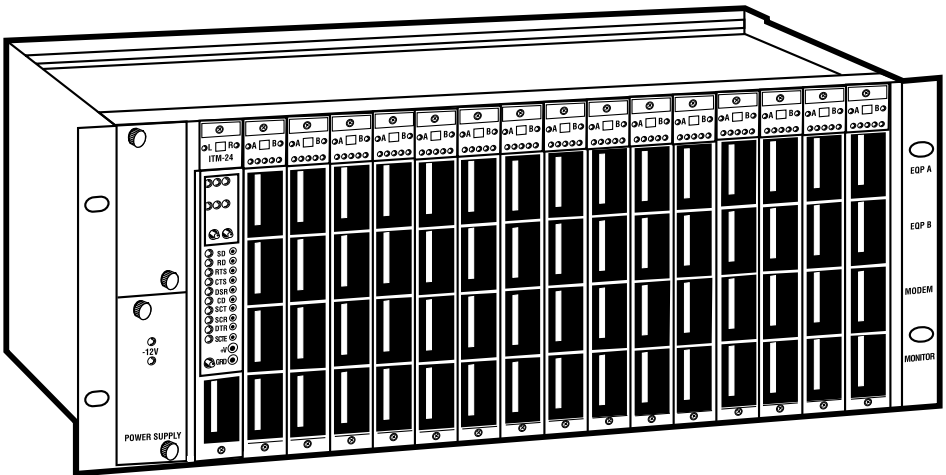




JANUARY 2002

SM900A	SM906C	SM910C
SM901A	SM907C	SM911C
SM902C	SM908C	SM912A
SM904C	SM909C	SM950A
		SM950A-220

Pro Switching System II with Management Software



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This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart 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.

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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.
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7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
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13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
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 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. General Description

1.1 Introduction

The Pro Switching System II consists of rackmount modular components that provide an economical and reliable means to manage RS-232/V.24, V.35, X .21 and RS-530 data interfaces.

The system is based on a family of circuit modules. Each module is a single switchable circuit between the your Data Terminal Equipment (DTE) and Data Communications Equipment (DCE).

FEATURES

- Manual patching
- Switching
- Console-controlled A/B switching
- Intrusive and bridged (monitor) test access
- Circuit-status display and alarm definition, detection, and reaction
- Four manual patch cavities exist on each module:
 - Three cavities provide intrusive access to the “A-side,” “B-side,” and Common (modem) side of the switchable circuit.
 - Fourth cavity provides bridged (non-intrusive) access to the Common (modem) side.

One Pro Switching System II console can support 32,000 switchable circuits in 2,000 racks (100 racks at each of twenty sites).

1.2 Hardware Summary

Each Pro Switching System II consists of one control module, one power supply, one optional redundant power supply, and up to 16 circuit modules. (See Figure 1-2 on page 14.) The control module is the logical bridge between the circuit modules and the console-generated commands. The control module also includes a full array of LED signal indicators accessed via manual patching.

All Pro Switching System IIs have a control-communications interface and two test-equipment interfaces located on the rear of the rack. The control-communication interface is labeled Control In/Out. One test interface, labeled I/A (Interactive) Test, is for connection of a BER tester or a protocol analyzer. Another test interface, labeled Monitor, is for connection of a data-line monitor device for passive monitoring of selected lines. The Monitor interface has two connectors that are parallel-wired for daisy-chaining two or more Pro Switching System II chassis.

1.3 System Architecture

A Pro Switching System II containing multiple chassis is configured in a hierarchical fashion. At the highest level is the Pro Switching System II PC with a serial port connected to a master chassis with the required address of "00." The master chassis is configured through the control-panel switches on the Control Module. Only one chassis connected to each Pro Switching System II serial port can be configured as a master.

Pro Switching System II (PSSII) (for use with Windows® 95, Windows 98, and Windows NT®) supports up to 2,000 racks via eighteen serial ports (100 racks at each of twenty sites)

Each site contains one master rack which, in turn, supports up to 99 slave chassis. The connection between the console and the master chassis can be local hard-wired cabling, a dedicated communications link, or a dialup communications link. All slave connections must be hard-wired local cabling.

Figure 1-1 on the next page shows connections to the "Control Converter Adapters" (CCAs), one of which is connected to each chassis via the rear "Control In/Out" DB25 connector.

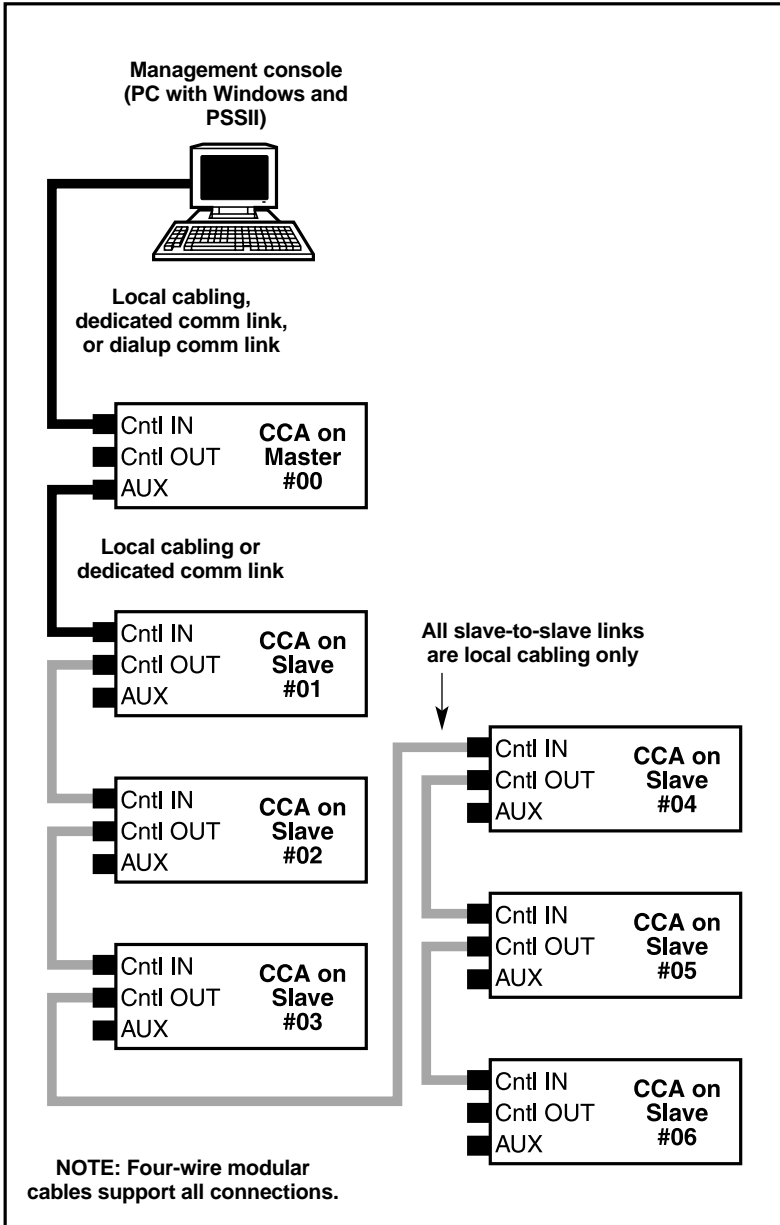


Figure 1-1. Connections to the Control Converter Adapters.

1.4 Rack-Adapter Bus Arrangements

Three buses connect the control module to the circuit modules within a chassis. The control bus transports commands and responses. The monitor bus transports monitor information in TTL format (with no circuit disconnection) from the circuit modules to the control module and is converted to either RS-232 or V.35 signal levels before delivery to the rear-mounted “Monitor” connectors, regardless of its original interface. The Interactive (I/A) Bus transports information directly from a specified interface circuit to the rear-mounted “Interactive” (I/A Test) connector.

1.5 Mechanical Mounting

All modules mount in a Pro Switching System II chassis for installation in a standard 19-inch equipment rack. The module provides mechanical mounting and power distribution. It is 7 inches (17.8 cm) high and 10.25 inches (26.1 cm) deep.

Each chassis has 18 mounting slots. The first slot contains power supplies. The next slot contains a control module. The remaining 16 slots accommodate 16 circuit modules, with each module passing one switchable data circuit. Failure of either power supply will trigger a console alert, although the remaining supply will support a full chassis.

Located on the rear of the chassis are three rows of DB25 EIA connectors for attaching the EQP A, EQP B, and Common (modem) sides of the data line. The connectors on your data cables are screwed onto the rear plate. When the card modules are inserted (from the front), their data connectors will plug into the cable connectors without disturbing the cable bundles at the rear. The rightmost connectors are labeled Control In/Out (for the “Control Converter Adapter”), I/A Test, and Monitor. These connectors provide the interfaces for interactive test-module communications and test functions.

The redundant front-loaded power supplies provide DC-voltage power to the chassis. The chassis includes a six-foot (1.8-m) AC power cord. Standard AC voltage is 115- or 230-volt input.

PRO SWITCHING SYSTEM II WITH MANAGEMENT SOFTWARE

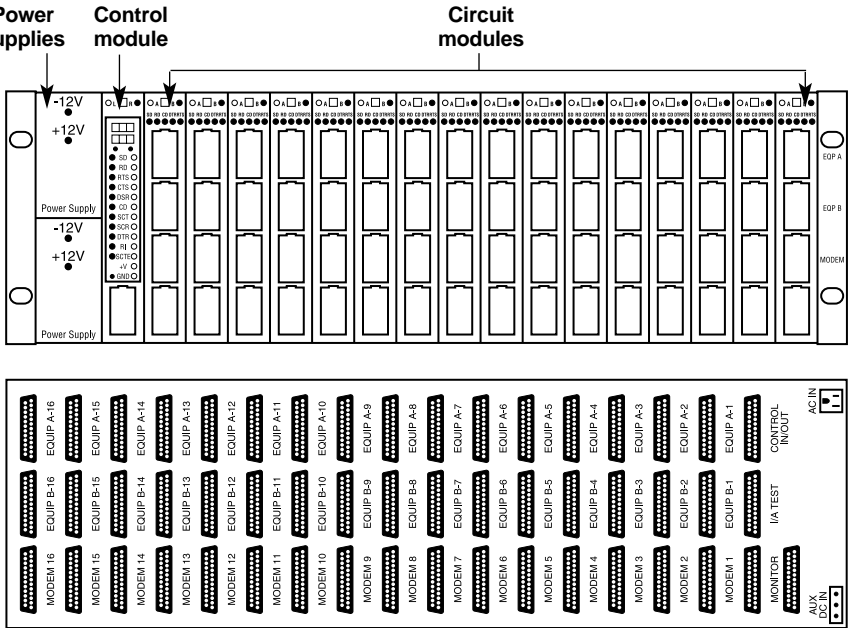


Figure 1-2. Front and back views of a Pro Switching System II.

1.6 Circuit Modules

Pushbutton switches are used to manually set A/B switches to the desired (A or B) position. Five LEDs are located at the top of each circuit module to indicate status activity for these five leads: SD, RD, CD, DTR, and RTS. The LEDs illuminate with a positive voltage, such as a data “space” or a control signal “high.” Four patch cavities allow monitor or disruptive (intrusive) testing of all 24 leads of each interface.

The four patch cavities and Interactive (I/A) bus access work in conjunction with the switch position as follows (see the examples on the following pages).

1. Switch in “A” position.

- Patch cord in “A” cavity or I/A access to “A” interface results in connection to “A” with normal path disconnected.
- Patch cord in “B” cavity or I/A access to “B” interface results in connection to “B” for off-line access (normal path remains connected).

- Patch cord in “Common” cavity or I/A access to “Common” interface results in connection to “Common” with normal path disconnected.
 - Patch cord in “Monitor” cavity results in bridge across “Common” (normal path remains connected).
2. Switch in “B” position.
- Patch cord in “B” cavity or I/A access to “B” interface results in connection to “B” with normal path disconnected.
 - Patch cord in “A” cavity or I/A access to “A” interface results in connection to “A” for off-line access (normal path remains connected).
 - Patch cord in “Common” cavity or I/A access to “Common” interface results in connection to “Common” with normal path disconnected.
 - Patch cord in “Monitor” cavity results in bridge across “Common” (normal path remains connected).

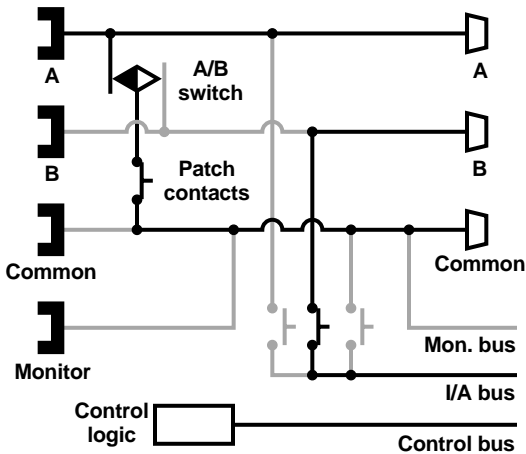


Figure 1-3. Example 1: Switch is in “A” position. I/A access to “B” interface has been commanded via Control Bus. Normal data path is retained.

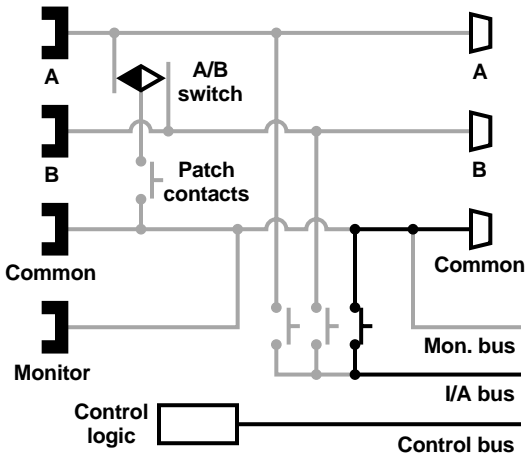


Figure 1-4. Example 2: Switch is in “A” position. I/A access to “Common” interface has been commanded via Control Bus. Normal data path has been disconnected.

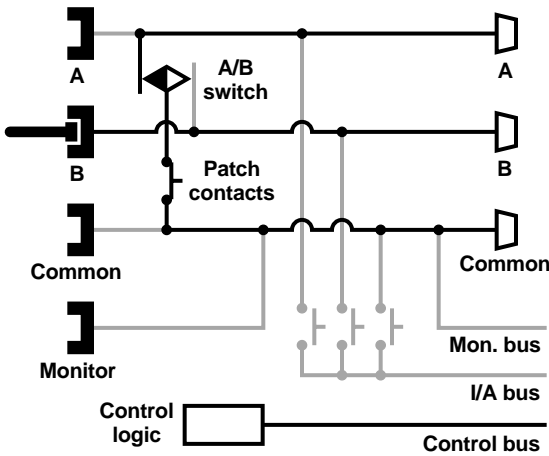


Figure 1-5. Example 3: Switch is in “A” position. Patch cord has been manually inserted into “B” position. Normal data path is retained.

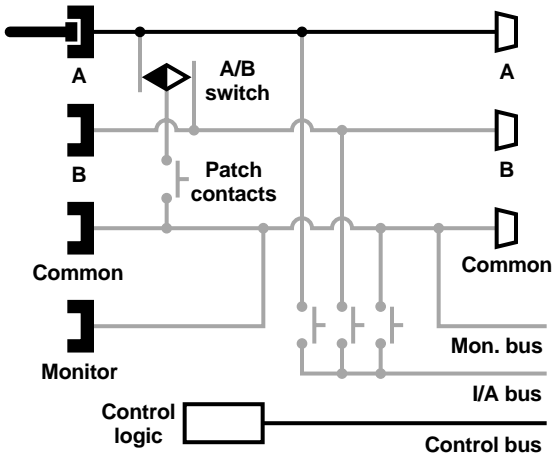


Figure 1-6. Example 4: Switch is in “A” position. Patch cord has been manually inserted into “A” position. Normal data path has been disconnected.

1.7 Control and Test Modules

The Control Module is a microprocessor-based, multi-function remote test module that constitutes the heart of a Pro Switching System II. The Control Module functions as a logical bridge between the console-generated commands and the circuit modules.

1.7.1 ALARMING

The Control Module supports console-controlled data-circuit alarming. Circuit modules can be programmed to alarm on any combination of the following interface leads:

RS-232/V.35/RS-530 circuits:

SD	Send Data present/absent
RD	Receive Data present/absent
SCT	Serial Clock Transmit present/absent
SCR	Serial Clock Receive present/absent
RTS	Request to Send high/low
DTR	Data Terminal Ready high/low
DCD	Data Carrier Detect high/low
CTS	Clear to Send high/low

X.21 circuit:

T	Transmit Data present/absent
R	Receive Data present/absent
S	Signal Element Timing present/absent
C	Control high/low
I	Indicate high/low
B	Byte Timing present/absent

In order for an alarm to be reported to the console, the condition causing the alarm must be present for a user-definable period of time, the "Time to Alarm." After an alarm has been reported to the console, the clearing of that alarm is also reported. A "clear" is issued after the original alarm condition has been clear for a user-definable period of time, the "Time to Clear."

1.7.2 SWITCHING

The Control Module accepts switching commands from the Pro Switching System II and relays these commands to the appropriate circuit cards within the rack. These commands can be for individual circuits, all circuits within a rack, or specific circuits that are part of a user-defined circuit group. These commands can result from a real-time console entry or can be generated automatically upon the occurrence of an alarm. If an autoswitch has occurred as the result of an alarm, all subsequent conditions on the alarmed circuit will be ignored for a fixed two-second "Time to Ignore."

1.7.3 MANUAL MONITORING

The Control Module contains LEDs that indicate signal status of any interface patched to the control-module cavity from a patch cavity. The LEDs illuminate with a positive voltage, such as a data "space" or a control signal "high." The following signals can be monitored:

RS-232/V.35/RS-530 circuits: SD, RD, RTS, CTS, DSR, CD, SCT, SCR, DTR, RI, or SCTE

X.21 circuits: T, R, I, C, S, or B

Adjacent to each LED are voltage-test jacks. Unbalanced signals have single jacks per signal while balanced signals have dual jacks. Positive test voltage and ground are also included.

1.8 Specifications

1.8.1 CONSTRUCTION

Circuit Modules

Front Panel: Molded plastic unit with four keyed rectangular jack receptacles for patch-cord installation.

Body: Printed circuit board with latching relays for switching and patching, non-latching relays for interactive test access.

Control Module

Front Panel: Molded plastic unit with one (1) rectangular monitor jack receptacle for patch-cord installation. Front-panel controls and indicators are PC-mounted with a plastic insert screened with appropriate identification.

Body: Printed circuit board which contains the electronics and provides the interface to the DB25 or other connectors located at the rear of the chassis.

Chassis

The ISP chassis is made of black-painted steel, with plastic card guides and a backplane PC board which provides the card-edge interface for the modules. Attaching ears are slotted at the standard EIA location for a 7" panel.

1.8.2 PHYSICAL CHARACTERISTICS OF THE CHASSIS

Power: Chassis can hold 2 front-loaded power supplies which are installed in the leftmost slots of the rack.

AC Source: 115- or 230-volt input to dual redundant power supplies

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 $\pm 3\%$

Energy Rate: 50 VA

Receptacle: 3-prong, grounding

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)

Temperature: 32 to 104°F (0 to 40°C)

Relative Humidity: 10 to 80% noncondensing

2. Module, Cable, and Test Installation

2.1 Inspection

Check the unit for possible shipping damage. Call Black Box immediately at 724-746-5500 if the unit is damaged. Common carriers reserve the right to inspect packaging in case of damage claims. If damage is found, save the packing material and shipping container for equipment return.

RACK ADAPTER INSTALLATION RECOMMENDATIONS

1. Install the Control Converter Adapter (CCA) and Interface Connector Converters (ICCs), if included, before mounting the chassis into the cabinet.
2. Mount the chassis in a 19-inch equipment rack. For convenience, locate panels as close as possible to eye level.
3. Do not install units near hot equipment, especially hot power supplies. Excessive heat may interfere with operation.
4. Cables entering the equipment cabinets should be labeled at both ends, bundled, and tied to the equipment racks for strain relief.

2.2 Module Installation and Removal

CAUTION!

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

2.2.1 ADDING MODULES

To add a module:

1. Power down the chassis.
2. Insert the module's rear top and bottom card edges into the chassis' guide rails.
3. Push the module straight in along the chassis guide rails until the module encounters resistance to moving any further. It is important that the module is pushed parallel with the guide rails; otherwise, damage may result to the module or guide rails.

4. Push hard and sharply 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.

2.2.2 REMOVING MODULES

To remove a module:

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, damage may result to the module or guide rails.
4. Restore power to the chassis.

2.2.3 USING BLANK PATCH-PANEL 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.

2.3 Control Cabling

The Control Converter Adapter, “CCA,” installed on the rear Control connector of each chassis, lets you use straight-through modular cabling for Pro Switching System II management. If the site is local to the management console, a straight-through modular cable connects the console to the “Cntl In” jack on the CCA on the master chassis. If the site is remote from the console, the modular cabling begins at the modem. A switch on the CCA provides the required 2↔3 crossover if the console is connected via a modem. A modular adapter and a modular cable are included with every system.

The master chassis’ “Aux” connector supports the first slave chassis. Additional slaves are cabled in a Cntl Out/Cntl In daisychain fashion with additional straight-through modular cables.

NOTE

Modems can NOT be installed within a site’s daisychain.

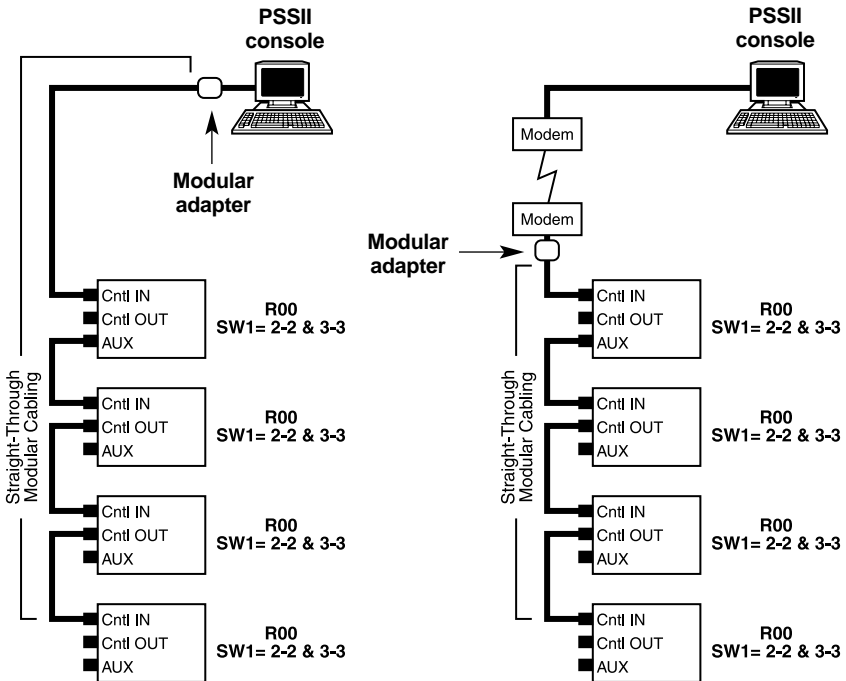


Figure 2-1. Control cabling.

Figures 2-2 through 2-5 show CCA components:

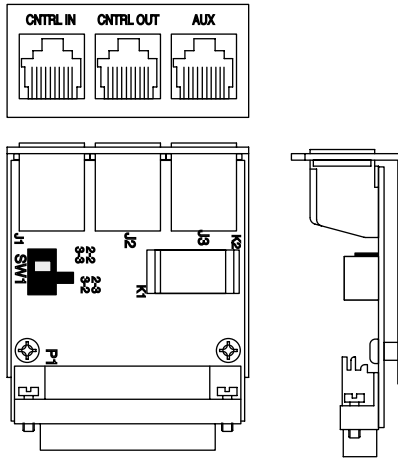


Figure 2-2. Control converter for chassis with DB25 data-line ports.

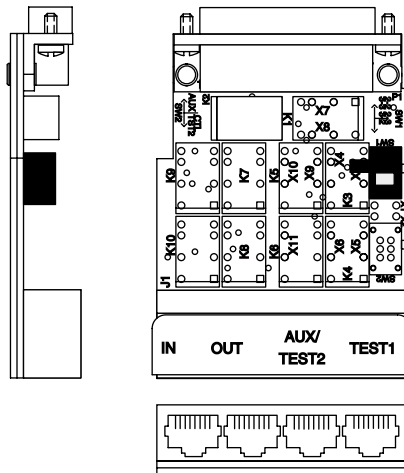


Figure 2-3. Control converter for chassis with M/34 data-line ports.

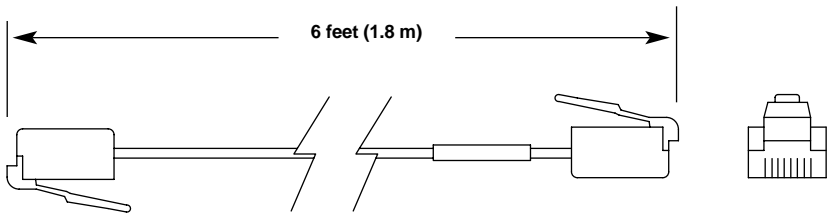


Figure 2-4. RJ-45 male to RJ-45 male cable.

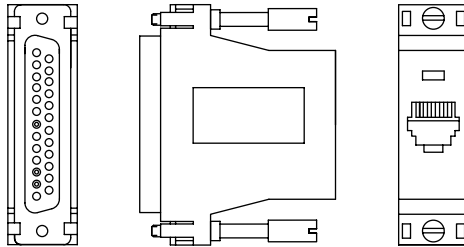


Figure 2-5. DB25 male to RJ-45 control adapter.

2.4 Connecting User Data Cables

Select user cables with connectors that match the configuration:

- DB25 connectors are standard.
- V.35 (M-series, 34-pin) connectors are standard with V.35 chassis.

Connector pin assignments should be as shown in Table 2-1 on the next page.

Table 2-1. Connector pin assignments.

DB25 pin	RS-232 signal	RS-530 signal	RS-449 signal	DB37 pin	V.35 signal	M/34 pin	X.21 signal	DB15 pin
1	Shield	Shield	Shield	1	Shield	A	Shield	1
2	TD	TD(A)	SD(A)	4	SD(A)	P	T(A)	2
3	RD	RD(A)	RD(A)	6	RD(A)	R	R(A)	4
4	RTS	RTS(A)	RS(A)	7	RTS	C	B(A)	7
5	CTS	CTS(A)	CS(A)	9	CTS	D	B(B)	14
6	DSR	DCR(A)	DM(A)	11	DSR	E		
7	SGND	SGND	SG	19	SG	B	G	8
8	DCD	DCD(A)	RR(A)	13	DCD	F		
9		RSETC(B)	RT(B)	26				
10		DCD(B)	RR(B)	31				
11		TSETT(B)	TT(B)	35	LT	K		
12	(S)CD	TSETC(B)	ST(B)	23	SCR(B)	X	S(B)	13
13	(S)CTS	CTS(B)	CS(B)	27	SD(B)	S	T(B)	9
14	(S)TD	TD(B)	SD(B)	22	SCT(B)	AA	C(B)	10
15	TSETC	TSETC(A)	ST(A)	5	SCT(A)	Y	C(A)	3
16	(S)RD	RD(B)	RD(B)	24	RD(B)	T	R(B)	11
17	RSETC	RSETC(A)	RT(A)	8	SCR(A)	V	S(A)	6
18	RDC/LL	LL	LL	10	INTLK*	M		
19	(S)RTS	RTS(B)	RS(B)	25				
20	DTR	DTR(A)	TR(A)	12	DTR	H		
21	SQD/RL	RL	RL	14				
22	RI	DCR(B)	DM(B)	29	RI	J		
23	DSRS	DTR(B)	TR(B)	30	SCTE(B)	W	I(B)	12
24	TSETT	TSETT(A)	TT(A)	17	SCTE(A)	U	I(A)	5
25	BUSY/TM	TM	TM	18				

(S) designates a secondary signal.

(A) and (B) designate complementary leads for balanced signals.

*Proprietary interlock signal used internally by the Pro Switching System II.

2.5 Connecting Passive Test Equipment

A data-line monitor (DLM) or a protocol analyzer can be connected to the Pro Switching System II for line-monitoring purposes. The equipment is connected to either of the two DB25 monitor connectors on the rear of the chassis. When an RS-232 control module is being used, all passively monitored leads are sent out to these connectors at RS-232 levels, regardless of the signaling level of the user interface. Otherwise, the leads are sent out at V.35 levels. The standard monitored leads are: SD, RD, RTS, CTS, DSR, DCD, DTR, SCT, SCR, SCTE, and LL. In the case of X.21, the following translation takes place:

T becomes SD
 R becomes RD
 S becomes SCT and SCR
 I becomes DCD
 B becomes DSR
 C becomes RTS

The same piece of test equipment may be connected to two or more Pro Switching System II chassis by cabling from test equipment to rack to rack to rack (etc.). One monitor connector on each rack is “in” while the other is “out.” By selecting breaks in this daisychain, several monitor 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” signal prevents inadvertent double monitoring.

2.6 Connecting Interactive Test Equipment

Interactive test equipment, such as a bit-error-rate testers or protocol simulators, can be connected to the Pro Switching System II. The equipment is connected to the DB25 I/A test connector on the rear of the rack. Signals from the selected (and disconnected) interface are sent directly to these connectors without any signal-level conversion. If the selected interface is RS-232, all signals appear on the normal pins. However, all other signaling uses custom pin assignments. See Table 2-2 on page 29.

The same piece of test equipment may be connected to two or more chassis by using ribbon cabling to connect test equipment to rack to rack to rack (etc.). By selecting breaks in this daisychain, several test access groups can be created.

Each chassis contains a multipurpose multiple-interface “interactive bus.” Any interface within a chassis can be connected to the bus. Each line has three interfaces, “A,” “B,” and “Modem” (common) and, for this purpose, the I/A test

connector is also an interface. Thus, the line #1 modem and the line #2 “A equipment” can both be connected to the bus and therefore connected to each other. If the line #1 modem is removed from the bus and the I/A test connector is connected to the bus, then the line #2 “A equipment” is connected to whatever is cabled to the I/A test connector. This could be interactive test equipment or another interface on another rack within the I/A test group. See Figure 2-6.

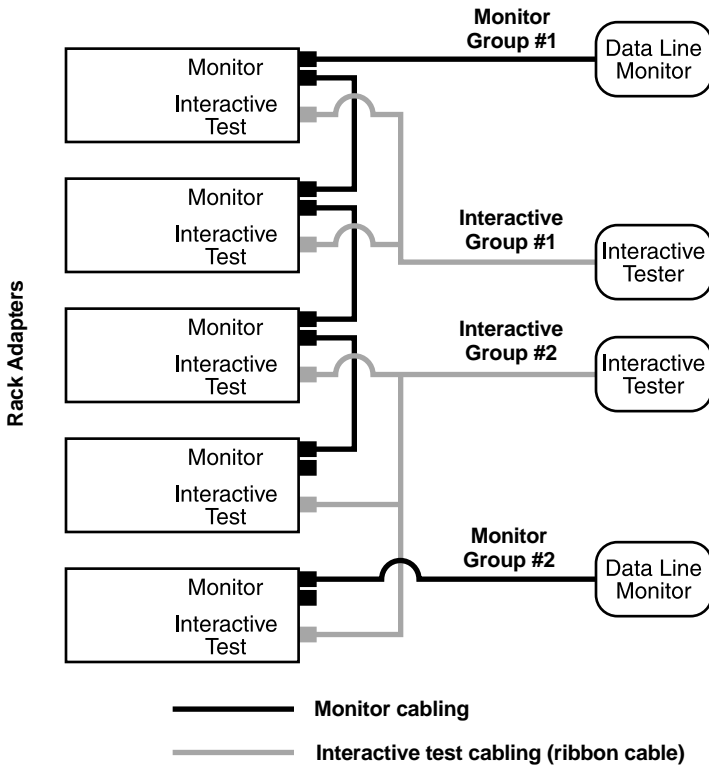


Figure 2-6. Interactive bus.

The Interactive (I/A Test) connector uses custom pin assignments. Listed in Table 2-2 are the signals as they appear on the rear DB25 I/A test connector with a standard control module when the control-module type matches the circuit-module type. (Only twelve leads are available on this connector, so some V.35 and RS-530 signals are not included in order to provide full coverage on others.)

Table 2-2. Interactive signals.

Non-X.21 signal or signal pair	RS-232 pinout on DB25	V.35 pinout on DB25	RS-530 pinout on DB25	X.21 signal	DB15 pins
TD	2	2 and 5	2 and 14	T	2 and 5
RD	3	3 and 16	3 and 16	R	3 and 16
RTS	4	4	N/A	I	8 and 20
CTS	5	N/A	N/A	C	15 and 14
DSR	6	6	6 and 22	S	17 and 22
DCD	8	8	N/A	B	4 and 6
SCT	15	15 and 14	15 and 8		
SCR	17	17 and 22	17 and 4		
DTR	20	20	20 and 5		
RI	22	N/A			
SCTE	24	N/A	N/A		
LL	18	N/A	N/A		

RS-530 and X.21 control modules support V.35 switch patch module signaling and provides V.35 output monitor signaling. The signaling that appears on the rear DB25 connectors is shown in Table 2-3.

NOTE

I/A-bus signaling can be directed to either the I/A test connector or the monitor connector, but monitor-bus signaling is provided only on the monitor connector.

Table 2-3. I/A bus signaling.

V.35 Signals	I/A bus directed to I/A Test	I/A bus directed to Monitor	Monitor bus directed to Monitor	M/34 pin
Shield	1	1	1	A
SGND	7	7	7	B
SD(A)	2	2	2	P
SD(B)	5	11	11	S
RD(A)	3	3	3	R
RD(B)	16	21	21	T
SCT(A)	15	15	15	Y
SCT(B)	14	14	14	AA
SCR(A)	17	17	17	V
SCR(B)	22	25	25	X
SCTE(A)	N/A*	N/A*	24	U
SCTE(B)	N/A*	N/A*	23	W
RTS	4	4	4	C
DSR	6	6	6	E
DCD	8	8	8	F
DTR	20	20	20	H
INTLK†	N/A	N/A	18	M

(S) is secondary signal.

(A) and (B) are leads for balanced signal.

*SCTE is not carried on the I/A bus.

†Proprietary interlock signal used internally by the Pro Switching System II.

3. Front-Panel Configuration

3.1 Control-Module Front-Panel Configuration Mode

Before configuring a Pro Switching System II, all console and inter-rack cabling should be installed and the desired addresses for the chassis determined. The master chassis' address must be "00" while slaves must be "01" through "99."

When the Pro Switching System II has been installed and first powered up, it will automatically go into the configuration mode. The initial configuration parameters are rack-address selection, site selection, Cntl-In/Out data rate, and Aux data rate. To change an existing configuration, you must enter the configuration mode manually by pressing the front-panel "A" and "B" buttons simultaneously.

NOTE

Front-panel button "A" is located above the column of interface LEDs on the control module. Front-panel button "B" is located above the column of interface test jacks on the control module. The front-panel display is the seven-segment LED display located above the "A" and "B" buttons.

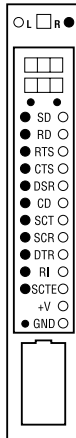


Figure 3-1. Control module.

3.2 Selecting the Rack Address

To select a rack address while in the front-panel configuration mode, press button “B” to change the rack address incrementally until the desired address is shown on the lower portion of the front-panel display. The master rack adapter’s address must be “00.” Slave addresses are “01” to “99” with Pro Switching System II (PSSII).

Once the desired address is shown, press button “A.” If you’re configuring a master Pro Switching System II chassis, the control module will proceed to the site-identification selection (see **Section 3.3**). If configuring a slave, the control module will proceed to the Cntl-In/Out selection (see **Section 3.4**).

3.3 Selecting the Site-Identification Number (Master Rack Only)

To select the site-identification number, press button “B” to cycle through the available site numbers until the identifier is displayed on the lower part of the front-panel display. The first configured site should be “01,” the second “02,” etc., up to “20.” Then press button “A.” The Pro Switching System II will proceed to the Cntl-In/Out selection (see **Section 3.4**).

3.4 Selecting the Cntl-In/Out Data Rate

On a master rack adapter, the Cntl-In/Out data rate should be as high as practical (9600 bps maximum), but must always match the data rate of the PC’s serial port. The master’s Aux rate need not match the master’s Cntl-In/Out rate but, if the rates are different, neither one should be more than double the other.

On slave racks, the Cntl-In/Out rate must match the attached master’s Aux rate.

To select the Cntl-In/Out data rate, press button “B” to cycle through the available data rates in bps until the desired rate appears on the lower portion of the front-panel display.

Once the desired data rate is shown, press button “A.” The Pro Switching System II will proceed to Aux data-rate selection (see **Section 3.5**).

3.5 Selecting the Aux Data Rate

The Aux data rate has meaning only with the master chassis. It can be ignored with slaves. To select the Aux data rate, press button “B” to cycle through the available data rates in bps until the desired rate appears on the lower part of the front panel display. Once the desired data rate is shown, press button “A.” Inability to command some or all slave-rack adapters is the symptom of an incorrect Aux data rate.

3.6 Control-Module Front-Panel Run Mode

The first time you finish the configuration and go into “run mode” (normal operation), the upper LED display will indicate the rack number (“rac xx”) and the lower display will be blank. Also, the “L” (local) LED at the top of the interactive test module should be lit to indicate that the rack is in the local (unlocked) condition. In the unlocked condition, every card in the rack can be switched to its opposite position with the rack switch button (on the top of the control module). Also, individual cards can be switched by the buttons at the top of the circuit modules.

NOTE

All switch buttons must be pressed and held for two seconds before switching takes place. This prevents inadvertent operation.

If the “R” (remote) is illuminated, the rack has been inadvertently locked. Continue with the instructions in **Chapter 4** of this manual and attempt to unlock the chassis with the Pro Switching System II software. If the Pro Switching System II software will not permit unlocking or will not recognize the existence of the chassis, check the cabling between the Pro Switching System II PC and the Pro Switching System II chassis.

4. PC Configuration and Pro Switching System II Quick Start

NOTE

This chapter describes how to quickly get started with Pro Switching System II software. For more in-depth information, refer to Chapter 6 and the chapters that follow.

4.1 The Software's PC Requirements

1. Original Pentium (that is, Pentium 1) or better processor.
2. CD-ROM drive.
3. An available serial port for Pro Switching System II connections to one or more sites. Additional serial ports are necessary if additional sites are to be supported without serial-port sharing.
If additional serial ports are to be added, please call Black Box Technical Support.
4. 64 or more MB of RAM.
5. Windows® 95, Windows 98, or Windows NT®. (Windows 2000 and Windows XP are not supported.)

4.2 PC Setup and Software Installation

1. Place the "Install Disk #1" in a CD-ROM drive. The software might autorun; if it doesn't, take steps 2 and 3.
2. From the Windows "Start" button, select Settings and then select Control Panels.
3. Double-click on Add/Remove Programs and locate "setup.exe" on the CD-ROM. Run it.
4. Follow on-screen instructions.

4.3 Pro Switching System II Startup

Open and configure Pro Switching System II as follows:

1. Open Pro Switching System II from the Windows "Start" menu.
2. Log on with User ID "Super" and password "User" (case sensitive).

3. Select Enterprise from the Configuration Menu and configure the software's enterprise-level settings (refer to **Section 9.1**). The Communications Ports and Maximum Sites entries are particularly important at this time. Click **OK** when finished.
4. Select Site from the Configuration Menu and configure one PC serial port for one physical site (refer to Section 9.2) . The Site Number must match the site number configured at the master rack (see **Section 3.3**). The Baud Rate (data rate) must match the Cntl-In/Out rate of the master rack adapter at the site (see **Section 3.4**). If the site is to be accessed with a dial modem or X.25 PAD, you also need to select Dial Strings from the Configuration Menu and set up the dial strings. Follow the examples below and refer to the dial-strings discussion in **Section 9.2**. (Click **OK** when finished.)

Example: Pro Switching System II Dial Strings

	Command	Response	Timeout (seconds)	Attempts
1	+++	OK	5	3
2	ATHM	OK	5	3
3	ATDT5556789M	CONNECT	45	3
4	<i>[leave this blank]</i>		45	3

Example: Pro Switching System II Hangup Strings

	Command	Response	Timeout (seconds)	Attempts
1	+++	OK	3	3
2	ATHM	OK	5	3

Set the Remote Call Cleared String to "NO CARRIER."

Remote (Master Rack) Dial Strings

	Command	Response	The master rack, after waiting for
1	+++	OK	[60] seconds for any response,
2	ATHM	OK	will repeatedly attempt to call
3	ATDT5556789M	CONNECT	the Pro Switching System II PC.
4	<i>[reserved for internal use by Pro Switching System II]</i>		

Set the PSSII Call Cleared String to "NO CARRIER."

Check "Configured" in the Discovery menu to direct the Pro Switching System II to recognize the existence of this particular site. Click **OK** when finished. All chassis at that site and all circuits within the chassis will be automatically configured (auto-discovery) provided that all chassis are properly cabled.

5. If necessary, select View/Map to display the Map. The configured-site icon will be displayed. If it's green, proceed to the next step. If it's maroon, click on the icon to observe connect activity.

NOTE

If there are more configured sites than available serial ports, the system may be waiting for an idle port.

Continue with the next step *only* if the Pro Switching System II connect is successful and the site icon turns green. If the icon does not turn green, review the enterprise- and site-configuration entries (earlier in **Section 3.3**), the rack configurations (**Section 9.3**), and the master-rack cabling.

6. Enter the View/Site screen for the configured site. Continue with the next step *only* if all racks at the site are recognized by Pro Switching System II. If any racks are missing, review the site's inter-rack cabling and the slave racks' Cntl-In/Out data rates.
7. If you want to configure additional sites, repeat this process beginning with step #4.

4.4 Checking the Console Cabling

The communications-cabling configuration for a Pro Switching System II master chassis can vary somewhat depending on a combination of the particular product being cabled and your preferred cabling and console hardware. This cabling can include two DB25 connections, several modular (RJ-45) connections and, in some cases, a DB9 connection. The configuration can be further complicated if the master rack is being accessed through a modem.

Console cabling can be investigated by using either of two basic items, an ohmmeter or an LED-equipped interface checker. If an ohmmeter is used, disconnect the cabling at the extreme ends and "ring out" the appropriate pins. If any wiring errors are detected, disconnect different sections of the cabling to isolate the errors.

If an interface checker is used, disconnect only at the control-module end and connect the interface checker to the CCA's DB25. Repeatedly attempt to enter a command at the PC running the Pro Switching System II software while confirming that the correct LED is blinking. Although this confirms the wiring in only one direction (from the PC), most wiring errors result from inadvertent crossovers in the modular connections (1-6 becomes 6-1 or 1-8 becomes 8-1). The modular cabling should then be checked using whatever means are available.

CHAPTER 4: PC Configuration and Pro Switching System II Quick Start

Figures 4-1 and 4-2 include all cabling-connector combinations that might be used in an installation. Cabling is shown from the Control Module, through the Control Converter Adapter's "Cntl-In" connector, to the Pro Switching System II PC. Figure 4-1 shows connections when a modem is *not* involved, while Figure 4-2 shows connections with a modem.

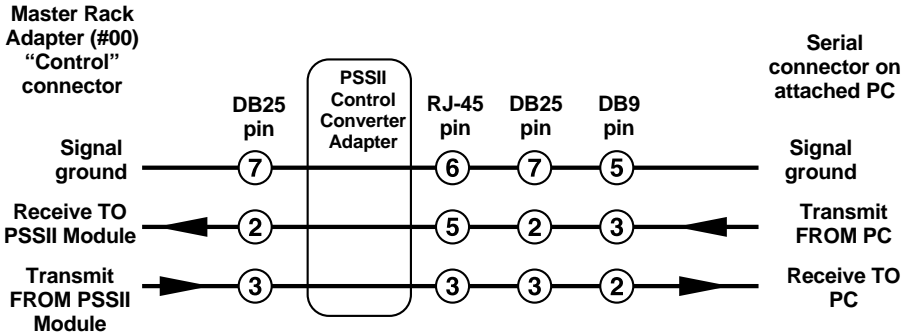


Figure 4-1. Cabling connector combinations without a modem.

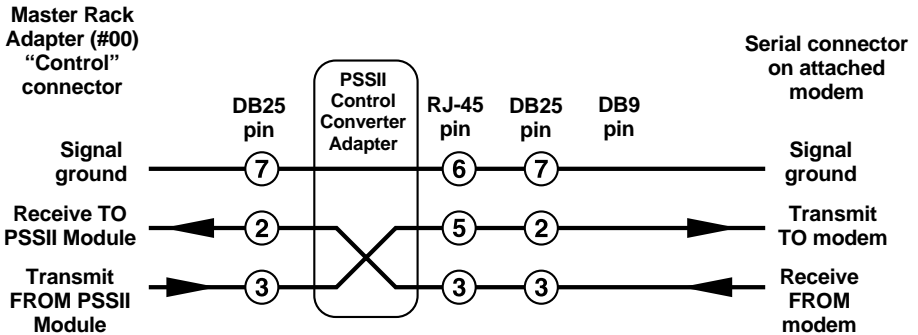


Figure 4-2. Cabling connector combinations with a modem.

5. Interfaces and Connectors

When two devices are connected together to perform a common function, they are connected via their respective “interfaces.” These interfaces must be compatible; that is, they must complement each other.

The most obvious compatibility consideration is the connector’s mechanical gender. A male connector (with pins) must always be connected to a female connector (with holes) and vice versa. A less obvious consideration is the logical (signal flow) gender, called DTE (Data Terminal Equipment) and DCE (Data Communications Equipment); this has no relationship to mechanical gender. Using RS-232 as an example, “Transmit Data” goes from DTE to DCE on pin #2 (wire #2) of both interfaces. “Receive Data” goes from DCE to DTE on pin #3. Consequently, a DTE and a DCE are connected with straight-through cabling while two DTEs (or two DCEs) are connected with a crossover cable. But while the data crossover is straightforward (2 to 3 and 3 to 2), the requirements of the attached devices must be investigated to determine proper control-signal crossovers. Clocking crossovers are usually straightforward unless tail circuits are involved.

In order for two connected interfaces to be compatible, they must adhere to the same standard. However, despite the apparent simplicity of that statement, there are pitfalls, most notably in the difference between what a given standard “really” says and what is accepted as part of the standard. The venerable RS-232 provides a classic example. The specification describes the electrical and functional characteristics of the various signals and specifically excludes any mechanical description of a connector. Yet we all “know” that the “RS-232 connector” is the well-known 25-pin semi-rectangular “DB25.”

Another pitfall is in interpreting standards “compliance” and standards “compatibility.” If an interface complies with most (many, some) of the requirements of a standard, is it compliant or merely compatible? An RS-232C device will communicate properly when connected to an RS-232D device provided that there is no need for the test mode and loopback signals. And how should a device be classified if it requires signaling not included in the standard? RS-232 has never included the “New Sync” signal, but some multipoint modems require it and it sometimes appears on pin #14. Lack of full compliance or compatibility is typically a problem only when one device requires an incoming signal not commonly provided by other devices.

Excluding the obsolete current loop, data communications interfaces use voltage signaling. An unbalanced signal consists of a voltage on a wire relative to “signal ground,” a defined common reference wire. All RS-232 signaling is unbalanced

and pin #7 is signal ground. A balanced (differential) signal requires two wires of opposite voltage polarity, called “A-side” and “B-side,” and the signal is the relationship between the two wires. Newer interfaces, such as RS-530, include both balanced signals and unbalanced signals. On occasion, an unbalanced signal can be connected directly to one side of a balanced signal; however, such a connection is rarely supported by vendors.

RS-232, published by the Electronic Industries Association (EIA), is a widely used interface standard. All signals are unbalanced and are relative to signal ground (pin #7). The standard was intended for data rates up to 20 kbps, although it is occasionally used for significantly higher rates. The standard defined fourteen interface types, requiring anywhere from seven to nineteen wires.

However, many real-world systems function with as few as three wires, and rarely does a system require more than ten or twelve. The DB25 (25-pin) and DB9 connectors have become a de facto part of the standard.

The “D” revision of RS-232 was created by the EIA to bring the standard more in line with the ITU (CCITT) V.24. RS-232D is essentially identical to RS-232C except that some semantics were changed and several control signals (for test purposes) were added.

The V.35 interface is usually used for interfaces operating at rates from 48 kbps to 2.048 Mbps. Balanced signals are used for data and clock while control signals are unbalanced. A Winchester-type 34-pin M-block (M/34) connector, with defined pin assignments, is commonly accepted as “the V.35 connector.” However, many vendors put V.35 signaling on DB25 connectors.

The X.21 standard supports data transmission up to 2.048 Mbps. All signals are differential and a DB15 connector, with defined pin assignments, is identified in the standard. Only six signals are specified, five of which have RS-232 equivalents.

Originally intended to supplant RS-232, RS-449 supports data rates up to 10 Mbps with balanced RS-422 signaling or up to 100 kbps with unbalanced RS-423 signaling. The specification defines pin assignments for two connectors, a DB37 and a DB9. RS-423 signaling lost popularity quickly and the DB9 connector was never used. As a practical matter, RS-449 today means a single DB37 connector with RS-422 signaling.

As a cost-saving measure, many vendors supplied products with DB25 connectors and a subset of the RS-422 signals. The EIA legitimized this use by creating RS-422A.

6. Software Introduction

6.1 Pro Switching System II Concept

PSSII is a Windows based software package intended to manage the Pro Switching System II. PSSII can support 100 racks (chassis) at each of twenty physical sites. The Pro Switching System II console communicates with the sites with any combination of dedicated or dial connections, using up to eighteen PC comm ports (one for the mouse if a comm port mouse is installed and the remainder for site support).

PSSII requires:

1. Original Pentium (that is, Pentium 1) or better processor.
2. CD-ROM drive.
3. An available serial port for Pro Switching System II connections to one or more sites. Additional serial ports are necessary if additional sites are to be supported without serial-port sharing.
If additional serial ports are to be added, please call Black Box Technical Support.
4. 64 or more MB of RAM.
5. Windows® 95, Windows 98, or Windows NT®. (Windows 2000 and Windows XP are not supported.)

6.2 Flexibility

PSSII provides you with the ability to examine any portion of the supported enterprise network at any desired level of detail. At the same time, however, PSSII will instantly advise you of any major occurrence anywhere in the network without regard to your current activity. This “Major Occurrence Monitoring” is accomplished with colored bars that appear at the bottom of all PSSII screens:

- If a maroon bar appears in the lower left of any screen: At least one Pro Switching System II communications problem exists. This could have resulted from a communications-link failure or from removal or failure of a supported component.
- One possibility if there's a yellow bar at the lower left of any screen: The “Circuit Interruptions” reporting option is enabled in the Enterprise Configuration and either (a) at least one circuit has been switched on a switching product or (b) at least one circuit has been interrupted by patch-cord insertion or intrusive test command. For more information, refer to **Section 9.1**.

- Another possibility if there's a yellow bar at lower left of any screen: "Programmed Alarms" reporting is enabled in the Enterprise Configuration and an alarm has been cleared as the result of an "AutoSwitch on Alarm" function of a switching product. For more information, refer to **Section 9.1**.
- If there's a blue-green bar at lower right of any screen: At least one acknowledged alarm exists. For more information, refer to **Section 7.5.1**.
- If there's a red bar at lower right of any screen: At least one unacknowledged alarm exists. For more information, refer to **Section 7.5.1**.

6.3 Logon and Logout

Start up PSSII by double-clicking on the Windows Pro Switching System II icon. Enter a valid User ID and Password and click "OK." If PSSII is being accessed for the first time, the factory default user ID is "Super" and the factory-default password is "User" (both are case sensitive). This "Super User" has access to all Pro Switching System II functions. Please refer to **Section 9.6** for more information.

A currently logged-on user can log out by selecting Log Out from the Security menu. Also, the Windows screen saver, if enabled, will also initiate an automatic logout from Pro Switching System II. From the Windows "Start" button, enter the Windows Control Panel and then enter the display. Select any screen-saver display and choose the desired time for an automatic logout.

A currently logged-on user can exit Pro Switching System II by selecting "Quit" from the Utilities menu.

6.4 Menu Structure

PSSII has six main menu selections: View, Logs, Configuration, Security, Reports, and Utilities. These are discussed in **Chapters 7** through **12** respectively.

7. View Menus

View
<u>E</u>nterprise
<u>S</u>ite
<u>R</u>ack
<u>C</u>ircuit
<u>G</u>roup
<u>M</u>ap
<u>S</u>erial <u>P</u>orts

Figure 7-1. View menu.

7.1 Status Displays

Status displays are provided in the Enterprise, Site, Rack, Circuit, and Group views. Interpretation of these displays is related to each individual view. For example, a particular status icon displayed in the Enterprise View relates to all components within the enterprise network while the same icon in a Site View relates to those components within the site being displayed.



A “thumbs up” icon in a green field indicates that no Pro Switching System II management-communications problems exist.

A “thumbs up” icon in a yellow field will appear only if “Circuit Interruptions” is checked (enabled) in the Enterprise Configuration. It indicates that at least one switching circuit has been switched and/or at least one circuit has been patched.



A yellow question mark within a maroon field indicates that at least one Pro Switching System II management-communications problem exists.



An alarm symbol within a red field indicates that at least one unacknowledged user-defined alarm exists.

An alarm symbol within a blue-green field indicates that at least one acknowledged user-defined alarm exists.

An alarm symbol within a yellow field will appear only if “Programmed Alarms” is checked in the Enterprise Configuration. It indicates that at least one user-defined alarm on a switching product has been cleared as a result of AutoSwitch on Alarm.



A padlock symbol indicates that all racks are locked.



An eye symbol within a yellow field indicates that at least one circuit is being monitored by external test equipment via either the Monitor test bus or the I/A Test bus.



A bus symbol indicates that at least one circuit is using the I/A bus for intrusive test access or cross-connect purposes.



A “patch” symbol indicates that at least one circuit has been interrupted as a result of either manual patch-cord insertion or I/A-bus connection. For switching products, note that activity involving the “A” interface while the circuit is switched to “B” results in no interruption.



If the “A” indicator is displayed, all switching circuits are in the “A” position. If the “B” indicator is displayed, all switching circuits are in the “B” position.

7.2 Horizontal Sub-Component Displays

Horizontal sub-component displays are provided in the Enterprise, Site, and Group views. Interpretation of these displays is related to each individual view. For example, each horizontal display in the Enterprise View relates to a site within the enterprise network. Each horizontal display in a Site View relates to a rack within the site being displayed. Each horizontal display in a Group View relates to a circuit within the group being displayed.

Name

The “Name” identifies the Pro Switching System II sub-component summarized in the horizontal display.

Status

A green bar on the left side indicates the absence of Pro Switching System II management-communications problems.

A maroon bar on the left side indicates the presence of one or more Pro Switching System II management-communications problems.

A yellow bar on the left side will appear only if “Circuit Interruptions” is checked in the Enterprise Configuration. It indicates that at least one circuit has been switched and/or patched.

A white bar on the right side indicates that there are no user-defined alarm conditions.

A red bar on the right side indicates the presence of one or more unacknowledged user-defined alarm conditions.

A blue-green bar on the right side indicates the presence of one or more acknowledged user-defined alarm conditions.

A yellow bar will appear on the right side only if “Programmed Alarms” is checked in the Enterprise Configuration. It indicates that at least one switching circuit has one or more user-defined alarm conditions that cleared as a result of “AutoSwitch on Alarm.”

Lock

A brown bar in the “Lock” column indicates that all racks represented by this view are locked.

Monitor

A yellow bar in the “Monitor” column indicates that at least one circuit is connected to an external monitor tester.

Interactive

A blue-green bar in the “Interactive” column indicates that at least one circuit is using the I/A bus for either intrusive testing or cross-connect purposes.

Patch

A blue bar in the “Patch” column indicates that at least one circuit has been interrupted by either manual patch-cord insertion or I/A-bus access.

A

B

A black bar in the “A” column indicates that at least one switching circuit is in the “A-position.”

A black bar in the “B” column indicates that at least one switching circuit is in the “B-position.”

7.3 Rack View

Each Rack View includes a conceptual depiction of the physical rack (chassis) itself. The rack can be depicted with either of two views, selected by the “Change View” button at the right side of the rack, as shown in Figure 7-2: with rectangles showing the states of the circuits (shown at left) or with rectangles showing the states of the leads (shown at right). The rectangles are color-coded to correspond with the Status icons.

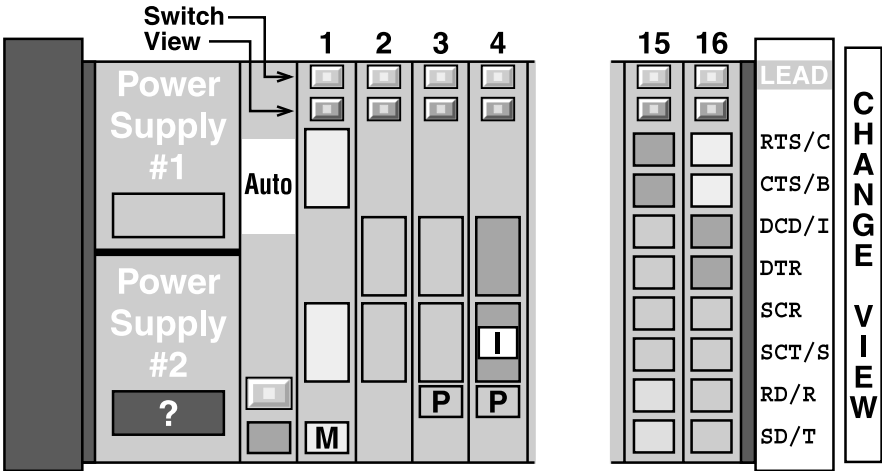


Figure 7-2. The Rack View.

RACK RESET AND STATUS



A rack-reset button and a rack-status icon are located on each Rack View, to the right of power supply #2. This icon is green when the rack logic is operating normally. If any of the following numbers are displayed, the rack logic is experiencing a problem:

01, 03, 04, 05, or 10 — Internal rack-firmware problem. Note the number, click on Reset, and contact Black Box Technical Support at 724-746-5500.

02 — Temporary communications problem. Some management data may have been lost. Click on **Reset**.

06 or 07 — Temporary buffer overload. Some management data may have been lost. Click on **Reset**.

08 — Status-message overload. This may have been caused by insertion of the circuit card while the system was powered. The Rack will cease transmission of status messages pending user intervention. Click on **Reset**.

09 — The rack logic has automatically reset itself two times in succession without user intervention. This could have been caused by significant manual rack switching while the rack was offline. The rack will cease accepting switch commands from the Pro Switching System II pending user intervention. Note the number, click on Reset, and contact Black Box Technical Support.

11 — The master rack has not received a message from the console for a period greater than the “watchdog timer,” and/or an attached slave has not received a message from the master for a period greater than the “watchdog timer.” Click on Reset and investigate the cause of the absence of messages. If you cannot determine the cause, contact Black Box Technical Support for assistance.

NOTE

The “Watchdog Timer” is not configured independently. To determine its value, refer to the Site Configuration menu (see Section 9.2). Multiply the “Communication Attempts” by the “Timeout Between Attempts” (in Retry Logic). Add this result to the “Polling Interval” (in Miscellaneous).

7.4 Circuit View

Below the Status area, the Circuit View identifies the circuit's group membership (if any) and its assigned alarm template (if any). Below that information is a reproduction of the "user information" entered in the circuit-configuration screen (see Section 9.4). The example in Figure 7-3 would be used for a switching circuit, with the arrow indicating the current switch position.

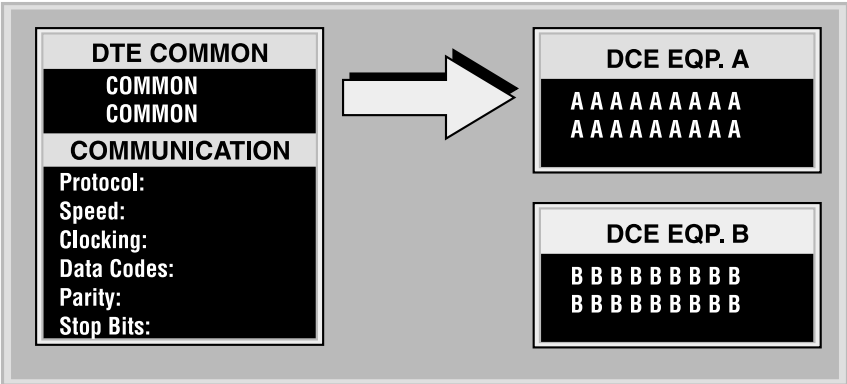


Figure 7-3. Switching circuit example.

A "software breakout box" is displayed to the right of the user information area, as shown in Figure 7-4:

Lead States	
RTS	OFF
CTS	OFF
DCD	OFF
DTR	OFF
SCR	NO CLOCK
SCT	NO CLOCK
RD	IDLE
SD	IDLE

Figure 7-4. Software breakout box.

7.5 Action Buttons

“Action Buttons” are provided at the bottom of the Enterprise, Site, Rack, Circuit, and Group views. The actual buttons provided in any specific view depend on the characteristics of the component(s) included within the view, and may consist of any combination of the following:

7.5.1 ALL VIEWS



The “Lock” and “Unlock” buttons lock and unlock all racks represented by the view.



The “Ack” button will acknowledge all alarms within the selected view. All red alarm indications will change to blue-green. The “Clear” button will clear all unacknowledged and acknowledged alarms within the selected view. All alarm icons and indicators will be removed except for the yellow alarms previously cleared via AutoSwitch, which will remain until acknowledged by the operator.

NOTE

If an alarm had been previously cleared via AutoSwitch, the “Ack” button will remove all yellow alarm icons and indicators.

7.5.2 ALL VIEWS THAT CONTAIN SWITCHING CIRCUITS



The “A” button forces all switching circuits within the displayed view to the “A” position. The “B” button forces all switching circuits to the “B” position. The “Alt.” button reverses the current positions of all switching circuits.

7.5.3 ALL ENTERPRISE AND SITE VIEWS



The “View Circuit” button causes an immediate jump to a view of any desired circuit within the enterprise network.

7.5.4 ALL RACK AND CIRCUIT VIEWS



The “interactive” button brings up the screen shown in Figure 7-5. It allows you to connect or disconnect a circuit or circuits to or from the Interactive (I/A) test bus. You can also select whether the I/A bus is connected to the rear “I/A test” connectors or to the rear “monitor” connectors.

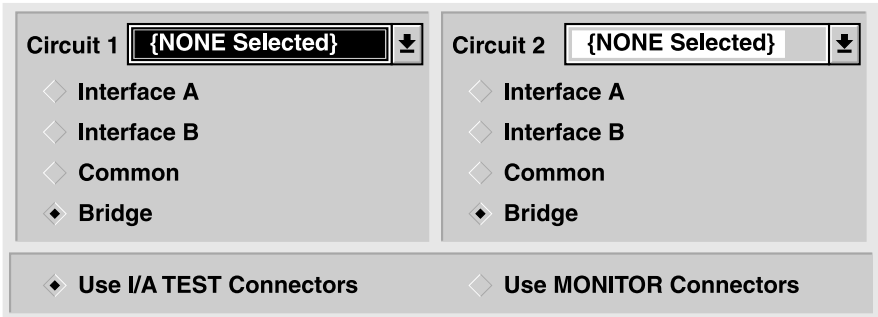


Figure 7-5. Interactive screen.

The “monitor” button brings up the screen shown in Figure 7-6. It allows you to connect or disconnect a circuit to or from the monitor bus. Rates up to 2.048 Mbps can be monitored with the temporary loss of alarm and status processing.

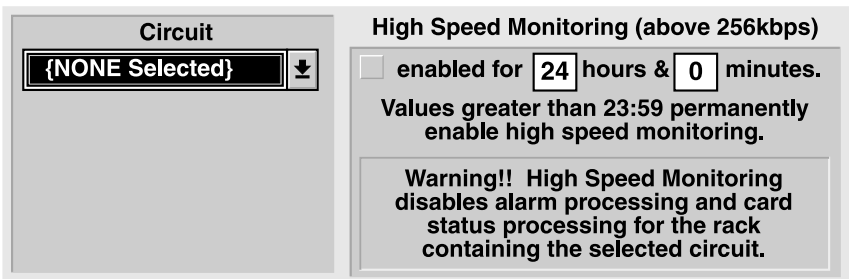


Figure 7-6. Monitor screen.

The “View Circuit” button (not included in Circuit Views) causes an immediate jump to a view of an identified circuit within the enterprise network.

7.6 Map View

The Map View superimposes site icons on a user-determined geographical map. It provides a “quick look” at the health of all sites within the enterprise network.



Southhampton

A green background indicates that the site has no anomalies.

A red background indicates that the site has unacknowledged alarms.

A blue-green background indicates that the site has acknowledged alarms.

A set of yellow question marks with a maroon background indicates that the site has a Pro Switching System II communications problem.

A yellow background corresponds to the yellow “Thumbs-Up” and yellow “Alarm” icons in the Site View status-display area (see **Section 7.1**).

Clicking on a site icon will cause a jump to the appropriate site view.

The map is selected by an authorized user from the Enterprise Configuration menu. The Pro Switching System II is shipped with a selection of commonly used maps. Additional maps can be created by you with any graphics software that produces “.bmp” files. Map file sizes should be 642x424 pixels. These files should be placed in the C:\PSSII\MAPS directory to allow selection from the configuration menu.

7.7 Serial Ports View

The Serial Ports view allows you to force a connection or disconnection of any dial modems or X.25 PADs used to support the Pro Switching System II management link. This function is most useful for those modems (or PADs) defined within the “First/Last Automatically Assigned Serial Port” range in the Enterprise Configuration menu (see **Section 9.1**).

When this feature is used with optional remote-site hardware, a single physical PC comm port and a single dial connection can be shared between the Pro Switching System II management system and a communications-tester management system. Contact Black Box Technical Support for details.

8. Logs Menu



Figure 8-1. Logs menu.

8.1 Alarm and Event Logs

The Alarm Log is a chronological record of the most recent alarms, alarm clears, and alarm acknowledgments, while the Event Log is a chronological record of the most recent system events. The temporary versions of these logs only hold entries about the alarms and events that have occurred since the last time that Pro Switching System II was started. To conserve space, twenty-five entries will be discarded from either log once two hundred are accumulated in that log. So, once the software has been running for awhile, each log will maintain at least 175 and no more than 200 entries at all times. Because the temporary logs are stored in RAM, they will be lost when the Pro Switching System II software is exited.

If enough disk space is available, alarms and events are also appended to the ends of the permanent versions of these logs. The permanent Alarm and Event Logs are stored on disk and can be viewed and printed through the Reports menu (see **Chapter 11**).

ALARMS

In order for an alarm to “occur,” it must have been defined and enabled as a “trigger” in an alarm template. Then, the template must be assigned to a circuit or circuits. Finally, conditions matching the alarm definition must occur on the circuit or circuits.

A mouse click on a specific alarm will select that alarm. A mouse click on the “View” button (upper left) will cause a jump to the circuit view appropriate for the selected alarm. A double-click on a specific alarm will cause the same jump.

EVENTS

Events are displayed with this color coding:

- Maroon: The console has lost communication with a component in the system. If this type of event occurs while the log is being viewed, the display will automatically scroll to the new event.
- Blue: System milestones, such as initialization, login (successful), login (unsuccessful), logout, and communications restored (with a previously “lost” component).
- Gray: Minor system occurrences, including switching and periodic attempts to reestablish communications with a “lost” component.
- Yellow: Switching has occurred while “Circuit Interruptions” is checked in the Enterprise Configuration.

8.2 Print

Use this entry to configure your printer for real-time alarm and event printing. The following display appears:

Enable

Current Printer Settings

Epson LQ-1050,EPSON24,LPT1:

Alarm Printing	Event Printing
<input checked="" type="checkbox"/> Alarm <input checked="" type="checkbox"/> Clears	<input checked="" type="checkbox"/> Errors <input checked="" type="checkbox"/> Milestones <input checked="" type="checkbox"/> Changes
Page Breaks	<div style="border: 1px solid black; padding: 5px; display: inline-block;">Setup Printer...</div>
<input checked="" type="checkbox"/> Titles <input checked="" type="checkbox"/> Headers	

Figure 8-2. Print display.

Clicking on the Enable checkbox at the top enables the special printing feature that permits the Pro Switching System II to print to any printer.

NOTE

We recommend that you use a local dot-matrix printer with a 132-column print width.

The alarm-printing checkboxes allow you to determine if alarm occurrences and alarm clears will be printed.

The event-printing check boxes allow you to specify which events will be printed by the line printer: errors, milestones, and/or changes.

The page-break checkboxes allow you to specify whether titles and headers are to be printed at the beginning of each page.

The “Setup Printer...” selection displays a typical Windows printer-setup screen.

9. Configuration Menus

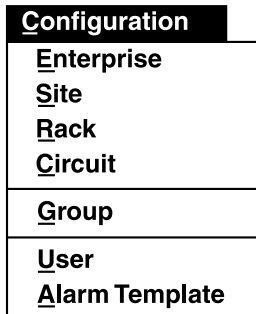


Figure 9-1. Configuration menu.

9.1 Enterprise Configuration

Select “Enterprise” from the Configuration Menu to configure parameters for the entire enterprise. A window will appear containing panes dedicated to various options.

The “Name” pane allows you to personalize the enterprise network.

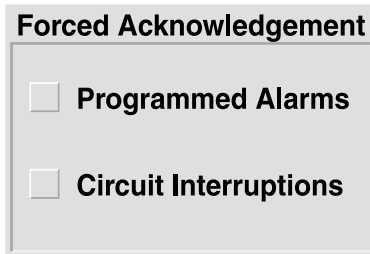


Figure 9-2. Forced Acknowledgement pane.

The “Forced Acknowledgements” pane forces the PSSII to notify you of things:

If “Programmed Alarms” is checked, you will be advised whenever a user-defined alarm has been cleared because of “AutoSwitch on Alarm.” Yellow indicators will remain on the appropriate screen(s) until you manually acknowledge the clear(s).

If “Circuit Interruptions” is checked, you will be advised whenever any switch position has been changed either manually (local pushbutton) or automatically (AutoSwitch on Alarm). You will also be advised whenever a manually inserted patch cord interrupts your data. Yellow indicators will remain on the appropriate screen(s) until the user manually acknowledges the switching action.

For additional information, please refer to the descriptions of the Pro Switching System II “views” (**Chapter 7**).

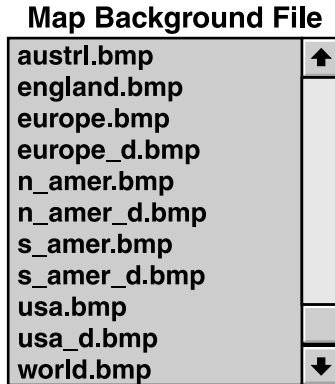


Figure 9-3. Map Background File list box.

The “Map Background File” list box is used to select the map that will be displayed when the Map View is selected.

The Pro Switching System II is shipped with a selection of commonly used maps. Additional maps can be created by the user with any graphics software that produces “.bmp” files. Map file sizes *must* be 642x424 pixels to prevent inordinately slow screen painting. These files should be placed in the C:\PSSII\MAPS directory to allow selection from the configuration menu.

Communication Ports	
First Serial Port	COM 01 <input type="button" value="↓"/>
First Automatically Assigned Serial Port	DISABLED <input type="button" value="↓"/>
Last Automatically Assigned Serial Port	DISABLED <input type="button" value="↓"/>
Last Serial Port	COM 02 <input type="button" value="↓"/>

Figure 9-4. Communication Ports pane.

Use the “Communication Ports” pane to tell the PSSII which PC ports it can talk to:

The “First/Last Serial Port” entries define the total range of PC serial ports assigned for Pro Switching System II use. These ports can be cabled directly to master racks or can be connected via dedicated or dial modems or X.25 PADs.

The “First/Last Automatically Assigned Serial Port” entries are a subset of the “First/Last Serial Port” entries. They have significance only if the number of physical sites exceeds the number of total PC serial ports in the system. When that occurs, specific ports (connected to dial modems or X.25 PADs) are shared for support of some or all sites and these ports are automatically assigned as required.

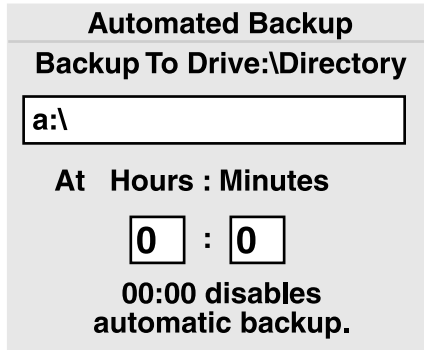


Figure 9-5. Automated Backup pane.

In the “Automated Backup” pane, the Pro Switching System II can be configured to automatically back up its entire configuration database once every day. The location for the automatic backup is determined by the contents of the “Backup to Drive:\Directory” box. The hours and minutes entries indicate the time of day that the backup will occur.

NOTE

The size of the backup files precludes using floppies for this purpose. Backups should be directed to a LAN server.

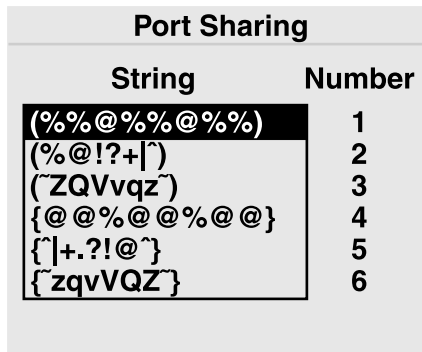


Figure 9-6. Port Sharing pane.

You can use the Port Sharing pane to set up the Pro Switching System II software to share a single dial connection with the management software for a communications tester. It is used in conjunction with the Serial Ports “View” menu and requires special remote-site hardware. Contact Black Box Technical Support for details.

The image shows a configuration window titled "Miscellaneous". It contains two input fields. The first is labeled "Maximum Sites" and has the value "2" entered. The second is labeled "Minimum Password Length" and has the value "4" entered.

Figure 9-7. Miscellaneous pane.

You can set two options in the Miscellaneous pane:

Pro Switching System II software can support up to twenty physical locations (sites). However, performance can be optimized by setting the figure in the “Maximum Sites” box to the number of sites that actually exist within the supported network.

The “Minimum Password Length” (in characters) affects all passwords defined *after* this entry is made.

9.2 Site Configuration

Select “Site” from the Configuration Menu to define the characteristics of any particular site. The Site Configuration window consists of panes dedicated to various options.

The image shows a configuration window with two sections. The top section is titled "Name" and contains a text box with the value "Z-Site 01". The bottom section is titled "Description" and contains a text box with the value "Z-Site 01 Description".

Figure 9-8. Site Name and Description pane.

The site name and site description are free-form text boxes that allow user-meaningful information for each site.

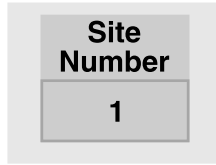


Figure 9-9. Site Number pane.

The site number can NOT be changed by the Pro Switching System II user. This number is manually set at the site’s master rack. Make sure that the master rack at this site is configured to match this number.

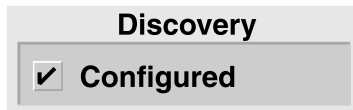


Figure 9-10. Discovery pane.

The “Discovery:Configured” check box is a flag indicating (to the console) that the site exists. If a site is not configured, the console will not recognize the site nor any racks and/or circuits at that site. If a site is “configured” after having been “unconfigured” (this checkbox turned on after being off), all racks at that site and all circuits within those racks will be automatically “discovered” and configured.

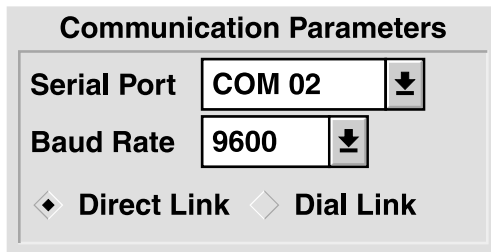


Figure 9-11. Communication Parameters pane.

Use the “Communication Parameters” pane to set several serial-link options.

The “Serial Port” must be either a specific PC serial port or “Next Free” (for dial connections only). If “Next Free” is chosen, the Pro Switching System II will select an available port from the “First/Last Automatically Assigned Port” range when a connection to a remote location is necessary.

The Pro Switching System II supports remote-site connections through either dial modems or X.25 PADs. If modems are used, they must be capable of accepting Hayes commands and they must be configured for “direct” asynchronous mode (no compression, no buffering, and no protocol). X-ON/X-OFF flow control must be selected.

The “baud rate” (data rate) must match the rate configured for the master rack at the site (see **Section 3.4**) and must match the setting for the modems (or X.25 PADs) that will be used to support the link.

Check the “Dial Link” box if and only if this site is supported by dial modems or X.25 PADs.

Retry Logic	
Communication Attempts	3
Timeout between attempts (Seconds)	6
Reconnect (Minutes)	5

Figure 9-12. Retry Logic pane.

Use the “Retry Logic” pane to set how the PSSII handles retries.

“Communication Attempts” is the number of attempts by Pro Switching System II to send an error-free message to a remote site (we recommend three). The “Timeout Between Attempts” is the length of the pause between these message attempts (we recommend six seconds).

After unsuccessful transmission of the specified number of attempts using a dial or X.25 link, Pro Switching System II will disconnect (hang up) the link. The “Reconnect” time is the “wait time” before the site is redialed and the attempts repeated. On a dedicated (non-dial) link, “Reconnect” is the wait time before the attempts are repeated.

Miscellaneous	
Remote Unlock Key (000 to disable)	000
Maximum Racks	3
Polling Interval (Minutes)	30
Minimum Online (Minutes)	5

Figure 9-13. Miscellaneous pane.

Use the “Miscellaneous” pane to set various options.

Remote Unlock Key: The “Remote Unlock Key” is the password number that can be used to manually unlock any rack at this site. It provides a benefit if local switching functions are necessary during the time that a malfunction is preventing the Pro Switching System II from controlling the racks. A “000” entry disables manual unlocking capability.

To manually unlock a rack, press Lamp Test at the bottom of the control module until the upper LED display indicates “PAS” (approximately five seconds). The lower LED display will indicate a “0” at the left side. Press the right button as required until the left digit matches the first password number. Press the left button to access the center digit and repeat for the second password number. Repeat this again for the right digit and the third number. When the correct number is displayed, press the left button to unlock the rack and enable all switching and configuration buttons.

After manual unlocking, a rack can be manually relocked by pressing Lamp Test for approximately five seconds (both LED displays will flash “888”).

NOTE

If the rack’s configuration-setup buttons (on the control module) have been operated, do NOT manually lock the rack until successful Pro Switching System II access can be confirmed (a Pro Switching System II lock command is recommended). If you lock the rack and discover that the PSSII can’t access it, you’ll have to erase the control module’s RAM as described in Chapter 13.

After manual unlocking followed by five minutes of “unlock time,” the rack will automatically lock, but this automatic relocking will be disabled if the rack’s configuration setup buttons have been operated. In that case, the rack can be relocked *only* via Pro Switching System II command.

Maximum Racks: Pro Switching System II can support 100 racks at an individual site. However, performance can be optimized by setting the “Maximum Racks” entry in the Site Configuration to the quantity of racks that actually exist at the site.

NOTE

The “Maximum Racks” assumes that there are no “gaps” in the site’s slave numbers. For example, if a site physically includes only a master #00 and a slave #07, the “Maximum Racks” entry **MUST** be eight or greater.

Polling Interval: When Pro Switching System II has not communicated with a site for a significant period of time, it will connect to that site and transmit an “Are You There” message to confirm the integrity of the management link. This period of time is the “Wake Up Interval.”

Minimum OnLine: When there has been an automatic connection via a dial or X.25 link, Pro Switching System II will keep the connection up for the “Minimum On-Line” time to allow the user to investigate the cause for the automatic connection. The link will be kept up indefinitely if the user is in the appropriate Site View or a view of a rack or circuit within that site.

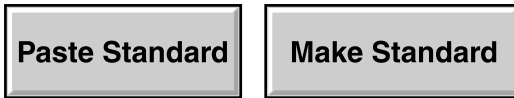


Figure 9-14. Standard buttons.

A standard site configuration, initially set to factory defaults, can be “pasted” into any site with the “Paste Standard” button. The “Make Standard” button defines *this* site’s configuration as the standard. (You should note that this doesn’t codify the *existing* settings as the standard configuration, but rather *whatever* settings are configured for this site—both now and in the future. If the site configuration is subsequently changed, the standard will be automatically changed as well.)

The standard site configuration does not include the site’s dial strings (which can also be defined as a standard). However, it is typically in your best interests to assign both standards to the same site.



Figure 9-15. Configure Dial Strings button.

Pro Switching System II supports remote site connections via either dial modems or X.25 PADs. If modems are used, they must be capable of accepting Hayes commands and they must be configured for “Direct” asynchronous mode (no compression, no buffering and no protocol). X-ON/X-OFF flow control must be selected. The same data rate must be used for the Pro Switching System II comm port, the remote master rack, and both modems.

Outgoing calls (from the Pro Switching System II) are sent via either a specific serial port and modem (or PAD) or to an automatically selected port from the “First/Last Automatically Assigned Port” range defined in the Enterprise Configuration menu. Incoming calls (to Pro Switching System II) are made to either a specific modem (and PC serial port) or to the first available port as determined by a telco-supplied “hunt group.” Although there is no required relationship between the outgoing automatically assigned ports and the incoming hunt group, you are advised to make the hunt group a subset of the outgoing ports (or the full range of outgoing ports).

Press the Configure Dial Strings button to access the Dial-String Configuration window. It consists of the panes shown below and on the following pages.

PSS II Dial Strings				
	Command	Response	Timeout (Seconds)	Attempts
1	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>
2	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>
3	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>
4	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>

Figure 9-16. PSSII Dial Strings pane.

The Pro Switching System includes provision for four sequential dial/response strings for console-initiated dial connections (although many systems will require only one combination).

Dial string #1 is first sent to the appropriate PC serial port and modem (or PAD). If and when the correct response is received by the Pro Switching System II, dial string #2 (if it exists) will be sent, followed by #3 and #4. If no response is received

after sending any specific command, it will be repeated after expiration of the indicated “Time-out.” If the specified number of “Attempts” has been made with no response, the subsequent dial strings will not be sent and the Pro Switching System II will report a system-alarm condition.

Modem example:

	Command	Response	Timeout	Attempts
1	ATDT12155551212\M	CONNECT 9600	45	3

X.25 PAD example:

	Command	Response	Timeout	Attempts
1	chr\M	hello	4	3
2	address*port \M	com	4	3

PSS II Hang Up Strings				
	Command	Response	Timeout (Seconds)	Attempts
1	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>
2	<input type="text"/>	<input type="text"/>	<input type="text" value="45"/>	<input type="text" value="3"/>

Figure 9-17. Hang Up Strings pane.

The Pro Switching System II includes provision for two sequential hangup/response strings (although many systems will require only one combination).

Hangup string #1 is first sent to the appropriate PC serial port and modem (or PAD). If and when the correct response is received by the Pro Switching System II, hangup string #2 (if it exists) will be sent. If no response is received after sending any specific command, it will be repeated after expiration of the indicated “Timeout.”

If the number of “Attempts” has been made with no response, the subsequent hangup strings will not be sent and Pro Switching System II will report a system-alarm condition.

NOTE

The remote site CANNOT command a call termination.

Modem example:

	Command	Response	Timeout	Attempts
1	+++	OK	3	3
2	ATH\M	OK	45	3

X.25 PAD example:

	Command	Response	Timeout	Attempt
1	\PP chr\M	hello	4	3

Remote (Master Rack) Dial Strings			
	Command	Response	The master rack, after waiting for
1	<input type="text"/>	<input type="text"/>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">180</div> seconds for any response, will repeatedly attempt to call the PSS II PC.
2	<input type="text"/>	<input type="text"/>	
3	<input type="text"/>	<input type="text"/>	
4	Please refer to the help screens for an explanation of the fourth dial string.		

Figure 9-18. Remote (Master Rack) Dial Strings pane.

The remote-site firmware includes provision for three sequential hangup/response strings (although many systems will require only one combination).

Remote dial string #1 is first sent to the appropriate PC serial port and modem (or PAD). If and when the correct response is received, remote dial string #2 (if it exists) will be sent, followed by #3. If no response is received after sending any specific command, it will be repeated after expiration of the indicated "Timeout." This sequence will be repeated indefinitely until the correct response is eventually received.

When the last user-entered response string is satisfied, the remote site automatically sends a fourth, system-generated "dial string." Because this string is sent after the connection has been established, the link treats the string as data and delivers it to the console, which enables the console to confirm that the incoming call came from a valid site. The console, in turn, generates a response (also treated as data), which enables the rack to confirm that it is connected to the correct console.

Modem example:

	Command	Response	Timeout
1	ATDT12155551212\M	CONNECT 9600	180

X.25 PAD example:

	Command	Response	Timeout
1	chr\M	hello	180
2	address*port \M	com	

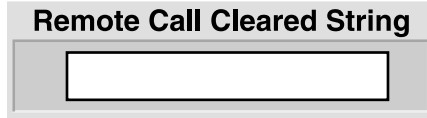


Figure 9-19. Remote Call Cleared String field.

If the remote master rack receives the “Remote Call Cleared” string, it will recognize that the dial connection has been terminated for reasons beyond its control. This message is typically “No Carrier” for modem connections and “Cleared” for X.25 connections.

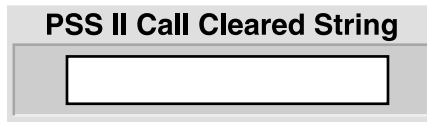


Figure 9-20. PSSII Call Cleared String field.

If the Pro Switching System II console receives the “PSSII Call Cleared” string, it will recognize that the dial connection has been terminated for reasons beyond its control. This message is typically “No Carrier” for modem connections and “Cleared” for X.25 connections.

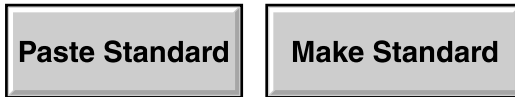


Figure 9-21. Standard buttons.

A standard dial configuration, initially set to factory defaults, can be “pasted” into any site with the “Paste Standard” button. The “Make Standard” button defines *this* site’s dial parameters as the standard. (You should note that this doesn’t codify the *existing* dial settings as the standard configuration, but rather *whatever* dial settings are configured for this site—both now and in the future. If the site’s dial parameters are subsequently changed, the standard will be automatically changed as well.)

The standard dial-string configuration does not include the site configuration itself (which can also be defined as a standard). However, it is typically in your best interests to assign both standards to the same site.

HAYES COMMANDS

Hayes commands almost always begin with the “AT” (attention) characters and end with a carriage-return character. The characters following the “AT” determine the action(s) that the modem will perform when it receives the carriage return.

Printable characters (such as “A” and “T”) are entered via normal keystrokes. Control characters are entered with a backslash followed by an appropriate printable character (please refer to an ASCII code chart). For example:

“M” sends a carriage return to the modem

“J” sends a line feed to the modem

“\” sends a single backslash to the modem

“T” is the Hayes “Tone” (DTMF) command. “D” is the “Dial” command. The following command string will cause a modem to use tones to dial 1-215-555-1212:

```
ATDT12155551212\M
```

A typical response to this string is “CONNECT”.

WHY UNCONFIGURE?

The Pro Switching System II system has been designed to ensure that the console acknowledges the existence of all circuits and racks that exist within a site. If a circuit or rack is physically removed, that removal is considered to be a system anomaly and the user is informed with color-coded bars and question marks. “Unconfigure” (removing the check mark in “Discovery:Configured”) should be performed when a system component, such as a circuit or a rack, has been deliberately removed and you want to prevent the display of the “anomaly.”

Circuits and slave racks can be deliberately unconfigured after physical removal from the system.

However, if a master rack is unconfigured (under any circumstances), the entire site is unconfigured.

When a site (or master rack) is unconfigured, the Pro Switching System II will cease polling that site regardless of whether it is physically present or not. If a circuit or slave rack is unconfigured without having been physically removed, the system will rediscover the unconfigured item.

9.3 Rack Configuration

Select “Rack” from the Configuration Menu to define the characteristics of any particular rack. In the window that appears, the rack name and description are free-form text boxes that allow user-meaningful information for each rack. This rack *must* be physically located at the indicated site and *must* be configured for the indicated rack number.

The “Discovery:Configured” check box is a flag indicating (to the console) that the rack exists. All racks that physically exist (and are connected) will be “discovered” and automatically configured when the Pro Switching System II is powered up. If a rack has been deliberately “unconfigured” (check removed), all circuits within that rack will also be unconfigured. See “Why Unconfigure?” on the previous page.

9.4 Circuit Configuration

Select “Circuit” from the Configuration Menu to define the characteristics of each individual Pro Switching System II-supported circuit. Except as noted, these characteristics are for user information only (they are displayed on the Circuit View screen) and do not affect Pro Switching System II operation.

The Circuit Configuration window consists of panes dedicated to various options. The circuit name and description are free-form text boxes that allow user-meaningful information for each site. If the user circuit is synchronous, the entries in the “Communications Parameters” list boxes are entirely for your convenience.

Free-form text boxes are also available for a name and description of each individual interface (or “side”) of the circuit. There are three “sides” to a switching circuit: the “Common,” an “A,” and a “B.” The “Common” is set by the user as “DTE” or “DCE” and the “A” and “B” sides will be the opposite. In the case of a non-switching circuit, the Pro Switching System II assumes “DTE” and “DCE” to be as marked on the physical rack connectors.



Figure 9-22. Discovery:Configured checkbox.

The “Discovery:Configured” checkbox is a flag indicating (to the console) that the circuit exists. When a Site is initially configured, all Racks within that Site and all Circuits within those Racks are automatically discovered (and “configured”). Also see “Why Unconfigure?” on the previous page.

Site	Z-Site 01
Rack	Z-Rack S01R00
Slot	01

Figure 9-23. Site/Rack/Slot pane.

The “Site/Rack/Slot” pane allows no entries. It displays the user-defined names for the site and rack containing the circuit being configured and the number of the circuit’s physical card slot within the rack. Refer to **Sections 9.2** and **9.3**.

Circuit Type

RS232 (V.24)	⌵
--------------	---

Figure 9-24. Circuit Type field.

The “Circuit Type” field reports the interface signaling for the circuit being configured, which is autodetected by the PSSII. It is possible to scroll between different interfaces, but the system will not let you select an incompatible interface.

NOTE

Module versions are available with PROMs dedicated to a particular signaling standard which will cause the circuit to default to that standard when Pro Switching System II is restarted. Also, the circuit type is automatically detected.

Alarm Template

{ALARMS DISABLED}	⌵
-------------------	---

Figure 9-25. Alarm Template list box.

The “Alarm Template” list box allows you to select a particular “alarm template” (see **Section 9.7**) that Pro Switching System II will use to continuously monitor the proper operation of this circuit.

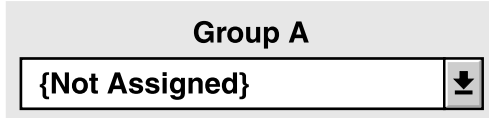


Figure 9-26. Group list box (Group A shown).

Use the “Group A,” “Group B,” and “Group C” list boxes to determine the groups (if any) to which this circuit will belong (see **Section 9.5**). Each individual circuit can belong to as many as three groups but need not belong to any. Pull down the list boxes to select any of the user-defined groups (there can be as many as 63 of these).

All circuits in any specific group can be viewed in the Group View. Also, in the case of switching products, an entire group can be switched at one time (either via command or automatically upon alarm). There is no requirement that all circuits within a group be at the same site.

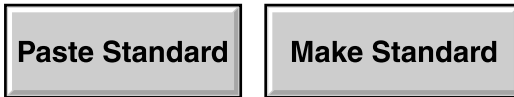


Figure 9-27. Standard buttons.

A standard circuit configuration, initially set to factory defaults, can be “pasted” into any circuit with the “Paste Standard” button. The “Make Standard” button defines *this* circuit’s parameters as the standard. (You should note that this doesn’t codify the *existing* circuit settings as the standard configuration, but rather *whatever* settings are configured for this circuit—both now and in the future. If the circuit’s parameters are subsequently changed, the standard will be automatically changed as well.)

9.5 Group Configuration

Select “Group” from the Configuration Menu to define switching groups. In the Group Configuration window, you can customize group names and descriptions. (Group membership is determined using the Circuit Configuration window—see **Section 9.4**). You can also configure automatic (time of day) switching for all members of the group.



Enable	Switch to
<input checked="" type="checkbox"/>	Alternate 
<input type="checkbox"/>	Alternate 

Figure 9-28. Enable checkboxes and Switch To list boxes.

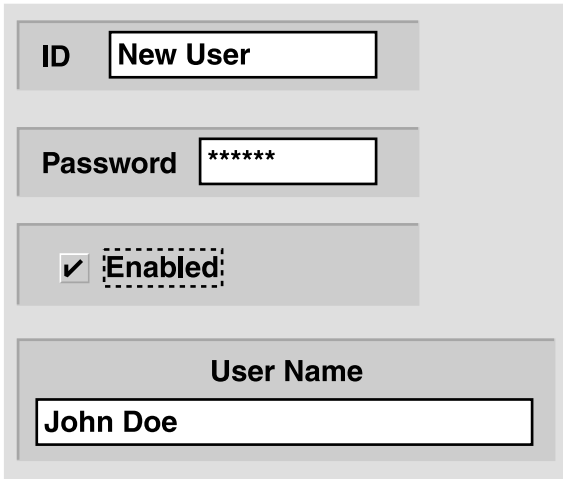
The “Enable” check box enables a particular switching action for all members of the group. Up to eight enables are available for eight switching actions and/or times of the day and/or days of the week and/or days of the year. (In the example in Figure 9-29, all switches within the group will reverse their current positions at 2:10 p.m. every Tuesday, every Wednesday, every Saturday and every August 15.) The “Switch to” list boxes allow you to select “Alternate” (switch to A if on B or to B if on A), “Force-A” (switch to A), or “Force-B” (switch to B).

Hour : Minute	Mo	Tu	We	Th	Fr	Sa	Su	Date (MM/DD)
14 : 10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	08 / 15
00 : 00	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	/

Figure 9-29. Sample switch-timing configuration for a group.

9.6 User Configuration

Select “User” from the Configuration Menu to enter user information and set users’ access privileges. The User Configuration window consists of an Info pane and a Security pane.



The screenshot shows a configuration window with the following fields:

- ID:** A text box containing "New User".
- Password:** A text box containing "*****".
- Enabled:** A checkbox that is checked, followed by the text "Enabled:".
- User Name:** A text box containing "John Doe".

Figure 9-30. Info pane.

In the info pane, the “ID” and “Password” entries are required for logon purposes. Each individual user can change his or her own password during a subsequent logon.

NOTE

A user with “Administration” access can change another user’s password without knowing its current setting.

The “Enabled” checkbox must be checked for Pro Switching System II to accept this user’s logon sequence. All enabled users can log on and off, have access to all Pro Switching System II “View” screens, and can shut down (Quit) the Pro Switching System II from the “Utilities” menu. Other capabilities are determined by the “Security” check marks (see the following paragraphs).

The “User Name” is the user’s real name.

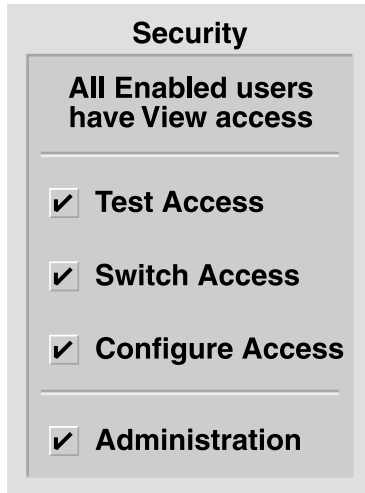


Figure 9-31. Security pane.

In addition to “View access,” the Security pane’s checkboxes provide the following:

“Test Access” privileges allow you to establish test connections and to enable, acknowledge, and clear alarms.

“Switch Access” privileges allow you to switch circuits and to lock and unlock racks.

“Configure Access” privileges allow you to configure any aspect of the Pro Switching System II system except “Enterprise” and “Users.” “Utilities:Database” access is also excluded from this security level.

“Administration” privileges allow you to configure the “Enterprise” and “Users” and also permit access to the “Database” portion of the “Utilities” menu to purge or initialize the Pro Switching System II database.

CAUTION!

It is possible to delete the Administration access privileges from the presently logged-on user. If the system is logged off while no users with Administration privileges remain, Administration authorization cannot be retrieved without calling Technical Support.

9.7 Alarm-Template Configuration

Select “Alarm Template” from the Configuration Menu to define alarm “templates,” which can then be assigned to specific circuit(s) using the Circuit Configuration menu (see **Section 9.4**). The actual creation of an alarm template is performed by modifying one of the ninety-nine default templates provided with Pro Switching System II. The names for the default templates have a “Z” prefix.

Name	Signal Level		Time To Alarm		Audio-Visual Alarms	
Enabled	Lead		(in seconds)	Clear	A	V
<input type="checkbox"/>	RTS	OFF	5	5	<input type="checkbox"/>	<input type="checkbox"/>

Figure 9-32. Alarm template.

In the Alarm Template window, the default template name can be changed with normal text-editing keystrokes in the “Name” field. Names should be chosen that have meaning relative to the expected use of the associated alarm.

Each template can have up to eight “triggers.” Each trigger is a separate alarm condition and is individually enabled (checked) by a mouse click on its enable box. For each “trigger” within an Alarm template, the alarm-detection mechanism independently interprets signal levels of a specific lead as follows:

- Control signals (RTS, CTS, DCD, or DTR) ON (high) or OFF (low)
- Clock signals (SCR or SCT) PRESENT (transitions) or ABSENT (no transitions)
- Data signals (RD or SD) ACTIVE (zeroes/spaces) or IDLE (ones/marks)

The Alarm and Clear timers must be set for each enabled “trigger” (alarm condition) in an alarm template. Minimum times (for both alarm and clear) are:

- Control signals, 1 second
- Clock signals, 2 seconds
- Data signals, 4 seconds

The maximum time to alarm is 6 hours. The “Ignore” timer is fixed at 2 seconds.

Two checkboxes are provided for each trigger in an alarm template: “A” for audible and “V” for visual. These respectively enable audible (beep) and visual (LED) alarm indications at the rack(s) where the alarm condition occurs.

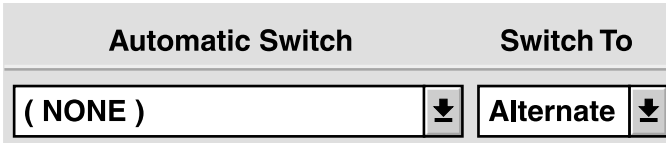


Figure 9-33. Automatic Switch and Switch To list boxes.

The alarm template’s switching entries apply only to switching circuits that the Pro Switching System II supports.

Each alarm “trigger” within an Alarm template can be independently configured for a specific automatic switching action. This action will take place when an alarm condition has resulted from the conditions described in the trigger. The action selected can be directed toward:

- > None: No automatic switching.
- > Circuit: Switch the alarming circuit(s) only.
- > Rack: Switch all circuits in the physical rack(s) containing the alarming circuit(s).
- > Group: Switch all circuits within a selected group. This group will typically include the alarming circuit, but that is not a requirement.

The switching action itself can be:

- > Alternate: Reverse the existing switch position(s).
- > “A”: Force the switch(es) to the “A” position.
- > “B”: Force the switch(es) to the “B” position.



Figure 9-34. Standard buttons.

A standard circuit configuration, initially set to factory defaults, can be “pasted” into any circuit with the “Paste Standard” button. The “Make Standard” button defines *this* circuit’s parameters as the standard. (You should note that this doesn’t codify the *existing* circuit settings as the standard configuration, but rather *whatever* settings are configured for this circuit—both now and in the future. If the circuit’s parameters are subsequently changed, the standard will be automatically changed as well.)

10. Security Menu

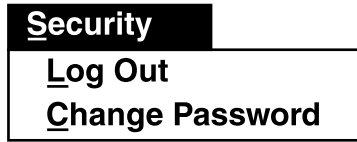


Figure 10-1. Security menu.

10.1 Log Out

Logs the user out of the Pro Switching System II without shutting down the software.

10.2 Change Password

Allows the logged-on user to change his or her own password.

11. Reports Menu

Reports
A larm Range E vent Range
C onfiguration
A ll A larms A ll E vents

Figure 11-1. Reports menu.

The Reports Menu allows Event, Alarm, and Configuration reports to be printed to the console screen, a text file, or a printer. In order to view or print properly, a specific printer must be selected in landscape mode through the operating system. Reports can be generated from either the permanent Event Log or the permanent Alarm Log with user-determined filtering at the time the report is selected. All permanent records of events and alarms that haven't been purged (see **Section 12.1**) are available for a "Report," including those that were lost or discarded from the temporary log files (see **Chapter 8**).

11.1 Alarm Range

Alarm Range allows you to select the "from/to" range of alarms stored on disk. The "Anomalies Only" check box will filter out all alarm clears. Also see **Section 12.7**.

11.2 Event Range

Event Range allows you to select the "from/to" range of events stored on disk. The "Anomalies Only" check box causes the Pro Switching System II to filter out all normal system events and to display/print only "anomalies." An event anomaly is a major event that would have displayed a maroon bar at the bottom of all Pro Switching System II displays. Also see **Section 11.7**.

11.3 Configuration

Configuration allows you to print a report of the current configuration of Sites, Racks, Circuits, or Users. Three types of “Circuits” reports are available: “Circuits,” “Protocol,” and “Circuits in Large Print.”

- The basic “Circuits” report displays/prints the name of each circuit with descriptions of the circuit itself and the DTE/DCE “sides” of the circuit.
- The “Protocol” report displays/prints the name of each circuit with its protocol, speed (data rate), clock configuration, data code, parity, stop bit configuration, and rack identification.
- The “Circuits in Large Print” report uses a large, more readable font. The report resembles the basic “Circuits” report except that Primary Group assignment is added while abbreviated descriptions are provided for the DTE/DCE “sides” of the circuit.

11.4 All Alarms

All Alarms provides a report of all alarms stored on disk. No filtering is applied.

11.5 All Events

All Events provides a report of all events stored on disk. No filtering is applied.

11.6 Report-Display and Report-Printing Controls

The scroll bars on the right side of the screen function within the single displayed report page. Icon mouse clicks are used for page selection and print control:



Displays the first page of the report.



Displays the preceding page of the report.



Displays the following page of the report.



Displays the last page of the report.



Stops further loading of alarms or events into the selected report.



Prints the displayed report using the printer identified by the Print Manager.

12. Utilities Menu



Figure 12-1. Utilities menu.

12.1 Database

Upon entering the Database portion of the Utilities menu you are presented with choices to completely or partially purge the permanent logs, back up or restore the configuration database, or initialize the database.



Figure 12-2. The Complete Log Purges pane.

By clicking the appropriate button in the Complete Log Purges pane, the Alarm and/or Event Logs can be completely purged to save disk space. These logs are not the temporary log files accessed under the “Logs” menu (see **Chapter 8**) but, rather, the complete logs accessed under the “Reports” menu. Before purging either or both of these logs, make sure that their contents are not required for a trouble history.

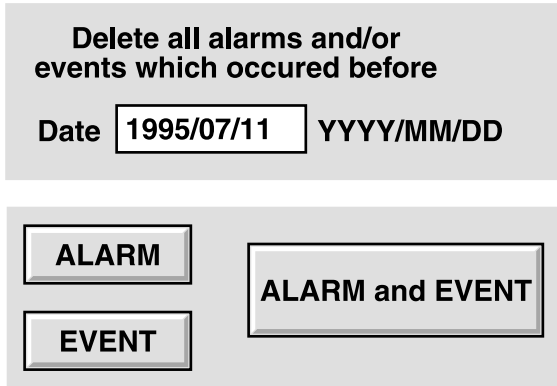


Figure 12-3. The Partial Log Purges pane.

If, rather than purging an entire permanent log, you'd like to purge just older records, you can specify a start date and click the appropriate button in the Partial Log Purges pane to purge all entries in the permanent Alarm and/or Event Logs that were recorded *before* that date.

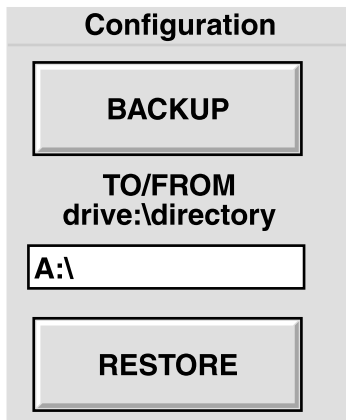


Figure 12-4. The Configuration pane.

The entire configuration database can be backed up and restored manually using the buttons and the TO/FROM field in the Configuration pane. The size of the backup files precludes using floppies for this purpose; send backups to a LAN server.

CAUTION!

If automatic backup has been configured in the Enterprise Configuration screen, and manual backups are made to the same location, they will overwrite each other.

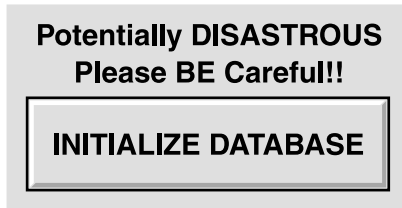


Figure 12-5. The Initialize Database button.

You can initialize the PSSII's entire configuration database by clicking the "Initialize Database" button. Initializing the database will return the Pro Switching System II to its factory-default configuration. ALL user-entered parameters will be lost. We *strongly* recommend that you back up the current database before taking this action.

12.2 Quit

The Pro Switching System II will shut down when this menu item is selected.

NOTE

The temporary log files available under the Logs Menu (see Chapter 8) will be lost when the Pro Switching System II shuts down.

13. Erasing Control-Module RAM

If a control/test module was accidentally locked while not connected to the control console, you'll have to use the following procedure to unlock the control module:

1. Power down the rack by disconnecting it from its power source.
2. Remove the control/test module (See **Section 2.2.2**).
3. Remove the RAM chip from position U25 (see Figure 13-1) on the control/test module.

CAUTION!

Removing the RAM chip erases all configurations and settings.

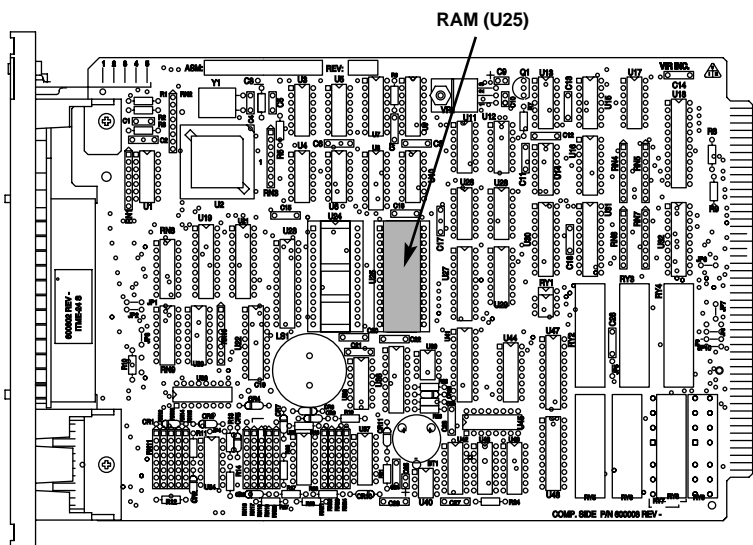


Figure 13-1. Position of the RAM chip on the control/test module.

14. Troubleshooting

14.1 Calling Black Box

If you determine that your Pro Switching System II is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Black Box Technical Support at 724-746-5500.

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

- the nature and duration of the problem;
- when the problem occurs;
- the configuration of your system;
- the components involved in the problem—cables, devices, etc.;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you've already done.

14.2 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.
- Before you ship the PSSII back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Glossary

Alarm: An alarm is a customer-defined occurrence on any circuit within the entire network. An alarm can be the presence or absence of data, clock, or control signaling. Although alarms are normally defined as undesirable interface anomalies, that is not a requirement. Also see *Alarm Timers*.

Alarm Timers:

- **Time to Alarm:** When an alarm condition occurs, the Pro Switching System II will confirm that the condition is present for the “Time to Alarm” before it recognizes that alarm and takes appropriate action.
- **Time to Clear:** When an alarm has been recognized and the alarm condition subsequently clears, it must remain clear for the “Time to Clear” before the Pro Switching System II recognizes the clear condition and takes appropriate action.
- **Time to Ignore:** When an alarm occurrence on a particular switchable circuit results in an autoswitch, all potential alarm and clear conditions on that line will be ignored for the duration of the “Time to Ignore.”

ARQ: Automatic Repeat reQuest. An error-control mechanism with which the receiver circuitry can determine whether or not a received transmission is totally error-free. If it is not, a repeat of the transmission is automatically requested. ARQ is the most efficient form of error control on commonly available long-haul transmission facilities. In comparison with FEC, ARQ results in significant delays when errors are present and large amounts of errors can completely halt the successful transmission of valid user data.

ASCII: American Standard Code for Information Interchange. An asynchronous signaling code with character framing. An ASCII character consists of a start bit, seven data bits, a parity bit (even if unused), and a stop bit. In some cases, 1, 1½, or 2 stop bits are used. Thus, ASCII is at best 70% efficient with seven data bits out of every ten-bit character. Note that 1½ stop bits can not be used if the data will be carried by modern-day modems. Also see *Parity* and *Asynchronous*.

The parity bit is used as an eighth data bit with International ASCII and Extended ASCII, thus increasing the number of definable characters from 128 to 256.

ASCII data can also be transported synchronously and, in such cases, it is commonly known by the oxymoron “clocked async.”

Asynchronous: Asynchronous (async) data transmission does not use clock signaling between the DTE and DCE. Characters are individually framed by start and stop bits. The most common async character code is ASCII. True async DCEs can accept any DTE data rate up to a defined maximum.

Isochronous data transmission also does not use clock signaling between the DTE and DCE. However, isochronous DCEs will accept only specifically identified DTE data rates. As a practical matter, modern-day “async” DCEs are actually isochronous. Exceptions are modems supporting no more than 300 bps and the obsolete 1200-bps 202-type modem. Note that isochronous modems cannot accommodate a 1½-stop-bit coding.

Balanced Signals: Balanced signals are those that require two wires per signal, an “A” wire and a “B” wire. Examples are V.35 clock and data leads and RS-530/449/422 clock, data, and control leads.

This contrasts with unbalanced signals, which are those that use a single wire per signal plus a common ground shared with other signals. Examples are V.35 control leads and RS232 clock, data, and control leads.

Breakout Box: A basic communications tester that provides the instantaneous status of the leads in an interface.

Circuit: A pair of connected complementary (DCE/DTE) interfaces. In the case of a Pro Switching System II, an example of a circuit is a common DCE connected to either DTE-A or DTE-B.

Two (or more) circuits in a series are commonly treated as a single larger circuit.

Compression: A mechanism that allows a significantly large amount of data to be represented by a relatively small amount for storage and/or transmission. Data is not usable in its compressed form; it must be uncompressed (returned to its original form) before use. Files can be compressed offline in a computer or in real time by a modem but not both (a compressed file cannot be compressed a second time).

Modems incorporating a modified FEC with Trellis Coded Modulation (TCM) typically include real-time compression.

Configured/Unconfigured: System components (sites, racks, and circuits) must be “configured” in order to be recognized by the Pro Switching System II software. Components are configured automatically and with checkboxes in the appropriate configuration menus. They are unconfigured by removal of the check mark. The Pro Switching System II will deny the existence of any components that are not configured.

CSU: Channel Service Unit. Connects a DSU or a bipolar DTE to digital common carrier networks such as DDS. Contains the last signal regenerator on the digital line and a mechanism to put the line into loopback for testing from the carrier's central office.

Data: Any representation such as bits, characters, or analog quantities to which meaning is, or might be, assigned.

DCE: Data Communications Equipment. The "side" of an interface closer to the common carrier network. Also known as "Service." See *Interface*.

DDCMP: DEC's Digital Data Communications Message Protocol. A general-purpose byte-oriented data-link protocol designed for inter-computer data communications. DDCMP operates over synchronous or asynchronous and switched or non-switched communications links. It can operate in point-to-point configurations or in multipoint configurations in which communication takes place between a control station and each of several tributary stations. Incoming bits are assembled into bytes (characters) with start/stop bits for async endpoints and data blocks with synchronization characters (or sequences) for sync endpoints.

DDD and PSTN: DDD and PSTN are terms for the dial network commonly used for voice-telephone calls and by dial modems. DDD is "Direct Distance Dial" and PSTN is "Public Switched Telephone Network." The dial network is universally "2-wire."

DDS: Dataphone Digital Service, formerly Digital Data Service. A digital network service available from AT&T, the Bell Operating Companies, and independent telephone companies. Non-switched synchronous data rates of 2400, 4800, 9600, and 56,000 bps (bits per second) and switched synchronous 56,000 bps are commonly available. Also, some operating companies offer 19,200 bps and some offer reverse channel capability. A DSU and a CSU are used in place of a modem, although some 56,000-bps DTEs use bipolar signaling and require only a CSU.

DSU: Data Service Unit. A DCE used in place of a modem with common carrier digital networks. Frequently (but incorrectly) referred to as a "digital modem." The DSU converts common data-processing signals, such as those used in RS-232, V.35, and RS-422, to the digital network's bipolar format. The DSU is not needed if the attached DTE uses bipolar signaling. Connects to the network through a CSU.

DTE: Data Terminal Equipment. The "side" of an interface closer to the data processing equipment. Also known as "Equipment." See *Interface*.

EBCDIC: Extended Binary Coded Decimal Interchange Code. A synchronous signaling code, commonly used by IBM, with no character framing (start/stop) bits and no parity bit. An EBCDIC character consists of eight data bits. It is used as one of many contiguous characters within a large block. The block contains start- and stop-bit sequences and an error-control bit sequence. Also see *Synchronous*.

Echo: Async terminals use an “echo” to display entered characters on the screen. The echo can be remote (provided by the host computer) or local (within the terminal). A remote echo requires a full-duplex transmission facility while a local echo does not. Consequently, many terminals use the “FDX” terminology to configure for remote echo and the “HDX” terminology to configure for local echo.

Failure to configure the host to complement the terminal will result in either no screen display (no echo) or double characters (two echoes).

Enterprise: The sum total of all network components managed by the Pro Switching System II.

Error Measurements:

- Bit Error Rate (BER) is, simply, the ratio of errored bits received to total bits received during the receipt of a known repeating pattern. The Pro Switching System II generates and detects two standard pseudo-random patterns, 511 bits and 2047 bits, plus All Marks, All Spaces, and Alternate Mark/Space. A BER Test is also known as a BERT.
- Block Error Rate (BKER) is similar to BER except that groups of contiguous bits are artificially defined as “blocks.” Block sizes are sometimes related to the transmitted pseudo-random pattern size, but a 1000-bit block size is also common. An “errored block” is a block that contains at least one bit error.
BKER is more meaningful than BER for analog facilities used with sync error-control protocols. A BKER Test is also known as a BLERT.
- Error-Free Seconds (EFS) is the quantity of error-free seconds expressed as a percentage of the total quantity of seconds of the test. EFS is more meaningful than BER and BKER for digital (DDS) facilities.
- Also see *Interactive Testing*.

FEC: Forward Error Control. An error control mechanism in which the receiver circuitry can determine the presence of errors in a received transmission and can correct those errors without requesting additional information from the transmitting circuitry. In comparison with ARQ, FEC consumes large amounts of bandwidth regardless of the presence of errors.

Trellis Coded Modulation (TCM, used with 19,200- and 38,400-bps modems) includes a modified FEC to bring the perceived performance to a level that can be handled efficiently by common EDP ARQ protocols. A 19,200-bps modem can

nominally transmit 1920 ASCII cps (characters per second). However, that figure includes the 20% overhead required for the modified FEC. Thus, under the best of circumstances, a 19,200-bps modem can transmit 1536 ASCII cps.

If data compression is enabled (common with TCM modems), the 1536 cps figure can represent a substantially greater quantity of actual user cps. Note that the modem's compression mechanism provides no benefit if the user data has been previously compressed by the computer.

Full-Duplex: Also known as “FDX” and “Duplex.” See *Half-Duplex*, *Simplex*, and *Echo*.

1. The ability of a transmission facility to transport data in both directions simultaneously. Modems (or DSUs) at both ends of point-to-point full-duplex facilities and at the master location in multipoint full-duplex facilities use “constant carrier.” Modems at remote locations in multipoint full-duplex facilities use “controlled carrier” (carrier controlled by RTS with data transmission controlled by CTS).
2. The ability of a data-processing device or protocol to simultaneously transmit and receive data.

NOTE

Some devices and protocols (for example, BiSync) require full-duplex facilities but actually operate in half-duplex.

Group: A “group” is a logical collection of circuits without regard to their location within the Pro Switching System II. All switchable circuits within a specific group can be switched by either console command or automatically (upon alarm). There is no requirement that the alarming circuit belong to the group that will be automatically switched. A circuit need not belong to a group, but, if it does, it can belong to one, two, or three groups. Circuits are assigned to and removed from groups by using the Circuit Configuration menu (see **Section 9.4**).

The Group View screen provides detailed status information regarding all circuits within a group and allows single-command switching of all switchable circuits within the group.

Half-Duplex: Also known as “HDX.” See *Full-Duplex*, *Simplex*, and *Echo*.

1. The ability of a transmission facility to transport data in both directions but not simultaneously. Half-duplex facilities use modems (or DSUs) configured for “controlled carrier,” also known as “switched carrier,” (carrier controlled by RTS with data transmission controlled by CTS) at all locations.
2. The ability of a data-processing device or protocol to transmit and receive data but not simultaneously.

NOTE

Some devices and protocols (for example, BiSync) require full-duplex facilities but actually operate in half-duplex.

High-Speed Monitoring: If “High-Speed Monitoring” is selected from any Pro Switching System II monitor-activation menu, user data up to 2.048 Mbps can be monitored. Because of rate limitations with RS-232 signaling, the rack must contain the optional interactive test-module card with V.35 monitor outputs.

During the time that the high-speed monitoring is activated, all circuit-card processing in the entire rack containing the monitored circuit will be halted. This includes alarm reporting (and any attendant automatic switching), software breakout-box information, and switch-position status. The circuit cards will respond to console-generated switch commands (but without reporting the resulting position-change information to the console). When the high-speed monitoring is subsequently turned off, all current status will be immediately reported to the console.

Hunt Group: The local telephone-operating company (telco) can configure multiple dial lines at a single location as a “hunt group.” Incoming calls are always dialed to a single number (the lowest number of the group). The telco Central Office directs the call to the first non-busy line within that group. A hunt group with attached modems at the Pro Switching System II site can be used to support incoming calls from remote sites.

Interactive (I/A) bus: The Interactive (I/A) bus functions as an “all-purpose” bus in a rack adapter. By console command, any identified circuit (or circuits) can be disconnected and a specific interface (“A,” “B,” or “common”) connected to the I/A bus. Thus, the bus can be used to connect an interface to the rear-mounted I/A Test connectors or, in the case of the Pro Switching System II, to the rear-mounted Monitor connectors and/or to cross-connect any two interfaces within a rack adapter. Through appropriate external cabling, a cross-connect can be established between two interfaces in separate rack adapters.

Interactive Test Module (ITM): The Interactive Test Module (ITM) is installed in the leftmost full-height slot in a Pro Switching System II rack. It contains the system firmware. The firmware constitutes a logical bridge between the console commands and the circuit modules. Rear connectors support console communications and external connections from both the interactive test bus and the monitor test bus.

The interactive test module also contains LED signal-status indicators and voltage-test points accessed with manual patch cabling.

Interactive Testing: “Interactive Testing” is the intrusive testing of one interface of a circuit. Interactive testing requires the identification of both a circuit and an interface, DTE or DCE, associated with that circuit. In the case of the Pro Switching System II, the interface is identified as “A,” “B,” or “common.” If the selected interface is half of a connected DCE/DTE combination, that combination must be disconnected.

Interactive tests can consist of protocol simulation, BER tests, BKER tests, or EFS tests. Also see *Error Measurements*.

Interface:

1. One “side” of a pair of connected devices; that is, the DCE side or the DTE side.
2. The signaling specification used by a pair of connected devices. Signaling specifications supported by the Pro Switching System II are RS-232, V.35, X.21, RS-530/422A, and RS-449/422 (abbreviated).

Leased Line: A telephone line (nearly always 4-wire) that permanently connects two or more customer sites. It is also called a “private line” and a “dedicated line.” Except for the 4-wire configuration, leased lines are similar to dial lines.

Lock/Unlock: Racks can be locked and unlocked from the Pro Switching System II console.

Switching and configuration buttons will not function on a locked rack. However, all manual patching functions are still enabled.

The Pro Switching System II has no switching buttons and the configuration buttons perform no function under the software. When a Pro Switching System II rack is locked, manual patch-cord insertion will *not* result in circuit interruption.

Modem: A “dataset,” commonly called a “modem” (from “modulator-demodulator”), allows digital computer signaling to be transmitted over analog telephone lines. Modems are available that are synchronous or asynchronous for either 2-wire dial (DDD, PSTN) or 4-wire leased-line applications.

Monitor bus: The Monitor bus in a Pro Switching System II rack adapter carries the TTL representation of the signaling from any circuit identified with a console command. This TTL signaling is then converted to RS-232 signaling by the interactive test-module (ITM) card and presented to the rear-mounted Monitor Test connector, thus ensuring electrical isolation in the case of an operator error at the tester control panel. An optional ITM card converts to V.35 signaling. Any circuit can be monitored by a single RS-232 (or V.35) monitor tester regardless of the interface signaling of the circuit itself.

The Pro Switching System II hardware can provide monitor outputs for customer signaling at customer data rates up to 256 kbps with no impact on system functionality. It can support 2.048 Mbps with minor reductions in system functionality during the time that the “High-Speed Monitoring” is activated.

The signals available for monitoring are SD, RD, RTS, CTS, DSR, DCD, DTR, SCT, SCR, SCTE, and LL.

Monitor Testing: “Monitor Testing” is the non-intrusive monitoring of a selected circuit and is also known as “bridged testing.”

Multipoint: A communications link connecting more than two stations in which one station is responsible for data-link control. Also known as multidrop. See *Full-Duplex*.

Overhead: Framing, error control, addressing, idle code, or any other characters or bit sequences in a data transmission other than actual end-user data.

Parity: A character-level error-control mechanism used with asynchronous signaling codes. A parity bit is set to either a “one” (mark) or a “zero” (space) to ensure that the total quantity of “ones” within a character are either odd (odd parity) or even (even parity). Start and stop bits are excluded from the parity calculation. Character level error control has not been successful and, today, parity is rarely used. However, asynchronous hardware requires that the parity bit be present (usually forced to “one”) even if unused. Also see *ASCII*.

Point-to-Point: A communications link connecting two and only two stations. See *Full-Duplex*.

Polling: Interrogation of devices for purposes such as to avoid contention, to determine operational status, or to determine readiness to send or receive data.

Rack Adapter: A “rack adapter,” also called a “rack,” is a Pro Switching System II chassis that is mounted in a NEMA standard 19” equipment cabinet. It contains slots to accommodate power supplies, a control module, and sixteen circuit modules.

Reverse Channel: The RS-232 specification assumes that normal transmit and receive data (pins #2 and #3) will be at identical rates. However, the specification also includes a full complement of secondary data and control signals (but no clocks) for additional data transport, typically at rates from 5 to 75 bps. The need for these secondary channels no longer exists but, when it did, a half-duplex facility was configured to operate in a simplex manner with a secondary channel in the opposite, or reverse, direction (hence, “reverse channel”).

The Pro Switching System II supports all reverse channel signaling.

RS-232: An electrical signaling specification published by the Electronic Industries Association (EIA). Although not identified in the specification, the 25-pin (DB25) connector, with specific pin assignments, is commonly accepted as “the RS-232 connector.”

The Pro Switching System II supports RS-232 on the DB25 connector with industry-standard pin assignments.

All RS-232 signaling is unbalanced.

RS-530, RS-449, RS-422, RS-422A: RS-530, RS-449, RS-422, and RS-422A are signaling specifications published by the Electronic Industries Association (EIA).

RS-422 defines electrical signaling characteristics. It references a companion standard RS-449 which defines signal functions placed on a 37-pin (DB37) mechanical connector with specific pin assignments.

Because of the cost of the DB37 connectors, manufacturers generally ignored that portion of the specification and placed a subset of the RS-449 signals on a 25-pin (DB25) connector. The EIA subsequently legitimized this practice by publishing RS-422A/RS-530.

As a practical matter, RS-530 is simply “RS-449 on DB25.” The Pro Switching System II supports both RS-449 and RS-530 with pin assignments that match the specifications.

All RS-530 signaling is balanced.

SDLC: Synchronous Data Link Control. A discipline conforming to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute (ANSI) and High-level Data Link Control (HDLC) of the International Standards Organization (ISO) for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or non-switched lines. The configuration of the link connection may be point-to-point, multipoint, or loop.

Shared Management Links: Multiple physical sites can share Pro Switching System II serial ports for management access through dial modems and/or X.25 PADs. The Pro Switching System II console and the remote locations will automatically connect when necessary for management communication in either direction. This sharing can be implemented as a cost-saving measure and is absolutely necessary when the total number of physical sites exceeds the number of available PC serial ports.

Simplex:

1. A transmission facility limited to transporting data in only one direction. Simplex facilities are extremely rare. See *Full-Duplex* and *Half-Duplex*.
2. A data-processing device or protocol capable of transmitting or receiving, but not both. Simplex devices are rare in data-processing applications. One example is printing through the obsolete “202” modem. In dial mode, the 202 was half-duplex and printer flow control could not get back to the computer fast enough. So the printer was configured as simplex with a reverse channel for flow control. Simplex examples in other industries include commercial radio and television.

Site: All hardware components (racks and circuits) accessed through a single serial port at the Pro Switching System II PC, typically residing at one physical site or location.

Switch/Patch Module: A switch/patch module supports one A/B switchable circuit in the Pro Switching System. Twenty-four leads (wires) are switched; safety ground is never disconnected. Switch/patch modules are available for RS-232, V.35, X.21, and RS-530/RS-449 interfaces. Each Pro Switching System II chassis accommodates sixteen switch/patch modules in any mix/match configuration.

Synchronous: Synchronous (sync) data requires the exchange of bit-rate clocking between the DTE and DCE. Transmit Data (to the DCE) is phased to the Transmit Clock (usually provided by the DCE). Receive Data (from the DCE) is phased to the Receive Clock (always provided by the DCE). Sync data does not use stop/start character framing. Instead, a large group of contiguous characters are framed by a start-bit sequence and an end-bit sequence. The most common sync character code is EBCDIC.

NOTE

With modern-day bit-oriented “DLC” protocols, the “large group of contiguous characters” is treated as a very large group of sequential bits.

Turnaround Time: The physical delay from the end of a transmission to receipt of the response to that transmission. This could result from a variety of factors, including physical distance and/or CTS delay at a remote location configured for controlled carrier (carrier controlled by RTS with transmission controlled by CTS).

Unbalanced Signals: Unbalanced signals are those that use a single wire per signal plus a common ground shared with other signals. Examples are V.35 control leads and RS-232 clock, data, and control leads.

This contrasts with balanced signals, which require two wires per signal, an “A” wire, and a “B” wire. Examples are V.35 clock and data leads and RS-530/449/422 clock, data, and control leads.

V.35: V.35 is an electrical signaling specification published by the CCITT (ITU). Although not identified in the specification, the M/34 (Winchester-type) connector, with specific pin assignments, is commonly accepted as “the V.35 connector.” V.35 signaling is also legitimately supported on DB25 connectors, but the pin assignments have not been standardized within the industry.

The Pro Switching System II supports V.35 on both the DB25 and M/34 connectors. The DB25 pin assignments are provided in Table 2-1 in **Section 2.4**. The M/34 pin assignments are industry-standard.

V.35 clock and data signals are balanced. V.35 control signals are unbalanced.

X.21: X.21 is an electrical standard published by the CCITT (ITU) that includes a DB15 mechanical connector identification with specific pin assignments.

The Pro Switching System II supports X.21 on both DB15 and DB25 connectors. The DB15 pin assignments are per specification. The DB25 pin assignments are provided in Table 2-1 in **Section 2.4**.

All X.21 signals are balanced.

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