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Power Administrator™ 800

User's Manual

SYSTEMS ENHANCEMENT CORPORATION

Power Administrator™ 800

User Manual

SYSTEMS ENHANCEMENT CORPORATION

MT-SE-42/01

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Systems Enhancement Corporation (hereinafter "SEC") warrants that each product sold by SEC is free from defects in materials and workmanship under normal use. This warranty is applicable only to the initial end user (END USER), and is not transferable. The duration of this warranty is ninety (90) days from the date of the first retail sale or the date of delivery to the PURCHASER, whichever occurs first, subject to the following conditions.

If the PURCHASER discovers within the duration of this warranty a defect in material or workmanship, the PURCHASER must promptly notify SEC in writing within the duration of the warranty. SEC's obligation under this warranty is limited to the replacement or repair, subject to the conditions specified below, of such product returned intact to SEC which shall appear to SEC, upon inspection, to have been defective. Replacement or repair will be made at SEC's Technical Support Center, 174 Chesterfield Industrial Boulevard, Chesterfield, MO. Such repair or replacement shall be at SE's expense. This warranty does not cover any taxes which may be due in connection with replacement or repair, nor any installation, removal, transportation or postage costs. These expenses will be paid by PURCHASER. If SEC is unable to repair or replace the product to conform to this warranty after a reasonable number of attempts, SEC will refund the purchase price to the purchaser or dealer through which the product was sold. Remedies under this warranty are expressly limited to those specified above.

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No warranty is made with respect to other products sold by SEC which do not bear the name Systems Enhancement Corporation, and no recommendation of such other product shall imply or constitute any warranty with respect to them. The warranty does not apply to products which have been abused, mishandled, modified, damaged, by Act of God or a source external to the product; repaired by others; or which have their serial numbers removed or altered.

Please register your unit by completing the Warranty Registration Card enclosed with your product. Should you need to make a claim, please contact your dealer or Systems Enhancement Corporation; giving the serial number, date of purchase and details of the fault.

Governing Law

This statement shall be construed, interpreted, and governed by the laws of the State of Missouri.

YOU ACKNOWLEDGE THAT YOU HAVE READ THIS AGREEMENT, UNDERSTAND IT AND AGREE TO BE BOUND BY ITS TERMS AND CONDITIONS. YOU FURTHER AGREE THAT THIS IS THE SOLE AGREEMENT BETWEEN US AND SUPERSEDES ANY PROPOSAL OR AGREEMENT ORAL OR WRITTEN BETWEEN US RELATING TO THE SUBJECT MATTER.

(Some states do not allow the exclusion or limitation of liability for consequential or incidental damages, so the above limitations may not apply to you.)

FCC Compliance

Power Administrator has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy; and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

CHANGES OR MODIFICATIONS TO THIS EQUIPMENT NOT EXPRESSLY APPROVED BY THE MANUFACTURER MAY VOID YOUR WARRANTY AND/OR AUTHORITY TO OPERATE THE EQUIPMENT.

Ratings: 115VAC 50/60Hz 11.5A Max Per Outlet (Not to Exceed 11.5A Total for All Outlets) Unit Rating: 12A Input

Warning: No User Serviceable Parts Inside. Opening the PA-800 will void the manufacturer warranty and could subject the operator to lethal voltages. Refer all units for repair to your reseller or Systems Enhancement Corporation.

Trademarks

Power Administrator is a trademark of Systems Enhancement Corporation.

IBM, IBM NetView/6000 are trademarks or registered trademarks of International Business Machines Corp.

Hewlett-Packard, HP, HP Open View are trademarks or registered trademarks of Hewlett-Packard Company.

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Novell and NetWare are registered trademarks, and NLM is a trademark of Novell, Inc.

Conventions Used In This Guide

This guide uses these conventions:

Bold italic print, as shown in this example, indicates field names, menu items, or values in the Power Administrator configuration menu.

`Bold print`, as shown in this example, indicates items that you must type exactly as they appear.

`Italic print words or letters in braces { }` indicate values that must be supplied by the user. For example: *`{drive}`*`:\setup`

Italic print words or letters in brackets < > indicate keys to press. If two keys are separated by a + plus symbol, then the first key should be pressed and held down while pressing the second key. For example: *<alt+enter>*.

Note:	**Important information set off from the text.**

Warning:	**These messages alert you to specific procedures or practices; serious consequences may result including injury if you disregard them.**

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Introduction

Congratulations on your purchase of the ***Power Administrator™ 800*** ("PA-800", or "PA"). The PA-800 is a microprocessor-controlled receptacle management device for in-band and out-of-band control of AC power to remote equipment. The PA-800 provides flexible power management to critical equipment, such as hubs, routers, rack-mount servers, or other gear that require occasional power-down or power-up under remote control.

With the Windows '95/NT software provided, users may selectively apply power to devices connected to the PA-800 or schedule power-up and power-down sequences for automatic occurrence at a user-defined time or when triggered by an alarm input (such as a temperature or humidity alarm or a contact-closure input.)

Optional network and modem interfaces allow remote operation via dialup, `telnet`, or SNMP (Simple Network Management Protocol). *See Internal Ethernet Card* Section on Page 53 for more discussion of network support and *Modem Configuration Dialog* on page 41 for discussion of modem support.

Please review the enclosed Release Notes for important information prior to installing and operating the Power Administrator.

PA-800 Features

The PA-800 provides the following features. Note that not all configurations use all features.

Remote Control of Power Anywhere

The Power Administrator provides advanced power control via in-band and out-of-band communications including RS-232, modem, and Ethernet interfaces. Support for standard protocols such as SNMP allows the PA-800 to work with the best-selling Network Management Stations (NMS) while still providing easy-to-use menu-driven operation for customers with less-extensive software requirements.

Six Integrated Receptacles
The Power Administrator has on-board outlets for powering six devices (11.5A maximum load).

Optional Remote Receptacles
The PA-800 supports two additional remote receptacles for switching remote contactors or relays. Ideal for high-voltage and/or high-current loads. Remote receptacles are sold separately.

Scalability
Up to sixteen PA-800 units may be connected via a single interface for control of up to 128 outlets.

Remote Contact Monitoring
Monitors two relay contact closures for user-definable events.

Front Panel Interface
Allows manual operation via the face of the PA-800. May be disabled.

Integrated Load Meter
Provides load information on the front panel and via the software interface.

Optional Temperature/Humidity Monitoring
Allows the PA-800 to provide environmental as well as power management to the rack.

Optional Network Interface
Ethernet (10BaseT or 10Base2) interface for SNMP or *Telnet* operation over TCP/IP. Generate network traps at a central Network Management Station (NMS) when alarm conditions occur.

Optional Modem Interface
For dialup operations with a simple terminal-mode interface or protocol support.

Pager Support
Dialout on alarm to alert maintenance personnel.

Slave Shutdown Feature
The PA-800 can be configured to send shutdown indications to attached servers or other equipment prior to powering down the corresponding receptacle. This allows graceful operating system shutdown prior to power-off.

Enunciator Outputs
The PA-800 may be configured to send contact output indications to an enunciator panel to allow alarm conditions to be displayed for the operator.

Intelligent Load Shedding
The Power Administrator allows overload conditions to be handled gracefully – with loads shed in order of priority until the overload is cleared.

Sequenced Power Up and Power Down
To avoid unnecessary in-rush current and to provide intelligent power-up of computer accessories, the PA-800 allows the user to specify the order in which all components are powered up and time delays. Outlets may be left off for on-demand switching, if desired.

☎ NOTE ☎

If you have any questions about Power Administrator 800 or other products from Systems Enhancement Corporation, please contact us at:

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PA-800 Package

Package Contents

The PA-800 package as shipped contains the following items:

Standard Contents	Optional Components
PA-800 Unit	Telephone Interface Cable (Modem Units Only)
Window 95/NT Software Disk (3.5")	MIB disk - 3.5" DOS format (SNMP capable units only)
RS-232 Interface cable	MIB disk - 3.5" Unix format (SNMP capable units only)
Power Cord (U.S. versions only)	
This User Manual	
Registration Card	
Packing Material	
Release Notes	

PA-800 Front Panel

The following illustrations show the arrangement of the PA-800's front and rear panels. The front panel illustration points out the location of the control (manual override) switches, power LED, and load meter.

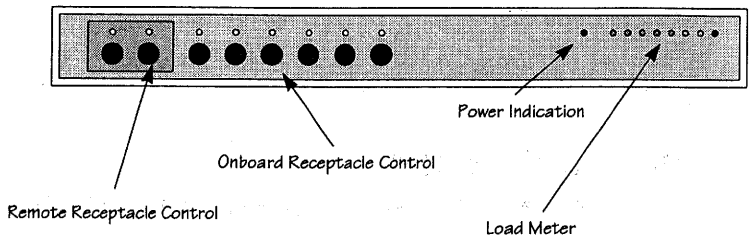


Figure 1 - PA-800 Front Panel

Receptacle LEDs

The light-emitting diodes (LEDs) on the face of the PA-800 indicate output status of the unit. For Remote Receptacles and Onboard Receptacles the LED indicates that the associated receptacle is ON or OFF. For onboard receptacles, these outlets are on the reverse of the PA-800. Remote receptacles relays are controlled via flat cable connected to the R1 and R2 connectors on the reverse of the PA-800.

Flashing LEDs

A flashing LED indicates that a receptacle has a power-off or power-up scheduled. A slowly-flashing LED indicates that the receptacle is OFF with a power-on scheduled. A quickly-flashing LED indicates that the receptacle is ON with a power-off scheduled.

Receptacle Controls

Onboard and Remote Receptacles connected to the Power Administrator may be commanded on or off from the front panel by pressing and holding the associated switch on the PA-800. An audible beep will be heard. If the receptacle is *OFF* it will be turned on immediately. ***If the receptacle is ON, it will be scheduled off according to the Minimum Shutdown Delay configured for the associated receptacle*** *(see Minimum Shutdown Delay* ***on page 33).***

Note that the front-panel may be disabled via the Configuration Applet.

Power Indication

This LED indicates that power is present to the PA-800.

Load Meter

The load meter on the PA-800 indicates the output load connected to the unit. Each LED is approximately 12% of full-load. When the unit is overloaded, the rightmost (red) LED is illuminated. See *PA-800 Operation* on Page 23 of this manual for a discussion of operation during overload.

The PA-800 Rear Panel

Figure 2 shows the layout of the PA-800 rear panel. See the *Connector Pinouts* on Page 75 if you require information on how to wire a connector for operation with the PA-800.

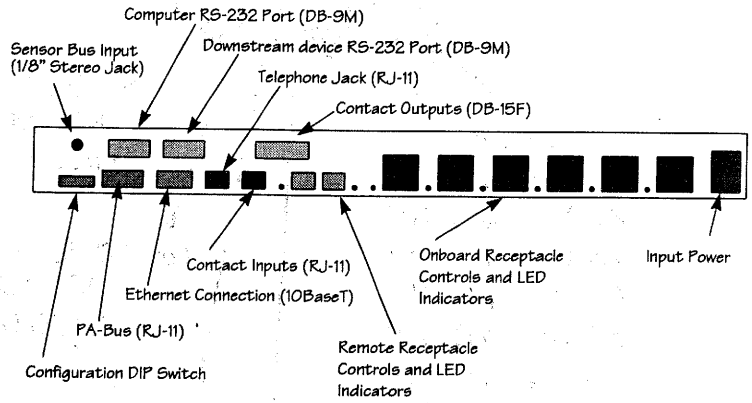


Figure 2 - PA-800 Rear Panel

Power Interfaces

The PA-800 has a single input power connector and six (6) output receptacles. Each receptacle is rated for 11.5A maximum load.

Important: Total output load for the PA-800 is not to exceed 11.5A.

Configuration DIP Switch

Basic configuration of the PA-800 is via a DIP switch on the left side of the rear of the unit. Figure 3 shows the DIP switches and their meanings.

You must configure the DIP switch for correct operation.

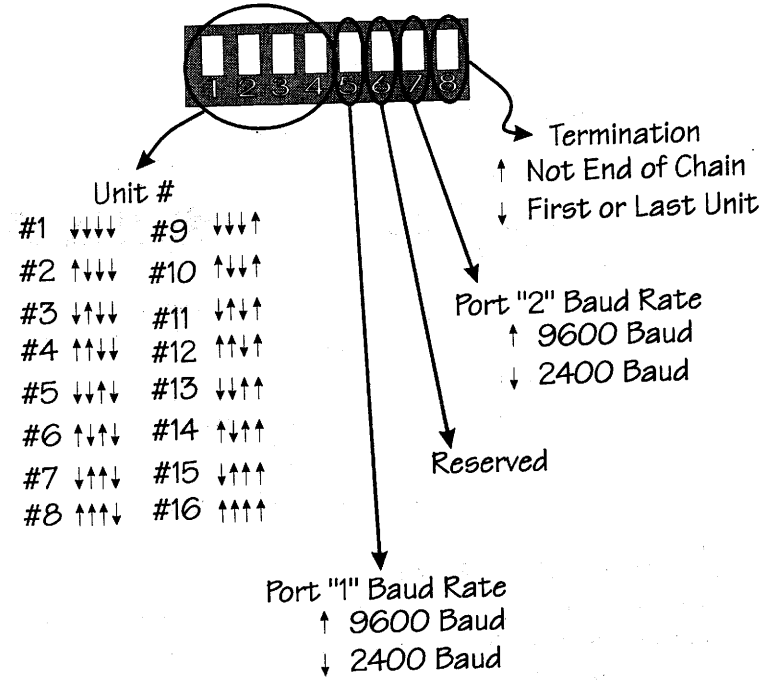


Figure 3 - DIP Switch

Rear Panel Electronic Interfaces

Electronic interfaces on the PA-800 include the following. Note that not all interfaces are used by every configuration.

Serial Port "1"

DB-9M connector for RS-232 communication with controlling computer.

Serial Port "2"

DB-9M connector for RS-232 communication with optionally attached Uninterruptible Power Supply (UPS) or other device.

"PA-Bus" Port

Twin RJ-11 connectors to which all PA-800 units are connected.

Contact Input "IN" Port

RJ11 connector for input contact alarms.

Temperature/Humidity Bus "Sensor" Port

Stereo jack for connection of temperature and humidity sensor module. Sensor module is sold separately.

Remote Receptacle #1 "R1" Port

RJ11 jack for control of remote receptacle #1. Note that remote receptacle controls are located to the left of controls for onboard receptacles on the front of the PA-800.

Remote Receptacle #2 "R2" Port

RJ11 jack for control of remote receptacle #2.

Network Connection "10BaseT" Port

This is used for SNMP-capable units only. RJ45 connector for connection onto 10BaseT Ethernet networks.

Telephone "TEL" Jack

This is used for modem units only. Standard RJ12 telephone jack for connection to the end-user's telephone line.

Contacts "OUT" Port

DB15F connector provides contact outputs to initiate operating system shutdown on attached servers prior to power-off. This connector may be configured to drive an enunciator panel for indicating alarm status.

Installation of Unit #1

This section describes the installation of the PA-800 Unit #1. For installation of Units #2 through #16, see *Installation of Additional Units* on Page 21.

DIP Switch Configuration

Before installing the PA-800, ensure that your DIP switch settings (on the reverse of the unit) are correct.

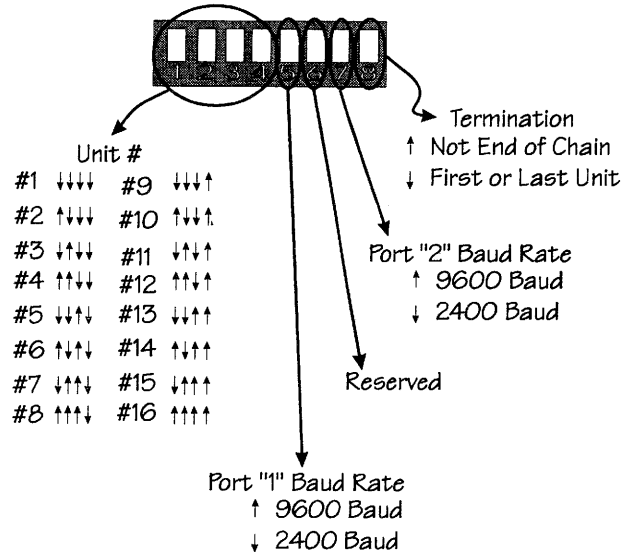


Figure 4 - DIP Switch

The PA-800 will not communicate properly if the DIP switch is incorrectly configured.

Configure Address

For installation of Unit #1, ensure that DIP switches 1 to 4 are DOWN (corresponding to Unit #1).

Configure Baud Rates

DIP Switch #5 corresponds to serial port "1" (for connection to your PC). For 9600 baud operation, this DIP switch should be UP. For 2400 Baud operation, this DIP switch should be DOWN.

If using a downstream device is connected, DIP switch #7 indicates the baud rate for serial port "2". For 9600 baud operation, this DIP switch should be UP. For 2400 Baud operation, this DIP switch should be DOWN.

First/Last Units DIP Switch

Ensure that DIP switch #8 is DOWN to indicate that Unit #1 is the first PA-800 in the chain.

Rack Mount Installation

To install the PA-800 in a 19" or 23" rack, ensure that the unit has been shipped with factory-installed rack-mount hardware. If not, see your reseller to upgrade the unit to a rack-mount configuration.

Please see the following important notice on the following page for rack-mount installation.

IMPORTANT INFORMATION FOR RACK-MOUNT INSTALLATION

Please note the following important considerations for rack-mount operation of the PA-800:

- Do not exceed the Maximum Recommended Ambient of 118^{o} Fahrenheit. Racks often achieve elevated temperatures relative to outside surroundings. Verify that worst-case temperatures will not exceed this 118^{o} limit.
- Ensure that adequate airflow is maintained on sides and rear of the rack.
- Ensure that the rack in which the PA-800 is mounted has sufficient loading in its base to eliminate the possibility of the rack tipping.
- Do not use the PA-800 as a load-bearing shelf.
- Do not exceed the output load limit of 11.5A.
- Ensure that the rack and all equipment are properly grounded (earthed). Reliable earthing of rack-mount equipment should be maintained with particular attention given to supply connections other than direct connections to the branch (e.g., the use of power strips).

  Consideration should be given to the connection of equipment to the supply circuit and the effect that overloading of circuits could have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Ensure that the rack environment has humidity of less than 90% non-condensing.

Standalone Installation

The PA-800 may also operate in a standalone (stackable) mode. Ensure that adequate ventilation space (at least 6") is provided on the sides and rear of the unit.

IMPORTANT INFORMATION FOR STAND-ALONE INSTALLATION

Please note the following important considerations for stand-alone operation of the PA-800:

- Do not exceed the Maximum Recommended Ambient of 118° Fahrenheit. Verify that worst-case temperatures will not exceed this 118° limit.
- Ensure that adequate airflow is maintained on sides and rear of the PA-800.
- Do not exceed the output load limit of 11.5A.

  Consideration should be given to the connection of equipment to the supply circuit and the effect that overloading of circuits could have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Ensure that the operating environment has humidity of less than 90% non-condensing.

Install Communications Connectors

To communicate with the PA, you must install appropriate cables, depending upon your configuration.

RS-232 Connection

For direct communication with an attached PC or workstation, connect the serial cable (part #SM-SER-117A/01) shipped with your PA-800 to the DB-9M connector labeled ***1*** on the rear of the unit. Ensure that the baud rate setting for channel 1 is set (DIP switch #5) correctly (see *DIP Switch Configuration* on Page 10).

Downstream Device Connection

If you have an attached UPS or other device, connect is communication cable to the DB-9M connector labeled ***2*** on the rear of the unit. Ensure that the baud rate setting for channel 2 (DIP switch #7) matches that of the device (see *DIP Switch Configuration* on Page 10).

Ethernet Connections

If you have the optional LAN interface installed, plug a standard RJ-45 patch cable (10BaseT) into the connector labeled "10BaseT". The remaining end should be plugged into a 10BaseT hub or concentrator.

You must configure the network settings for the network interface card prior to network operation. See the *Internal Ethernet Card* on Page 53 for details.

Modem Connection

If you have the optional internal modem, plug the enclosed telephone patch cord into the "TEL" connector. The remaining end should be plugged into a standard telephone wall jack.

You must configure the settings for the modem prior to modem operation. See the Modem Configuration Dialog **section beginning on page *41* for details.**

Contact Input Connections

Contact input connections vary from installation to installation. Consult *Connector Pinouts* for electrical definitions for wiring contact inputs to the PA-800.

Remote Receptacle Connections

If you have purchased remote receptacles, plug the control flat-cable into PA-800 remote control connectors labeled "R1" and "R2". Plug the power cable for the receptacle into a 120VAC outlet. *See instructions included with the remote receptacle unit for operation instructions.*

Contact Output Connections

Various configurations for output connectors are available based upon the user's requirements. See *Misc Settings* on Page 35 for the meanings of the configurations discussed below.

Enunciator Cable

You must fabricate a cable for enunciator panel operation according to the pinout information contained in *Connector Pinouts* on Page 75 and the connector(s) used by the enunciator panel. Plug the DB15-M cable end into the connector labeled "OUT" on the reverse of the PA-800.

Mirror Cables

Mirror capability allows the Power Administrator to duplicate input contact alarms for use by up to four external, similar to SEC's *MultiMon* products. To use the *Mirror* capabilities, you must obtain SEC cable CT-PA-MIR for Unix or NOV-PA-MIR for Windows and Novell installations. Plug the DB15-M cable end into the connector labeled "OUT" and the remaining ends into the servers you wish to have monitor the contact inputs to the PA-800. You must configure the shutdown software on the server as you would for the downstream UPS. See your shutdown software manual for details on cable type configuration.

Note: When using the Mirror feature, please ensure that automatic shutdown timers for Standard and High Priority (AC Fail and Low Battery) for a given receptacle exceed those specified by the shutdown software running on the server attached to that receptacle. Failure to do so may result in power being removed from the server before graceful operating system shutdown is completed.

Slave Shutdown Cables

To use the slave shutdown feature of the PA-800, you must obtain SEC cable CT-PA-SDN for Unix or NOV-PA-SDN for Windows and Novell installations. Plug the DB15-M cable end into the connector labeled "OUT" and the remaining ends into the servers you wish to have monitor the contact inputs to the PA-800. You must configure the shutdown software on the server as you would for the downstream UPS, specifying that only AC Failure will be monitored. See your shutdown software manual for details on cable configuration.

Note: When using the Slave Shutdown feature, please ensure that all shutdown timers (automatic or manual) for a given receptacle exceed those specified by the shutdown software running on a server attached to that receptacle. Failure to do so may result in power being removed from the server before graceful operating system shutdown is completed on that server.

Power Connections

After you have mounted the Power Administrator, connected communications interface cabling, you are now ready to attach AC devices to the unit.

Connect Devices

Plug devices you wish to control into the PA-800. Each integral output receptacle (labeled "1" through "6" on the reverse of the PA-800) is rated for 11.5A maximum load. Note that the maximum output for the entire unit is not to exceed 11.5A (not counting remote receptacles).

Exceeding the load limitations of the PA-800 will result in the internal breaker tripping and AC power being removed from all devices plugged into the PA-800.

Connect Power Cord

Plug the enclosed 15A 120VAC power cord into the jack labeled "INPUT".

IMPORTANT: YOU MUST USE THE ENCLOSED POWER CORD (OR ITS EQUIVALENT) WITH YOUR PA-800. FAILURE TO DO SO MAY RESULT IN A FIRE OR SHOCK HAZARD.

Apply Power

Apply power to the PA-800 by plugging the power cord into a 120VAC 50/60Hz 15A outlet.

You are now ready to operate the PA-800 via computer or front panel interface.

Installation of Additional Units

Up to sixteen PA-800 may be connected together to allow communications via a single control application or network connection. To do so, the PA-Bus is used. The PA-Bus is a high-speed electronic bus that provides the interface necessary to communicate with many PA-800s from a single serial or network connection.

In this scenario PA Unit #1 acts as a *gateway*, directing requests to other units down the PA-Bus and directing responses to the requesting computer through the appropriate communications port.

Multiple unit installation requires special DIP switch settings and connection to the PA-Bus as detailed below.

DIP Switch Configuration

Configure Address

You must number your PA-800 units consecutively from 1 to 16. Thus, if you are adding a second PA-800 to your installation DIP switches 1 to 4 should correspond to **Unit 2** for the PA-800 you are adding to the chain. See Figure 3 on Page 10 for DIP switches and their meaning.

First/Last Unit DIP Switch

Ensure that the rightmost DIP switch (#8) for the first and last PA-800 units in the chain is DOWN and that the rightmost DIP switch on all other PA-800 units is UP.

Connect to PA-Bus

If you are connecting the PA-800 to an existing unit, connect the PA-Bus expansion cable to the PA-Bus connector located on the last PA-800 in the chain. Figure 5 shows how to connect more than one PA-800 together.

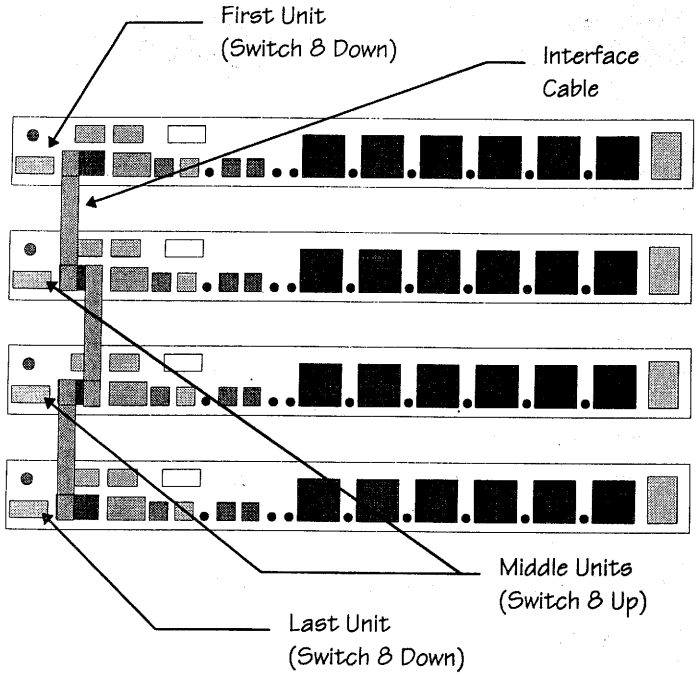


Figure 5 - Connection of Additional PA-800 Units

Power Connections

Plug devices you wish to control into the PA-800. Each integral output receptacle (labeled "1" through "6" on the reverse of the PA-800) is rated for 11.5A maximum load. Note that the maximum output for the entire unit is not to exceed 11.5A (not counting remote receptacles).

Exceeding the load limitations of the PA-800 will result in the internal breaker tripping and AC power being removed from all devices plugged into the PA-800.

Connect Power Cord

Plug the enclosed 15A 120VAC power cord into the jack labeled "INPUT".

IMPORTANT NOTE: YOU MUST USE THE ENCLOSED POWER CORD (OR ITS EQUIVALENT) WITH YOUR PA-800. FAILURE TO DO SO MAY RESULT IN A FIRE OR SHOCK HAZARD.

General Notes on Operation

Power-Up Sequence

At power-up, the PA-800 will verify that non-volatile memory is intact and then turn outlets on in the order specified by the user. By default, the sequence is R1, followed one second later by R2, followed by onboard receptacle #1, #2 and so on.

Front Panel Interface

From the front panel, the user may manually power-up or power down receptacles on the PA-800 on demand. The configuration will be saved to memory for the next power up.

Note that computer receptacle settings take precedence over front-panel settings. Thus, if an outlet is commanded on or off under computer control, these settings will be used at power-up instead of settings entered via the front panel.

Communications

The Power Administrator supports multiple communications interfaces concurrently. This allows both in-band and out-of-band communications access with the unit.

Serial Port "1"

Communications with a PC or other computer equipment connected via the supplied RS-232 cable allows the user to configure the PA-800, command outputs on and off on demand, and various other functions provided by the Power Administrator.

Modem Input

With the optional internal modem, the PA-800 allows dial-in usage (using both dumb terminal modes and the supplied PA-800 Configuration Applet.)

The PA-800 can be configured to dialout and signal paging systems when an alarm is received. See the *Modem Configuration Dialog* section on page 41 for details on this feature.

Ethernet Connection

Ethernet activity (SNMP and *Telnet*) sessions are supported by the PA-800 when the Internal Ethernet Card is installed. See the *Internal Ethernet Card* section on Page 53 for discussion of SNMP and *Telnet* support provided by the PA-800.

Downstream Device on Serial Port "2"

If the Internal Ethernet Card (IEC) option is installed and the Power Administrator is connected to a downstream device (that is supported by the PA-800) communications with that device will occur automatically. If the device is not supported by the PA-800, the PA-800 will transparently pass communications through to the downstream device. See your SEC reseller for details on how to support downstream serial devices with the PA-800.

Additional Functionality

The following sections contains useful information on configuring and using the Power Administrator. Please read them.

Note: It is recommended that you review the following sections for discussion of the various Power Administrator capabilities even if you do not plan to make use of the Configuration Applet.

Alarm Operation

Load Shedding Based Upon Events

The PA-800 can be configured to automatically schedule power off to outlets upon receipt of an alarm condition. Valid alarms are from the optional temperature and humidity sensor, over- or under-load alarms, or contact inputs from the "IN" connector on the rear of the unit.

Standard Priority Alarms

Standard alarms are defined to be *Contact #1* alarm indication, temperature, humidity, or load alarms. The operation of the PA-800 upon receipt of an alarm is configurable for each receptacle. See Alarm Settings Dialog on Page 34 for discussion of how to enable load-shedding after receipt of an alarm.

High Priority Alarm

A user-defined override allows automatic load-shedding upon receipt of a high-priority alarm, which is defined as *Contact #2.* See Alarm Settings Dialog on Page 34 for discussion of how to enable load-shedding after receipt of a high-priority alarm.

Alarm Interaction

The Power Administrator may be configured to monitor or ignore alarms. For alarm indications that are being monitored, the user must define limits for the sensor being monitored (contact input, temperature or humidity, etc). Alarms are generated when the input falls outside the specified limits.

User-specified parameters determine how each receptacle behaves during an alarm. The shutdown sequence for a receptacle follows the following steps.

Step 1: Alarm Occurs

A contact closure or other alarm is received.

Step 2: Shutdown Timer Begins

The *Shutdown After* timer is begun. At any time the user may cancel a scheduled shutdown by pressing the appropriate switch on the face of the PA-800. **If the alarm condition is cleared before the receptacle is turned off, the pending shutdown is canceled and the receptacle stays ON.** Note that if User Acknowledgment of alarms is required, user acknowledgment is required before the alarm will clear.

Step 3: Minimum Shutdown Timer Begins

When the shutdown timer expires, the user-specified *Minimum Shutdown Delay* timer is begun. This allows the user to warn an attached device (using *Slave Shutdown* Mode) that the receptacle is scheduled to be turned off.

Step 4: Receptacle Off

Power is removed from the receptacle.

Step 5: Alarm Condition Cleared

Once the alarm condition is removed (and the alarm is acknowledged by the user, if required) the receptacle will power-up if configured to do so. Otherwise the receptacle will stay off requiring user intervention for restart.

Operation with Multiple Alarms

If multiple alarms occur, the *Shutdown Delay* timer will only be changed if the remaining time-to-go is greater than that specified for the new alarm. This means that for alarms of the same priority, the countdown is not changed when a new alarm occurs before the first alarm clears. However, all alarms must be cleared for a receptacle to automatically power-up (if *Restart After* is specified).

A user-initiated cancellation of a scheduled shutdown is effective regardless of how the shutdown was scheduled.

Load Shedding and Breaker Operation

Load Metering and Shedding

The Power Administrator is instrumented to measure output load current. It may be configured to power-off receptacles in a pre-defined sequence when the unit is overloaded. This overload is shown when the rightmost (red) LED on the face of the unit is illuminated.

Priority-based Load Shedding

Load shedding is accomplished by turning outlets off at two-second intervals (beginning with receptacle #6 down to #1) until the overload condition is cleared. *Auto load shedding will not power off remote receptacles.*

If load-shedding is disabled, the PA-800 will not shed load. The output breaker will trip when the unit is overloaded and no sequenced load-shedding will occur.

Internal Breaker Operation

The PA-800 has an internal breaker that automatically resets after a few minutes. The electronics onboard the Power Administrator will continue to function after breaker trip.

Note that the PA-800 will attempt to restart output loads after a breaker trip up to a user-defined limit within a user-defined time interval. See *Alarm Threshold Dialog* on Page 40 for discussion of the retry settings.

If the number of user-specified retries is attempted in the interval specified, all outputs are commanded off and the unit will require manual intervention to restart outputs.

For example, if the user has specified three trips in five minutes, the PA-800 will attempt to restart twice within a five minute window. If the breaker trips a third time, the PA-800 will not restart the outputs automatically and the user will have to power outlets up manually.

Configuration Applet

Distribution Media

The PA-800 Control Applet is shipped on two 3.5" floppy diskettes. To install, insert Disk 1 into your floppy drive. There are two recommended methods of installation as listed below.

Installation Method 1: Win '95 and NT 4.0

From the ***Start*** Menu, select ***Settings ...Control Panel.*** In the Control Panel, select ***Add/Remove Programs.*** Select the ***Install*** button to install the PA-800 Control Applet.

Follow the instructions in the installation procedure.

Installation Method 2: Win NT 3.51

Selecting ***SETUP*** under the ***Run...*** option in the Program Manager will install the application.

Cable Installation

Ensure that the enclosed RS-232 cable is plugged into an available COM port on your PC and into the connector labeled "1" on the rear of the PA-800. Apply power to the PA-800.

Software Activation: Win '95 and NT 4.0

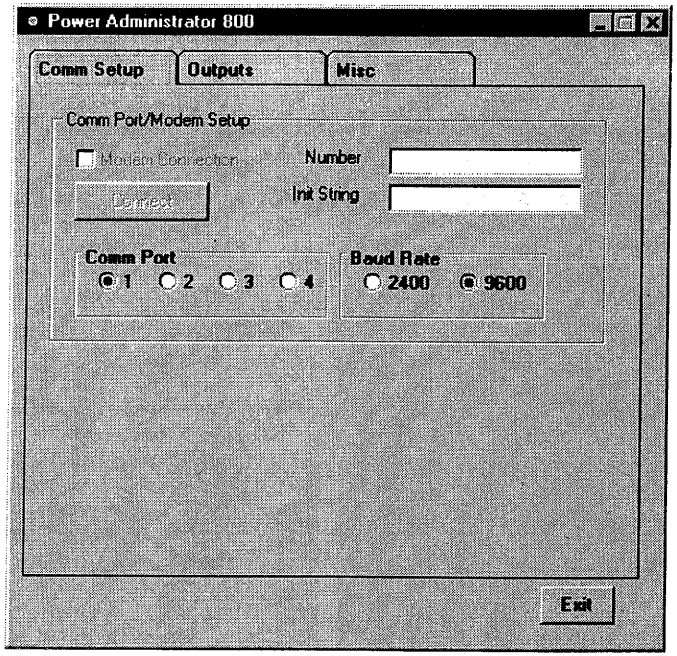
To activate the program, select the ***PA-800 Control Applet*** icon under ***Programs...*** in the ***Start*** Menu.

Software Activation: Win NT 3.51

To activate the program under Windows NT 3.51, double click on the ***PA-800 Control Applet*** in the working directory you specified at installation time.

Comm Settings

The Comm Setup Index Tab allows baud and COM port selection.



Comm Port

Select the COM port to which the PA-800 RS-232 cable is connected.

Baud Rate

This selection must match the setting for Port 1 of the PA-800. For 2400 baud operation, DIP switch #5 should be DOWN. For 9600 baud operation, DIP switch #5 should be UP.

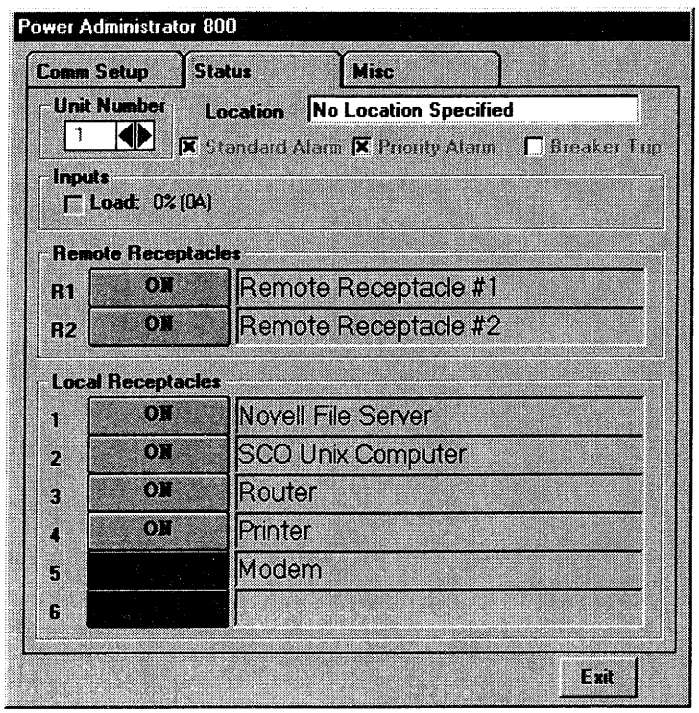
Modem Operation

For operation with a Hayes® compatible modem, select the ***Modem Connection*** checkbox and enter the appropriate telephone number and modem initialization string. *Consult your modem manual if you have questions regarding the INIT STRING.*

Pressing ***Connect*** will dial the modem and establish a connection with your remote PA-800 *if the PA-800 has been configured to answer the telephone.* See Number of Rings on page 41.

Status Panel

The **Status** index tab shows the general status of the PA-800 input alarms and receptacles. It also allows on-demand power switching and configuration of receptacle names and other information.



Receptacle Control Buttons

Pressing the color-coded control buttons on the left of the panel will turn the associated output on or off depending upon its current state. If a receptacle has a power-up or power-down scheduled, the time remaining until transition will be displayed in HH:MM:SS format.

To Configure a Receptacle

To set a receptacle's name and alarm interaction options, double-click on the associated space to the right of the receptacle control button for that receptacle. See Configuration Dialog on page 33.

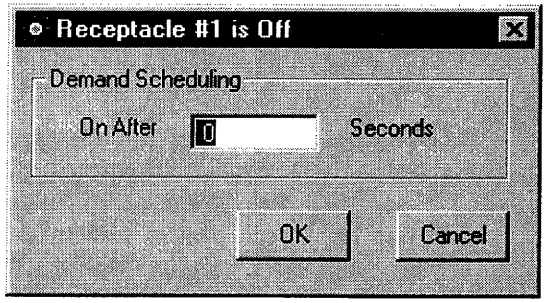
Unit Number
For installations with more that one PA-800 installed, selection of units is accomplished by clicking on this control. In single PA-800 installations, this number should not be changed.

Location
This field allows the user to uniquely identify the PA-800 by location. Maximum field length is 24 characters.

Output Load
This field displays the output load connected to the PA-800 in percent and Amperes. *This does not include loads on any attached remote receptacles.* An **X** in the checkbox indicates that the load alarm is asserted.

Temp and Humidity
For units with the available temperature and humidity module, the current values are displayed. An **X** in the checkbox indicates that the corresponding alarm is asserted.

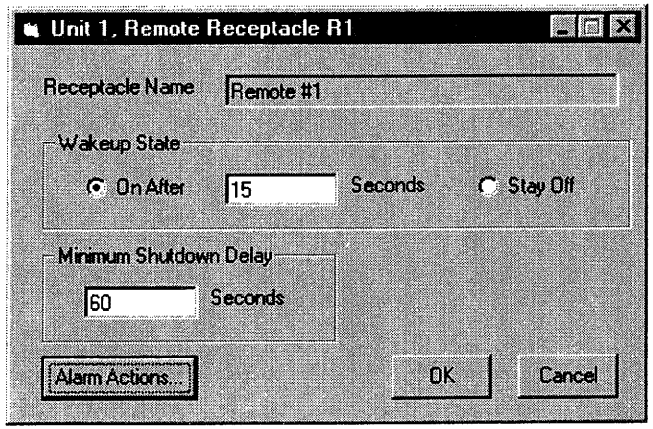
Demand Scheduling
If you wish to turn a receptacle on or off on demand, pressing its corresponding control button will activate the Demand Scheduling dialog:



On {Off} After...
Simply enter the delay in seconds before power-on or power-off here. After "OK" is selected, the PA-800 will automatically perform the action after the delay specified. Note that the corresponding LED on the face and rear of the PA-800 will flash quickly if powering off and slowly if powering on. The time remaining until power-on or power-off will be displayed in the control button for the receptacle.

For servers attached to receptacles being powered off (using the *Slave Shutdown* feature of the PA-800) ensure that adequate time is provided for graceful operating system shutdown. This interval should be specified in the *Configuration Dialog* (see below) and is added to the value specified in the *Demand Scheduling* dialog when attempting to power-off a receptacle.

Configuration Dialog
Each receptacle's characteristics may be set by selecting the **Config...** button next to the receptacle name. The following panel appears:



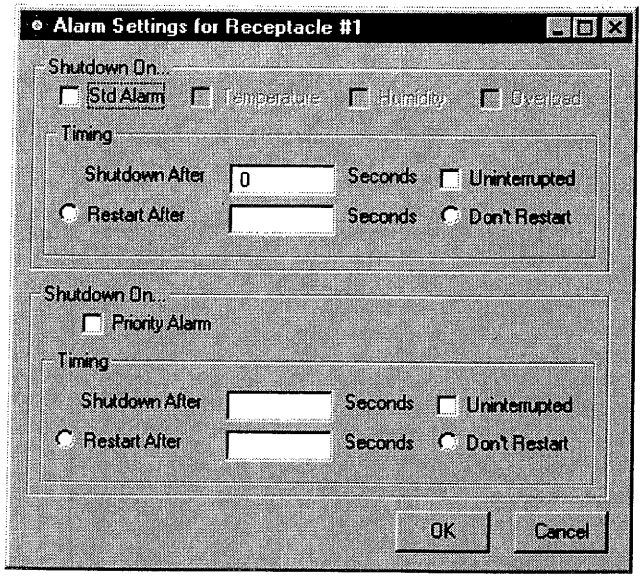
Receptacle Name
The name of the device attached to the receptacle.

Wakeup State
Specify whether you wish the receptacle to power up automatically when the PA-800 is powered on. A time delay may be specified to allow devices to startup in a user-defined sequence. *This wakeup time is also used at power-up after a breaker trip.*

Minimum Shutdown Delay
If you wish to have an automatic time-delay for all power-off attempts, specify it here. This allows the Power Administrator to provide shutdown commands to attached computers or other devices prior to powering off the associated receptacle when operating in *Slave Shutdown* mode (see *Slave Shutdown* on p. 38).

Alarm Settings Dialog

The Alarm Actions dialog allows the user to configure how the PA-800 will react to incoming alarm indications configured in the *Misc Settings* panel.



Shutdown On...

The first *Shutdown On...* group allows the user to specify if the receptacle is to shutdown upon receipt of an alarm condition. These alarms are the *Standard Alarm* (contact input #1), *temperature, humidity, or load*. Thresholds for these alarms are defined in the *Misc Settings* panel.

The second *Shutdown On...* group allows the user to indicate if the receptacle is to shutdown upon receipt of a high priority alarm (contact input #2).

Shutdown After...

Enter the number of seconds to wait after receipt of alarm before beginning the power off sequence for the receptacle. Actual power-off then occurs after the Minimum Shutdown Delay has elapsed. In *Slave Shutdown* mode, this is useful for providing time for an attached device to gracefully shutdown prior to power-off. The figure below shows the possible shutdown sequence for a server attached to receptacle #3. Figure 11- Slave Shutdown Wiring Example shows the wiring that would be used for this example. *Note that actual time required to completely shut down a server operating system may vary significantly from this*

example. The user should take into account the actual length of time required for shutdown as well as the shutdown delay (if any) specified for the shutdown software running on the server.

Note that if you have a server attached to the receptacle you are powering off (using the *Mirror* or *Slave Shutdown* feature of the PA-800), you *must* ensure that adequate time is provided for graceful operating system shutdown.

Settings for Receptacle #3:

Minimum Shutdown Delay	60 Seconds
Shutdown After (Std Alarm)	30 Seconds

Sequence:

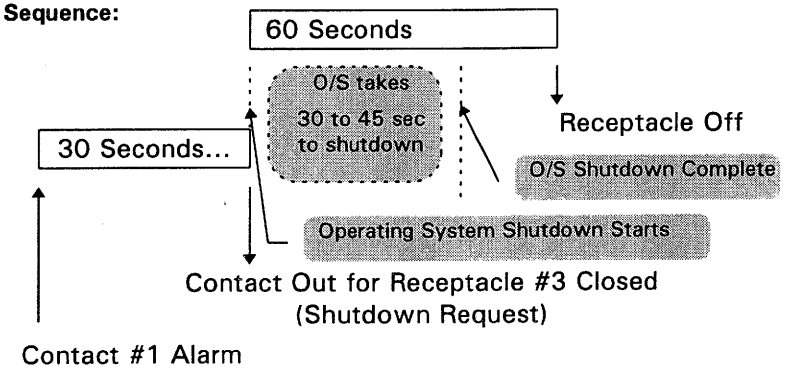


Figure 6 - Slave Shutdown Timing

Restart After...

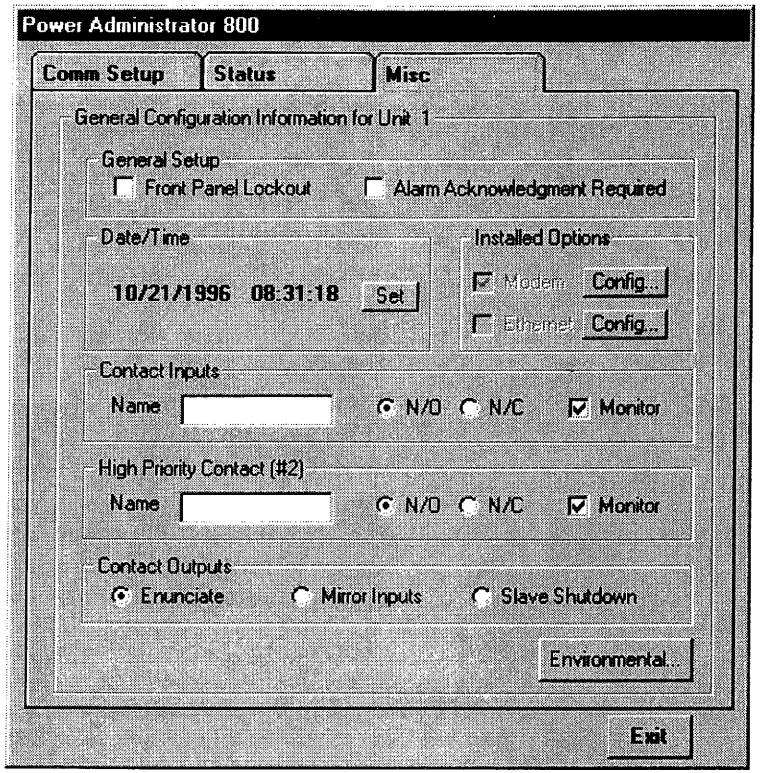
Enter the number of seconds to wait after the alarm condition clears before powering the receptacle back on. *Please note that if the receptacle is off when the alarm condition is asserted, it will not be powered back on when the alarm condition is cleared regardless of the user's Restart After settings.*

Uninterrupted

If you wish, you may configure the receptacle to always continue its power-off sequence upon receipt of an alarm. This means that even if the alarm condition is cleared before the power-down takes place, the receptacle will continue its countdown and power-off when scheduled. If this option is not selected and the priority alarm is cleared before the timer expires, the countdown is canceled and the receptacle remains on.

Misc Settings

General configuration information is set by selecting the ***Misc*** index tab.



Front Panel Lockout

If you wish to disable the ability to power-on and power-off receptacles from the front panel of the Power Administrator, select this option.

Alarm Acknowledgment Required

Alarm Acknowledgment Required indicates that all alarms generated by the Power Administrator will only be cleared after the alarm condition is removed AND operator acknowledgment of the alarm has been received. If this option is not set, the associated alarm is automatically cleared when the condition causing it is removed.

Date/Time

The PA-800 has an internal time clock. To set it (according to your PC time clock) press **SET.**

Installed Options

You may configure the internal modem or Ethernet card if they are installed by selecting the appropriate button.

Input Contact Configuration

The two contact closure inputs on the PA-800 monitor an attached device or switch. Select normally open **(N/O)** or normally closed **(N/C)** as specified by the device or switch manufacturer. The current state of the corresponding alarm is shown on the *Status* index tab. See *Connector Pinouts* on Page 75 for information on how to connect contact inputs to the Power Administrator.

Contact #1 is defined as a *standard* alarm (with the same priority as load, temperature, and humidity alarms). **Contact #2** is the Power Administrator's only *high priority* alarm.

Output Contact Configuration

The PA-800 has eight output contacts that may be configured to operate one of three ways (see *Connector Pinouts* on Page 75).

Enunciate

If you wish the contact outputs to indicate the alarm state of the PA-800 for an enunciator panel, select *Enunciate.* The outputs will be configured to *CLOSE* upon the following alarms:

Contact #	Definition
1	Standard Alarm ("In" Contact #1)
2	Temperature Alarm
3	Humidity Alarm
4	Priority Alarm ("In" Contact #2)
5	Overload
6	Breaker Tripped
7	Not Used
8	Alarm [contact #1..#7] Present

Figure 7 - Enunciate Mode Contact Outputs

Mirror Inputs

In this mode, the eight contacts are configured as four sets of two, each set exactly mirroring the state of the PA-800 input contacts. This "MultiMon" functionality allows four servers to monitor the contacts of a single UPS, for example.

Output contact states in *Mirror* mode are mapped to input contact states as shown below:

Input State	Output Driver State
Open (or No Connection)	OFF
Closed	ON

Figure 8 - Mirror Mode Input and Output Contact Mapping

Output definitions for *Mirror* operation are as follows:

Contact #	Definition
1	Input Contact #1
2	Input Contact #2
3	Input Contact #1
4	Input Contact #2
5	Input Contact #1
6	Input Contact #2
7	Input Contact #1
8	Input Contact #2

Figure 9 - Mirror Mode Contact Outputs

Note that when using the *Mirror* feature of the PA-800, you must ensure that all automatic shutdown times (as setup in the *Alarm Actions*) provide adequate time for graceful operating system shutdown as specified by the shutdown software running on the attached server. Manually cycling power on a receptacle to which a server is attached in this configuration should only be used if the attached server is locked up or has had its operating system shutdown manually.

Slave Shutdown

In this mode, each contact will be CLOSED if power-off is scheduled on the respective receptacle (or if the receptacle is off). This allows attached equipment (usually a Windows NT, Novell, or Unix file server) to complete a graceful shutdown prior to having power removed.

Contact #	Definition
1	Shutdown Scheduled for Remote Receptacle #1
2	Shutdown Scheduled for Remote Receptacle #2
3	Shutdown Scheduled for Receptacle #1
4	Shutdown Scheduled for Receptacle #2
5	Shutdown Scheduled for Receptacle #3
6	Shutdown Scheduled for Receptacle #4
7	Shutdown Scheduled for Receptacle #5
8	Shutdown Scheduled for Receptacle #6

Figure 10 - Slave Shutdown Mode Contact Outputs

Note that when using the *Slave Shutdown* feature of the PA-800, you must ensure that all automatic and manual shutdown times (as setup in the *Alarm Actions* and *Configuration* Dialogs) provide adequate time for graceful operating system shutdown as specified by the shutdown software running on the attached server.

Slave Shutdown Example

Figure 11 shows the conceptual wiring to the Power Administrator a remote server running shutdown software. In this example, a device powered on receptacle #3 has shutdown contact #5 on the *Out* connector wired to the serial port used by PowerMon® II software. The Power Administrator is set for *Slave Shutdown* operation.

See *Contact Out DB15F Connector ("Out")* on page 78 for details on the DB15F connector.

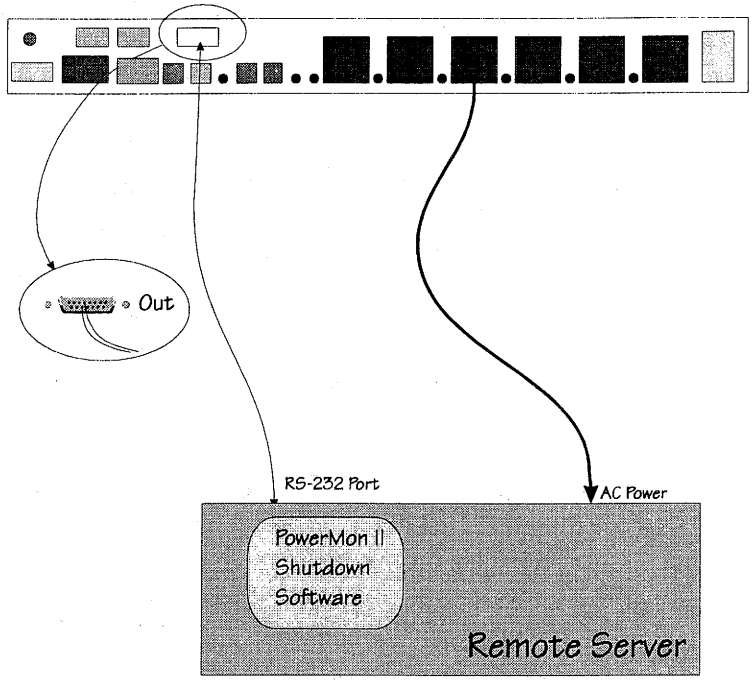
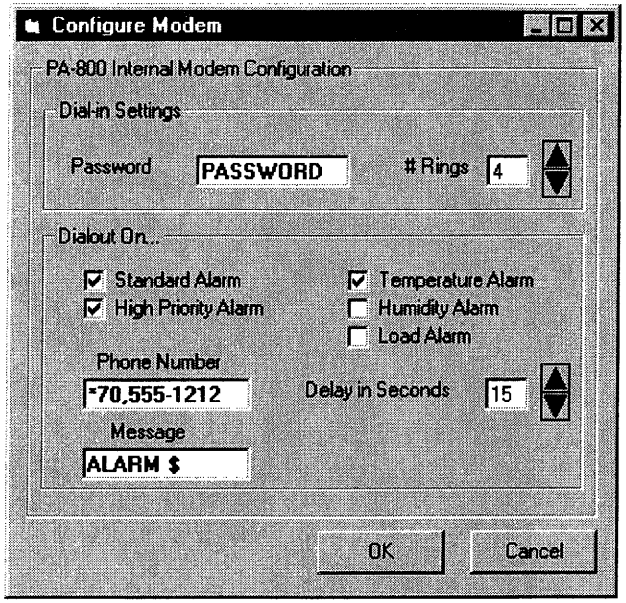


Figure 11- Slave Shutdown Wiring Example

Modem Configuration Dialog

The modem configuration panel allows the user to control the settings for the internal modem, if installed.



Password

Specify the password required for dialup operation. This is also the password used for `telnet` sessions (see *Terminal Mode Sessions* for discussion of `telnet` operation).

Number of Rings

Enter the number of rings required before the Power Administrator will pick up the line. If set to 0, the Power Administrator will not answer the phone.

Dialout On...

For alarm conditions dialout is available. Specify the telephone number to dial as well as the output message (alphanumeric pager string) to send after the receiver answers. The *Delay in seconds...* field indicates how long to wait after receipt of an alarm before dialing.

Valid Message Field Entry

Valid characters in the message field are the letters A-Z, *, #, the numbers 1-9, and $. All other characters are ignored. A dollar sign ($) in the message string will be replaced by a single digit indicating the first alarm encountered at dialout time. See Figure 12 - Alarm Numbers for alarm number assignments.

Alarm Number	Definition
1	Standard Alarm ("In" Contact #1)
2	Priority Alarm ("In" Contact #2)
3	Temperature Alarm
4	Humidity Alarm
5	Overload or Underload
6	Breaker Tripped

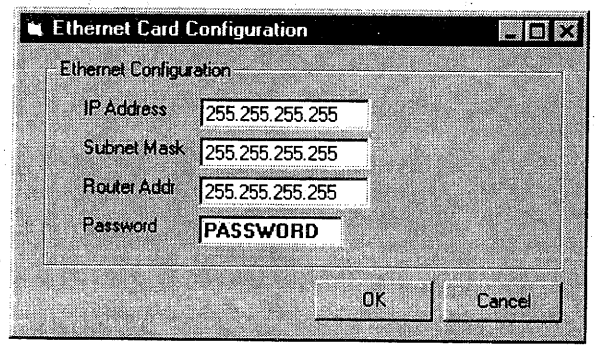
Figure 12 - Alarm Numbers

Ethernet Configuration Dialog

The ethernet configuration panel allows the user to specify the information required to communicate with the internal network card. This panel is only accessible when the Power Administrator has a network card installed.

Note that configuration of the Power Adminstrator's Ethernet option is a two step process that includes setting the values shown below AND then completing configuration via `telnet`.

Correct operation of the IEC SNMP interface requires completion of the Setup process via *telnet*. See the *Telnet Sessions* on page 46.



IP Address, Subnet Mask, Router Address

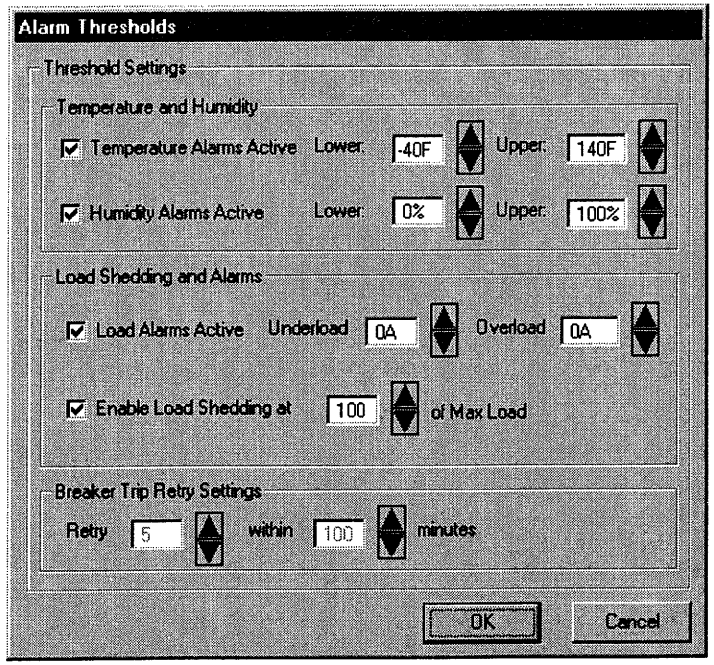
See *IP Addresses* and subsequent sections starting on page 69 for discussion of these settings.

Password

Specify the password required for `telnet` operation. This is also the password used for modem dialup sessions.

Thresholds Dialog

The Thresholds dialog allows the operator to specify how the PA-800 handles various alarm conditions.



Temperature and Humidity

If the optional temperature/humidity module is connected to the PA-800, the user will have the option to select temperature and humidity alarm monitoring and specify a ranges outside of which alarms are generated. Note that each receptacle may be configured to honor or ignore these alarm indications.

Load Shedding and Alarms

If the user wishes to shed load at thresholds lower than the maximum for the unit (11.5A), this value may be specified here. For alarm generation, a range of load readings is specified. If the output load falls outside this range, the Load Alarm condition is raised.

Breaker Trip Retry Settings

The user may specify a number of times (within the specified time interval) to attempt to reset the output breaker after it trips. These parameters are set here. If the specified number of retries is unsuccessful, outputs will remain off and manual intervention is required.

Terminal Mode Operation

If use of the Windows control application or SNMP is not available or not desired, the Power Administrator still allows complete control and configuration via its *Terminal Mode* operation. This makes access to the Power Administrator available to any computer running terminal emulation software.

Protocol and Terminal Modes

Each communications port on the Power Administrator operates in one of two modes at any given time. The first mode, ***Protocol Mode***, is used for communications with a computer running the PA-800 Control Applet or other software package. The second mode, ***Terminal Mode,*** allows dumb-terminal style interaction with an end-user via terminal emulation software.

Terminal Mode Sessions

Terminal mode sessions are available on the serial port "1", the modem port, and through the ethernet card (via `telnet`).

Serial Port "1"

For terminal mode operation using the RS-232 port on the reverse of the unit, you must ensure that the communications settings for the terminal emulator match those for the serial port. See

Configure Baud Rates on page 13 for information on setting baud rates. ***Press @@@ to place the Power Administrator in Terminal Mode.***

Modem Port

For terminal mode operation using the internal modem port on the reverse of the unit, you must ensure that the communications settings for the terminal emulator match those for the modem and you have configured the Power Administrator to answer the telephone (see p. 41). Using the dialout capability in the terminal emulator software, dial the Power Administrator. Once connected, ***press @@@ to place the Power Administrator in Terminal Mode.***

Note: When using Serial port #1 or a modem, failure to enter @@@ at session start will result in the Power Administrator remaining in protocol mode and user input being ignored.

Telnet Sessions

If you have the optional Internal Ethernet Card, you may use `telnet` to connect to the Power Administrator for terminal mode operation. To enter `telnet` from a Unix workstation, login as *superuser* and enter the following at the # prompt:

```
telnet <ip address>
```

where ***<ip address>*** is the IP address you specified for the Power Administrator in the Ethernet Configuration menu. Windows '95, 3.11, or NT users should enter the above command from the *RUN...* option on the *START* menu or Program Manager. When telnet connects *Terminal Mode* is automatically entered.

Exiting Menu Mode

You must exit menu mode prior to hanging up or quitting. Otherwise the Power Administrator will not re-enter *protocol mode,* which is used for communications with the Control Applet.

Options and Their Meanings

For discussion of the options listed in this section, see the Configuration Applet Section which begins on page 29.

Main Menu

The main menu is displayed upon entry into terminal mode:

```
Power Administrator 800 v1.10 © 1996 By SEC
Temp: 98F    Humidity: 44%    Alarms: [12THL]
================================================
#       Name                          Status
R1      Remote Receptacle #1          Off
R2      Remote Receptacle #2          On in :30
1       Router                        On
2       Hub                           On
3       SCO Unix Box                  Off in :45
4       Novell 3.12 Server            On
5       Monitor                       Off
6       Printer                       Off
------- Options ------------------------------
        1.      Power Scheduling
        2.      Acknowledge Alarms
        2.      Receptacle Configuration
        3.      General Configuration
        4.      Alarm Configuration
        5.      Modem Configuration
        6.      Ethernet Configuration
        7.      Quit

Your Choice? 2
```

Figure 13 - Terminal Mode Main Menu

Power Scheduling Menu

For on-demand power scheduling, select Option 1 from the main menu.

```
Power Administrator 800 v1.10
Power Scheduling
Press ? for Options

#       Name                          Status
R1      Remote Receptacle #1          Off
R2      Remote Receptacle #2          On in :30
1       Router                        On
2       Hub                           On
3       SCO Unix Box                  Off in :45
4       Novell 3.12 Server            On
5       Monitor                       Off
6       Printer                       Off

Receptacle Number?     4
Power Off Delay [60]?  30
Proceed (y/n)?
```

Figure 14 - Demand Scheduling

Receptacle Configuration

For general configuration of a receptacle, select option 2 from the main menu:

```
Power Administrator 800 v1.10
Receptacle Configuration
Press ? for Options

Receptacle Number? 4
Name [Novell 3.12 Server]?
Wakeup State [On]?
Wakeup Delay [60]?
Minimum Shutdown Delay [60]?
Std Alarms to Monitor (C1,C2,Temp,Humidity,Load) [--THL]?
Shutdown After [45]?
Uninterrupted [N]?
Restart [Y]?
Restart Delay [120]?
Monitor High Priority Alarm [Y]?
Shutdown After [45]?
Uninterrupted [N]?
Restart [Y]?
Restart Delay [120]?
```

Figure 15 - Receptacle Configuration

General Configuration

Options for overall operation of the Power Administrator are contained in the General Configuration menu as shown below:

```
Power Administrator 800 v1.10
General Configuration
Press ? for Options

Front Panel Lockout [Y]?
Alarm Acknowledgment Required [N]?
Date: [10/10/96]?
Time: [14:22:00]?
Contact #1 Name [AC Power Failure]?
Contact #2 Name [Low Battery Indication]?
Contact #1 (NC/NO) [NC]?
Contact #2 (NC/NO) [NC]?
Output Configuration (E/M/S) [S]?
Telnet/Modem Password [PASSWORD]?
```

Figure 16 - General Configuration

Alarm Configuration

For definition of alarm thresholds and the Power Administrator's operation during alarm, use the Alarm Configuration menu:

```
Power Administrator 800 v1.10
Alarm Configuration
Press ? for Options

Monitor Temp [Y]?
Lower Bound [-20]?
Upper Bound [105]?
Monitor Humidity [Y]?
Lower Bound [20]?
Upper Bound [90]?
Enable Load Shedding [Y]?
Percent of Max Load [100]?
Overload Setting [10]?
Underload Setting [4]?
Breaker Trip Retries [3]?
Breaker Trip Retry Interval (minutes) [5]?
```

Figure 17 - Alarm Configuration

Modem Configuration

If you have installed the optional modem, you may configure it via the Modem Configuration menu:

```
Power Administrator 800 v1.10
Modem Configuration
Press ? for Options


No. Rings [4]?
Dialout On (C1, C2, Temp, Humidity, Load) [-2TH-]?
Dialout # [*70,555-1212]
Dialout Delay [15]?
Dialout Message [ALARM $]?
```

Figure 18 - Modem Configuration

Ethernet Configuration

For users connected via modem or RS-232 connection, the following the Ethernet Configuration menu is provided:

```
Power Administrator 800 v1.10
Ethernet Configuration
Press ? for Options


IP Address [192.217.132.205]?
Subnet Mask [255.255.255.0]?
Router Addr [192.217.132.253]?
```

Figure 19 - Ethernet Settings

For users connected via *telnet*, Ethernet configuration is provided via a separate menu as shown on the following page.

First Time Network Configuration

The first time you configure the Power Administrator, you must configure its network information shown above via *Terminal Mode* or the Configuration Applet. Once this is done, the user should complete Ethernet configuration using *telnet*. This allows specification of certain information needed for SNMP operation. See IEC Configuration Parameters on page 59 for thorough discussion of Ethernet card setup for SNMP operation.


```
<<<<<        IEC Main Menu             >>>>>
<<<<<-------------------------------->>>>>
 1. Set the IP Address, Gateway Address & MIB System Group.
 2. Set Access Controls of SNMP Communities.
 3. Set Trap Receivers.
 4. Additional Setup Screen.
 5. Display  Settings.
 6. Reset IEC settings to Default.
 7. Save IEC settings.
 M. Return to PA Main menu.


Select an option =>
```

Figure 20 - Ethernet Configuration Menu in **telnet** Mode

Internal Ethernet Card ("IEC")

Ethernet Card Overview

The optional Internal Ethernet Card (*"IEC"*) runs an embedded Simple Network Management Protocol (SNMP) software agent that allows SNMP and `telnet` interaction with the Power Administrator.

This agent responds to SNMP GETS and SETS and, also, forwards traps to designated recipients when critical conditions occur at the Power Administrator, such as a temperature or contact input alarm.

The IEC features:

- **Internally Mounted** —A small card fits inside your PA-800.
- **Remote Monitoring and Control** —Monitors alarm conditions and provides receptacle management to your rack from anywhere in the world.
- **NMSs To Receive Alarms**—These traps (unsolicited messages) inform you about the environmental and power conditions at the Power Administrator location.
- **Works with all major NMSs on Ethernet**—IEC works with the most widely used Network Management Systems: HP Open View, Novell NMS, Sun NetManager, IBM NetView, and many more.

Network Connection Port

The IEC provides UTP (RJ-45) connector for 10Base-T networks on the reverse of the PA-800. *This connector is only active when the IEC is installed.* See Figure 2 on Page 9 for location of the network connection.

Two 3.5" Diskettes

In addition to the PA-800 Configuration Applet diskettes, your package contains two 3.5" MIB diskettes—one in DOS format and one in TAR format. These diskettes contain the UPS MIB file. Copy the MIB file to the appropriate **NMS MIB** directory for the UPS connected to your IEC.

Ethernet Card System Requirements

The Power Administrator IEC requires a terminal, Windows '95, or Windows NT workstation for configuration and a network connection for operation. The following is a description of all required components and a list of the most widely used NMSs.

- The IEC installed in your PA-800 at the factory
- Connection to an Ethernet network
- An SNMP-based management station (if SNMP usage is desired). Some NMSs that support the IEC are:

  HP OpenView for UNIX
  HP OpenView for Microsoft Windows
  Novell NMS
  SunConnect SunNet Manager
  IBM NetView/6000

- A dumb terminal or a PC with a terminal emulation package to configure the IEC SNMP Agent via *Terminal Mode* **OR** a Windows '95 or NT workstation with a serial port for configuration of the IEC via the supplied Configuration Applet.
- Network identification values for the IEC:

  IP Address
  Net Mask
  IP Addresses for the NMS
  Definitions of Communities
  IP Address of the Gateway/Router

- ***telnet*** software for final configuration of the IEC.

You should familiarize yourself with SNMP concepts before attempting to configure the IEC. This manual is not a substitute for an SNMP tutorial.

IEC Configuration

Two Step Configuration Process

Configuration of the IEC is a two-step process:

Step One

The first step is involves setting the minimal Ethernet settings required (*ip address, net mask*, and gateway/*router address*). For configuration of these settings using dumb terminal mode, see *Terminal Mode Operation* on page 46. To use the supplied Windows '95/NT Applet, see Ethernet Configuration Dialog on page 42.

Once these minimal settings are configured, use `telnet` for all configuration sessions.

Step Two

The second step involves using `telnet` to establish a network connection to the Power Administrator. Configuration continues as shown in IEC Configuration Parameters on page 59.

Verify The IEC Operation

After you complete all configuration settings and connect the IEC to the network, check the communications status by ***pinging*** the IEC from the Network Management Station (NMS).

If you do not get a response, check the IEC's network connection and IP address (see *Step One*, above.)

Test the adapter with an NMS. Perform a ***"get"*** and a ***"set."***

If the get or set commands fail, check the IEC access controls. The manager must have read permission to execute a ***get*** command successfully and read/write permission to execute a ***set*** command successfully.

See *Configuring the NMS* on page 62 for a detailed discussion on configuring your NMS to work with the IEC.

Your IEC SNMP adapter is now installed and functional.

IEC Configuration Parameters

IEC Main Menu

The IEC Main Menu allows selection of sub-menus for configuration of the IEC.

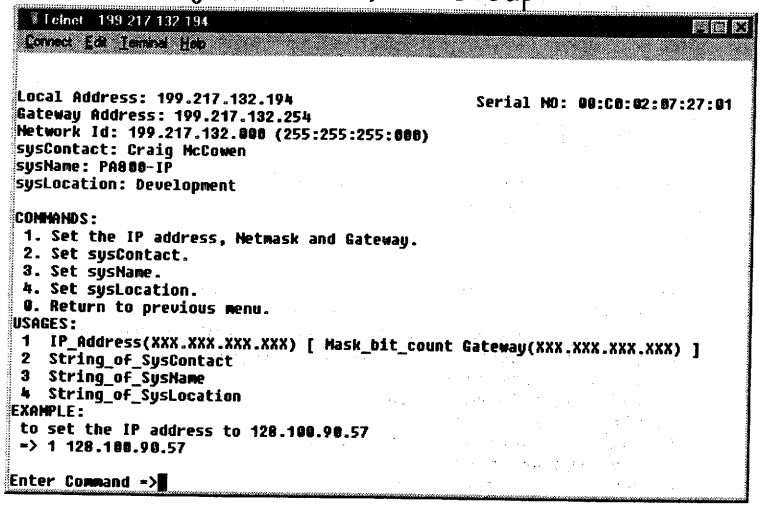
```
<<<<<        IEC Main Menu             >>>>>
<<<<<------------------------------------>>>>>
 1. Set the IP Address, Gateway Address & MIB System Group.
 2. Set Access Controls of SNMP Communities.
 3. Set Trap Receivers.
 4. Additional Setup Screen.
 5. Display  Settings.
 6. Reset IEC settings to Default.
 7. Save IEC settings.
 M. Return to PA Main menu.


 Select an option =>
```

Options

From the IEC Main Menu, the user may select any of various configuration options. These options are discussed on the following pages.

The actual menus displayed by the IEC may vary slightly from those shown above depending upon the version of the IEC firmware purchased. Consult the Release Notes included with the Power Administrator for more information.

IP & Gateway Addresses, MIB Group



IP Address, NetMask, Gateway

This information is required for correct operation and should be entered in standard dot notation, e.g.:

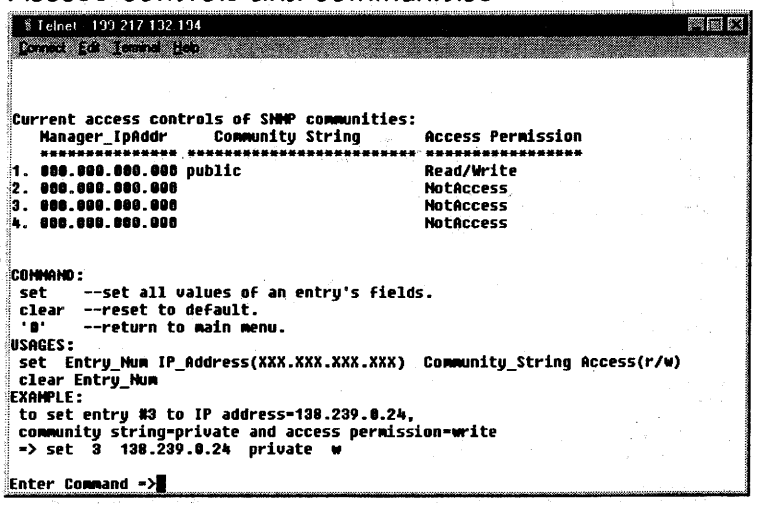
199.217.132.205

See *IP Addresses* on page 69 for discussion of IP addresses.

SysContact, SysName, SysLocation

This information is optional and for informational purposes. SysContact is the name of the person responsible for the Power Administrator, SysName is a mnemonic name for the device, and SysLocation is where the device is located.

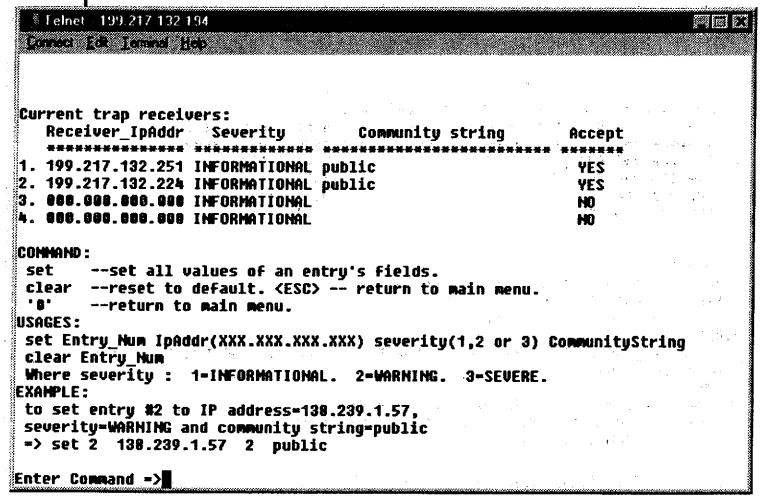
Access Controls and Communities



Access Controls

Enter the IP address of NMS stations that will be communicating with the IEC as well as a *community string* that will be required by the NMS for access. See *Communities* on page 69 for discussion of communities.

Trap Receivers



Trap Receivers

Enter the IP address of up to four NMS stations that should receive SNMP traps from the IEC. These traps contain information on events (such as temperature alarm, contact alarm, load shedding, breaker trip, etc.) See *IP Addresses* on page 69 for discussion of IP addresses.

Configuring the NMS

To complete the IEC installation and configuration process, you must compile the necessary MIBs to configure the NMS.

Any NMS with a MIB compiler can manage the IEC adapter. For instructions on how to compile MIBs for the most popular NMSs—Novell's NetWare Management Station, Hewlett-Packard's OpenView Network Node Manager, and SunConnect's SunNet Manager; see the corresponding heading below.

General Network Management Stations

Follow these general procedures to configure an NMS:

- Compile the device MIBs.
- Add the IEC object to the *Management Map*.
- Ping the IEC.

HP OpenView Network Node Manager for HP-UX

Compile the Device MIB

I. Copy the UPS MIB file from the TAR formatted diskette into the subdirectory **`/usr/ov/snmp_mibs`**.

II. From the main menu, select ***Options***

III. Load/Unload ***MIBs: SNMP...***

IV. Select ***Load***.

V. Select the MIB file copied earlier.

VI. Select ***OK***.

Add the IEC Object to the Management Map

I. Select the submap then ***Edit: Add Object***.

II. Select the group computer.

III. With the middle (or opposite) mouse button, drag the generic symbol subclass device to the submap.

IV. Enter a name for the object in the Selection and Label fields of the *Add Object* box.

V. Highlight ***IP Map*** from *Object Attributes* group.

VI. Select Set Object Attributes button.

VII. Enter Host name and IP address of IEC adapter.
VIII. Enter ***OK***.
IX. Enter ***OK*** at *Add Object* menu.
X. Enter ***OK*** at *Add Object:palette*.

Poll the Device OIDs

I. From the main menu, select ***Monitor: MIB*** values then ***Browse MIB: SNMP***.
II. Move around the MIBs to view the UPS device information.

Set the Device OIDs

From the main menu, select ***Monitor: MIB*** values then ***Browse MIB: SNMP***.

I. Select a MIB variable you want to alter; click on it.
II. Enter the new value then click on ***Set***.
III. Click on ***Start Query*** to view the changes.

Ping the IEC

I. Change active Window to ***Shell***.
II. Type ping <IP address> and press <enter>.

Novell's NetWare Management Station v.2.0

Compile the Device MIB

I. Copy the UPS MIB file from the DOS formatted diskette into the subdirectory
\nms\snmpmibs\current.
II. From the main menu, select ***Tools*** then SNMP MIB Compiler.
III. From the *SNMP MIB Compiler* box, select Compile.

Add the IEC Object to the Management Map

The NMS will discover the IEC and add it to the Management map during its discovery pass.

Poll the Device OIDs

I. From the main menu, select ***Tools*** then the *SNMP MIB Browser*.
II. From the *SNMP MIB Browser* box, select the IP protocol and then enter the IP Address.
A. select the profile ***to read***.
B. select ***OK***.

Set the Device OIDs

I. From the main menu, select ***Tools*** then *SNMP MIB Browser*.
II. From the *SNMP MIB Browser* box, select ***Add***.
III. From the *SNMP Profile Editor* box,
A. assign the profile a name, a community, and a poll interval.
B. select the OID groups from the Group Choice then select Add to transfer them to the Group Selection(s).
C. Save the profile.

Ping the IEC

I. From the main menu, first select ***Fault,*** second ***Test Connectivity,*** and third ***Once***.
II. From the *Test Connectivity* box,
A. type in the IP address.
B. select ***Test***.

SunConnect SunNet Manager

Compile the Device MIB

1. Copy the UPS MIB file from the TAR formatted diskette into the subdirectory specified by **na.snmp.schemas** keyword in **$SNMHOME/snm.conf**.
2. Execute **mib2schema** on the MIBs. This creates respective ***.mib.oid** and ***.mib.schema** and ***.mib.traps** files.
3. In the ***SNM console window***, select ***File|Load***.
4. Select ***Management Database***.

5. Click on ***.mib schema**, where * = the name of each MIB copied in step 1 and select ***Load***.
6. Start a new shell window; change to the subdirectory **$SNMHOME/agent** and execute ***build_oid***. This creates an oid database using all compiled MIBs.
7. Append ****.mib.traps*** to the file specified by ***na.snmp-trap.default*** keyword in **$SNMHOME/snm.conf**.

Add the IEC Object to the Management Map

I. Enter the submap where the managed device will be placed.

II. Select ***Edit, Create, Component, lanbox*** with the right (opposite) mouse button. Select ***Create***.

III. The ***Properties*** box displays.

IV. Enter the IEC 's name as it appears in **etc/hosts** or in the name server.

V. Enter the ***SNMP WrCommunity***.

VI. Select the desired MIBs.

VII. Choose a color for the device.

VIII. Select ***Apply***. This adds the device to the submap.

IX. Create a managed device view with the following steps:

- A. Select the relevant submap .
- B. Select ***Edit, Create, View***, subnet with the right (opposite) mouse button.
- C. Select ***Create*** and press *<enter>*.
- D. Enter the view name.
- E. Copy and paste the glyph into the managed device view.

Poll the Device OIDs

I. Select the device glyph with the right mouse button.

II. Select **Quick Dum, *-MIB** then one of the MIB groups. A window appears displaying a snapshot of the group.

Set the device OIDs

I. Select the device glyph with the right mouse button.

II. Select ***Set Request***, ***-MIB**, {*OID name*}.

III. When the ***Set Tool*** application displays,

- A. Click on ***Get*** to receive the current values.
- B. Select a new value by clicking on ***New Value*** then by clicking ***Set***.
- C. Click on ***Get*** again to view the changes.

Ping the IEC

I. Change active Window to Shell.

II. Type ping <IP address> and press <enter>.

IEC Appendix

This appendix has three sections: *Reference*, *Glossary*, and *Troubleshooting*.

Reference

This section discusses Communities, IP Addresses, Sub net masking, and routers/gateways.

Communities

A community is a string of printable ASCII characters that identifies a user group with the same access privileges. For example, a common community name is "public."

For security purposes, the SNMP agent validates requests before responding. The agent can be configured so that only trap managers that are members of a community can send requests and receive responses from a particular community. This prevents unauthorized managers from viewing or changing the configuration of a device.

IP Addresses

Every device on an internetwork must be assigned a unique IP (Internet Protocol) address. An IP address is a 32-bit value comprised of a network ID and a host ID. The network ID identifies the logical network to which a particular device belongs. The host ID identifies the particular device within the logical network. IP addresses distinguish devices on an internetwork from one another so that IP packets are properly transmitted.

IP addresses appear in dotted decimal (rather than in binary) notation. Dotted decimal notation divides the 32-bit value into four 8-bit groups, or octets, and separates each octet with a period. For example, 199.217.132.1 is an IP address in dotted decimal notation.

To accommodate networks of different sizes, the IP address has three divisions—Classes A for large, B for medium, and C for small. The difference among the network classes is the number of octets reserved for the network ID and the number of octets reserved for the host ID.

Class	Value of First Octet	Network ID	Host ID	Number of Hosts
A	1-126	first octet	last three octets	16,387,064
B	128-191	first two octets	last two octets	64,516
C	192-223	first three octets	last octet	254

Any value between 0 and 255 is valid as a host ID octet except for those values the InterNIC reserves for other purposes.

Value	Purpose
0, 255	Subnet masking
127	Loopback testing and interprocess communication on local devices
224-254	IGMP multicast and other special protocols

Subnetting and Subnet Masks

Subnetting divides a network address into subnetwork addresses to accommodate more than one physical network on a logical network.

For example: A Class B company has 100 LANs (Local Area Networks) with 100 to 200 nodes on each LAN. To classify the nodes by its LANs on one main network, this company segments the network address into 100 subnetwork addresses. (If the Class B network address is 150.1.x.x, the address can be segmented further from 150.1.1.x through 150.1.100.x.)

A subnet mask is a 32-bit value that distinguishes the network ID from the host ID for different subnetworks on the same logical network. Like IP addresses, subnet masks consist of four octets in dotted decimal notation. You can use subnet masks to route and filter the transmission of IP packets among your subnetworks. The value "255" is assigned to octets that belong to the network ID, and the value "0" is assigned to octets that belong to the host ID.

For the example above, if you want all the devices on the subnetworks to receive each other's IP packets, set the subnet mask to 255.255.0.0. If you want the devices on a single subnetwork only to receive IP packets from other devices on its own subnetwork, set the subnet mask to 255.255.255.0 for the devices on that subnetwork.

Subnet Mask	Routing and Filtering
0.0.0.0	IP packets are transmitted to all devices.
255.0.0.0	IP packets are only transmitted to devices whose IP address's first octet matches the sender's IP address's first octet.
255.255.0.0	IP packets are only transmitted to devices whose IP address's first two octets match the sender's IP address's first two octets.
255.255.255.0	IP packets are only transmitted to devices whose IP address's first three octets match the sender's IP address's first three octets.

Gateways

Gateway, also referred to as a router, is any computer with two or more network adapters connecting to different physical networks. Gateways allow for transmission of IP packets among networks on an internetwork.

SNMP Glossary

The Glossary section defines the terms used in the IEC-MP environment.

Agent	Implemented SNMP applications in network elements (hosts). Agents perform the network management's functions as requested by the network administrator from an NMS.
Dry Closure Input	Non-powered contact type inputs—switch, relay contact, open-collector.
Dry Closure Output	Form C dry-contact outputs which are common, normally open, or normally closed.
EtherNet	Local Area Network technology, originally developed by the Xerox Corporation, can link up to 1,024 nodes in a bus network. EtherNet provides raw data transfer in a rate of 10 megabits/sec. with actual throughputs in 2 to 3 megabits/sec. using a baseband (single-channel) communication technique. EtherNet uses carrier sense multiple access collision detection (CSMA/CD) that prevents network failures when two devices attempt to access the network at the same time. LAN hardware manufactures use EtherNet protocol; their products may not be compatible.
Gateway	A computer that attaches to a number of networks and routes packets between them. The packets can be different protocols at the higher levels.
IP	*Internet Protocol*—The TCP/IP standard protocol defines the IP datagram as the unit of information passed across a network.
IP Address	*Internet Protocol Address*—A 32-bit address assigned to hosts participating in a TCP/IP network. The IP address consists of network and host portions. It is assigned to an interconnection of a host to a physical network.
MAC	*Medium Access Control*—The network layer between the physical and the datalink layers. Specifically, the physical (hardware) address exists in this layer.
MIB	*Management Information Base*—The database, i.e., set of variables maintained by a gateway running SNMP.
NC	*Normally Closed* —Refers to a contact switch that is normally closed.
NIC	*Network Interface Controller*—The hardware interface to the physical connection to the network.
NMS	*Network Management Station*

NO	*Normally Open*—Refers to a contact switch that is normally open.
OID	*Object Identifier*—The variables defined in a MIB.
Personality	The current device specific software uploaded to the IEC.
Router	A computer that manages traffic between different network segments or different network topologies. It directs the destination IP address. The network media can be different, but the higher level protocols must be the same.
RS-232	A specification for serial communication between data communication equipment and computers.
SNMP	*Simple Network Management Protocol*—A standard protocol used to monitor IP hosts, networks, and gateways. SNMP defines a set of simple operations that can be performed on the OIDs of the MIBs managed by the monitored Agents. It employs the UDP/IP transport layer to move its object between the Agents and the NMS.
Sub-Agent	A software module that manages specific MIB sub-groups for an Agent. They communicate with the Agent using a SMUX (multiplexer).
TCP/IP	*Transmission Control Protocol/Internet Protocol*—A protocol suite used by more than 15 million users with a UNIX association and widely used to link computers of different kinds.
TES	*Terminal Emulation Software*—Communications program to transform a personal computer into a terminal for the purpose of data communications.
TFTP Server	*Trivial File Transfer Protocol Server*—A host to provide services according to TFTP; a TCP/IP standard protocol for file transfer with minimal capability and overhead depending on UDP for its datagram delivery service.
UDP/IP	*User Datagram Protocol/Internet Protocol*—A TCP/IP standard protocol. It enables transfer of information between applications running on different host. It is referred to as an unreliable, connectionless datagram delivery service.
UPS	*Uninterruptible Power Supply*—A device that supplies power to your system with rechargeable batteries if there is an AC power failure.

Connector Pinouts

Convention Used

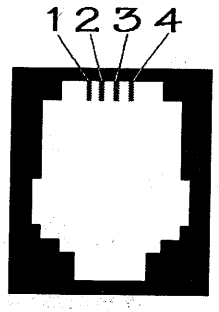
PA-800 Connector pinouts for all connectors. All views are from the outside of the PA looking in.

SEC does not provide support for cables not sold or manufactured by SEC.

Electronic Interfaces

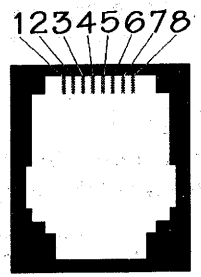
Expansion RJ11 Connectors ("PA-Bus")

PA Bus J1/J2 are in parallel (either one may be used)



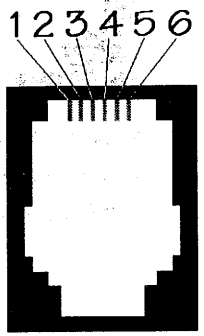
1,4	shield (not needed for shorter runs)
2	RS485 A (noninverting drive/receive)
3	RS485 B (inverting drive/receive)

LAN RJ45 Connector ("10BaseT")



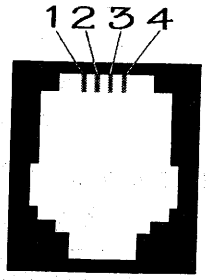
1	TX+
2	TX-
3	RX+
4	N.C.
5	N.C.
6	RX-
7	N.C.
8	N.C.

Telephone RJ12 Connector ("TEL")



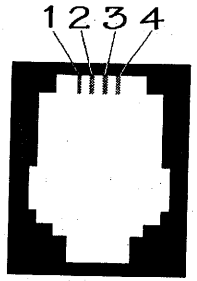
1	N.C.
2	N.C.
3	Tip
4	Ring
5	N.C.
6	N.C.

Contact In RJ11 Connector ("IN")



1,3	Ground
2	Low Battery (Contact #2)
4	AC Fail (Contact #1)

RJ11 Connectors ("R1" and "R2")



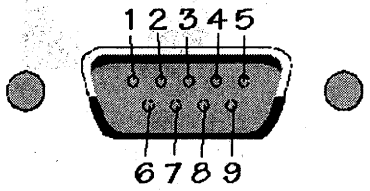
1,2	Drive -
3,4	V+ (12VDC Nominal)

1/8" Stereo Jack ("Sensor")

Sensor 1/8" stereo jack

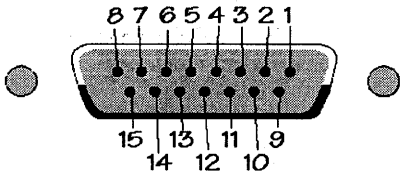
Tip	+5VDC
Ring	I/O data
Sleeve	Ground (Common)

RS-232 DB9-M Connectors ("1" and "2")



1	N.C.
2	RXD (input to PA)
3	TXD (output from PA)
4	DTR (output from PA)
5	GND
6	DSR (input to PA)
7	RTS (output from PA)
8	CTS (input to PA)
9	RI (input to PA)

Contact Out DB15F Connector ("Out")



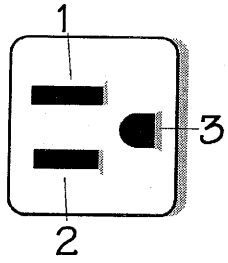
- Emitters (E) are generally grounded at other end
- Collectors (C) are generally pulled up at other end and read

1	E1	2	E2	3	E3	4	E4
9	C1	10	C2	11	C3	12	C4
5	E5	6	E6	7	C7	8	E7/E8
13	C5	14	C6	15	C8		

Power Receptacles

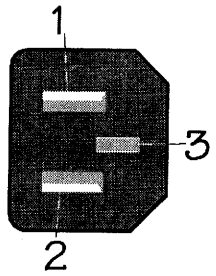
All output receptacles are UL recognized, rated to 11.5A output.

Power Output Receptacles



1	L (AC "HOT")
2	N (Neutral)
3	Ground (earth). All grounds in this system make to earth.

Power Input Receptacle



1	L (AC "HOT")
2	N (Neutral)
3	Ground (earth, all grounds in this system connected to earth)

Troubleshooting

Communications Problems

PROBLEM: Configuration Applet will not communicate via Serial Port "1".

Solution: Make sure the baud rate you select matches the DIP Switch Setting (see pages 9 and 30).

Solution: Ensure that you are using a NULL modem cable.

PROBLEM: Power Administrator will not answer the phone.

Solution: Ensure that you have the # of rings specified greater than 0 (see page 50).

IEC Problems

PROBLEM: Cannot `telnet` to the IEC or cannot `ping` the IEC.

Solution: Make sure the network connection to the IEC is good.

Solution: Make sure the cable is in good condition.

Solution: Make sure to set the Community String [Set Access Controls, Type 2, Set 1 through 4]. Follow these steps:

Name the community with any lowercase name. (A UPS monitors a designated community.)

Solution: Make sure to set the Manager Table. Set Access Controls, Type 3, Set 1 through 4]. Follow these steps:

Define the Manager IP Address, Community string, and Access Permission together.

The trap manager's community should be the same number as the number of the community it monitors.

The trap manager's status is set to Accept YES to enable sending traps or to Accept to No to disable.

PROBLEM: My NMS cannot do *gets* and *sets* on the PA-800.

Solution: Ensure that the IEC has been configured with the *IP address* and *community string* used by the NMS.

Getting Technical Support

Before calling for help, please complete the following form:

Installation Site:

Company Name:_____

Address:_____

City:_____ State:_____ ZIP code:_____

Installation Site Contact:

Full Name:_____

Phone Number:_____ Fax Number:_____

If you are a consultant,

Consultant Name:_____

Phone Number:_____ Fax Number:_____

Computer System:

Operating System and version:_____

System Manufacturer:_____

System Model Number:_____

NMS name and version number:_____

UPS (if any):

Manufacturer:_____

Model Name/Number:_____

Type of Port Connector (#pins, male or female.): _____

What are the symptoms?

_____

_____

_____

_____

☎ Technical Support ☎

Have the information listed above ready. You can reach us by calling:

US & World: (314) 532-2855

by fax at (314) 532-2037

or by E-mail at: support@sechq.com

Europe: +44 1600 716400

or by fax at +44 1600 772026