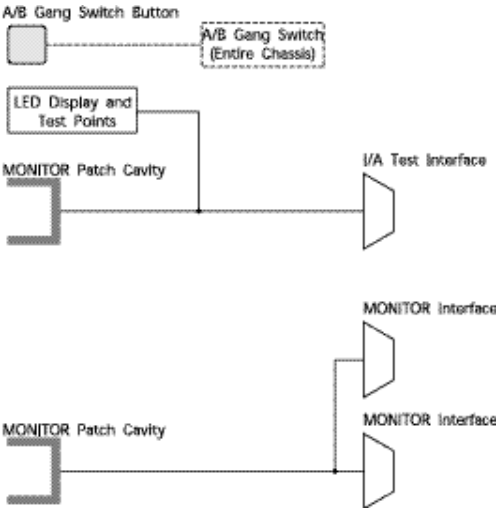

Figure 3-7. Test module schematic.

4. Circuit Modules

Circuit module topics include LEDs, using the A/B switch, connecting to the I/A test bus, and front-panel and schematic illustrations.

4.1 LEDs

A circuit module contains LEDs that indicate signal activity for any data line connected to the circuit module's modem pathway. The monitor patch cavity is always connected to the modem pathway.

4.2 Using the A/B Switch

Use the A/B switch button to switch a circuit module to the alternative A/B position. The switch button must be pressed and held for two seconds before switching takes place. This prevents inadvertent operation.

The A/B switch function can also be operated by a control console command or via a control module A/B gang switch.

4.3 Connecting to the I/A Test Bus

I/A Test bus connections are operated via control console commands.

4.4 Front-Panel and Schematic Illustrations

Table 4-1. Patch contact interactions.

Switch Position	Patch Cord Connection	I/A Test Connection	Opens Patch Contacts
A	EQP A patch cavity		Yes
		EQP A	Yes
	EQP B patch cavity		No
		EQP B	No
	Modem patch cavity		Yes
		MODEM	Yes
	Monitor patch cavity		No
B	EQP A patch cavity		No
		EQP A	No
	EQP B patch cavity		Yes
		EQP B	Yes
	Modem patch cavity		Yes
		MODEM	Yes
	Monitor patch cavity		No

Figures 4-1 through 4-3 use the following defaults:

- Switch in “A” position
- Without patch cavity connections
- Without interactive test bus connections
- Patch contacts closed

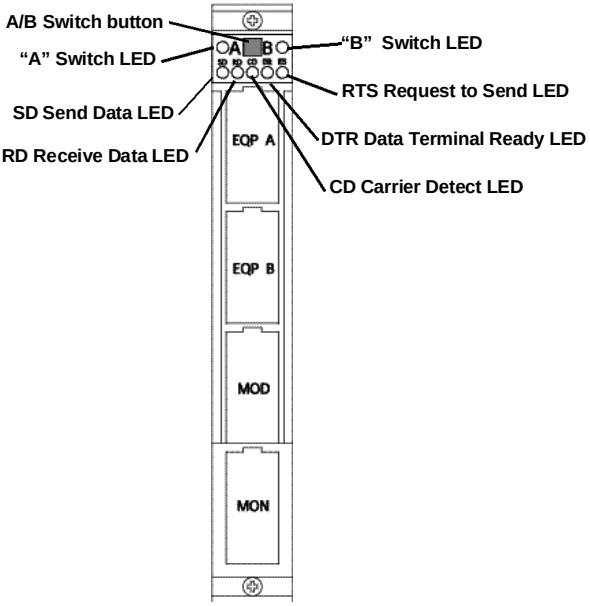

Figure 4-1. Circuit module front panel for RS-232, RS-530, and V.35 interfaces.

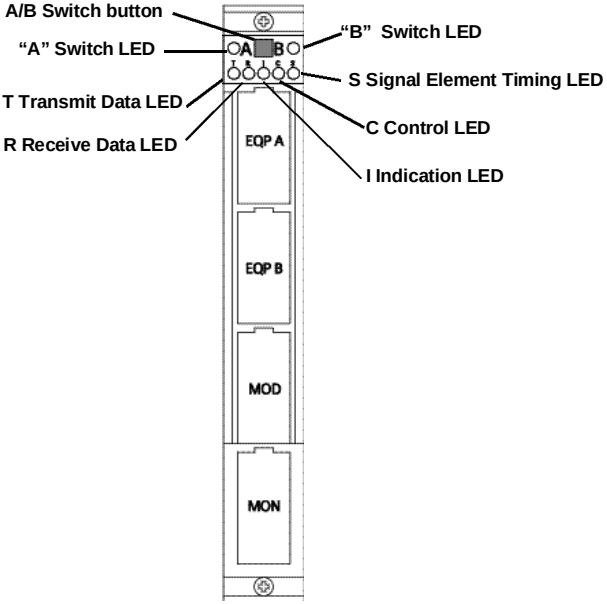

Figure 4-2. Circuit module front panel for X.21 interface.

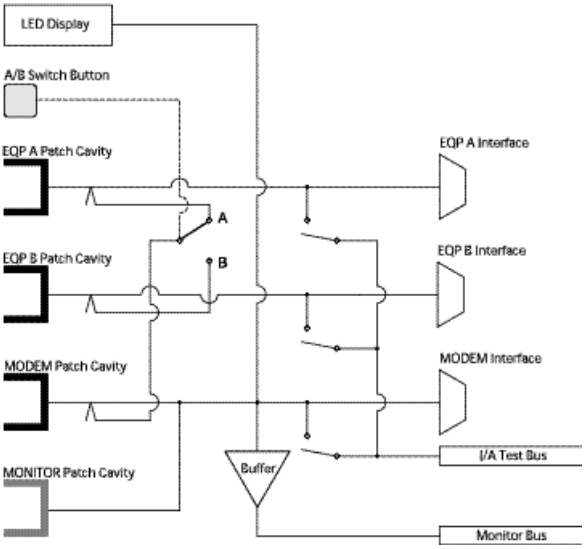

Figure 4-3. Circuit module schematic, switch in position "A," no patch cavity or I/A test bus connections.

5. Installation

5.1 Mounting the Chassis

Consider the following topics when mounting the chassis:

5.1.1 Site Environmental Recommendations

Relative Humidity

The operating environment's relative humidity should be between 10% and 80%, non-condensing.

Elevated Operating Ambient Temperature

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature of 32 to 104° Fahrenheit (0 to 40° Celsius).

Install the unit in an environment isolated from large motors and heating units.

Reduced Air Flow

Make sure when you install the Rack that the amount of air flow required for safe operation is not compromised.

Mechanical Loading

Be aware that uneven mechanical loading could pose a safety hazard.

5.1.2 Rack Mounting Specifications

The chassis mounts in a NEMA-standard 19-inch rack and occupies 7 inches (17.8 cm)/4 rack units (RU)of vertical space. The chassis can also accommodate a 23-inch (58.4-cm) extender for wider racks.

5.1.3 Chassis Mounting Procedure

To mount the chassis on a rack, attach the chassis to the rack with four screws,two through each mounting ear.

NOTE

All four screws must be used for the chassis to be secured properly to the rack.

5.2 Adding and Removing Modules

CAUTION

Always follow anti-static procedures when adding or removing a module. If you don't, the module may be damaged.

5.2.1 ADDING MODULES

1. Power down the chassis.
2. Insert the rear top and bottom module card edges into the chassis guide rails.
3. Push the module straight in along the chassis guide rails until the module encounters resistance. It is important that the module is pushed parallel with the guide rails; otherwise the module or guide rails may be damaged.
4. Push gently, yet firmly, on the module to seat it properly. When correctly seated, the module's front-panel casing should be in contact with the chassis.
5. Install the two mounting screws at the top and bottom of the module's front panel.
6. Restore power to the chassis.

5.2.2 REMOVING MODULES

1. Power down the chassis.
2. Remove the two mounting screws at the top and bottom of the module's front panel.
3. Pull the module straight out along the chassis guide rails. Pull the module parallel with the guide rails; otherwise the module or guide rails may be damaged.
4. Restore power to the chassis.

5.2.3 USING BLANK PANEL PATCH MODULES

All empty module slots on the chassis should be filled with blank panel modules. This will help to prevent damage from occurring to the installed modules and the chassis components.

CAUTION

Always follow anti-static procedures when adding or removing a module. If you don't, the module may be damaged.

5.3 Connecting DCE and DTE Devices

Data lines interface with the system at the rear chassis EQP and modem ports. Connect each set of data lines as follows:

- DCE side to the modem port
- Each DTE side to either an EQP A or EQP B port

Each port is named and numbered on the chassis. The port numbers correspond to the patch cavities of the same-numbered circuit (line) module.

See **Section 2.2** for the module-numbering convention.

See **Chapter 4** for a description of each circuit module's function.

5.4 Connecting External Test Equipment

5.4.1 NON-INTRUSIVE MONITOR CONNECTIONS

The rear right of the chassis includes the two monitor DB25 female ports. The monitor ports facilitate non-intrusive monitor data line connections to external test equipment. To create a test connection to a single chassis, connect the test equipment to one of the monitor ports. The other monitor port is not used.

See **Chapter 8** for descriptions of the monitor port pinouts and signal levels.

Connecting Test Equipment to Multiple Chassis

A single set of test equipment may be connected to two or more chassis in parallel by cabling from test equipment to chassis to chassis to chassis. By selecting breaks in this daisychain, several groups can be created. The daisychain cable should include pin 12, which the system uses as a "busy " signal between racks. Within a group of daisychained racks, only one line can be monitored at a time and the "busy " prevents inadvertent double monitoring.

5.4.2 Intrusive Interactive Connections

The rear right of the chassis includes a I/A test DB25 female test equipment port. The I/A test port facilitates intrusive interactive data line connections to external test equipment. To create a test interface to a single chassis, connect test equipment to the I/A test port.

See **Chapter 8** for descriptions of the I/A test port pinouts and signal levels.

Connecting Test Equipment to Multiple Chassis

A single set of test equipment may be connected to two or more chassis by using ribbon cabling to connect test equipment to chassis to chassis to chassis. By selecting breaks in this daisychain, several I/A test groups can be created.

5.5 Connecting to the Control Console

A control console can be any ASCII-capable terminal or PC.

5.5.1 Configuring the Control Console

Configure the control console as follows:

- No auto line feed after receipt of a carriage return.
- A bps rate of 1200, 2400, 4800, 9600, or 19,200 (to match the Ctrl-In bps rate of the master chassis).
- Seven data bits plus a "don't care" parity bit and one stop bit.

NOTE

Some terminal manufacturers might identify this configuration as 7-N-1 (seven data bits plus a "not used " parity bit), while other manufacturers might identify the same configuration as 8-N-1 (eight bits including a "not used " parity bit). Check the control console's documentation.

- Local echo on or off as required to be opposite the echo setting of the master chassis.
- The system will respond to X-ON/X-OFF (DC1/DC3) flow control. If possible, the terminal should be configured to generate those characters when appropriate. Note that the ISP expects a true X-ON; transmission will not resume upon receipt of "any character."

- The “BELL” character is sent to the ASCII terminal whenever important or invalid messages are displayed. This character commonly triggers an audible alarm on the terminal. To activate or deactivate the audible alarm, simply press <Cntl-G> on the terminal keyboard while in the main menu.

5.5.2 Configuring the Control Converter

Set the “SW1” switch on the control converter to the “2-2, 3-3” position for a straight-through control connection, or to the “2-3, 3-2” position for a modem control connection.

5.6 Connecting Slave Chassis

Through a daisychain hierarchy, a master chassis can support the console control of 1–99 first-level slave chassis and 1–99 second-level slave chassis for every first-level slave chassis.

All inter-chassis connections require cabling functionally identical to the RJ-45 male/RJ-45 male 4-wire cable. To connect the slave chassis, see Table 5-1.

Table 5-1. Slave chassis control converter port connections.

Connection	Connect Control Converter Ports		
	Master	First-Level Slave	Second-Level Slave
Master to first-level slave	Aux	In	
First-level slave to first-level slave		Out	In
First-level slave to second-level slave		Aux	In
Second-level slave to second-level slave		Out	In

NOTE

Modem connections are prohibited between master chassis and first - level slave chassis, first-level slave chassis and second-level slave chassis, and second-level slave chassis and second-level slave chassis.

Figure 5-2 (on the next page) shows an example of first and second level slave chassis connections.

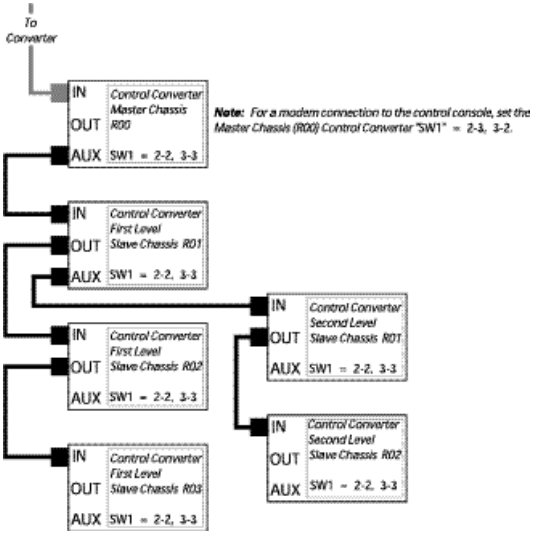

Figure 5-2. Example of connecting first- and second-level slave chassis.

SETTING THE BPS RATES

The bps rates of all connected control converter ports in a master / slave system must match.

To set the bps rate for the Aux port on a control converter, see **Section 6.16.6**.

For more information about setting the bps rate for the in and out ports on a control converter, see *Selecting the Control In/Out bps Rate (SPd)* in **Section 5.8.2**.

5.7 Connecting Power

5.7.1 RECOMMENDATIONS

Circuit Overloading

Consideration should be given when connecting the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Keep in mind equipment nameplate ratings when addressing this concern.

Reliable Earthing

Be sure to maintain reliable earthing of rackmounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (for example, use of power strips).

*Disconnect Devic*e

A suitably rated disconnect device should be used as part of the fixed wiring.

5.7.2 Power Requirements

AC Source: 110/220 volt

AC Fusing: Two fuses: 0.5 amp at 115 VAC; One fuse: 0.25 amp at 220 VAC; One fuse: 0.16 amp at 220 VAC

Frequency: 50/60 Hz ±3%

Energy Rate: 50 VA

Receptacle: 3-prong, grounding

5.7.3 Connecting to the AC Power Source

Connect the provided power cord to the 3-prong port at the rear top right of the chassis and an appropriate AC power source

NOTE

At power-up all power-supply LEDs should light. If any LEDs do not light, see Section 5.7.5.

5.7.4 Performing a Lamp Test

To check the function of the LEDs:

1. Confirm that all power-supply LEDs are lit. See **Section 5.7.5** if any LEDs do not light.
2. Push the "Lamp Test" button on the control/test module. All the module LEDs should light.
3. If any module LED does not light, check the power connections and the seating of the modules.

Perform a lamp test again. If any module LED still fails to light, see **Chapter 9**.

5.7.5 Checking Fuses

1. Disconnect the power connection.
2. Remove the power-supply module (see **Section 5.2**).
3. Check the F1 and F2 positions (Figure 5-3) on the power-supply module for incorrectly seated and/or burned-out fuses.

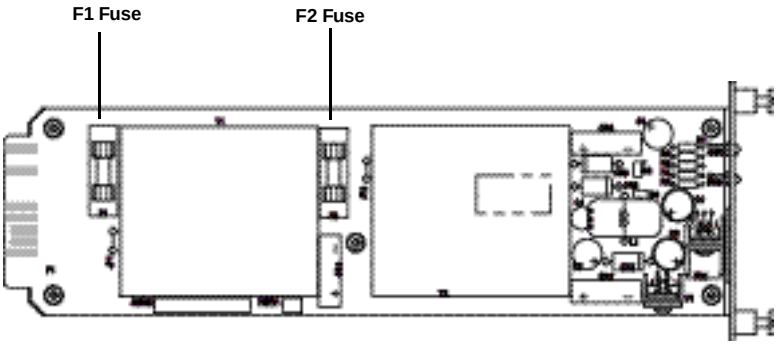

Figure 5-3. Fuse locations on the power-supply module.

4. Re-seat or replace the fuses.
5. Re-install the power module.
6. Restore the power connection.
7. If any power-supply LED still fails to light, see **Chapter 9**.

5.8 Configuring the Control Module

Make sure you've completed the following before configuring the control module: *Connecting to the Control Console* in **Section 5.5.3** and *Connecting Slave Chassis* in **Section 5.6**.

Upon power-up, use Table 5-2 to set the control module to enter configuration mode.

Table 5-2. Configuration mode settings.

Element	State	Description	Action
Local (unlocked) LED	On	Chassis in the local (unlocked) condition; A/B chassis, A/B gang	None
Remote (locked) LED	Off	Switch and individual module A/B switches functional	
Local (unlocked) LED	Off	Chassis is in the remote (locked) condition; Chassis A/B gang	To unlock, see **Section 5.8.1**
Remote (locked) LED	On	Switch and individual module A/B switches not functional	
Upper display	r 00	The master chassis address	None
	r01–99	A slave chassis address	None
Lower display	- loc	Blank	None Press "A" to toggle to blank

When the control module is ready to enter configuration mode, it should appear as illustrated in Figure 5-4.

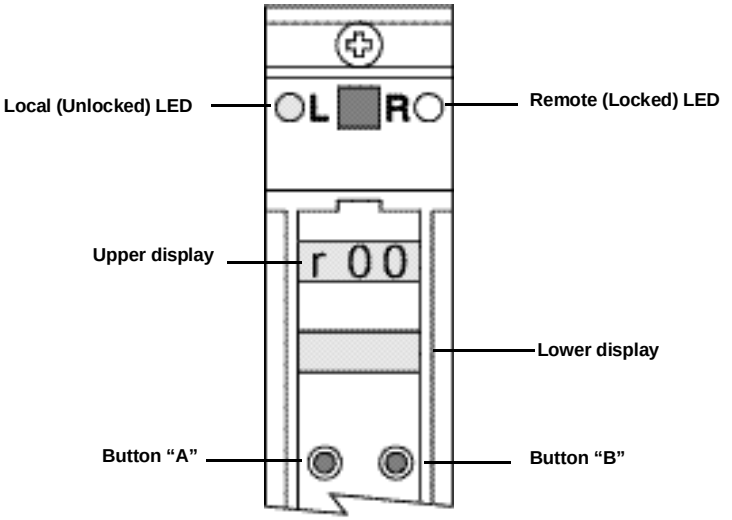

Figure 5-4. Control module ready for configuration mode.

5.8.1 Unlocking the Front Panel

If the remote LED is lit (Figure 5-5), the control module is in the front panel remote (locked) condition. The chassis A/B gang switch and the individual module A/B switches do not function.

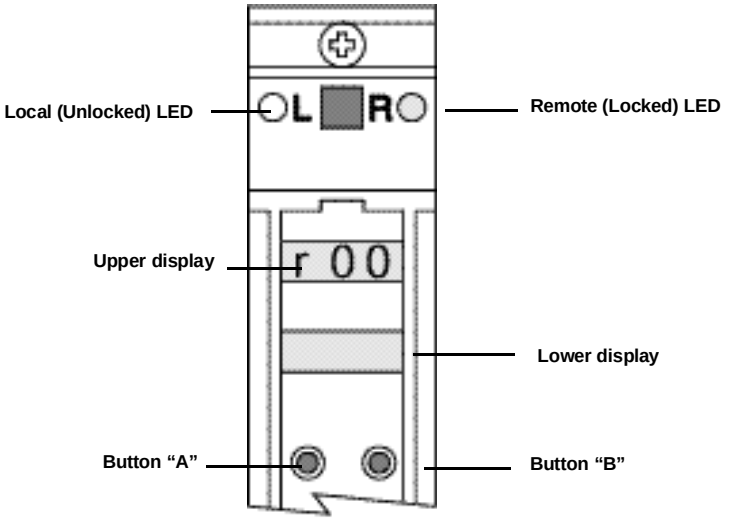

Figure 5-5. Control module in remote (locked) state.

If the control module was locked while connected to the control console, see **Section 6.9** to unlock the control module.

If the control module was locked while not connected to the control console, use the following procedure to unlock the control module:

1. Disconnect the power connection.
2. Remove the control/test module (See **Section 5.2.2**).
3. Remove the RAM chip from position U25 (Figure 5-6) on the control/test module.

CAUTION

Removal of the RAM chip erases all configurations and settings.

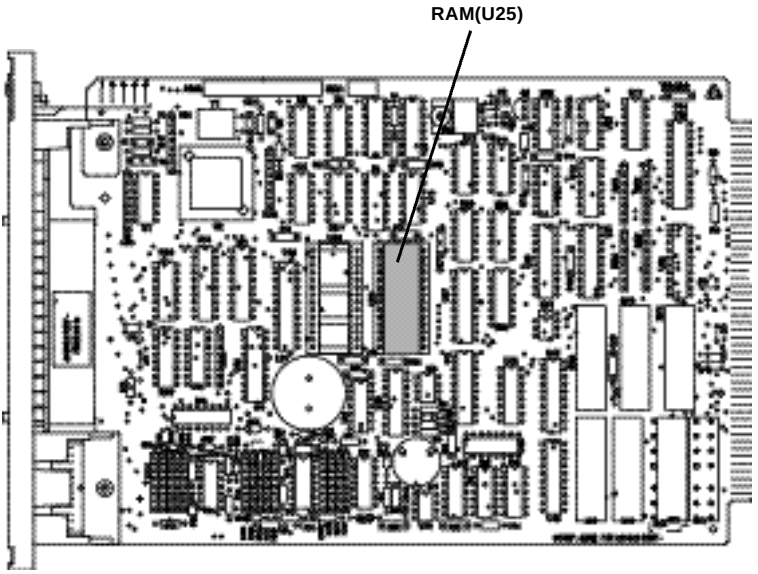

Figure 5-6. RAM chip position on the control/test module.

4. Re-seat the RAM chip in position U25 on the control/test module.
5. Re-install the control/test module.
6. Restore the power connection.
7. If the control/test module remains in the front panel remote (locked) condition, see **Chapter 9**.

5.8.2 Configuration Mode Functions

Selecting the Chassis Address (rAc)

To select a chassis address:

1. Press both the "A" and "B" buttons simultaneously to enter configuration mode. The upper display will read "rAc," as shown in Figure 5-7.
2. Press button "B" to change the chassis address incrementally on the lower display until the desired address is shown. The master chassis address must be "00." Slave addresses can be "01" to "99."
3. When the desired address appears, press button "A." Use the "A" button to cycle through the configuration menu options.

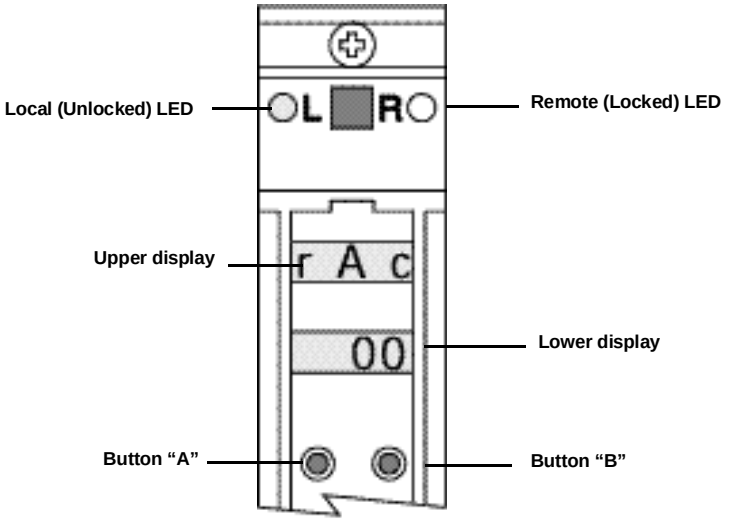

Figure 5-7. Control module in chassis address menu.

Selecting the Control In/Out bps Rate (SPd)

To select the Control In / Out bps rate:

1. Press both the "A" and "B" buttons simultaneously to enter configuration mode.

2. Press the "A" button to cycle though the menus in the upper display. Select the " SPd" menu as shown in Figure 5-8.

3. Press the "B" button to cycle through the rate options. The rate selected must match the control console's rate.

4. When the desired rate appears, press button "A." Use the "A" button to cycle through the configuration menu options.

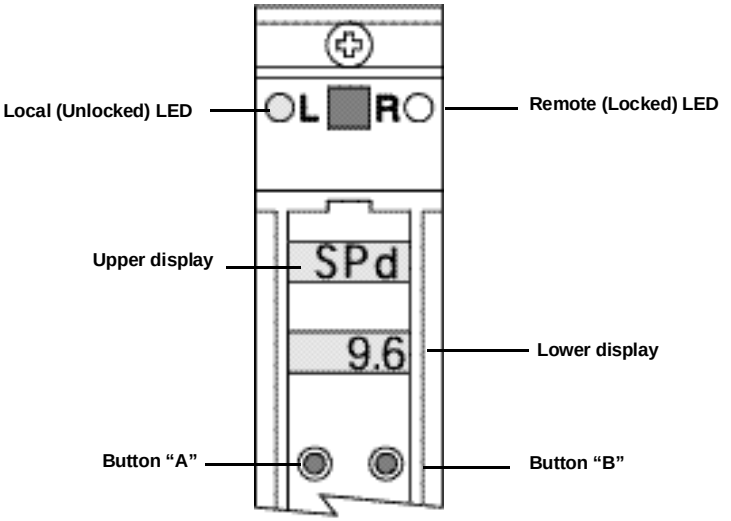

Figure 5-8. Control module in Control In/Out bps rate menu.

Setting the Terminal Echo Mode (Eco)

1. Press both the "A" and "B" buttons simultaneously to enter configuration mode.

2. Press the "A" button to cycle though the menus in the upper display. Select the "Eco" menu as shown in Figure 5-9.

3. Press the "B" button to toggle the terminal echo mode between On and Off.

4. When the desired state (On or Off) appears, press button "A." Use the "A" button to cycle through the configuration menu options.

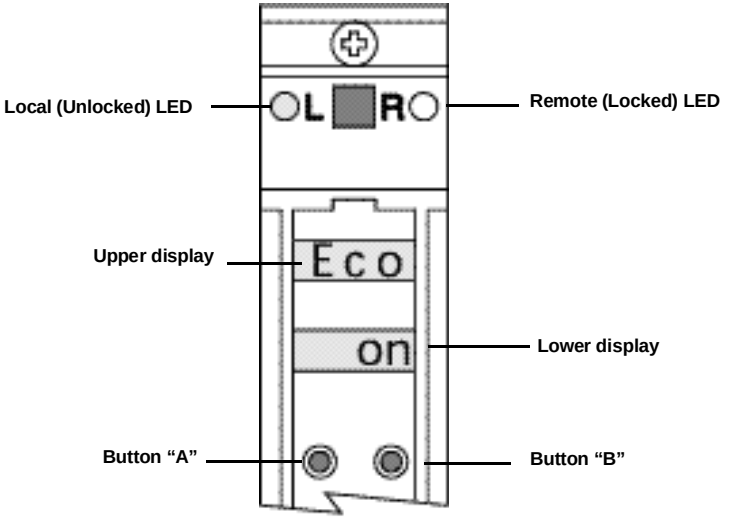

Figure 5-9. Control module in terminal echo mode menu.

5.9 Upgrading Firmware

Firmware can be updated with the replacement on the PROM chip on the control/test module. To replace the PROM chip:

1. Disconnect the power connection.
2. Remove the control/test module (see **Section 5.2**).
3. Remove the RAM chip (see **Section 5.8.1**).
4. Remove the current PROM chip from position U24 (Figure 5-10) on the control/test module.

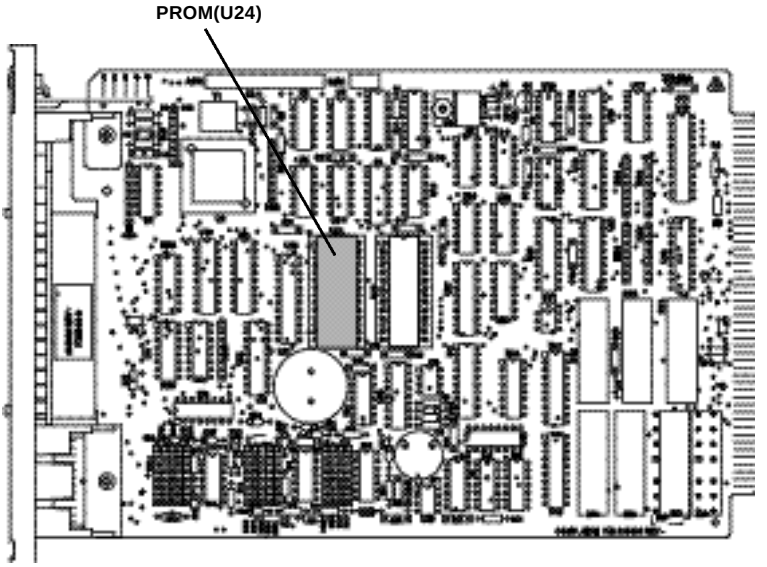

Figure 5-10. PROM chip position on the control/test module.

5. Seat the new PROM chip in position U24 on the control/test module.

6. Re-install the control/test module.

7. Restore the power connection.

6. Control Console Operations

6.1 Unsolicited Status Message Reporting

6.1.1 Alarm Reporting

The alarm system and its reporting capabilities can be a useful source of data on which to base statistics about the operation of the system as monitored and controlled by the system. All alarms except the power supply failure alarm are programmed by the user. If redundant power supplies are installed, a failure will trigger a power supply failure alarm.

6.1.2 Hardware Change Reporting

Manual switch changes are reported with the chassis address, the line number, the previous and current status of the switch, and the date and time stamp. The manual changes reported to the console include all switching, patching, and module removal/insertion.

6.2 Terminating Commands

Terminate all character string commands with a carriage return.

6.3 Defining Command Arguments

In addition to the root command syntax, some commands contain arguments. Arguments will always be contained in a set of brackets.

Table 6-1. Types of brackets.

Brackets	Description
[ ]	Optional argument, uses default setting if not defined in the command
< >	Required argument, must be defined in the command

6.3.1 PATH ARGUMENTS

Table 6-2 describes the arguments for paths. Paths define the chassis and/or line target for a command. The prompt line always shows the default path.

Table 6-2. Path arguments.

Argument	Setting	Description
chassis	I00	Master chassis
	I01–99	Slave chassis
line	L1–16	Line number corresponding to module number

NOTE

The master rack is not identified in a path when that path includes a first-level slave.

Refer to Figure 6-1 for the examples of paths:

- "I00" is the path to master chassis 00.
- "I01" is the path to first-level slave chassis 01.
- "I02L01" is the path to line #1 in first-level chassis 02.
- "I01I01" is the path to second-level slave chassis 01 in the first-level slave chassis 01 group.
- "I02I01L08" is the path to line #8 in second-level slave chassis 02 in the first-level slave chassis 01 slave group.

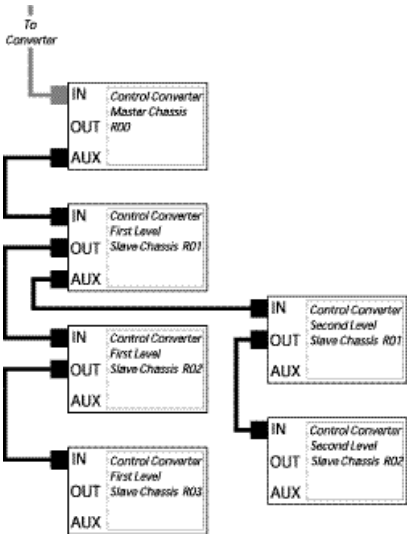

Figure 6-1. Example of the master/slave system.

6.3.2 Other Arguments

All other arguments and their settings are defined in the individual command descriptions.

6.4 Menu Commands

6.4.1 Display the Command Menu

Use this command to display the command menu.

Table 6-3. Display command menu keystroke.

Keystroke
Esc

Figure 6-2 shows the command menu.

```
SWITCH PATCH CONTROL SYSTEM Ver. 7.70 Copyright (c)

Command    Description
A -        Alarm/Switch Status Display, Enable, Disable
B -        A/B Switch Control
C -        Configuration of a node Display
D -        DLM (Data Line Monitor) Connect, Disconnect
F -        Front Panel Lock/Unlock
I -        Interactive Connect, Disconnect
L -        Lead State Display
P -        Path Set
Q -        Quiet Mode Set
R -        Read or Set Clock MM/DD/YY HH:MM:SS
S -        Set Alarm Parameters
T -        Transmit ASCII mode
X -        eXecute sequence
ESC -      Redisplay this menu

H -        HELP with commands

<I00>
```

Figure 6-2. Command menu.

6.4.2 Display Command Help

Use this command to display the embedded command help for a command letter group. When you type H with a letter it will give you help for each letter.

Table 6-4. Display command help command syntax.

Target	Syntax
N/A	h<groupletter>

6.5 Alarm and Switch Status (A) Commands

6.5.1 Display Alarm and Switch Status

Use this command to display the following information for an entire chassis or a specific line: alarm status, line status, and switch status.

Table 6-5. Display alarm and switch status command syntax.

Target	Syntax
Chassis	a[chassis]
Line	a<chassis>[line]

6.5.2 Alarm Bell On

Use this command to enable the alarm bell for an entire chassis or a specific line.

Table 6-6. Alarm bell on command syntax.

Target	Syntax
Chassis	abo[chassis]

6.5.3 Alarm Bell Off

Use this command to disable the alarm bell for an entire chassis or a specific line.

Table 6-7. Alarm bell off command syntax.

Target	Syntax
Chassis	abf[chassis]

6.5.4 Alarm On

Use this command to enable the alarm for an entire chassis or a specific line.

Table 6-8. Alarm on command syntax.

Target	Syntax
Chassis	ao[chassis]
Line	ao<chassis><line>

6.5.5 Alarm Off

Use this command to disable the alarm for an entire chassis or a specific line.

Table 6-9. Alarm off command syntax.

Target	Syntax
Chassis	af[chassis]
Line	af<chassis>[line]

6.6 A/B Switch (B) Commands

See Figures 6-3 and 6-4 for screen examples of the A/B switch displays.

```
 <100>b
 A/B Switch Sets
 Line #: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
 Set 01: X  X  X  X  X  X  X  X  X  X  X  X  X  X  X  X
 Set 02: N  N  N  N  N  A  A  A  A  A  N  N  N  N  N  N
 Set 03: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 04: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 05: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 06: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 07: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 08: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 09: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 10: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 11: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 12: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 13: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 14: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 15: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N
 Set 16: N  N  N  N  N  N  N  N  N  N  N  N  N  N  N  N

 Current positions: (Any position marked with * is Patched,
I is Interlocked.)
 Line #: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
         B  B  B  B  B  B  B  B  B  B  B  B  B  B  B  …

 <I00>
```

Figure 6-3. Screen example of an A/B switch sets and position display.

```
 <100> bAI00101
 Current positions: (Any position marked with * is Patched,
 I is Interlocked.)
 Line #: 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16
         A  B  B  B  B  B  B  B  B  B  B  B  B  B  B  …
 <I00>
```

Figure 6-4. Screen example of an A/B switch positions display.

6.6.1 Display A/B Switch Sets and Positions

Use this command to display the A/B switch sets and the A/B switch positions for a chassis.

Table 6-10. Display A/B switch sets and positions command syntax.

Target	Syntax
Chassis	b[chassis]

6.6.2 Switch to A

Use this command to switch an entire chassis or a specific line to the A position.

Table 6-11. Switch to A command syntax.

Target	Syntax
Chassis	b[chassis]
Line	ba<chassis><line>

6.6.3 Switch to B

Use this command to switch an entire chassis or a specific line to the B position.

Table 6-12. Switch to B command syntax.

Target	Syntax
Chassis	bb[chassis]
Line	bb<chassis><line>

6.6.4 Switch to Alternate A/B

Use this command to switch an entire chassis or a specific line to the alternate A/B position:

- Lines currently in the A position will switch to the B position
- Lines currently in the B position will switch to the A position

Table 6-13. Switch to A/B switch set command syntax.

Target	Syntax
Chassis	bx[chassis]
Line	bx<chassis><line>

6.6.5 Switch to A/B Switch Set

Use this command to switch an entire chassis or a specific line to a set-defined A/B position.

Table 6-14. Switch to A/B switch set command syntax.

Target	Syntax
Chassis	b<set>[chassis]
Line	b<set><chassis><line>

Table 6-15. Switch to A/B switch set command-specific arguments.

Argument	Setting	Description
set	1–16	The number of the set to apply

6.6.6 Define A/B Switch Set

Use this command to define an A/B switch set.

Table 6-16. Define A/B switch set command syntax.

Target	Syntax
Default chassis only	b<set><positions>

The "positions" argument is a 16-character string. The numerical order of the character in the string, counting from the left and excluding spaces, corresponds to the number of the line affected.

Table 6-17. Define A/B switch set command-specific arguments.

Argument	Setting	Description
set	1–16	The number of the target set
positions	a	Switch to A
	b	Switch to B
	n	No switch
	x	Alternate A/B switch

6.7 Configuration Summary (C) Commands

DISPLAY SLAVE MAP

Use this command to display a map of the current slaves under a specific chassis.

Table 6-18. Display slaves command syntax.

Target	Syntax
Chassis	c[chassis]

```
<100>c
The Slaves for Path I00 are:
      I01  I02 I03  …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …
      …    …   …    …   …   …   …   …   …   …


<I00>
```

Figure 6-5. Screen example of a slave map.

6.8 Data Line Monitor (D) Commands

6.8.1 DISPLAY DLM STATUS

Use this command to display the DLM status.

Table 6-19. Display DLM status command syntax.

Target	Syntax
Chassis	d[chassis]
Line	d<chassis><line>

```
<100> d
HIGH SPEED DLM CONNECTED ON LINE 01

<I00>
```

Figure 6-6. Screen example of display DLM status command.

6.8.2 DISCONNECT ALL DLMS

Use this command to disconnect all DLMs in both the master chassis and slave chassis.

Table 6-20. Disconnect all DLMs command syntax.

Target	Syntax
All Chassis	a

```
<100> da
<I00>
```

Figure 6-7. Screen example of disconnect all DLMs command.

6.8.3 CONNECT DLM

Use this command to connect a DLM at speeds of 256 kbps and below.

Table 6-21. Connect DLM command syntax.

Target	Syntax
Line	dc<chassis><line>

```
<100> dci00101
DLM CONNECTED ON LINE 01
<I00>
```

Figure 6-8. Screen example of a connect DLM command.

6.8.4 DISCONNECT DLM

Use this command to disconnect a DLM.

Table 6-22. Disconnect DLM command syntax.

Target	Syntax
Chassis	dd[chassis]

```
<100> dd
No DLM connected

<I00>
```

Figure 6-9. Screen example of disconnect DLM command.

6.8.5 CONNECT HIGH-SPEED DLM

Use this command to connect a DLM at speeds over 256 kbps.

Table 6-23. Connect high-speed DLM command syntax.

Target	Syntax
Chassis	dh<chassis><line>

```
<100> dhi00101
HIGH SPEED DLM CONNECTED ON LINE 01

<I00>
```

Figure 6-10. Screen example of connect high-speed DLM command.

6.9 Front Panel (F) Commands

6.9.1 Display Front Panel Lock Status

Use this command to display the front panel lock status.

Table 6-24. Display front panel lock status command syntax.

Target	Syntax
Chassis	f[chassis]

6.9.2 Lock Front Panel

Use this command to lock the front panel of a chassis. When locked, the control module's "R" (remote) LED is lit, and the module's A/B gang switch and "A" and "B" buttons are inoperable. The circuit modules' A/B switch buttons are also inoperable.

Table 6-25. Lock front panel command syntax.

Target	Syntax
Chassis	fl[chassis]

6.9.3 Unlock Front Panel

Use this command to unlock the front panel of a chassis.

Table 6-26. Unlock front panel command syntax.

Target	Syntax
Chassis	fu[chassis]

6.10 Interactive (I) Commands

6.10.1 Display Interactive Connect Status

Use this command to display the interactive connect status.

Table 6-27. Display interactive connect status command syntax.

Target	Syntax
Chassis	i[chassis]

6.10.2 Connect Interactive Test Bus to Monitor Ports

Use this command to connect the interactive test bus to the rear chassis monitor ports.

Table 6-28. Connect interactive test bus to monitor ports command syntax.

Target	Syntax
Chassis	ic[chassis]

```
<100> ict
INTERACTIVE CONNECTED ON LINE T

<I00>
```

Figure 6-11. Screen example of the connect interactive test bus to monitor ports.

6.10.3 Disconnect Interactive

Use this command to disconnect the interactive test bus from the rear chassis monitor ports for a single chassis.

Table 6-29. Disconnect interactive command syntax.

Target	Syntax
Chassis	id[chassis]

```
<100> id
No INTERACTIVE connected

<I00>
```

Figure 6-12. Screen example of disconnect interactive command.

6.10.4 DISCONNECT ALL INTERACTIVES

Use this command to disconnect the interactive test bus from the rear chassis monitor ports for the master chassis and all slave chassis.

Table 6-30. Disconnect all interactives command syntax.

Target	Syntax
Chassis	ia

```
 <100> ia
<I00>
```

Figure 6-13. Disconnect interactive test bus screen.

6.10.5 CONNECT BRIDGE

Use this command to attach a DLM (bridge tap) to a circuit.

Table 6-31. Connect bridge command syntax.

Target	Syntax
Chassis	ib<chassis><line>

```
 <100> ibi00101
 INTERACTIVE BRIDGE CONNECTED ON LINE 01M and T

<I00>
```

Figure 6-14. Screen example of connect bridge command.

6.10.6 CONNECT EQUIPMENT A

Use this command to connect the EQP A port line to the interactive test bus of the chassis. The command will also break any switched connection between the EQP A and the modem lines module.

Table 6-32. Connect equipment A command syntax.

Target	Syntax
Line	ica<chassis><line>

```
<100> ia
<100> icai00101
INTERACTIVE CONNECTED ON LINE 01A

<100>
<100>*SWITCH CHANGE ON LINE 01 from A to A* 03/22/01 09:39:56
<I00>
```

Figure 6-15. Screen example of connect equipment A command.

6.10.7 CONNECT EQUIPMENT B

Use this command to connect the EQP B port line to the interactive test bus of the chassis. The command will also break any switched connection between the EQP B and modem lines.

Table 6-33. Connect equipment B command syntax.

Target	Syntax
Chassis	icb<chassis><line>

```
<100> icbi00101
INTERACTIVE CONNECTED ON LINE 01B

<I00>
```

Figure 6-16. Screen example of connect equipment B command.

6.10.8 CONNECT MODEM (COMMON)

Use this command to connect the modem port line to the interactive test bus of the chassis. The command will also break any switched connection between the modem and EQP A or EQP B lines.

Table 6-34. Connect modem (common) command syntax.

Target	Syntax
Line	icm<chassis><line>

```
<100> icmi00101
INTERACTIVE CONNECTED ON LINE 01M

<I00>
<I00>*SWITCH CHANGE ON LINE 01 from A to A* 03/22/01 09:44:41
<I00>
```

Figure 6-17. Screen example of connect modem (common) command.

6.11 Lead Status Display (L) Commands

6.11.1 Lead Status Display On

Use this command to enable the lead status display. The following leads are monitored:

Table 6-35. Monitored leads.

Signal	State
SD	Data or Idle
RD	Data or Idle
SCT	CLK, Idle, or None
SCR	CLK, Idle, or None
DTR	ON/OFF (+/-)
DCD	ON/OFF (+/-)
DSR	ON/OFF (+/-)
RTS	ON/OFF (+/-)

Table 6-36. Lead status display on command syntax.

Target	Syntax
Line	io<chassis><line>

```
<L00> Loi00101
Lead Display on, ESC will activate

<I00> Lead States Enabled>
```

Figure 6-18. Screen example of lead status display on command.

```
LEAD STATES:      SD     RD   SCT   SCR  DTR  DCD  DSR   RTS
                  Idle   Idle None  None Off  Off  Off   Off
for I00 L01             3/22/01 10:04:58

<I00> Lead States Enabled>
```

Figure 6-19. Screen example of lead status display.

6.11.2 Lead Status Display Off

Use this command to disable the lead status display.

Table 6-37. Lead status display off command syntax.

Target	Syntax
Line	lf<chassis><line>

```
<100> Lead States Enabled> lf
Lead Display Off

<I00> (Command Line Prompt)
```

Figure 6-20. Screen example of lead status display off command.

6.12 Path Set (P) Commands

SET DEFAULT PATH

Use this command to set the default chassis path or default chassis and line path. The default path is used when the path is not specified in a command.

Table 6-38. Set default path command syntax.

Target	Syntax
Chassis	pi<chassis>
Line	pi<chassis><line>

```
 <100> pi01101
<I01 L01>
```

Figure 6-21. Screen example of set default path command.

6.13 Quiet Mode (Q) Commands

6.13.1 QUIET MODE OFF

Use this command to disable Quiet Mode.

Table 6-39. Quiet mode off command syntax.

Target	Syntax
Master Chassis Only	qf

```
 <100> QUIET Mode ON without retention > qf
<I00>
```

Figure 6-22. Screen example of quiet mode off command.

6.13.2 Quiet Mode On with Retention

Use this command to activate quiet mode with retention. In this mode:

- The master chassis does not transmit messages to the control console.
- Messages are stored in the buffer up to a capacity of approximately 60 messages.
- When the buffer is full, the oldest messages are deleted first to make room for new messages.
- Stored messages are transmitted to the console when quiet mode is disabled.

Table 6-40. Quiet mode on with retention command syntax.

Target	Syntax
Master Chassis Only	qr

```
<100> qr
<I00> QUIET Mode ON with retention >
```

Figure 6-23. Screen example of quiet mode on with retention command.

6.13.3 Quiet Mode On without Retention

Use this command to activate quiet mode without retention. In this mode, the master chassis does not transmit messages to the control console, and all messages are deleted.

Table 6-41. Quiet mode on without retention command syntax.

Target	Syntax
Master Chassis Only	qw

```
<100> qw
<I00> QUIET Mode ON without retention >
```

Figure 6-24. Screen example of quiet mode on without retention command.

6.14 Clock (R) Commands

6.14.1 Read Clock

Use this command to read the system clock.

Table 6-42. Read clock command syntax.

Target	Syntax
All Chassis	r

6.14.2 Set Clock

Use this command to set the system clock.

Table 6-43. Set clock command syntax.

Target	Syntax
All Chassis	r <MM/DD/YY><HH:MM:SS>

6.15 Alarm Edit Mode (S) Commands

Enter Alarm Edit Mode

Use the this command to enter the alarm edit mode. See **Chapter 7** for a detailed description of the alarm edit mode.

Table 6-44. Enter alarm edit mode command syntax.

Target	Syntax
Chassis	s[chassis]
Line	s<chassis><line>

6.16 Transmit ASCII (T) Commands

6.16.1 Display ASCII Mode and Speed

Use this command to display the ASCII mode and speed.

Table 6-45. Display ASCII mode and speed command syntax.

Target	Syntax
Default Chassis Only	t

```
<100> t
ASCII MODE IS NORMAL running at 9600.
<I00>
```

Figure 6-25. Screen example of display ASCII mode and speed command.

6.16.2 Enable ASCII Always Mode

Use this command to enable ASCII Always Mode. In ASCII Always Mode, system polls are not sent to any lower-level (downstream) chassis via the Aux control port, and the default chassis and all higher-level (upstream) chassis continue system polling via the Aux control port.

Table 6-46. Enable ASCII always mode command syntax.

Target	Syntax
Default Chassis Only	ta

```
<100> ta
ASCII MODE IS ALWAYS running at 9600.
<I00>
```

Figure 6-26. Screen example of enable ASCII always mode command.

6.16.3 Enable ASCII Normal Mode

Use this command to enable ASCII normal mode. This is the systems default mode. In ASCII normal mode, system polls are sent out via the Aux control port.

Table 6-47. Enable ASCII normal mode command syntax.

Target	Syntax
Default Chassis Only	tn

```
<100> tn
ASCII MODE IS NORMAL running at 9600.
<I00>
```

Figure 6-27. Screen example of enable ASCII normal mode command.

6.16.4 Transmit ASCII On

Use this command to enable transmit ASCII. When transmit ASCII is on:

- All system polling stops from the Aux control ports of the default chassis and all higher-level (upstream) chassis.
- The default chassis and all higher-level chassis ignore all commands except TOFF.
- Lower-level (downstream) chassis continue system polling via the Aux control port.

Table 6-48. Transmit ASCII on command syntax.

Target	Syntax
Default Chassis Only	ton

6.16.5 TRANSMIT ASCII OFF

Use this command (which is case-sensitive—it *must* be uppercase) to disable Transmit ASCII.

Table 6-49. Transmit ASCII off command syntax.

Target	Syntax
Default Chassis Only	TOFF

6.16.6 SET AUX SPEED

Use this command to set the bit speed for the Aux port on the control converter adapter.

Table 6-50. Set Aux speed command syntax.

Target	Syntax
Default Chassis Only	t<speed>

Table 6-51. Set Aux speed command-specific arguments.

Speed	Setting	Description
speed	1	1200 bps
	2	2400 bps
	3	4800 bps
	4	9600 bps
	5	19,200 bps

6.17 Execute Command Sequence (X) Commands

6.17.1 Display Sequences

Use this command to display the sequence macros.

Table 6-52. Display sequences command syntax.

Target	Syntax
Master Chassis Only	x

```
<100> x
X00=

X01=
BA;DCI00L01:ICAI00L01
X02=

X03=

X04=

X05=

X06=

X07=

X08=

X09=


<I00>
```

Figure 6-28. Screen example of display sequences command.

6.17.2 Execute Sequence

Use this command to execute a sequence macro.

Table 6-53. Execute sequence command syntax.

Target	Syntax
Master Chassis Only	x<macro>

Table 6-54. Execute sequence command-specific arguments.

Argument	Setting	Description
macro	0–9	The number of the sequence macro

6.17.3 Clear Sequence

Use this command to clear a sequence macro.

Table 6-55. Clear sequence command syntax.

Target	Syntax
Master Chassis Only	x<macro>c

Table 6-56. Clear sequence command-specific arguments.

Argument	Setting	Description
macro	0–9	The number of the sequence macro

6.17.4 Define Sequence

Use this command to clear an existing sequence macro and to define a new sequence macro.

Table 6-57. Define sequence command syntax.

Target	Syntax
Master Chassis Only	x<macro><command(1)>[;command(2)…;command(n)]

There is no limit to the number of commands that can be in the sequence, but the total quantity of characters in the sequence, including semicolons, cannot exceed 78 characters.

Table 6-58. Define sequence command-specific arguments.

Argument	Setting	Description
macro	0–9	The number of the sequence macro
command	Any valid command	A command to be executed

NOTE

A macro must not call itself.

```
 <100> xldba;dci00101;icai00101
<I00>
```

Figure 6-29. Screen example of define sequence command.

7. Alarms

7.1 Alarm Overview

A Pro Switching System allows up to eight alarms per individual line and 64 total alarms per chassis.

A defined alarm can allow a system to report an alarm condition to the control console and perform automatic switching in response to an alarm condition.

For an alarm to be active on a system, the following conditions must be met:

- The alarm must be defined.
- The defined alarm must be enabled.
- The alarm's line must be enabled for alarms.
- The line's chassis must be enabled for alarms.

To activate an alarm, reference Table 7-1.

Table 7-1. Activating an alarm.

To:	See:
Define an alarm	**Sections 7.2** and **7.3**
Enable a defined alarm	**Section 7.3**
Enable a line for alarms	**Section 6.5**
Enable a chassis for alarms	**Section 6.5**

ALARM STATUS DISPLAYS

All alarm information is presented in one or both of the alarm displays. Figure 7-1 shows an example of a line summary status display. Table 7-2 describes the line summary status display screen elements.

```
 <I00>a
ALARM SETUP for RACK at I00  RACK BELL on  RACK ALARMS are ENABLED
 LINE  LINE    ALARMS  ALARM   ALARM   LINE    SWITCH
 ##    ID      PRGMD   ENA/DIS LEAD    STATUS  STATUS
 01    POP 15  03      ENA     SD      ALARM   A
 02    POP 20  01      ENA     ---     OK      A
 03            00      DIS     ---     OK      A
 04            00      DIS     ---     OK      A
 05            00      DIS     ---     OK      A
 06            00      DIS     ---     OK      A
 07            00      DIS     ---     OK      A
 08            00      DIS     ---     OK      B*I
 09            00      DIS     ---     OK      B*I
 10            00      DIS     ---     OK      A
 11            00      DIS     ---     OK      A
 12            00      DIS     ---     OK      A
 13            00      DIS     ---     OK      A
 14            00      DIS     ---     OK      A
 15            00      DIS     ---     OK      B
 16            00      DIS     ---     OK      B
 NOTE: A Switch position marked with * is Patched,
 I is Interlocked.

 <I00>
```

Figure 7-1. Screen example of a line summary status display.

Table 7-2. Line summary status display screen elements.

Element	Setting	Description
Alarm setup for rack	Chassis #	The identification number of the current chassis
Rack bell	On Off	Chassis alarm bell on Chassis alarm bell off
Rack alarms	Enabled Disabled	Chassis alarms enabled Chassis alarms disabled
Line identification	0–28 characters	A user-defined character string used to identify the line

Table 7-2 (continued). Line summary status display screen elements.

Element	Setting	Description
Alarms Prgrmd	0–8	The number of defined alarms per line
Alarm Ena./Dis	Enabled Disabled	Line alarms enabled Line alarms disabled
Alarm lead	SD, RD, SCT, SCR, DTR, DCD, DSR, or RTS	Alarm condition on indicated lead
Line status	OK Alarm	No alarm condition present Alarm condition present
Switch status	A	Switch in position A
	A*	Switch in position A, circuit patched
	A I	Switch in position A, circuit interlocked
	A* I	Switch in position A, circuit patched and interlocked
	B	Switch in position B
	B*	Switch in position B, circuit patched

Figure 7-2 shows an example of a alarm summary status display. Table 7-3 describes the line alarm summary status display screen elements.

```
ID: POP 14
ALARM LEAD   LEVEL   TIME      TIME      ALARM    STATUS  AUTO
#            +/-     TO ALARM  TO ALARM  ENA/DIS          SWITCH
01    SD     Idle    00:00:01  00:00:01  ENABLED  ALARM   NO
02    RD     Idle    00:00:01  00:00:01  ENABLED  OK      NO
03    SD     Data    00:00:01  00:00:01  DISABLED OK      NO

<I00>
```

Figure 7-2. Screen example of a line alarm summary status display.

Table 7-3. Line alarm summary status display screen elements.

Element	Setting	Description
ID:	0–28 characters	A user-defined character string used to identify the line
ALARMING for LINE is	Enabled Disabled	Line alarms enabled Line alarms disabled
LEAD	SD, RD, SCT SCR, DTR, DCD, DSR, or RTS	Alarm defined on indicated lead
LEVEL +/-	Data	Alarm set to trigger on positive or data/clock activity
	Idle	Alarm set to trigger on negative or no data/clock activity
TIME TO ALARM	hours:minutes: seconds	Length of time an alarm condition must be present on the selected alarm before the a) alarm is reported to the system and b) alarm functions, if any, are performed

Table 7-3 (continued). Line alarm summary status display screen elements.

Element	Setting	Description
TIME TO CLEAR	hours:minutes: seconds	Length of time an alarm condition must be absent from the selected alarm before the alarm is reported as "cleared" to the system
ALARM ENA/ DIS	Enabled Disabled	Alarm enabled Alarm disabled
STATUS	OK Alarm	No alarm condition present Alarm condition present
AUTO SWITCH	No	Auto Switch disabled for the line
	Line	Line switches to the alternate position
	Set	Lines in the same chassis switch to alternative positions defined in the selected set
	Rack	All lines in the same chassis switch to the alternate positions
	Racks	All lines in the same chassis and chassis in the same inter-rack group switch to the alternate positions

7.2 Set Alarm Parameters—Line Summary Mode

General Line Summary Mode commands include:

Action	Command Syntax
Quit Set Alarm parameters—Line Summary mode	q
Display Set Alarm parameters—Line Summary mode menu	"Esc" keystroke

7.2.1 Add New Alarm

Use this command to add an alarm to a line. You can add up to eight alarms per line and 64 alarms per chassis.

Table 7-4. Add new alarm command syntax.

Target	Syntax
Line	n

7.2.2 Edit Alarm

Use this command to edit an alarm.

Table 7-5. Edit alarm command syntax.

Target	Syntax
Alarm	e<alarm>

Table 7-6. Edit alarm command-specific arguments.

Argument	Setting	Description
alarm	1–8	The number of an alarm

7.2.3 Delete Alarm

Use this command to delete an alarm.Table 7-7 describes the delete alarm command syntax.

Table 7-7. Delete alarm command syntax.

Target	Syntax
Alarm	d<alarm>

Table 7-8. Delete alarm command-specific arguments.

Argument	Setting	Description
alarm	1–8	The number of an alarm

7.2.4 CLEAR ID

Use this command to clear a line ID.

Table 7-9. Clear ID command syntax.

Target	Syntax
Line	i

7.2.5 SET ID

Use this command to set a line ID.

Table 7-10. Set ID command syntax.

Target	Syntax
Line	i<id>

Table 7-11. Set ID command-specific arguments.

Argument	Setting	Description
alarm	1–28 characters	A text string used to identify the line

7.2.6 SELECT LINE FOR ALARM EDITING

Use this command to select a a line for alarm editing.

Table 7-12. Select line for alarm editing command syntax.

Target	Syntax
Line	l<line:

Table 7-13. Select line for alarm editing command-specific arguments.

Argument	Setting	Description
line	1–16	Line number corresponding to module number

7.3 Set Alarm Parameters—Alarm Summary Mode

General Alarm Summary Mode commands include:

Action	Command Syntax
Quit Set Alarm parameters—Alarm Summary mode and return to alarm parameters—Line Summary mode	q
Display Set Alarm parameters—Alarm Summary mode menu	"Esc" keystroke

7.3.1 Change Auto Switch

Use this command to cycle through the following auto switch settings:

Table 7-14. Auto switch settings.

Action	Command
NO	No action. Auto switch disabled for the line.
LINE	Line switches to the alternate position.
SET	Lines in the same chassis switch to alternative positions defined in the selected set.
RACK	All lines in the same chassis switch to the alternate positions.
RACKS	All lines in the same chassis and chassis in the same inter-rack group switch to the alternate positions.

Table 7-15. Change auto switch command syntax.

Target	Syntax
Line	a

7.3.2 Disable Alarm

Use this command to disable the selected alarm.

Table 7-16. Disable alarm command syntax.

Target	Syntax
Line	d

7.3.3 Enable Alarm

Use this command to enable the selected alarm.

Table 7-17. Enable alarm syntax.

Target	Syntax
Line	e

7.3.4 Select Auto Switch Set

Use this command to select the default A/B switch set for the auto switch function on the selected alarm

Table 7-18. Select auto switch set command syntax.

Target	Syntax
Line	s<set>

Table 7-19. Select auto switch set command-specific arguments.

Argument	Setting	Description
set	1–16	The number of an A/B switch set

7.3.5 Set Time to Alarm

Use this command to set the length of time an alarm condition must be present on the selected alarm before the alarm is reported to the system and the alarm defined functions, if any, are performed.

Table 7-20. Set time to alarm command syntax.

Target	Syntax
Line	ta<hh:mm:ss>

Table 7-21. Set time to alarm command-specific arguments.

Argument	Setting	Description
hh:mm:ss	hh(hours) = 0–11 mm(minutes) = 0–59 ss(seconds) = 0–59	Length of timer

7.3.6 Set Time to Clear

Use this command to set the length of time an alarm condition must be absent from the selected alarm before the alarm is reported as "cleared" to the system.

Table 7-22. Set time to clear command syntax.

Target	Syntax
Line	tc<hh:mm:ss>

Table 7-23. Set time to clear command-specific arguments.

Argument	Setting	Description
hh:mm:ss	hh(hours) = 0–11 mm(minutes) = 0–59 ss(seconds) = 0–59	Length of timer

7.3.7 Set Alarm for Positive or Data/Clock Activity

Use this command to select a lead to alarm and to set the lead to trigger an alarm on the selected alarm under the following conditions: the control lead is On (high voltage) and data or clock activity is present.

Table 7-24. Set alarm for positive or data/clock activity command syntax.

Target	Syntax
Line	+<lead>

Table 7-25. Set alarm for positive or data/clock activity command-specific arguments.

Argument	Setting	Description
lead	SD	Signal Detect
	RD	Receive Data
	SCT	Signal Element Timing
	SCR	Serial Clock Receive
	DTR	Data Terminal Ready
	DCD	Receive Line Signal Detector
	DSR	Data Set Ready
	RTS	Request to Send

7.3.8 Set Alarm for Negative or No Data/Clock Activity

Use this command to select a lead to alarm and to set the lead to trigger an alarm under the following conditions: the control lead is Off (low voltage) and the data or clock lead activity is absent.

Table 7-26. Set alarm for negative or no data/clock activity command syntax.

Target	Syntax
Line	-<lead>

Table 7-27. Set alarm for negative or data/clock activity command-specific arguments.

Argument	Setting	Description
lead	SD	Send Data
	RD	Receive Data
	SCT	Signal Element Timing
	SCR	Serial Clock Receive
	DTR	Data Terminal Ready
	DCD	Receive Line Signal Detector
	DSR	Data Set Ready
	RTS	Request to Send

7.4 Alarms and the Interlock Feature

The "Interlock" feature functions regardless of whether alarming is being used or not. However, its primary value exists when used in conjunction with autoswitch alarming.

Interlock is enabled individually for each module. When enabled, pin #18 (others optional) of the EQP B port becomes a two-way signal. While the module's switch is in the "A" position, it monitors the EQP B pin #18. If the signal is high, the switching function is inhibited. If the signal is low and the module switches to "B" (either via button, command, or autoswitch), the module places a high signal on the EQP B pin #18.

The normal use for the interlock feature involves a single spare device backing up many primary devices. A "multiple-Y" cable would connect the single backup device to the EQP B side of as many switches as there are primary devices. Pin #18 must be present in all cable sections to the EQP B connectors, but it must be absent from the cable section to the backup device. Also, it must be absent from all "A" side cables and all "modem" (common) cables.

Interlock is enabled on each circuit module via a jumper wire. Circuit modules are normally shipped without the jumper wire (interlock disabled). To determine if a particular module has the jumper wire installed, remove the module and examine the solder side. Near the center of the board, there is a solder point labeled "INTERLOCK." A jumper wire from that point to the B18 solder point (near the edge of the connector) indicates that Interlock has been enabled for Pin #18.

7.5 Alarms and Inter-Rack Groups

An inter-rack group (or more properly, an inter-chassis group) was created when the master/slave system was connected during installation. An inter-rack group is defined as all chassis within an unbroken chain of Inter-Rack signaling.

The "Inter-Rack Signal " is a two-way signal. Each chassis monitors that lead and, when a signal is detected, the rack will toggle all its A/B switches. In addition, when an autoswitch "racks" command has been triggered within a chassis, that chassis places a signal on the inter-rack lead to cause switching within other chassis that are monitoring the lead.

All local inter-chassis cabling can include or exclude the inter-rack lead as required. However, it *must* be excluded from the connection to the management console and any modem(s) to prevent erratic switching (an inter-chassis group can not include modem connections). When switching has automatically occurred as the result of an alarm, the "time to clear" becomes functionally a "time to ignore" (although the console nomenclature does not change). This "ignore" function takes effect immediately upon initial alarm detection and switching. The alarm for the line in question is artificially cleared (regardless of its actual status) and, for the "time to clear" duration, all activity on that line is ignored. If any alarm conditions are present when the timer times out, they are treated as if they had just occurred (and the "time to alarm" begins its function).

8. Data Communication Interfaces

8.1 Data Line Interfaces and Patch Cavities

Table 8-1. Pinouts for data line interfaces and patch cavities.

Patch Cavity Pin	RS-232 Signal	RS-530 DB25 Pin	V.35 Signal	V.35 DB25 Pin	V.35 Signal	X.21 DB25 Pin	X.21 M/34 Pin	X.21 Signal	X.21 DB15
	FG	1	FG	1	FG	1	A	FG	1
2	SD	2	SD(A)	2	SD(A)	2	P	T(A)	2
3	RD	3	RD(A)	3	RD(A)	3	R	R(A)	4
4	RTS	4	RTS(A)	4	RTS	4	C	B(A)	7
5	CTS	5	CTS(A)	5	CTS	5	D	B(B)	14
6	DSR	6	DSR(A)	6	DSR	6	E		
7	SG	7	SG	7	SG	7	B	SG	8
8	DCD	8	DCD(A)	8	DCD	8	F		
9		9	SCR(B)	9					
10		10	DCD(B)	10					
11		11	SCTE(B)	11	LT	11	K		
12	DCD(S)	12	SCT(B)	12	SCR(B)	12	X	S(B)	13
13	CTS(C)	13	CTS(B)	13	SD(B)	13	S	T(B)	9
14	SD(S)	14	SD(B)	14	SCT(B)	14	AA	C(B)	10
15	SCT	15	SCT(A)	15	SCT(A)	15	Y	C(A)	3
16	RD(S)	16	RD(B)	16	RD(B)	16	T	R(B)	11
17	SCR	17	SCR(A)	17	SCR(A)	17	V	S(A)	6
18	LL	18	LL	18		18	M		
19	RTS(S)	19	RTS(B)	19					
20	DTR	20	DTR(A)	20	DTR	20	H		
21	SQ	21	RL	21					
22	RI	22	DSR(B)	22	RI	22	J		
23	DRS	23	DTR(B)	23	SCTE(B)	23	W	I(B)	12
24	SCTE	24	SCTE(A)	24	SCTE(A)	24	U	I(A)	5
25	BUSY	25	TM	25					

8.1.1 RS-232 PINOUTS

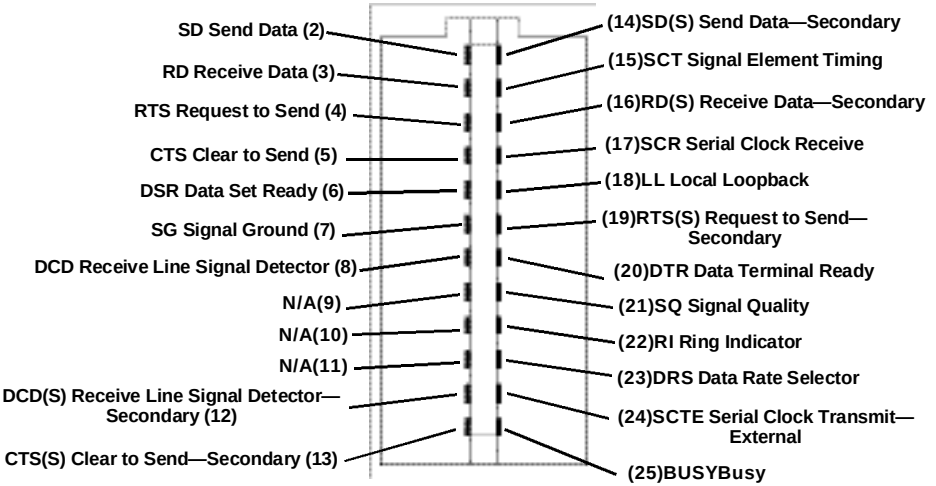

Figure 8-1. RS-232 patch cavity male pinout.

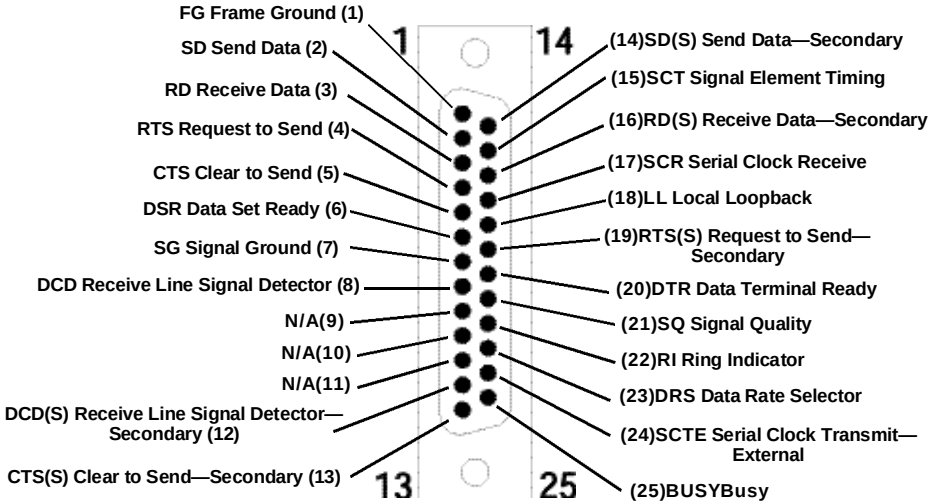

Figure 8-2. RS-232 DB25 female pinout.

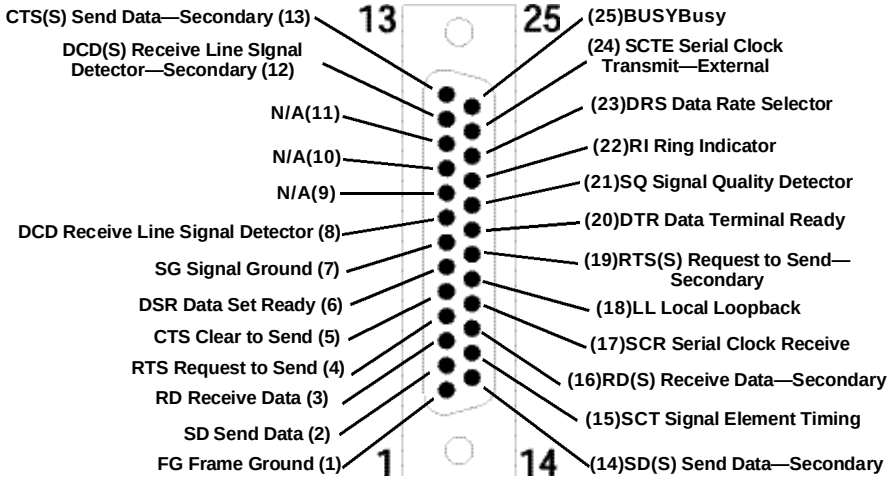

Figure 8-3. RS-232 DB25 male pinout.

8.1.2 RS-530 PINOUTS

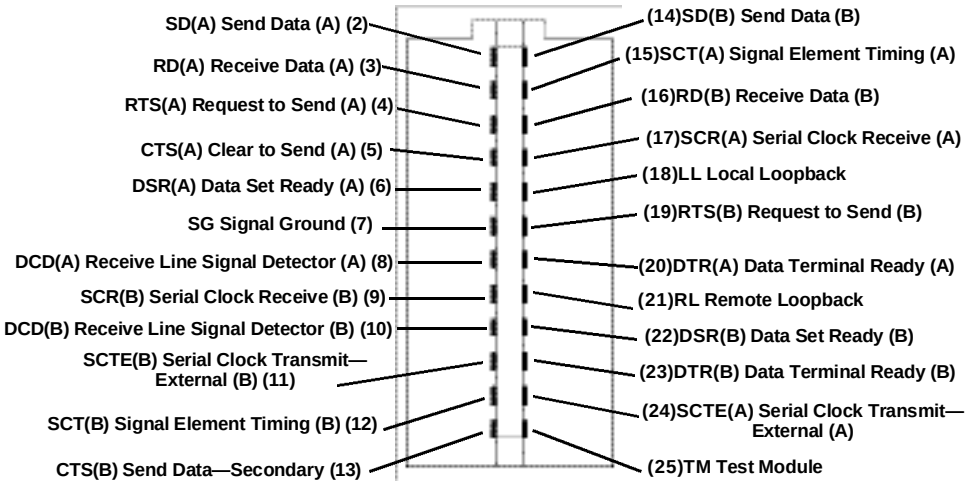

Figure 8-4. RS-530 patch cavity male pinout.

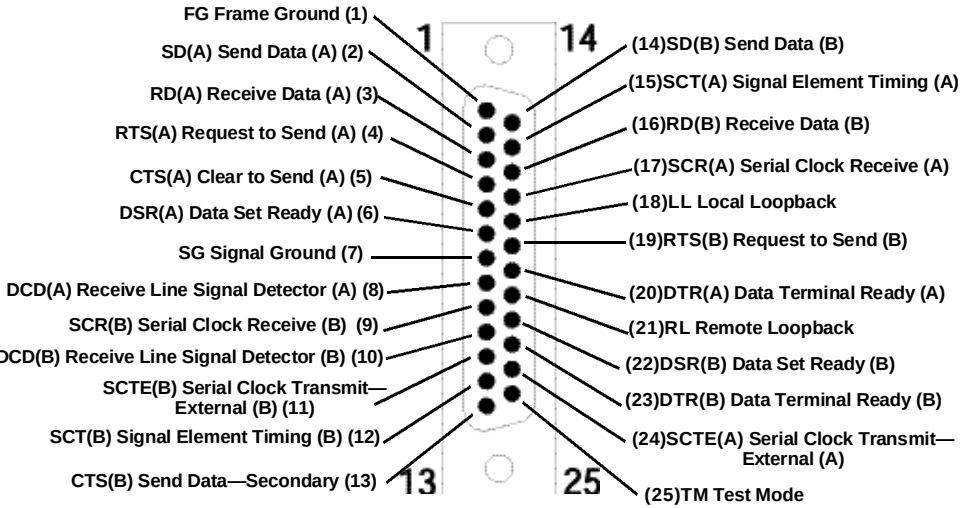

Figure 8-5. RS-530 DB25 female pinout.

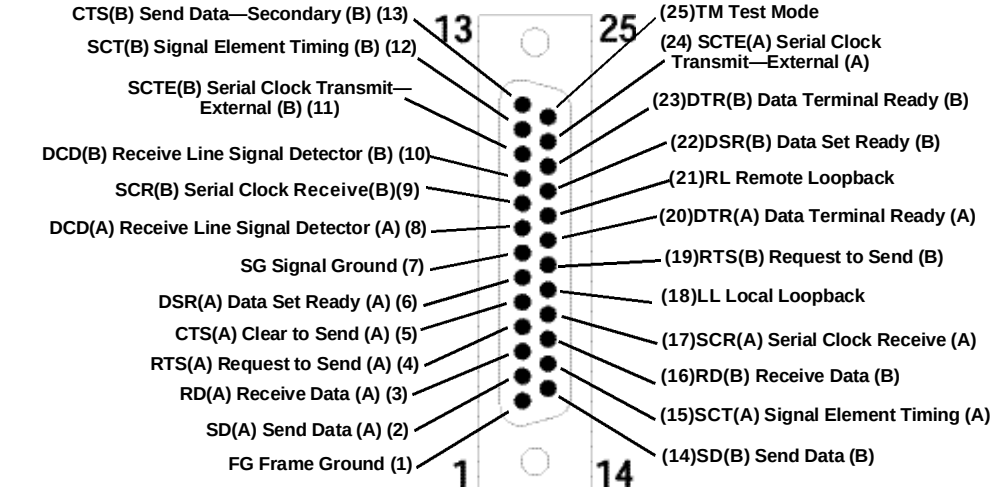

Figure 8-6. RS-530 DB25 male pinout.

8.1.3 V.35 PINOUTS

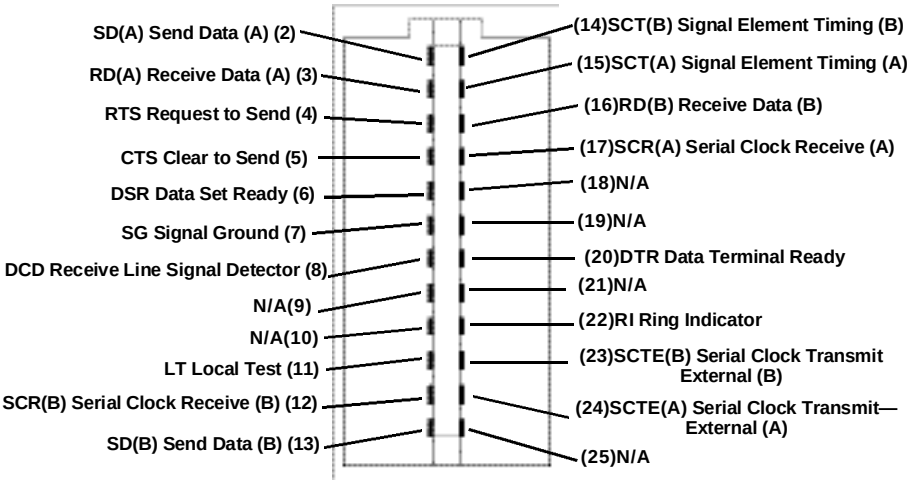

Figure 8-7. V.35 patch cavity male pinout.

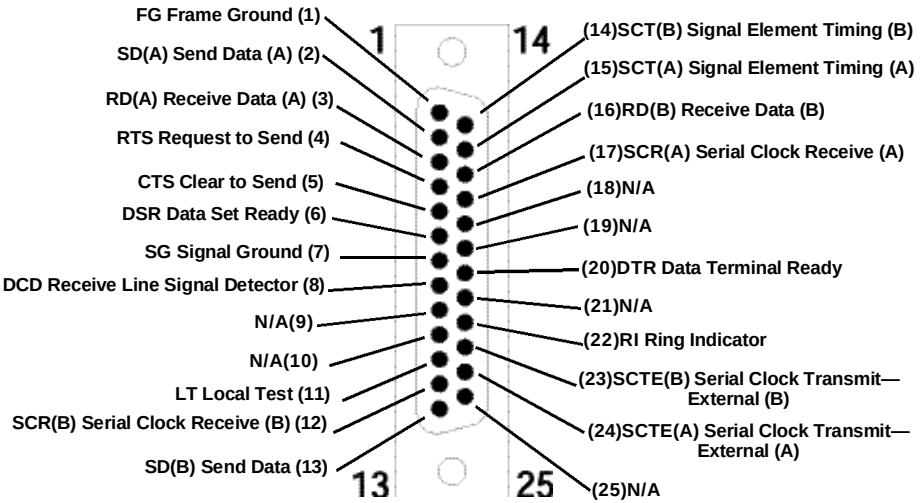

Figure 8-8. V.35 DB25 female pinout.

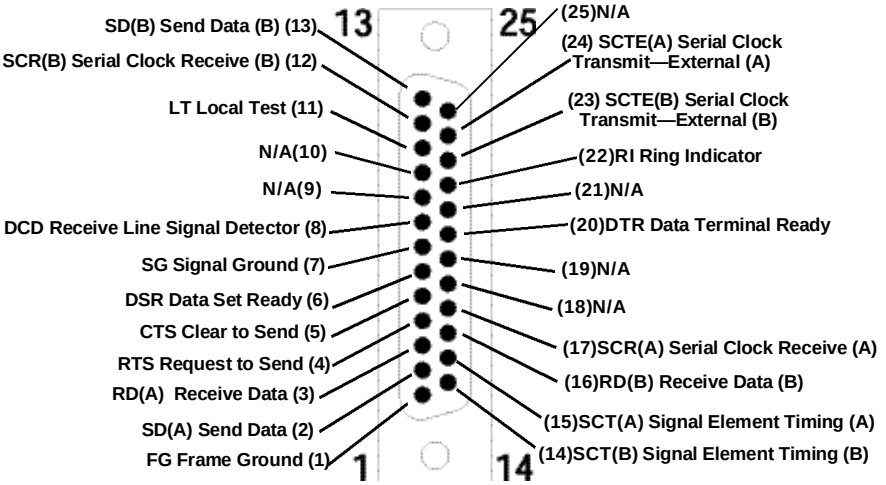

Figure 8-9. V.35 DB25 male pinout.

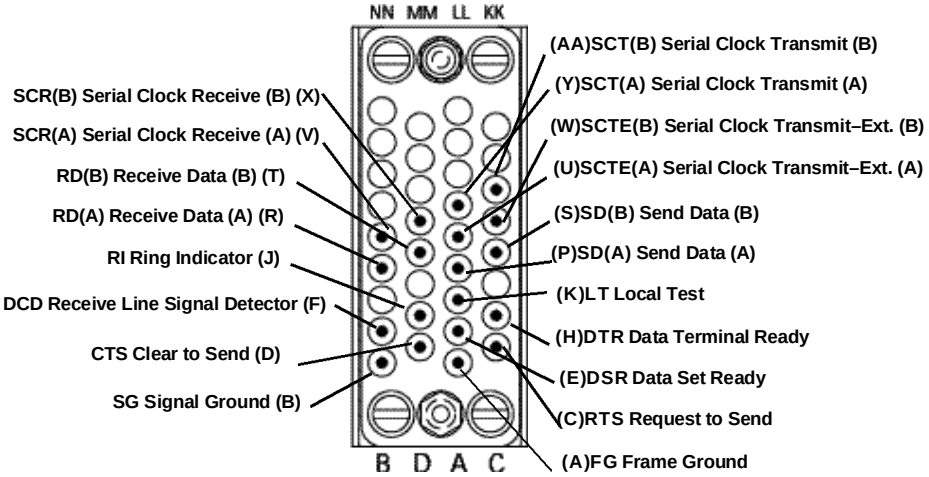

Figure 8-10. V.35 M/34 female pinout.

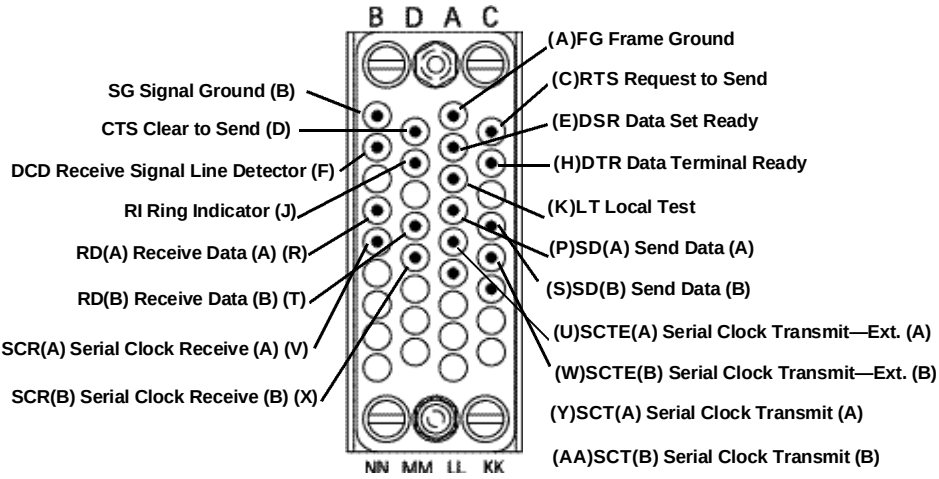

Figure 8-11. V.35 M/34 male pinout.

8.1.4 X.21 PINOUTS

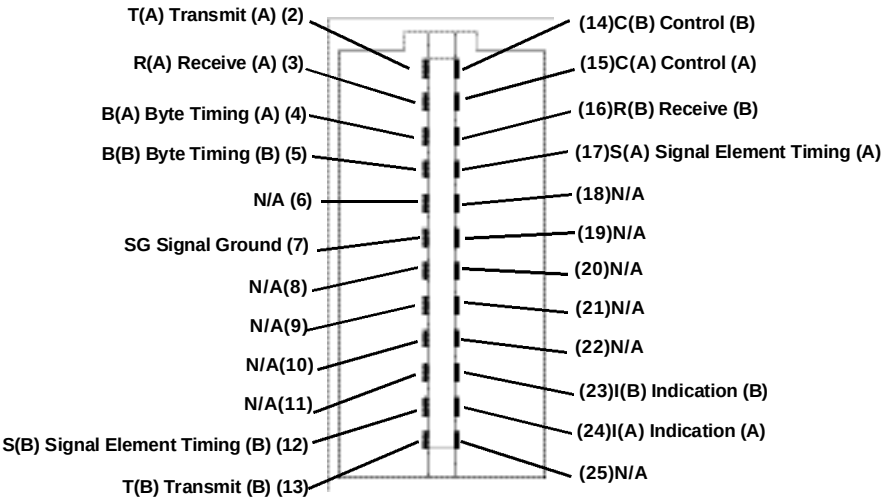

Figure 8-12. X.21 patch cavity male pinout.

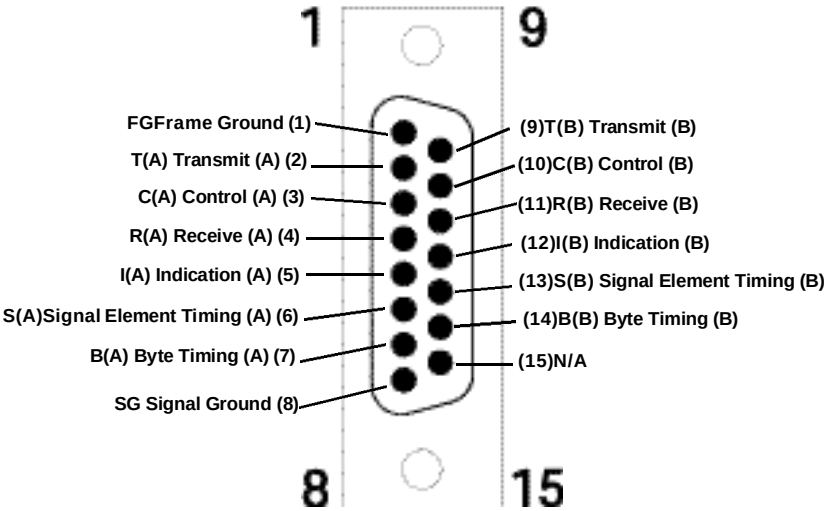

Figure 8-13. X.21 DB15 female pinout.

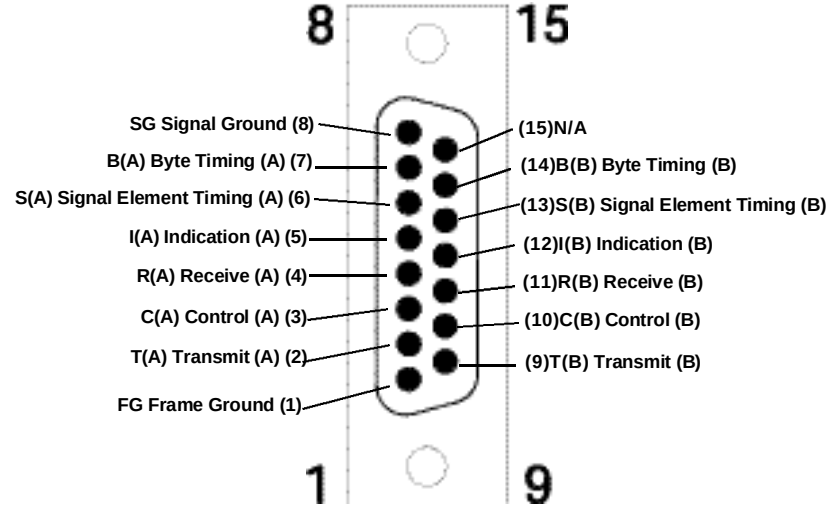

Figure 8-14. X.21 DB15 male pinout.

8.2 Control Interfaces

Table 8-2. Master chassis to direct connection (2-2/3-3) control pinouts.

Signal	Control In/Out Port DB25 Pin	Control Converter DB25 Pin	Control Cable In RJ-45 Pin	Control Adapter RJ-45 Pin	RJ-45	DB25
CI	2	2	5	5	5	2
CO	3	3	3	3	3	3
Signal Ground	7	7	6	6	6	7
ACO	14	14				
ACI	16	16				
Inter-Rack	20	20	4	4		

Table 8-3. Master chassis to modem connection (2-2/3-3) control pinouts.

Signal	Control In/Out Port DB25 Pin	Control Converter DB25 Pin	Control Cable In RJ-45 Pin	Control Adapter RJ-45 Pin	RJ-45	DB25
CI	2	2	3	3	3	3
CO	3	3	5	5	5	2
Signal Ground	7	7	6	6	6	7
ACO	14	14				
ACI	16	16				
Inter-Rack	20	20	4	4		

Table 8-4. Master chassis to slave chassis control pinouts.

Signal	Master Control In / Out Port DB25 Pin	Master Control		Control Cable RJ-45 Pin	Slave Control		Slave Control In / Out Port DB25 Pin
		Converter DB25 Pin	Aux RJ-45 Pin		Converter In RJ-45 Pin	DB25 Pin	
CI	2	2				2	2
CO	3	3					
Signal Ground	7	7	6	6	6	7	7
ACO	14	14	5	5	5	14	14
ACI	16	16	3	3	3	16	16
Inter-Rack	20	20	4	4	4	20	20

Table 8-5. Slave chassis to slave chassis control pinouts.

Signal	Slave #1 Control In / Out Port DB25 Pin	Slave #1 Control		Control Cable RJ-45 Pin	Slave #2 Control		Slave #2 Control In / Out Port DB25 Pin
		Converter DB25 Pin	Out RJ-45 Pin		Converter In RJ-45 Pin	DB25 Pin	
CI	2	2	5	5	5	2	2
CO	3	3	3	3	3	3	3
Signal Ground	7	7	6	6	6	7	7
ACO	14	14				14	14
ACI	16	16				16	16
Inter-Rack	20	20	4	4	4	20	20

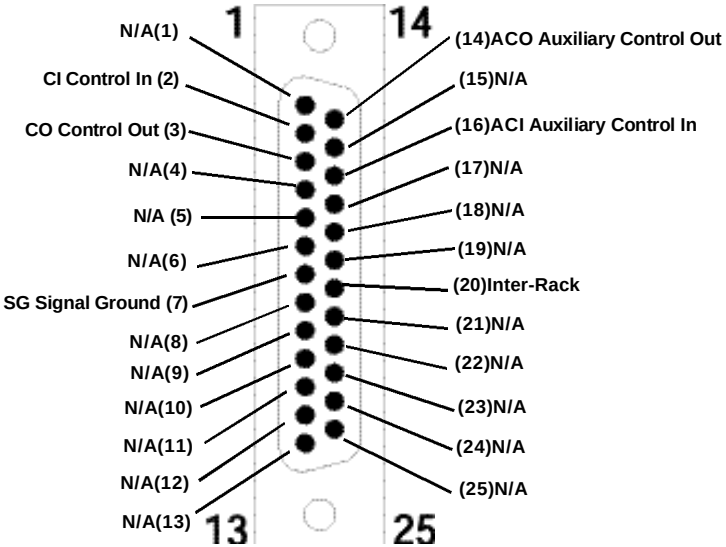

Figure 8-15. Control in / out port DB25 female pinout.

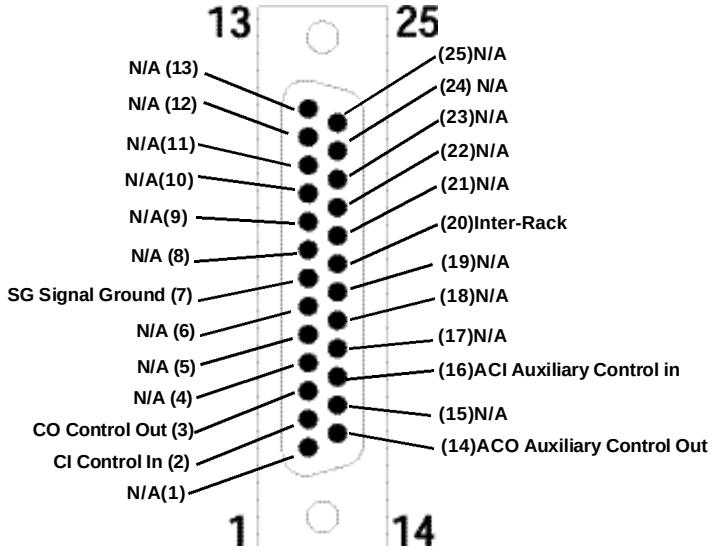

Figure 8-16. DB25 male pinout for control converters.

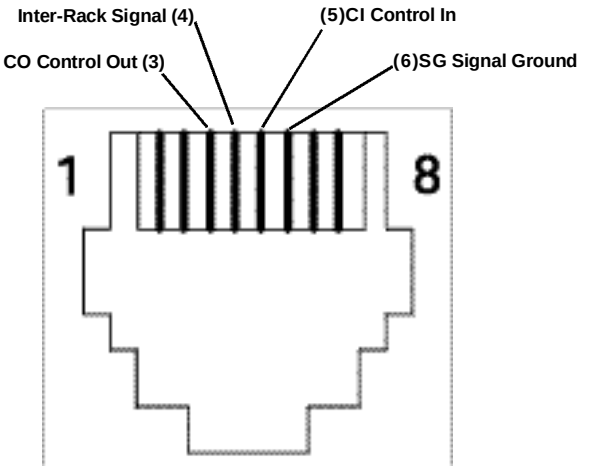

Figure 8-17. Control-in port RJ-45 female pinout for control converters, direct connection.

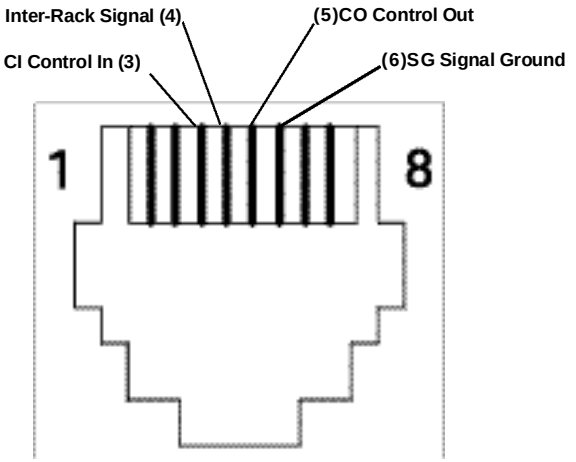

Figure 8-18. Control-in port RJ-45 female pinout for control converters, modem connection.

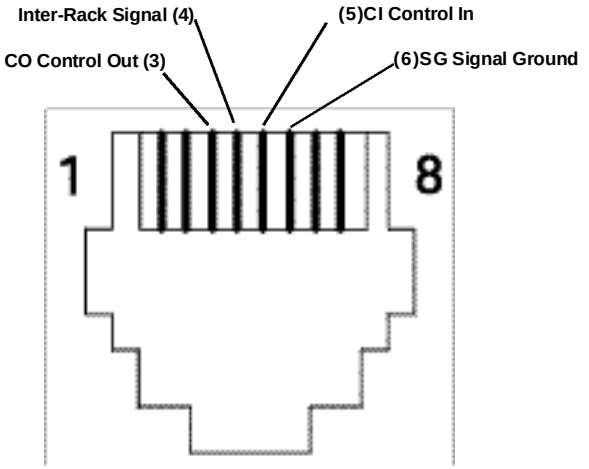

Figure 8-19. Control out port RJ-45 female pinout for control converters.

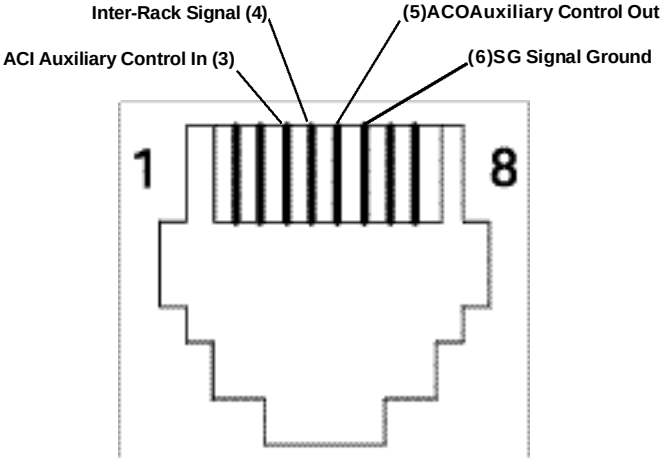

Figure 8-20. Aux port RJ-45 female pinout for control converters.

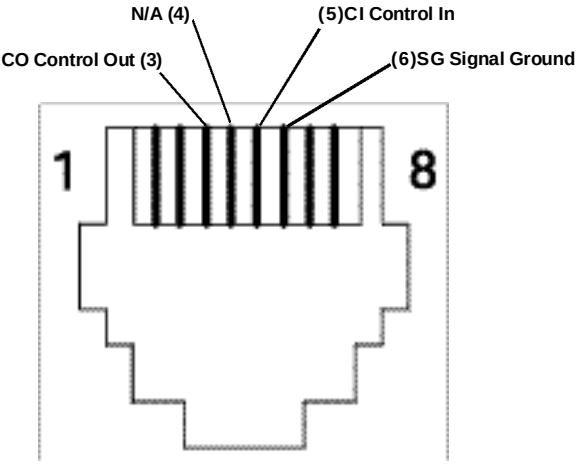

Figure 8-21. RJ-45 female pinout for control adapter, direct connection.

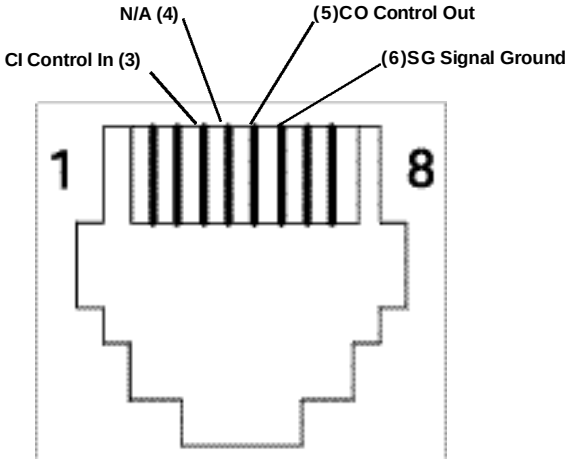

Figure 8-22. RJ-45 female pinout for control adapter, modem connection.

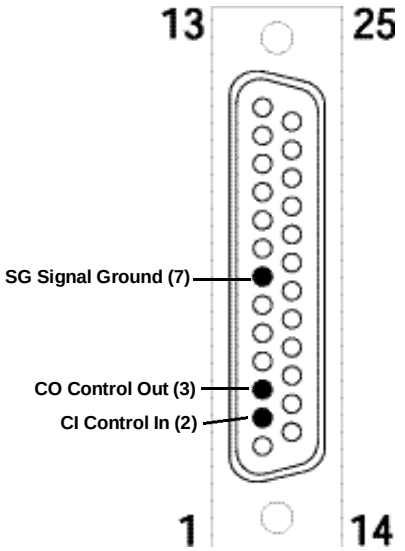

Figure 8-23. DB25 male pinout for control adapter, direct connection.

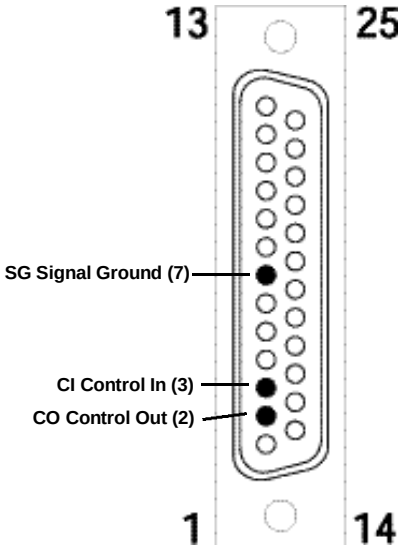

Figure 8-24. DB25 male pinout for control adapter, modem connection.

8.3 Test Interfaces

8.3.1 I/A Test Port

Table 8-6. I/A test port pinout for RS-232, RS-530, X.21, and V.35 from I/A bus.

Signal				DB25 Pin	Adapter M/34 Pin (V.35 Only)
RS-232	RS-530	X.21	V.35		
FG	FG	FG	FG	1	A
SG	SG	SG	SG	7	B
SD	SD(A)	T(A)	SD(A)	2	P
CTS	DTR(B)	T(B)	SD(B)	5	S
RD	RD(A)	R(A)	RD(A)	3	R
	RD(B)	R(B)	RD(B)	16	T
SCT	SCT(A)	C(A)	SCT(A)	15	Y
	SD(B)	C(B)	SCT(B)	14	AA
SCR	SCR(A)	S(A)	SCR(A)	17	V
	DSR(B)	S(B)	SCR(B)	22	X
				24	U
				23	W
RTS	SCR(B)	B(A)	RTS	4	C
DSR	DSR(A)	B(B)	DSR	6	E
DCD	SCT(B)	I(A)	DCD	8	F
DTR	DTR(A)	I(B)	DTR	20	H
RI				22	
SCTE				24	
LL				18	

NOTE

The control module and circuit module interface types must match.

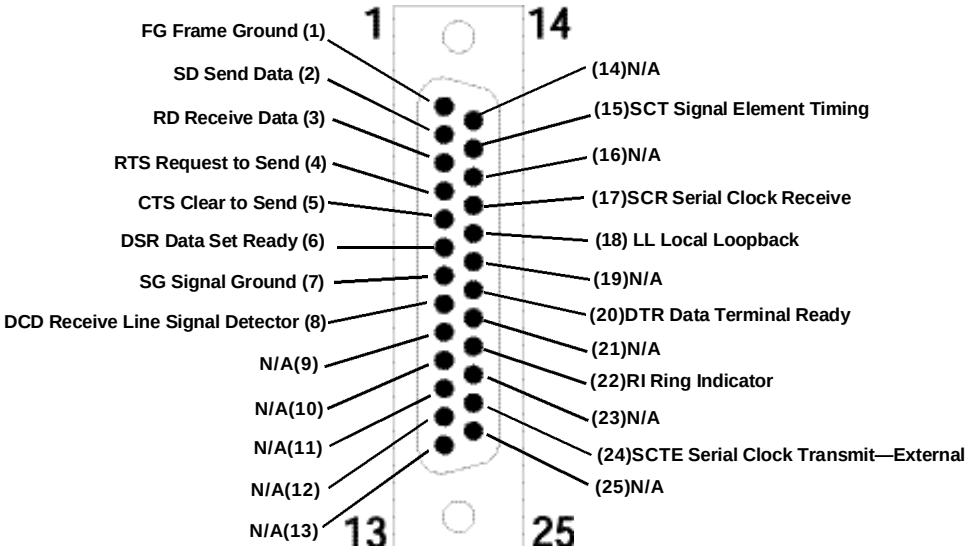

Figure 8-25. I/A test port RS-232 DB25 female pinout.

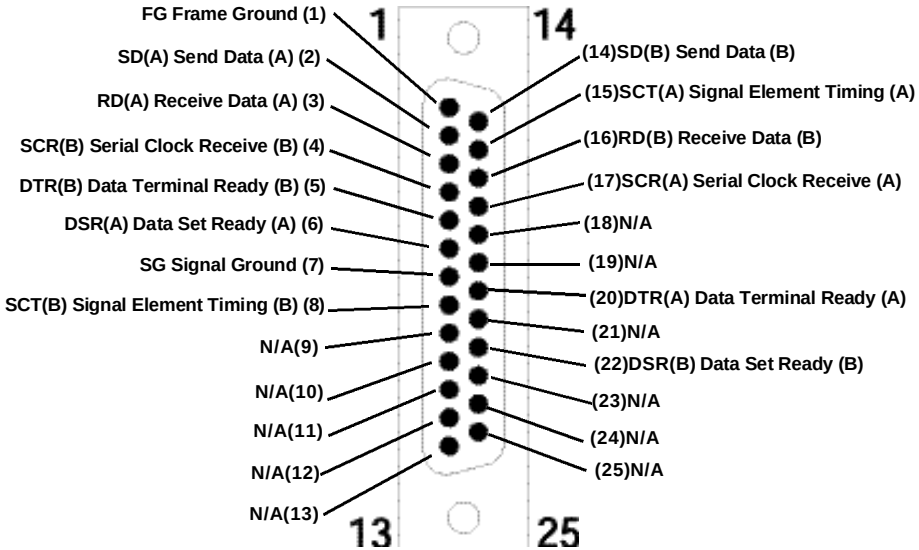

Figure 8-26. I/A test port RS-530 DB25 female pinout.

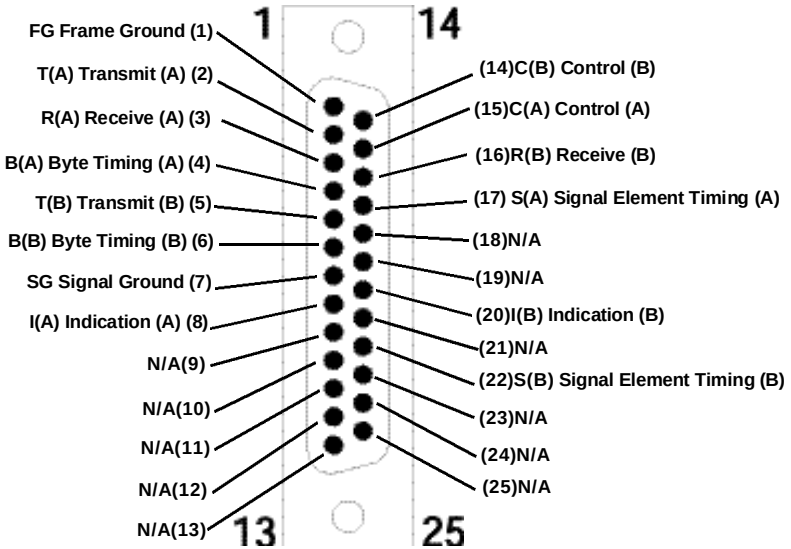

Figure 8-27. I/A test port X.21 DB25 female pinout.

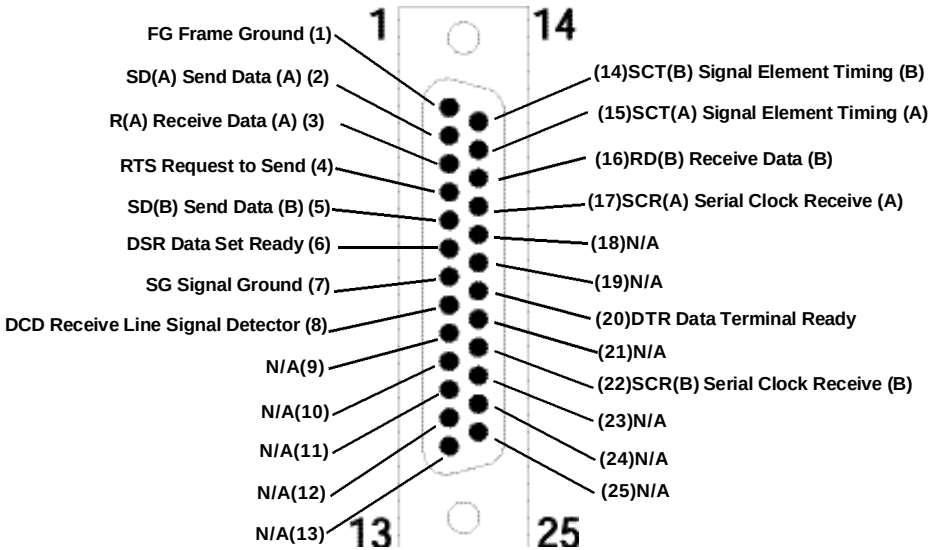

Figure 8-28. I/A test port V.35 DB25 female pinout.

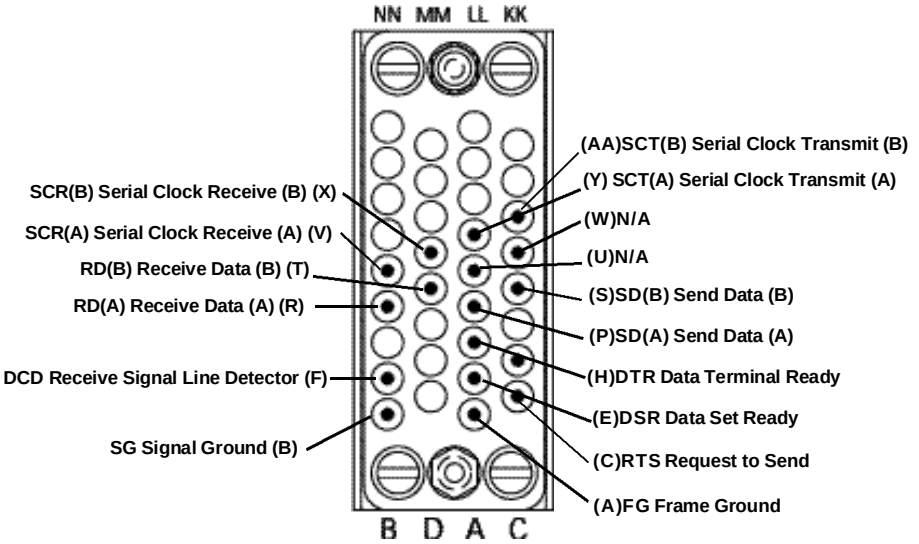

Figure 8-29. I/A test port with DB25 female/M/34 female connector converter V.35 M/34 female pinout.

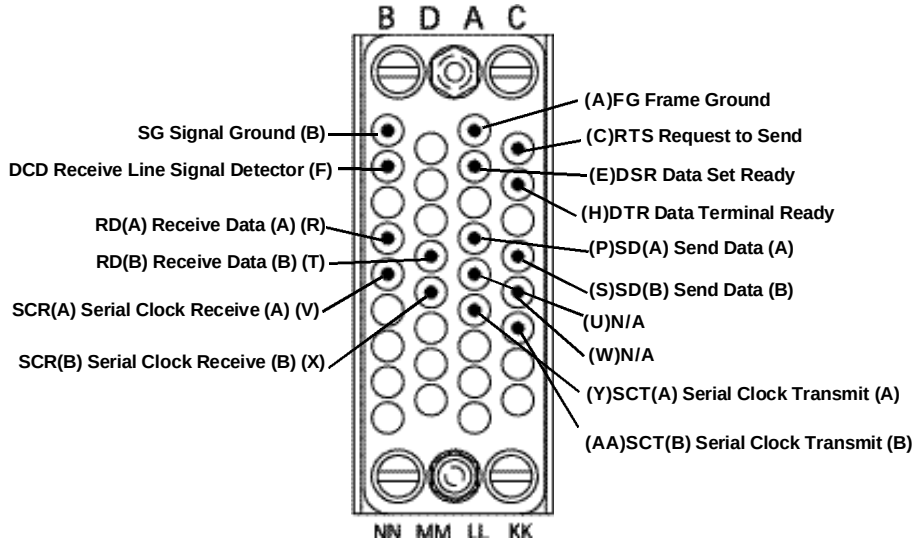

Figure 8-30. I/A test port with DB25 female/M/34 male interface connector converter V.35 M/34 male pinout.

8.3.2 MONITOR PORTS

Table 8-7. Monitor port RS-232 DB25 female pinout (monitor bus).

Signal	DB25 Pin
FG	1
SG	7
SD	2
RD	3
RTS	4
CTS	5
DSR	6
DCD	8
DTR	20
SCT	15
SCR	17
SCTE	24
RDC/LL	18
Inter-Rack Busy	12

Table 8-8. Monitor port pinouts for RS-530, X.21, and V.35 (monitor bus).

Signal Input from Monitor Bus			V.35 Signal Output	DB25 Pin	Adapter M/34 Pin
RS-530	X.21	V.35			
			FG	1	A
			SG	7	B
SD(A)	T(A)	SD(A)	SD(A)	2	P
SD(B)	T(B)	SD(B)	SD(B)	11	S
RD(A)	R(A)	RD(A)	RD(A)	3	R
RD(B)	R(B)	RD(B)	RD(B)	21	T
SCT(A)	S(A)	SCT(A)	SCT(A)	15	Y
SCT(B)	S(B)	SCT(B)	SCT(B)	14	AA
SCR(A)	S(A)	SCR(A)	SCR(A)	17	V
SCR(B)	S(B)	SCR(B)	SCR(B)	25	X
SCTE(A)		SCTE(A)	SCTE(A)	24	U
SCTE(B)		SCTE(B)	SCTE(B)	23	W
RTS(A)	C(A)	RTS	RTS	4	C
RTS(B)	C(B)				
CTS(A)		CTS	CTS	5	D
CTS(B)					
DSR(A)	B(A)	DSR	DSR	6	E
DSR(B)	B(B)				
DCD(A)	I(A)	DCD	DCD	8	F
DCD(B)	I(B)				
DTR(A)		DTR	DTR	20	H
DTR(B)					
				18	M
			Inter-Rack Busy	12	

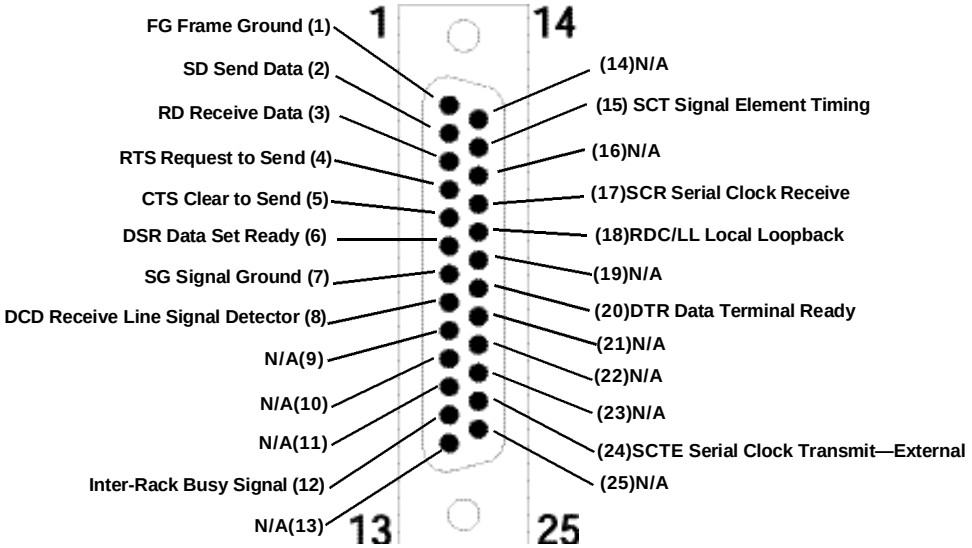

Figure 8-31. Monitor port RS-232 DB25 female pinout, monitor bus.

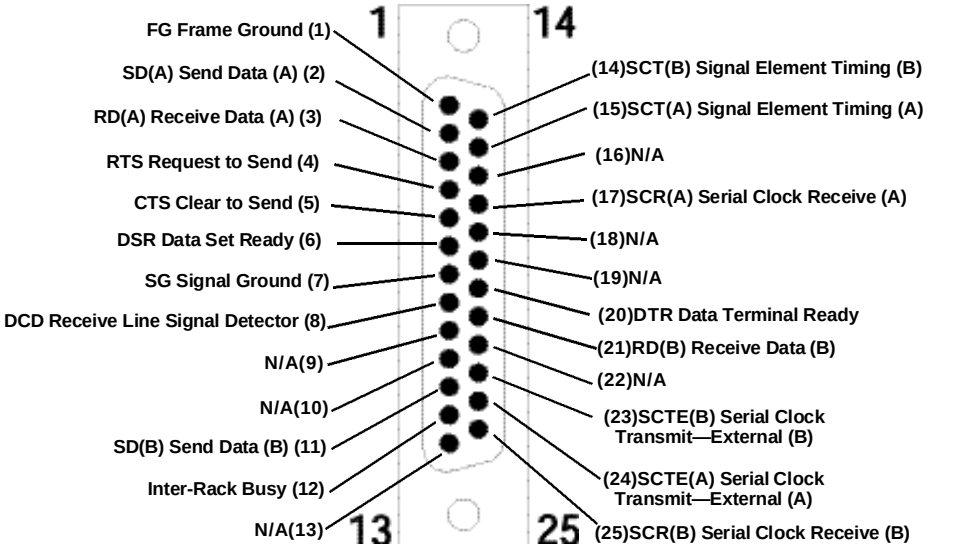

Figure 8-32. Monitor port RS-530, V.35, and X.21 DB25 female pinout, monitor bus.

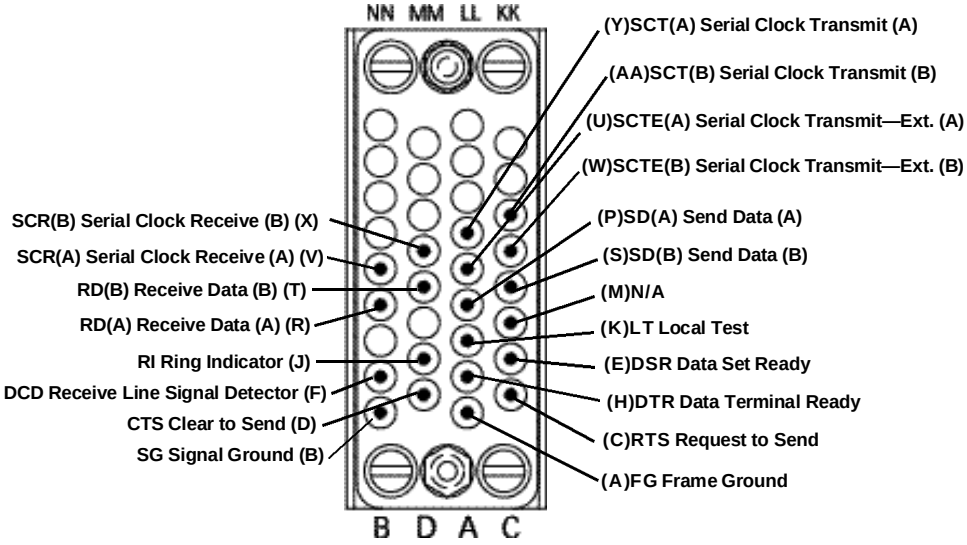

Figure 8-33. Monitor port with DB25 female/M/34 female interface connector converter RS-530, V.35, and X.21 M/34 female pinout, monitor bus.

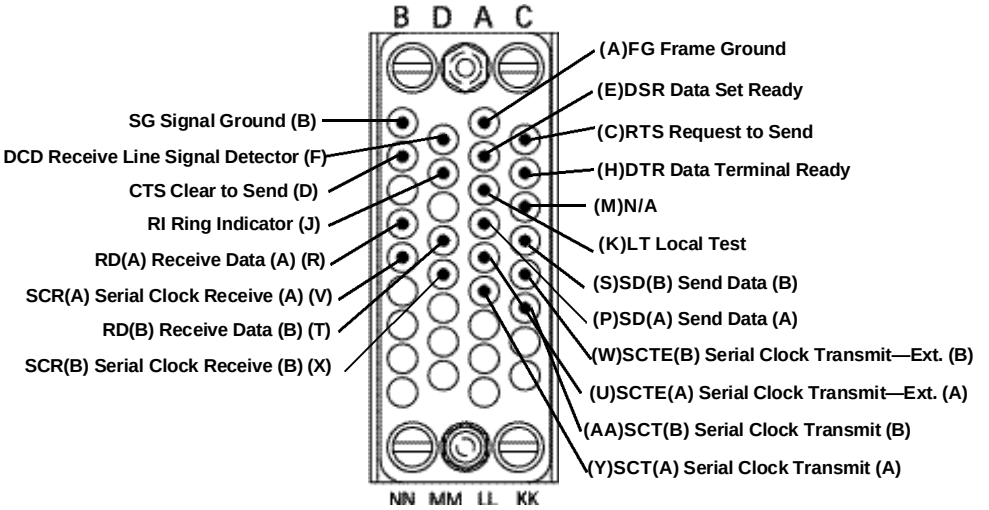

Figure 8-34. Monitor port with DB25 female/M/34 male interface connector converter RS-530, V.35, and X.21 M/34 male pinout, monitor bus.

9. Troubleshooting

9.1 Calling Black Box

If you determine that your Pro Switching System II is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box 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.

9.2 Shipping and Packaging

If you need to transport or ship your Pro Switching System II:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Pro Switching System II for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.

10. Glossary

A

A/B Switch: A switch that operates circuit switching between the EQP A and EQP B data lines in a circuit module. See also *A/B Gang Switch*.

A/B Gang Switch: A control-module function that operates the A/B switch for all circuit modules in a chassis.

ASCII: Acronym for American Standard Code for Information Interchange. Coding method to convert characters into digital format for transfer between computing devices

C

Circuit Module: A module that is inserted between DCE and DTE data lines and provides patch cavity interfaces to permit monitor, cross-connect, and intrusive test functions to be performed on those signals. They contain signal activity LEDs and either three or four different types of patch cavity. Also can interface with the I/A test bus and the monitor bus.

Control Module: A module that has provisions for either testing signals, creating a test access pathway for external test equipment, or both. The module contains one monitor patch cavity and signal activity LEDs with associated test points. Also can interface with external test equipment through rear-chassis ports. Control modules are the interface point for control console commands, inter-chassis signals, the I/A test bus, and the monitor bus.

Cross-Connect: Generically, the attachment of one set of wires to another set of wires using a third set of wires. In the Pro Switching System II, sets of wires (DCE and DTE) can be anchored to each circuit module. Possible cross-connections between circuit modules include a crossover or a straight-through. See also *patch*.

Crossover: A cross-connect between two DCE devices or two DTE devices using special patch cords, a breakout box, or both. Allows both devices to transmit and receive signals with each other. In the Pro Switching System II, a crossover joins one circuit module's DCE signal pathway to a second patch module's DCE signal pathway or, alternatively, joins two DTE signal pathways. Contrast with *Straight-Through*.

D

DB15: Connector that facilitates serial signal input and output. The initials DB (for data bus) are followed by a number that indicates the number of wires within the connector. The DB15 connector therefore supports up to 15 wires, each of which can connect to a pin on the connector.

DB25: Connector that facilitates serial signal input and output. The initials DB (for data bus) are followed by a number that indicates the number of wires within the connector. The DB25 connector therefore supports up to 25 wires, each of which can connect to a pin on the connector.

DCE: Acronym for data communications equipment. Also known as DCTE (data circuit-terminating equipment). Devices that provide the functionality required to establish, maintain, and terminate the interface between the DTE and the data-transmission circuit.

DTE: Acronym for data terminal equipment. Devices at the end of a data-transmission circuit that transmit, receive, or both. DCE enables the interface between the DTE and the data-transmission circuit.

E

EIA: Acronym for Electronics Industries Association. Organization that develops standards related to the electrical, functional, and physical attributes of electronic interface equipment. Cooperates with the TIA on telecommunications standards.

EQP A: Short name for Equipment A. Designation for one of the DTE data line interfaces on a circuit module.

EQP B: Short name for Equipment B. Designation for one of the DTE data line interfaces on a circuit module.

EN: Acronym for European Norm. Identifying prefix used with European Standard document numbers.

F

FCC: Acronym for Federal Communications Commission. United States government agency that supervises, licenses, and controls electronic and electromagnetic transmission standards.

Flash: Non-volatile information storage memory. Retains information without electricity. Can be electrically erased and rewritten.

Firmware: Software stored in non-volatile flash memory.

I

I/A Test Bus: The bus used to facilitate interactive intrusive *test* connections to data lines.

Intrusive Test: The breaking of a signal's circuit to test, interactively or non-interactively, its functionality. Intrusive testing interrupts signal service. Contrast with *Monitor*.

ITU: Acronym for International Telecommunication Union. Organization that absorbed the CCITT, the most important telecommunications standards-developing body in the world. CCITT became the ITU-TSS (Telecommunications Standards Section), a division of the ITU. The acronym ITU-TSS is commonly shortened to ITU-T.

L

LED: Acronym for Light-Emitting Diode. LEDs are used as function and condition indicators on the Pro Switching System II.

M

M/34: Connector that facilitates serial signal input and output. Also known as a "winchester" type connector. The initial M (for m series) is followed by a number that indicates the number of wires within the connector. The M/34 connector therefore supports up to 34 wires, each of which can connect to a pin on the connector.

Master Chassis: The top level chassis in a master/slave control system hierarchy. See also *Slave Chassis*.

Modem: Designation for the DCE data line interfaces on a circuit module.

Monitor: The non-interactive, non-intrusive functionality testing of a signal's circuit. Performing a monitor does not break the signal's circuit or cause an interruption in the signal's service. Contrast with *Intrusive Test*.

Monitor: Designation for the monitor access patch cavity on control, test, and circuit modules.

Monitor Bus: The bus used to facilitate non-intrusive connections to data lines.

N

NEBS: Acronym for Network Equipment-Building System. A generic spatial and environment requirements document published by Bellcore for telecommunications equipment sites.

NEMA: Acronym for National Electrical Manufacturers Association. Organization that develops standards for the electrical manufacturing industry.

P

Patch: A cross-connect using a patch panel.

Patch Cavity: Generic term for a keyed receptacle containing a male 24-pin, card-edge connector designed to interface with patch cords and test cords. In the Pro Switching System II, patch cavities are found on both the test and patch modules and appear in four varieties: EQP A (DTE), EQP B (DTE), MODEM (DCE), and MONITOR.

Patch Cord: In the Pro Switching System II, a 24-wire cable designed to facilitate a straight-through connection to a patch cavity at both ends. Each end terminates in an identical keyed connector block containing a female 24-pin card connector.

PING: Acronym for Packet Internet Groper. A diagnostic utility program that verifies whether a remote host is actually connected to the network.

R

Rack: A standard 19" wide mounting frame for telecommunications devices. Has provision for securing a device by screws.

Rack Unit (RU): 1.75 inches of vertical space on a NEMA standard rack. Generally permits four mounting screws to be used, two per mounting side when mounting a chassis.

Return Authorization (RA): The unique number used to identify an authorized product return

RJ-45: Short name for Registered Jack-45. A FCC -standard 8-pin connector for data transmissions over telephone wire.

RS-232: Short name for Recommended Standard-232. An EIA/TIA set of standards for data communication interfaces between DCE and DTE. Transmission speeds up to 20 kbps. Similar to *V.24*.

RS-422: Short name for Recommended Standard-422. An EIA/TIA set of standards for data communication interfaces between DCE and DTE with electrically balanced circuits. See also *RS-530*.

RS-530: Short name for Recommended Standard-530. An EIA/TIA set of standards for data communication interfaces between DCE and DTE. Transmission speeds between 20 kbps and 2 Mbps. In the Pro Switching System II, RS-530 follows the RS-422 standard.

RU: See *Rack Unit.*

S

Slave Chassis: Chassis controlled by a master chassis in a master/slave system control hierarchy. A first-level slave chassis connected to the master chassis. Second-level slave chassis are connected to first-level slave chassis. See also *Master Chassis*.

Straight-Through: A cross-connect of an equipment device to a facility device. Allows both devices to transmit and receive signals with each other.

T

Test Device: A telecommunications unit that tests data lines and data line signals.

Test Equipment: See *Test Device.*

Test Cord: In the Pro Switching System II, a 24-wire cable designed to connect a patch cavity to an external test device. One end terminates with a keyed connector block containing a female 24-pin card connector, permitting an interface with the patch cavity. The other end terminates with one of many possible types of connectors to facilitate the interface with the external test device.

Test Module: A module that has provisions for either testing signals, creating a test access pathway for external test equipment, or both. The module contains two monitor patch cavities and signal activity LEDs with associated test points. Also can interface with external test equipment through rear chassis ports.

U

UL: Acronym for Underwriters Laboratories®. Organization that tests products to safety standards. Also publishes some safety standards.

V

V.24: Short name for Version 24. An ITU standard specifying the attributes of the interface between DCE and DTE circuits. Transmission speeds up to 19.2 kbps. Similar to *RS-232*.

V.35: Short name for Version 35. An ITU standard specifying the attributes of the interface between DCE and DTE circuits. Transmission speeds up to 1.544 Mbps.

VAC: Acronym for volts alternating current.

VDC: Acronym for volts direct current

X

X.21: An ITU standard specifying the attributes of the interface between DCE and DTE circuits.

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