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FEDERAL COMMUNICATIONS COMMISSION AND INDUSRY CANADA RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

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NORMAS OFICIALES MEXICANAS (NOM) ELECTRICAL SAFETY STATEMENT**INSTRUCCIONES DE SEGURIDAD**

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

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

Contents

Chapter	Page
1. Specifications	5
1.1 Specs for Pow-R-Switch (SWI030, SWI031) Units	5
1.2 Specs for Rack Tray (SWI032)	7
2. Introduction	8
2.1 General Overview	8
2.2 Features	8
2.3 Applications	9
2.4 The Pow-R-Switches 1M and 1S Illustrated	10
3. Installation	12
3.1 Selecting the Address	12
3.2 Setting the Configuration Switch	13
3.3 Linking the Modules	14
3.4 Making the Control-Port Connection (Pow-R-Switch 1M Only)	15
3.5 Making the Power Connections	16
3.6 Testing for Proper Installation	16
4. Operation	18
5. Troubleshooting	21
5.1 Calling Your Supplier	21
5.2 Shipping and Packaging	21
Appendix A: Accessories	22
A.1 The Rack Tray (SWI032)	22
A.2 Modular Adapters	23
Appendix B: Pinouts	24

1. Specifications

1.1 Specs for Pow-R-Switch (SWI030, SWI031) Units:

Compliance —	FCC Class A, IC Class/classe A
Interfaces —	All models: Serial EIA RS-485; Pow-R-Switch 1M (SWI030) models only: Serial EIA RS-232 (DTE), IBM AT implementation
Protocol —	Asynchronous
Code Set —	ASCII
Data Format —	8 data bits, no parity, 1 stop bit (fixed)
Flow Control —	None
Data Rate —	2400 or 9600 bps, user-selectable
Maximum Distance —	RS-232 (Control) side: 50 ft. (15.2 m); RS-485 (Link) side: 2000 ft. (609.6 m) to farthest Pow-R-Switch 1S (SWI031) module
User Controls —	Keyboard commands; (2) Rear mounted: (1) Rotary dial for addressing and (1) 4-position DIP switch for data rate, toggle delay, and default outlet state
Indicators —	(3) Front-mounted LEDs: AC ON, LINK, and RDY (ready)

POW-R-SWITCHES 1M, 1S

Connectors —	All rear-mounted: Data: All models: (2) RJ-11 female (for RS-485); Pow-R-Switch 1M (SWI030) units only: (1) DB9 female (for RS-232); AC Power: 120-VAC models (SWI030A, SWI031A) only: Input: (1) North American standard NEMA 5-15P plug (on power cord); Output: (1) North American standard NEMA 5-15R outlet; 230-VAC models (SWI030AE, SWI031AE) only: Input: (1) International standard IEC 320 male inlet; Output: (1) International standard IEC 320 female outlet
Leads/Signals Supported —	1, 2, 3, 4, 5, and 7 (RLSD [DCD], TD, RD, DTR, SGND, and RTS respectively); see Appendix A
Power —	120-VAC models (SWI030A, SWI031A): Input and Output: 120 VAC, 60 Hz, up to 10 amps; Consumption (Standby, No Load): 0.5 amps; 230-VAC models (SWI030AE, SWI031AE): Input and Output: 230 VAC, 50 Hz, up to 10.2 amps Consumption (Standby, No Load): 0.25 amps
Temperature Tolerance —	32 to 122° F (0 to 50° C)
Humidity Tolerance —	20 to 80% noncondensing
Enclosure —	Steel

Size — 1.7"H x 5.5"W x 5"D (4.2 x 14 x 12.7 cm)

Weight — 2 lb. (0.9 kg)

1.2 Specs for Rack Tray (SWI032)

Configuration — Holds three Pow-R-Switch modules side by side

Material — Steel

Size — With Pow-R-Switch modules installed:
1.75" (1U) H x 19"W x 5.5"D (4.4 x 48.3 x 14 cm)

Weight — 15 lb. (6.8 kg)

2. Introduction

2.1 General Overview

Network devices sometimes lock up, so that communicating with them is impossible. On command, a Pow-R-Switch 1M can switch AC power at up to ten individual Pow-R-Switch 1S modules located throughout your facility. This serves to boot, shut down, or reboot the devices plugged into the Pow-R-Switches 1S.

Each addressable 10-amp Pow-R-Switch 1S module can be switched ON, switched OFF, or toggled OFF and then back ON. You can link individual modules together across a total end-to-end RS-485 distance of up to 2,000 feet (609.6 m) using 4-wire RJ-11 cable. One Pow-R-Switch 1M module serves as the control unit (address 0) while as many as nine Pow-R-Switches 1S (addresses 1 through 9) serve as satellites.

The Pow-R-Switch 1M's RS-232 Control Port, which can be connected to a modem, a PC, or one of our Port Manager Switches (product codes SW545A and SW546A), accepts command strings of ASCII characters. Use these command strings to operate the desired Pow-R-Switch 1S module, or send a status command to cause the master unit to display the ON/OFF condition of all modules on the link.

2.2 Features

- Through the Pow-R-Switch 1M's RS-232 Control Port (DB25 connector), control your Pow-R-Switch system by modem or directly from a PC.
- Interlink and control up to ten Pow-R-Switches through their RS-485 Link Ports (RJ-11 connectors).
- Build a chain of Pow-R-Switches up to 2000 ft. (609.6 m) long.
- Switch up to 10 amps of AC power on each Pow-R-Switch.
- Send the units ON, OFF, or Toggle commands.
- Choose the data rate and reboot-cycle duration you want.

2.3 Applications

- Remote network management
- Rebooting data-communications equipment
- Taking equipment out of service
- PC-based control of AC power: You can switch any AC-powered device ON or OFF using ASCII commands sent across modem links

2.4 The Pow-R-Switches 1M and 1S Illustrated

2.4.1 THE FRONT PANELS

The front panels of the Pow-R-Switches 1M and 1S both look as illustrated in Figure 2-1 below. They have three LED indicators, whose functions are described beneath the picture.

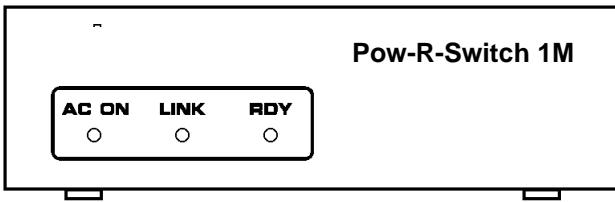


Figure 2-1. The Pow-R-Switches' front panel.

- **AC ON:** Lights when power to the Pow-R-Switch module's switched AC outlet is ON.
- **LINK:** Flashes when command data is received by the module.
- **RDY:** Lights to indicate that the Pow-R-Switch is receiving power and is ready to receive commands. (Note that the RDY LED does not indicate the ON/OFF condition of the Switch's switched AC outlet.)

POW-R-SWITCHES 1M, 1S

2.4.2 THE REAR PANELS

The rear panels of the Pow-R-Switches (shown in Figures 2-2 and 2-3 below) include a switched AC outlet, Link Ports for Pow-R-Switch interconnection, and controls you can use to configure each Switch module.

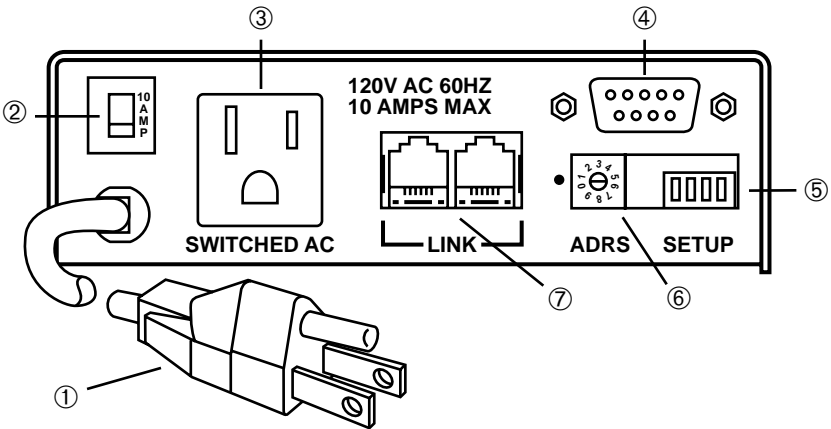


Figure 2-2. The rear panel of the 120-VAC Pow-R Switches (SWI030A and SWI031A).

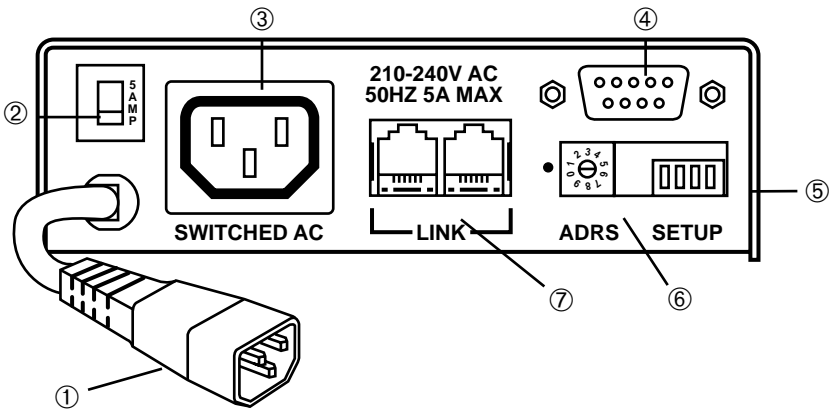


Figure 2-3. The rear panel of the 230-VAC Pow-R Switches (SWI030AE and SWI031AE).

- ① **Power-Input Plug:** On SWI030A and SWI031A models, this is a NEMA 5-15P plug (on the end of a power cord) that you can plug into a working 120-VAC outlet. On SWI030AE and SWI031AE models, this is an IEC 320 male inlet to which you can attach a country-specific power cord for plugging into a working 230-VAC outlet.
- ② **Fuse:** A 10-amp fuse. If the Pow-R-Switch is overloaded, this fuse will blow; you will have to reduce the load on the Switch and replace the fuse with a new one of the same type.
- ③ **Switched AC Outlet:** On SWI030A and SWI031A models, this is a NEMA 5-15R socket into which you can plug a 115-VAC device that you want to switch. On SWI030AE and SWI031AE models, this is an IEC 320 female outlet into which you can plug a 230-VAC device that you want to switch. The maximum load that can be attached to this outlet is 10 amps.
- ④ **RS-232 Control Port (Pow-R-Switch 1M only):** A DB9 connector from which you can run cable to your modem or local control device. (On the Pow-R-Switch 1S, there is only a blank panel here.)
- ⑤ **Setup Switch:** A 4-position DIP switch with which you can set the data rate, toggle delay, and other features as described in **Section 3.2**.
- ⑥ **Address-Selection Switch:** A rotary dial switch with which you can select the address for each Pow-R-Switch module.
- ⑦ **Link Ports:** Two RJ-11 jacks that are used to interconnect Pow-R-Switch modules. Switching commands and status reports are relayed through the Link Ports.

3. Installation

Installing the Pow-R-Switch 1M and 1S is simple. Briefly, the installation procedure consists of the steps listed below. For more information, please refer to the section identified in each step.

1. Set the address for each module as described in **Section 3.1**.
2. Set the configuration DIP switch as described in **Section 3.2**.
3. Use RJ-11 cables to link the Pow-R-Switch modules as described in **Section 3.3**.
4. Connect your modem or local PC or terminal to the control port on the rear panel of the Pow-R-Switch 1M as described in **Section 3.4**.
5. Connect each device you want to switch to an AC outlet on a Pow-R-Switch 1M or 1S, and connect each Switch to an AC power source, as described in **Section 3.5**.
6. Test the Switch as described in **Section 3.6**.

3.1 Selecting the Address

Use the rotary dial on the rear panel of each Pow-R-Switch 1M or 1S module (refer to Figure 2-3 on page 12) to set that module's address. Make certain that the module is powered OFF (its power cord is unplugged), then turn the dial to select the desired address for the module.

NOTES

The address for the Pow-R-Switch 1M (Master) module must always be set to "0" (zero).

The address for each Pow-R-Switch 1S (Satellite) module must always be set to a number from 1 to 9.

Each module in the link must be assigned its own unique address. Do not assign duplicate addresses.

You don't have to set the addresses of your Pow-R-Switch 1S modules in consecutive numerical order (the one attached to the Pow-R-Switch 1M as address 1, the next one as address 2, etc.). You can assign any of the nine satellite addresses to any Pow-R-Switch 1S.

If you need to change the address setting of a Pow-R-Switch 1M or 1S after installing the Switch, unplug the Switch module from the AC power source, then turn the dial to select the new address, then plug the Switch back in. The Switch will not recognize a new address setting until you power it OFF and back ON again.

3.2 Setting the Configuration Switch

Now set the Pow-R-Switch 1M's or 1S's SETUP DIP switch according to the requirements of your application:

Switch Position	Function	Up	Down
1	Data Rate	2400 bps	9600 bps
2	Toggle Delay	10 sec	5 sec.
3	Power-Up Default	ON	Last setting
4	(Reserved)		

- Position 1 (Data Rate): Used to set the data rate (communication speed) for ASCII transmissions between the Pow-R-Switch 1M and the PC or other control device, as well as between the Pow-R-Switch 1M and each Pow-R-Switch 1S module.

NOTE

The data rate set for each Pow-R-Switch 1S must match that set for the Pow-R-Switch 1M.

- Position 2 (Toggle Delay): Used to set the length of time the Switch will keep power OFF when a you send it a toggle command.
- Position 3 (Power-Up Default): Used to define how each switched AC outlet will react after an interruption in AC power to the Switch. When position 3 is set to Up, the Switch will always supply power at the outlet (the outlet will “turn ON” or “go live”) when power is restored to the Switch module.

When position 3 is set to Down, the outlet will return to the state that it was in prior to the power interruption. For example, if the outlet was OFF before the power interruption, the outlet will still be OFF after power is restored.

- Position 4: Reserved for future use.

NOTE

If you need to change DIP-switch settings later, it is not necessary to power the module OFF in order for the new settings to take effect.

3.3 Linking the Modules

After you set addresses and set all of the modules' SETUP switches, you can install the link cabling. Run straight-through-pinned twisted-pair or flat-satin cables between the Switches' Link Ports to interlink the Pow-R-Switch 1M and the Pow-R-Switches 1S as shown in Figure 3-1 below. (This system follows the EIA RS-485 specification for multipoint connections.)

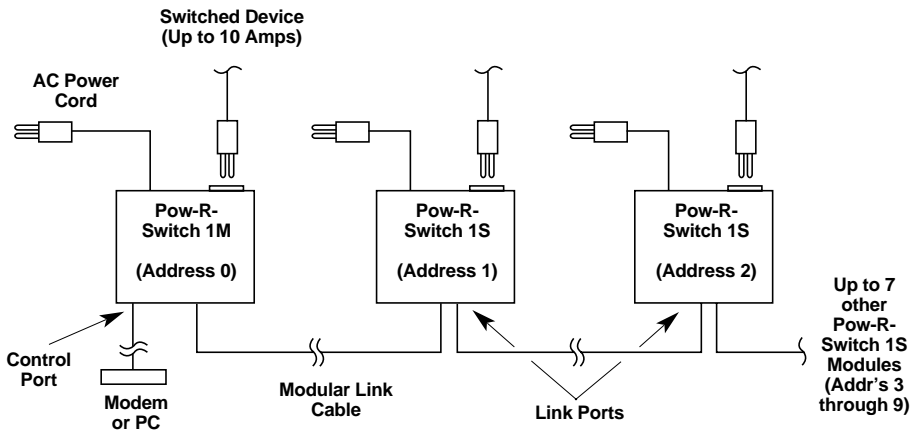


Figure 3-1. Cabling layout for a Pow-R-Switch 1M/1S system.

NOTES

The total length of cabling between the first Switch module in the link and the last Switch in the link must not exceed 2,000 feet (609.6 m).

Each Switch has two interchangeable Link Ports. One port should be connected to the previous Switch in line and the other should be connected to the next Switch (it doesn't matter which port is connected to which Switch).

Run straight-through-pinned twisted-pair or flat-satin cable with RJ-11 connectors between Link Ports to interconnect the Switches. Do not use cross-pinned cable for this purpose.

3.4 Making the Control-Port Connection (Pow-R-Switch 1M Only)

The RS-232 Control Port, located on the rear panel of the Pow-R-Switch 1M, is shown in Figure 3-2 below. It is a DB9 male connector wired in a DTE configuration, similar to the serial port on an IBM® AT® computer. We offer modular adapter kits that you can put together, attach to the Switch's Control Port and to the control device, and run twisted-pair or flat-satin cable between. Please refer to **Section A.2** in **Appendix A** for more information.

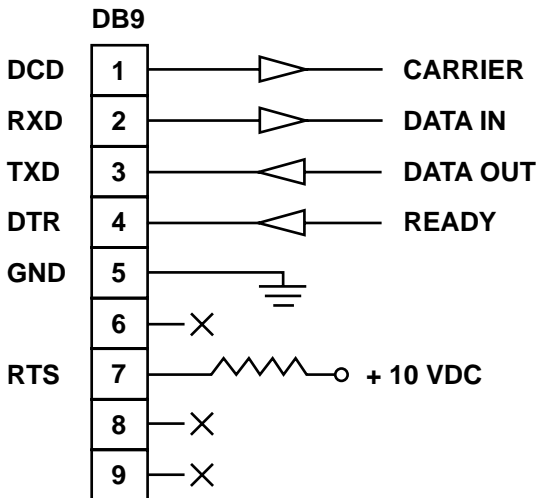


Figure 3-3. Schematic for the Pow-R-Switch 1M's Control Port.

3.5 Making the Power Connections

The next step is to plug in all power cords and power up the system.

1. Plug the AC-powered device that you want to switch into the AC outlet on the rear panel of the Pow-R-Switch 1M or 1S. Repeat this step for every device/Switch pair in your system.

NOTE

The total load on each Switch must not exceed 10 amps.

2. *230-VAC versions of the Pow-R-Switches 1M and 1S (product codes SWI030AE and SWI031AE) only:* Plug the outlet ends of country-specific power cords (not included) into the Switches' IEC 320 male inlets.
3. Plug the Switches' power cords into a working AC outlet.
4. Make certain that any power switches on any of the devices you'll be switching are set to the "ON" position. All of the devices you'll be switching should now be powered up and operating.

3.6 Testing for Proper Installation

Lastly, you should perform the following test to make certain the Pow-R-Switch 1M and all of the Pow-R-Switches 1S are operating correctly.

1. Establish a connection with the Pow-R-Switch 1M.
 - a) *If your PC or other control device will be communicating with the Pow-R-Switch 1M across a modem link*, make sure the modem directly connected to the Pow-R-Switch 1M's Control Port is set to the same data rate as the Switch (see **Section 3.2**). The modem should also be set to receive 8 data bits and no parity.

When both modems are ready to go, start your terminal-emulation software and dial the number for the modem connected to the Pow-R-Switch 1M. After approximately eight seconds, the Pow-R-Switch 1M should send the "PRS READY" message.

- b) *If the control device is connected directly to the Pow-R-Switch 1M's Control Port*, start your terminal-emulation software. Make sure that the terminal-emulation software is set to the same data rate as the Switch (see **Section 3.2**). The software should also be set to receive 8 data bits and no parity.
2. Once the connection has been made, send a few SPACE characters to the Switch. (If the control device is a PC, do this by tapping the spacebar on its keyboard several times.) When the spacebar is pressed, the LINK indicator on the Pow-R-Switch 1M and on each Pow-R-Switch 1S should flash briefly. If the LINK LED on any linked Switch module in the system does not flash, check the following:
 - a) Make certain that all of the Switches are plugged into a working AC outlet.
 - b) Make certain that the cables you have run between the Switches are pinned straight-through and are firmly seated in the Switches' Link Ports.
 - c) Make certain that the data-rate settings of the Pow-R-Switch 1M (see **Section 3.2**), the device connected to its Control Port, and all of the Pow-R-Switches 1S match.
 - d) Make certain that the same address has not been assigned to two or more Switches. Each module must have its own unique address (see **Section 3.1**).

4. Operation

After you have installed and tested your Pow-R-Switch system, it should be ready for operation. (Note that the PC, modem, or other control device must send ASCII characters at the same data rate as the Pow-R-Switches. Also, the Pow-R-Switches can *receive* data with any type of parity, but will always *transmit* data using 8 bits, no parity.)

The command character-string that you will use to control the Pow-R-Switch consists of nine contiguous (not separated by spaces) ASCII characters. The first six characters are ASCII control codes that constitute a “fixed password” that restricts access to the Pow-R-Switch system. The seventh character is the specific or wild-card address of the Switch(es) that will receive the command, and the eighth character is the code for the operation (what you want the Switch to do). The last character in the command string is an ASCII carriage return (“^M”).

1. Establish a connection to the Pow-R-Switch 1M. If you are contacting it across a modem link, the Pow-R-Switch 1M will wait for eight seconds after the attached modem raises Carrier Detect, then respond with the “PRS READY” message.
2. Send the ASCII command string for what you want the Pow-R-Switch system to do. The command string must be in this format:

```
^B^X^X^B^X^Xac^M
```

Where:

```
^B^X^X^B^X^X
```

is the Pow-R-Switch’s fixed password.

“^B” is an abbreviation for the [CTRL] [B] character (the ASCII control code [STX] that you can generate by pressing the [CTRL] and [B] keys simultaneously).

“^X” is an abbreviation for the [CTRL] [X] character (the ASCII control code [CAN] that you can generate by pressing the [CTRL] and [X] keys simultaneously).

- a is the address of the Switch(es) that you are sending the command to:
If you enter a number from 0 to 9 for the a value, only the specific Switch that you have selected will receive the command.
If you enter "*" (an asterisk) for the a value, all of the Switches will receive the command.
- c is the operation code:
If you enter "0" (zero) for the c value, the Pow-R-Switch(es) that receive the command will turn OFF power to their AC outlets.
If you enter "1" (one) for the c value, the Pow-R-Switch(es) that receive the command will turn ON power to their AC outlets.
If you enter "T" for the c value, the Pow-R-Switch(es) that receive the command will toggle power (turn power OFF, wait a few seconds, then turn it back ON) to their AC outlets. This command is case-sensitive—you must enter an uppercase "T," not a lowercase "t."
If you enter "?" for the c value, the Pow-R-Switch(es) that receive the command will return ASCII character strings indicating the status of their AC outlets.
- ^M is an abbreviation for the [CTRL] [M] character (the ASCII carriage return, [CR]), which you can generate by pressing the [ENTER] or [RETURN] key.

Examples:

- To toggle the switched AC outlet on the Pow-R-Switch 1S at address 3, send the command `^B^X^X^B^X^X3T^M`.
- To display the status of all linked Pow-R-Switch modules, send the command `^B^X^X^B^X^X*?^M`.

NOTE

The Pow-R-Switch 1M will not accept additional commands until it has finished executing the current command.

5. Troubleshooting

5.1 Calling BLACK BOX

If you determine that your Pow-R-Switch is malfunctioning, *do not attempt to alter or repair it*. Contact Black Box Technical Support at 724-746-5500. The problem might be solvable over the phone.

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

- The nature and duration of the problem.
- When the problem occurs.
- The components involved in the problem.
- Any particular application that, when used, appears to create the problem or make it worse.

5.2 Shipping and Packaging

If you need to transport or ship your Pow-R-Switch:

- Package it carefully. We recommend that you use the original container.
- Before you ship a unit for repair or return, contact Black Box to get a Return Materials Authorization (RMA) number, and make sure you include everything you received with the unit when you ship it.

Appendix A: Accessories

A.1 The Rack Tray (SWI032)

This optional accessory will hold three Pow-R-Switch modules, set side by side, as shown in Figure A-1 below. The Rack Tray is designed to fit most standard instrument racks.

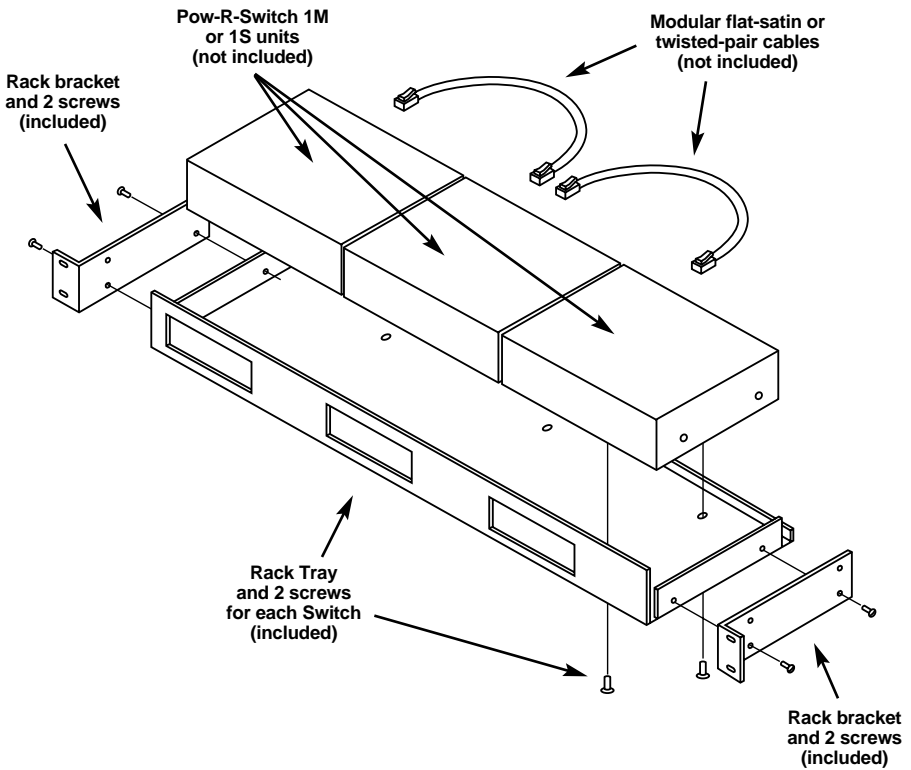
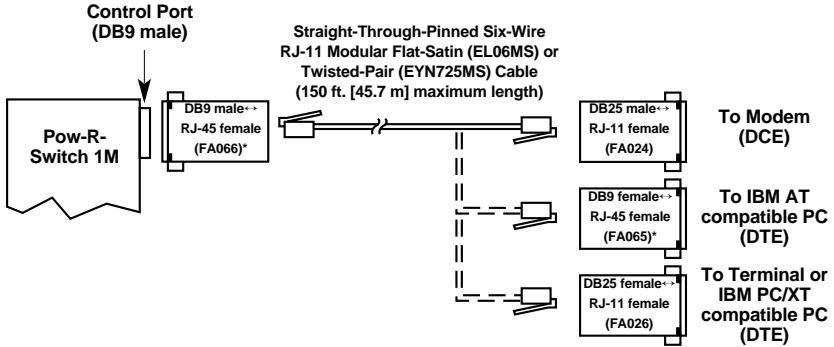


Figure A-1. Installing Pow-R-Switches in the Rack Tray.

A.2 Modular Adapters

We offer a complete selection of modular adapter kits and cables designed to simplify connecting the Pow-R-Switch 1M to your modem or PC. These adapter kits and cables are shown in Figure A-2 below; the necessary pinouts are described in **Appendix B**.



*We do not currently carry DB9 ↔ RJ-11 adapter kits as a stock item. The RJ-45 connectors on the kits shown are 100% backward-compatible with RJ-11.

Figure A-2. Possible connections using modular adapters.

Appendix B: Pinouts

End-to-End Pinning, Pow-R-Switch 1M Control Port to Modem

Pow-R-Switch (DB9 female)		Modem (DB25 female)	
Signal Abbrev.	Pin No.	Pin No.	Signal Abbrev.
RLSD (DCD)	1	←————— 8	RLSD (DCD)
RD	2	←————— 3	TD
TD	3	—————→ 2	RD
DTR	4	—————→ 20	DTR
SGND	5	————— 7	SGND
RTS	7	←————— 4	RTS

End-to-End Pinning, Pow-R-Switch 1M Control Port to Serial Port of AT Compatible Computer

Pow-R-Switch (DB9 female)		Computer (DB9 male)	
Signal Abbrev.	Pin No.	Pin No.	Signal Abbrev.
RLSD (DCD)	1	←————— 4	DTR
RD	2	←————— 3	TD
TD	3	—————→ 2	RD
DTR	4	—————→ 8	CTS
SGND	5	————— 5	SGND
RTS	7	←————— 7	DSR

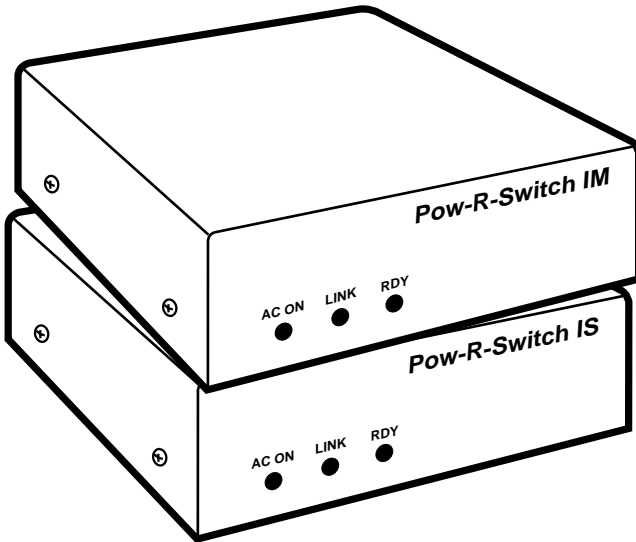
End-to-End Pinning, Pow-R-Switch 1M Control Port to Serial Port of Terminal or PC/XT™ Compatible Computer

Pow-R-Switch (DB9 female)		Terminal or Computer (DB25 male)	
Signal Abbrev.	Pin No.	Pin No.	Signal Abbrev.
RLSD (DCD)	1	←————— 20	DTR
RD	2	←————— 2	TD
TD	3	—————→ 3	RD
DTR	4	—————→ 5	CTS
SGND	5	————— 7	SGND
RTS	7	←————— 6	DSR

NOTES



Pow-R-Switches 1M, 1S, and Rack Tray



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