



WARNING:

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC rules, which are designed to provide reasonable protection against such interference when 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 required to correct the interference.

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IMPORTANT PASSWORD INFORMATION

The System Setup option from the Main Menu on the front panel is password-protected. The default password is MEMORY. It is recommended to change the default password to ensure security for the UPS setup. Use the Set Usr PWD option from the System Setup Menu to change the password. Contact your field service representative if you have misplaced your password: 1-800-843-9433.

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1 Introduction

The *Plus Communications Manual* describes the configuration and functional operation of the RS-232/LAN relay options board provided in the Powerware® Plus UPS product line. This board is available for the Powerware Plus UPS Models 3 kVA through 36 kVA that have a full-featured digital front panel.

A DB-25 connector is provided for access to the RS-232 interface, as well as the relay output contacts. See Figures 1 and 2 on page 3 for specific pin locations.

Chapter 2, “RS-232 Communication Configuration” describes the four modes of operation:

- Printer Mode
- Terminal Mode
- Binary Computer Mode
- ASCII Computer Mode

Chapter 3, “The Relay Option” describes the four relays, the relay setup for predefined configurations, and the custom options for each relay.

2 RS-232 Communication Configuration

A standard RS-232 cable may be used to attach the UPS to a terminal, printer, or computer for serial communication. See Figure 2 for the RS-232 pin assignments.

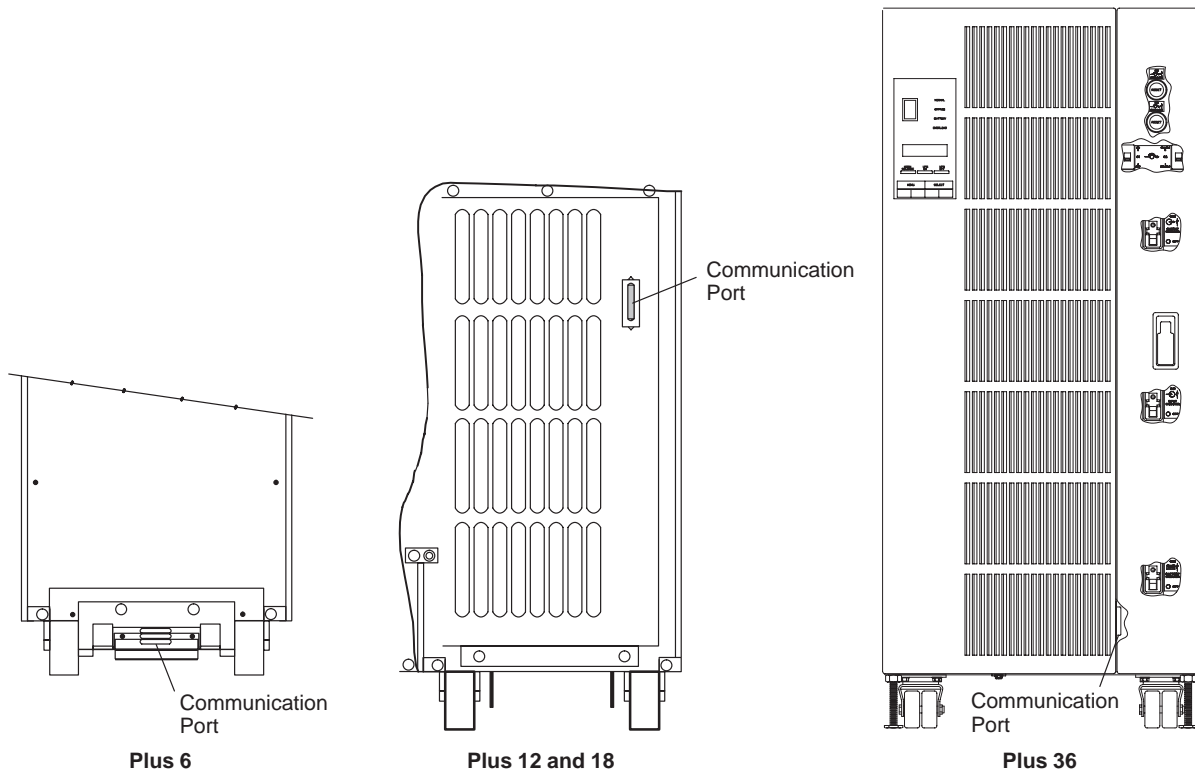


Figure 1. Location of Communication Connectors

A single DB-25 connector is used for RS-232 and Relay/LAN communications.

CHASSIS GND	1	14	RLY2 N.D.
RS232 TXD	2	15	RLY2 COM
RS232 RXD	3	16	RLY2 N.C.
RS232 RTS	4	17	RLY3 N.O./N.C.
RS232 CTS	5	18	RLY3 COM
RS232 DSR	6	19	RLY3 N.O.
SIGNAL GND	7	20	RS232 DTR
NOT USED	8	21	RLY3 N.C.
RESERVED	9	22	NOT USED
RESERVED	10	23	RLY4 N.C.
RLY1 N.O.	11	24	RLY4 N.O.
RLY1 COM	12	25	RLY4 COM
RLY1 N.C.	13		

Figure 2. Communication Pin Assignments

The Communications Setup Menu

The Communications Setup Menu has three submenus that allow you to configure the UPS communications, such as the output mode, the I/O port setup, and custom I/O options.

From the Main Menu on the UPS front panel, select the System Setup option. After entering a valid password, the System Setup Menu appears (see “Important Password Information” in the front of this manual). Select the COMM SETUP option to set up the UPS communications. The flow chart in Figure 3 shows the possible options. Follow the submenus and options to select the settings.

NOTE: The I/O Port Setup will automatically configure the I/O port to 9600 baud, 8 bit, No parity. The 2-wire terminal has no handshaking. Softhndshk Term has both software and hardware handshaking. See Figures 1 and 2 to make the appropriate cable connections.

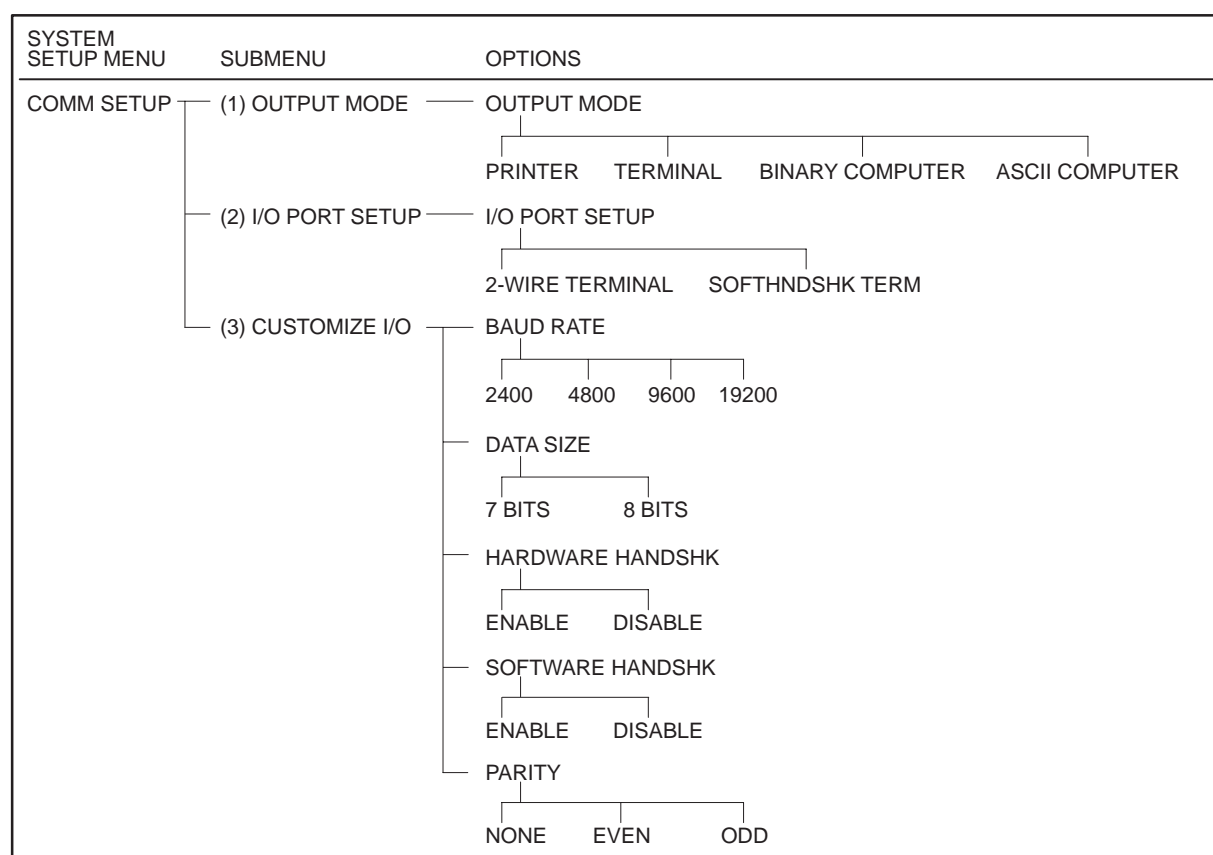


Figure 3. Communications System Setup

The Output Mode Menu

The Output Mode Menu has four modes of operation:

- Printer Mode — for hard copy logging of UPS operation
- Terminal Mode — for monitoring with a VT100-type terminal
- Binary Computer Mode — for computer interface
- ASCII Computer Mode — for computer interface

Printer Mode

Printer Mode outputs ASCII data when the state of the UPS changes, an alarm or event occurs, or the user requests data. An unattended serial printer may be attached to the UPS to record alarms and events as they occur. A terminal or computer with terminal emulation software may also be used to communicate with the UPS in Printer Mode. Printer Mode has two modes of operation:

- Options Mode
- Logging Mode

The Options Mode prints out a given screen of data upon request. The Logging Mode prints all unprinted alarms in the alarm history queue (oldest to most recent) and then continues to print any new alarm in the queue.

Options Mode Each option starts with a header string and a blank line. The header string consists of the name of the screen (all caps) and a time/date stamp of the exact time the command was issued. The time/date stamp follows the screen name, but does not start at any particular column. Each screen ends with an **<EOF>** character (**<ctrl> + Z**) followed by the message *****Return to Logging*****. Use the following commands for specific print options:

- 0 prints out all of the below
- 1 prints out Configuration Screen
- 2 prints out Meters Screen
- 3 prints out Active Alarms Screen
- 4 prints out entire Alarm History Screen

Configuration Screen

This screen displays all of the UPS setup and type information in two columns: category labels and data, starting at column 1 and column 22 respectively. Categories are as follows: Machine Type & Model Number, Input Frequency & Deviation Limit, Output Volts, Output Frequency, Output Phase Angle, Number Output Phases, Hardware Modules, Battery Information, Option Modules (communication/relay boards), Communications Setup, and Version Numbers.

Meters Screen

The top of the Meters Screen provides phase voltages, line voltages, and frequency. All of the valid voltages and currents are displayed in five columns according to the time/date stamp, starting at column 1, 30, 40, 50, and 60. The bottom of the screen provides rated current and kVA percentages in bar graph form. 0% starts at column 20 and each 25% increment takes up eight columns, up to 125%.

Active Alarms Screen

This screen displays all currently active alarms in one column. See "Alarm/Event Messages" on page 6 for a list of possible alarm messages.

Alarm/Event History Screen

This screen displays the entire alarm history queue in the UPS at the time this data is requested. It begins with the oldest alarm entry in the queue and ends with the most recent. Any alarms occurring during printing of the history are included in chronological order. The output format is identical to the format for the Printer Logging Mode. See "Alarm/Event Messages" on page 6 for a list of possible alarm and event messages.

Logging Mode The Logging Mode allows you to generate a hard copy of the Alarm/Event Queue. Any alarm entered into the alarm queue is also directed to the printer when the alarm occurs. The printed alarm queue messages contain a time and date stamp and the alarm text message. Entry numbers are not used for the printed alarms. Printer Mode uses the following output format for printing alarm entries:

NOTE: *The UPS may be configured for DD/MM/YY if the date format has been changed in the system setup.*

MM/DD/YY	HH:MM:SS.T	ALARM MESSAGE	. . .<CF>	<LF>
12345678901234567890123456789012			. . .	
1	2	3	. . .	
CHARACTER POSITION NUMBERS				
Symbol	Description			
MM	Month (2 digits)			
DD	Day (2 digits)			
YY	Year (last 2 digits, e.g. 1990 = 90)			
HH	Hours (2 digits)			
MM	Minutes (2 digits)			
SS	Seconds (2 digits)			
T	Tenths of Seconds (1 digit)			
<CR>	Carriage Return Character (ASCII 13)			
<LF>	Line Feed (ASCII code 10)			

The character position numbers indicate each field's starting position and length. The alarm message is prefixed by the word **CLEAR:** whenever an alarm is entered into the alarm history queue with a cleared status. The following table lists the possible alarm and event messages.

NOTE: *Some Powerware Plus models do not support all of the messages.*

Alarm/Event Messages	
Auto-Off Command	Auto-On Command
Auto On Enabled	Battery Charger Failure
Battery DC Over Voltage	Battery DC Under Voltage
Bypass Failure	Bypass Not Available
Bypass Under Freq/Over Freq	Complete Battery Discharge
Control Power Off	Control Power On
DC Link Over Voltage	DC Link Under Voltage
DC Start	Emergency Power Off Trip
Front Panel BIT Failure	Greater Than 106% Overload Phase A
Greater Than 106% Overload Phase B	Greater Than 106% Overload Phase C
Greater Than 125% Overload Phase A	Greater Than 125% Overload Phase B
Greater Than 125% Overload Phase C	Greater Than 150% Overload Phase A
Greater Than 150% Overload Phase B	Greater Than 150% Overload Phase C
Heatsink Over Temp	Heatsink Temp Sensor Failed

Alarm/Event Messages	
Input Line Voltage Loss	Input Over Voltage Phase A
Input Over Voltage Phase B	Input Over Voltage Phase C
Input Phase Rotation Error	Input Under Voltage Phase A
Input Under Voltage Phase B	Input Under Voltage Phase C
Inverter A/D Converter BIT Fail	Inverter Cntrl Bd Failed BIT
Inverter CPU BIT Failed	Inverter EEPROM Checksum Failed
Inverter EPROM Checksum Failed	Inverter Over Temp
Inverter Program Stack Error	Inverter RAM BIT Failure
Inverter Ramp Up Failed	Inverter Ramp Up Test Failed
Inverter Shutdown Imminent	Inverter Shutdown Rectifier
Inverter Temp Sensor Failed	Inv Senses DC Link Over Volt
Load Dumped	Load On Inverter
Low Battery Shutdown	Network Not Responding
Node EEPROM Verification Error	Output AC Over Volt Test Fail
Output Breaker Open	Output DC Over Voltage
Output Over Current Trip Phase A	Output Over Current Trip Phase B
Output Over Current Trip Phase C	Output Over Voltage Phase A
Output Over Voltage Phase B	Output Over Voltage Phase C
Output Under Voltage Phase A	Output Under Voltage Phase B
Output Under Voltage Phase C	Power Supply 5 volt Fault
Power Supply +/- 12 volt Fault	Power Supply Failure
Power Supply Over Temp	Power Supply Shutdown
Rectifier BIT Failed	Rectifier Current Over 100%
Rectifier Current Over 125%	Rectifier EEPROM Failure
Rectifier EPROM Failure	Rectifier Failed
Rectifier Fault Interrupt Fail	Rectifier Power Capacitor Fault
Rectifier Shutdown Imminent	Software Change Occurred
UPS On Battery	UPS On Bypass
UPS Off Command	UPS On Command

Terminal Mode

The Terminal Mode provides an interactive user interface to the UPS through an ANSI X3.64 compatible terminal, such as a VT100. A computer with VT100-compatible terminal emulation software may also be used to view the UPS status in Terminal Mode.

The data displayed in Terminal Mode is user-selectable through a menu screen. When you select a data screen, the data is continually updated to reflect the UPS state. The following options are available from the Main Menu screen:

- Meters
- Active Alarms
- Alarm/Event History
- Battery Data
- Mimic Screen
- Set Time & Date

```

Uninterruptible Power System Version 2.00
Status:  System Normal      Alarms:  0      15:30:23 03/01/91
-----
Display Menu
Meters
Active Alarms
Alarm/Event History
Battery Data
Mimic Screen
Set Time & Date

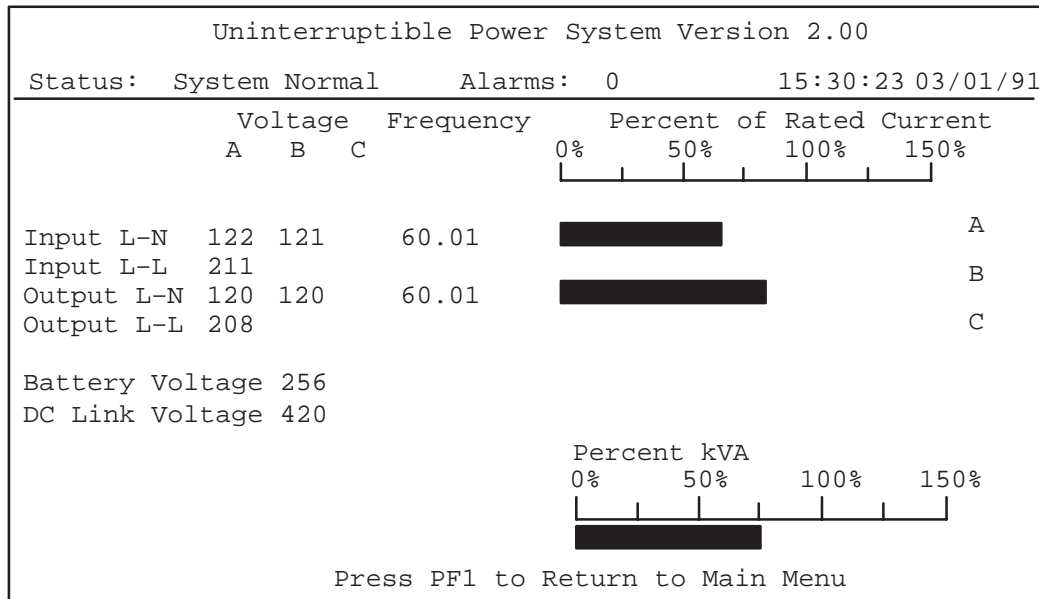
Press Up Arrow or Down Arrow to Move Cursor to Desired Entry
Press Return to Select Entry

Rectifier Version 2.00
Inverter Version 2.00

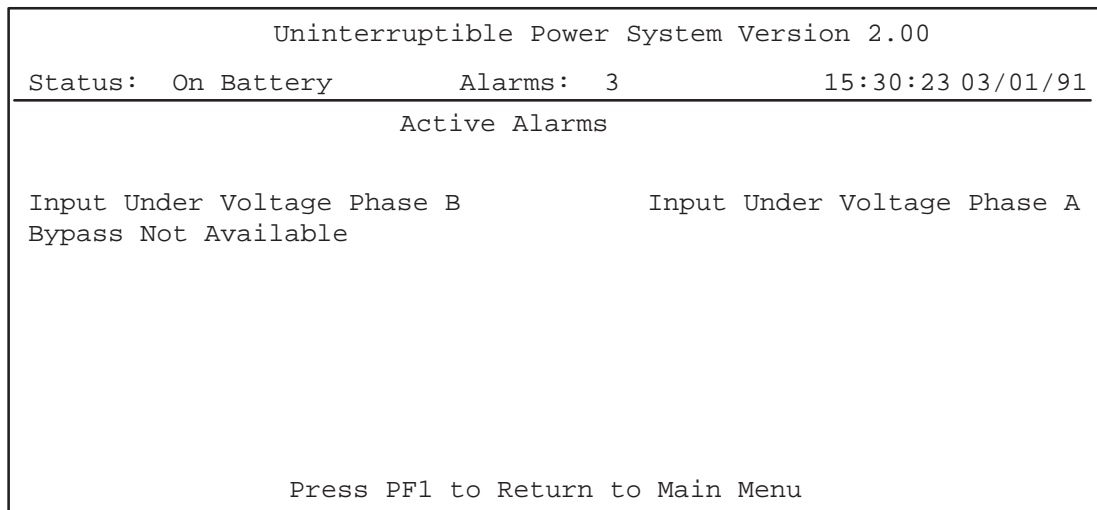
```

Use the up and down arrow keys to move within the menu. Press the **Return** key to select an option. The following sections describe each entry of the Main Menu screen.

Meters The Meters Screen provides the operating data values of the UPS. It displays the input and output voltages, input and output frequency, battery voltage, and the DC link voltage. Bar graphs of the percent of rated current for each output phase and the total kVA are also displayed.



Active Alarms The Active Alarms Screen provides a list of currently active alarms. Text descriptions are displayed in order of alarm priority. See "Alarm/Event Messages" on page 6 for a list of possible alarms.

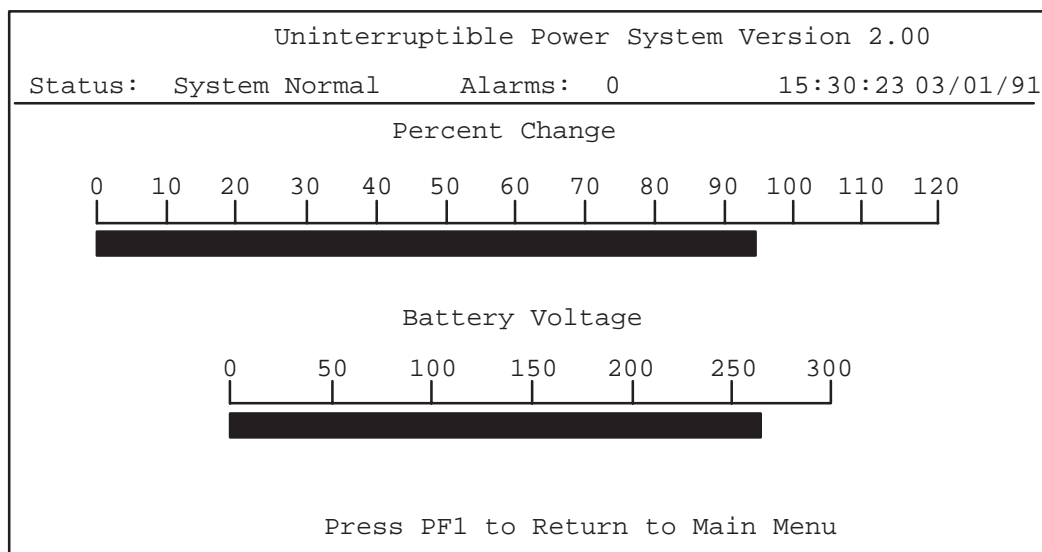


Alarm/Event History The entries on the Alarm/Event History Screen show the oldest alarm first. Each entry contains an entry number, time and date stamp, and description. When entries are made to the queue, the screen automatically updates. See “Alarm/Event Messages” on page 6 for a list of possible alarms and events.

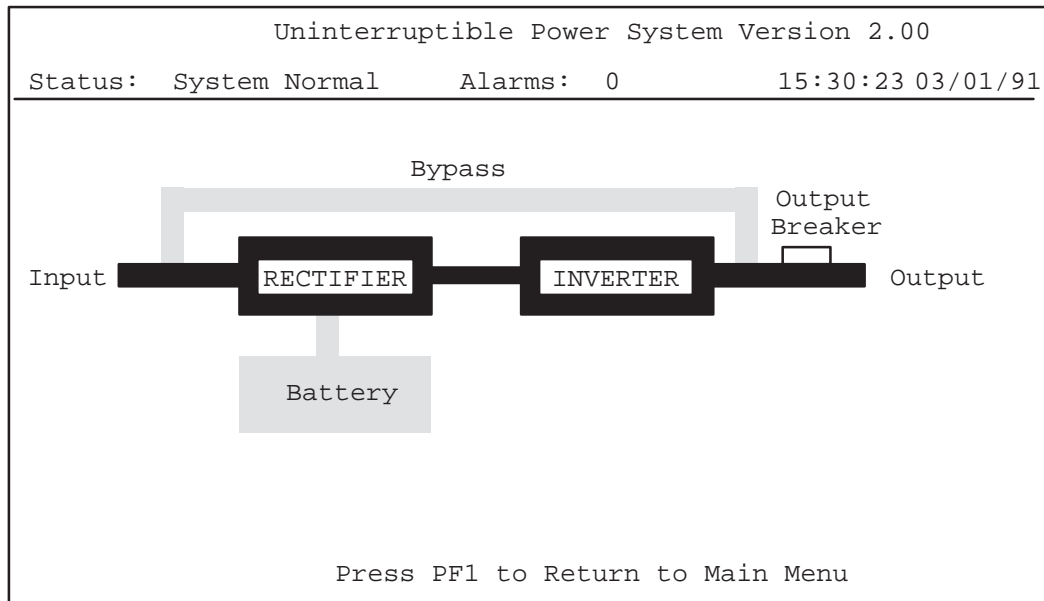
Uninterruptible Power System Version 2.00			
Status:	System Normal	Alarms: 0	15:30:23 03/01/91
Alarm/Event History			
#	Date	Time	Description
001	03/01/91	15:24:15.8	UPS On Bypass
002	03/01/91	15:24:25.7	UPS On Command
003	03/01/91	15:25:07.1	Load On Inverter
004	03/01/91	15:25:24.1	Bypass Not Available
005	03/01/91	15:25:24.2	UPS On Battery
006	03/01/91	15:25:24.2	Input Under Voltage Phase A
007	03/01/91	15:25:24.2	Input Under Voltage Phase B
008	03/01/91	15:25:24.2	Input Line Voltage Loss
009	03/01/91	15:25:25.5	CLEAR: Input Line Voltage Loss
010	03/01/91	15:25:30.7	CLEAR: Input Under Voltage Phase A
011	03/01/91	15:25:30.7	CLEAR: Input Under Voltage Phase B
012	03/01/91	15:25:38.5	CLEAR: Bypass Not Available
Press PF1 to Return to Main Menu			

Battery Data The Battery Data Screen displays an estimate of battery time remaining (when On Battery) or a percentage of charge (when not On Battery) and a bar graph of battery volts.

NOTE: Battery time remaining is unavailable for remote (custom) battery applications.

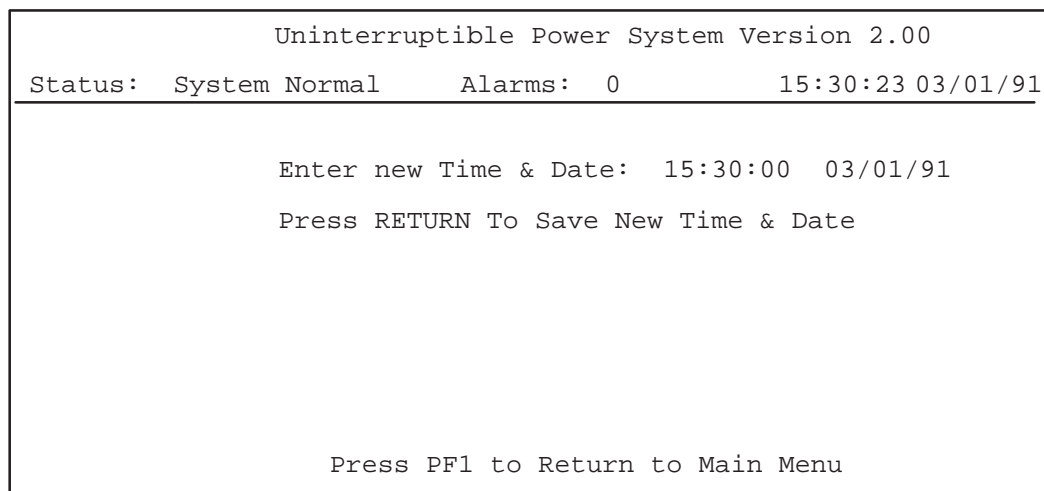


Mimic Screen The Mimic Screen provides a block diagram of the system configuration and displays the current operational state of the UPS (i.e., On Bypass).



Set Time & Date The Set Time & Date Screen allows you to set the UPS time and date via a remote terminal. Use the left and right arrow keys to move from field to field. The field flashes if you enter an invalid entry. Press the **Return** key to update the system time; this field flashes to show acceptance.

NOTE: The UPS may be configured for DD/MM/YY if the date format has been changed in the system setup.



Binary Computer Mode

Binary Computer Mode uses a proprietary protocol used by the OnliNet[®] Power Management Software and the ConnectUPS[™] Adapter to monitor UPS operation.

ASCII Computer Mode

ASCII Computer Mode is a proprietary protocol used by computer-based software to monitor UPS operation.

The I/O Port Setup Menu

The I/O Port Setup Menu provides standard port configurations for use with terminals, printers, or computers. When one of these configurations is active, an asterisk (*) appears to the left of the configuration option. Use the left or right arrow key to scroll through the configuration options. Press the **Select** key to configure one of the communication options.

2-Wire Terminal

2-Wire Terminal configures the communications port to 9600 baud, 8 bit, No parity. Hardware handshaking and software handshaking are both disabled.

Softhndshk Term

Softhndshk Term configures the communications port to 9600 baud, 8 bit, No parity. Hardware handshaking and software handshaking are both enabled.

The Customize I/O Menu

The Customize I/O Menu allows you to set the hardware parameters of the UPS RS-232 port. Note that the I/O Port Setup Menu also modifies these parameters; do not use the I/O Port Setup Menu if you are using the Customize I/O Menu.

Baud Rate Options

The baud rate determines the speed of the data transferred between the UPS and the auxiliary device. Available settings are: 2400, 4800, 9600, and 19200.

Data Size

This parameter determines the number of bits transmitted per ASCII character, for binary computer or graphics capability an 8-bit protocol should be used. The available settings are for 7-bit and 8-bit.

Hardware Handshaking

If hardware handshaking is enabled, the digital front panel uses two-signal pairs RTS-CTS and DSR-DTR to handshake with the host terminal. The signals RTS and DTR are inputs to the digital front panel and both must be high for transmission (from digital front panel to terminal) to occur. The digital front panel halts transmission if either RTS or DTR is low. The signals CTS and DSR are outputs from the digital front panel and must be high for reception (from terminal to digital front panel) to occur. CTS and DSR respond identically. Even if a terminal is using only the signal pair RTS-CTS, DSR mirrors the actions of CTS.

The digital front panel contains a 16-byte receive buffer with a 15-byte high-water mark. When the buffer contents reach 15 characters, both signals, CTS and DSR, are reset low. After the receive buffer reaches its low-water mark (five characters left in the buffer), both signals, CTS and DSR, are set high and reception continues.

The digital front panel requires the terminal to stop sending characters after receiving a low signal on CTS or DSR. The receive buffer accepts one more character after lowering CTS/DSR, but any additional characters are ignored.

Software Handshaking

If software handshaking is enabled, the digital front panel uses special characters, Xon and Xoff, to handshake with the host terminal. The Xon character is defined to be an ASCII value **11 hex** and the Xoff character is defined to be an ASCII value **13 hex**. On reception of an Xoff command, the digital front panel halts transmission until an Xon

command is received. In the same way, if the terminal receives an Xoff command, the digital front panel expects the terminal to halt transmission until the digital front panel sends an Xon command.

The digital front panel contains a 16-byte receive buffer with a 12-byte high-water mark. When the buffer contents reach 12 characters, an Xoff command is sent to the terminal. After the receive buffer reaches its low-water mark (five characters left in the buffer), an Xon command will be sent to restart reception.

The digital front panel requires the terminal to stop sending characters after an Xoff is received. The receive buffer accepts four more characters after sending the Xoff, but any additional characters are ignored.

NOTE: *If both hardware and software handshaking are disabled, the digital front panel transmits and receives data via the serial port, ignoring all inputs from handshaking lines.*

Parity Options

The digital front panel provides parity error detection for both seven and eight data bit communication. Three modes of parity error detection are provided: No parity, Even parity, and Odd parity.

No parity During No parity, the parity bit is either not set (8-bit data mode) or is set to look like a stop bit (7-bit data mode). In 8-bit data mode-No parity, the digital front panel sets its UART to transmit/receive 10 bits (1 start bit, 8 data bits, and 1 stop bit). In 7-bit data mode-No parity, the digital front panel sets its UART to transmit/receive 10 bits (as above), but the MSB of the data bits is set high.

Even parity For Even parity, there is an odd number of high bits then the parity bit is set, otherwise it is cleared. In 8-bit data mode-Even parity, the digital front panel sets its UART to transmit/receive 11 bits (1 start bit, 8 data bits, 1 parity bit, and 1 stop bit). In 7-bit data mode-Even parity, the digital front panel sets its UART to transmit/receive 10 bits (1 start bit, 8 data bits, and 1 stop bit), but the MSB of the data bits is the parity bit.

Odd parity For Odd parity, there is an even number of high bits then the parity bit is set, otherwise it is cleared. In 8-bit data mode-Odd parity, the digital front panel sets its UART to transmit/receive 11 bits (1 start bit, 8 data bits, 1 parity bit, and 1 stop bit). In 7-bit data mode-Odd parity, the digital front panel sets its UART to transmit/receive 10 bits (1 start bit, 8 data bits, and 1 stop bit), but the MSB of the data bits is the parity bit.

3 Relay Option

The Relay option, available with the UPS front panel, informs your hardware of the UPS condition during utility outages and battery discharge. Predefined relay setups are available for IBM AS/400®, Novell®, and AT&T® configurations. Many other configurations can be obtained by customizing each relay.

The relays energize or de-energize depending on the UPS status and alarms. The relay setup determines which UPS status or alarm causes a relay to energize or de-energize, and can be changed through the UPS front panel menus. The UPS saves the new setup even when the UPS is off and no power is applied.

There are four form-C relays installed on the circuit board. The relay contacts are on J2, the DB-25 connector shown in Figure 2 on page 3. Each relay has a common, a normally-closed, and a normally-open contact; and each relay is internally isolated.

For some computer applications it is necessary for the common pins of the relays to be tied together. When a relay is de-energized, the common and normally-closed pins are shorted. When a relay is energized, the common and normally-open pins are shorted. When the UPS is off and no power is applied, all relays are de-energized.

WARNING:

**The maximum voltage that can be applied across the relays is 50 volts DC.
The maximum current that the relay can carry is 150 milliamps.**

Relay Setup Menu

From the System Setup Menu on the UPS front panel, select the **Relay Setup** option. The Relay Setup Menu has the following options:

Relay Setup

1. Display Current Relay Configuration
2. AS/400
3. Novell
4. AT&T
5. Default 1
6. Custom

Use the up and down arrow keys to move within the menu. Press **Select** to continue to the configuration submenus. Press the **Menu** key to return to the previous menu. If you have a Banyan® system, select Novell.

The AS/400 Configuration Option

Select **2. AS/400** from the Relay Setup Menu to display the AS/400 options:

AS/400 Relays

1. Select AS/400 Relay Configuration
2. Set/Read Quick Power Down Time

Use the up and down arrow keys to move within the menu. Use the **Select** key to select one of the options. When you select the AS/400 Relay Configuration, a message appears confirming that the AS/400 Relay was selected.

AS/400 Relay Configuration

The AS/400 relay configuration provides four signals to inform the AS/400 computer of the UPS status. The activated pin makes contact with the common pin when the condition is true. For AS/400, the common pins of all four relays must be tied together.

Condition	Relay	Activated Pin when Condition is True*
UPS Available	1	Pin 11 (Normally Open)
Utility Failure	2	Pin 14 (Normally Open)
UPS Offline	3	Pin 17 (Normally Closed)
Battery Weak Signal	4	Pin 24 (Normally Open)
*Pin numbers are provided here for reference only and are subject to change. See Figure 2 on page 3 for pin numbers.		

Relay 1 remains energized to inform the computer that a UPS is available.

Relay 2 energizes to indicate that the utility has failed, and signals the AS/400 to start its QUPSDLYTIM timer. When this timer has expired, the AS/400 automatically shuts down. See your *IBM AS/400 Backup and Recovery Guide* for more information on QUPSDLYTIM.

Relay 3 de-energizes to inform the computer that the UPS is on bypass (opposite state of Relay 1).

Relay 4 energizes to indicate that there is insufficient battery power left, and signals the computer to shut down immediately. The amount of battery time remaining before energizing the relay is user-selectable through the Quick Power Down Time option on the AS/400 Menu. The default Quick Power Down Time is 2 minutes.

AS/400 Quick Power Down Time

Select the Set/Read Quick Power Down Time option to view the current setting or to change the battery time remaining before UPS shutdown. The front panel displays the following information:

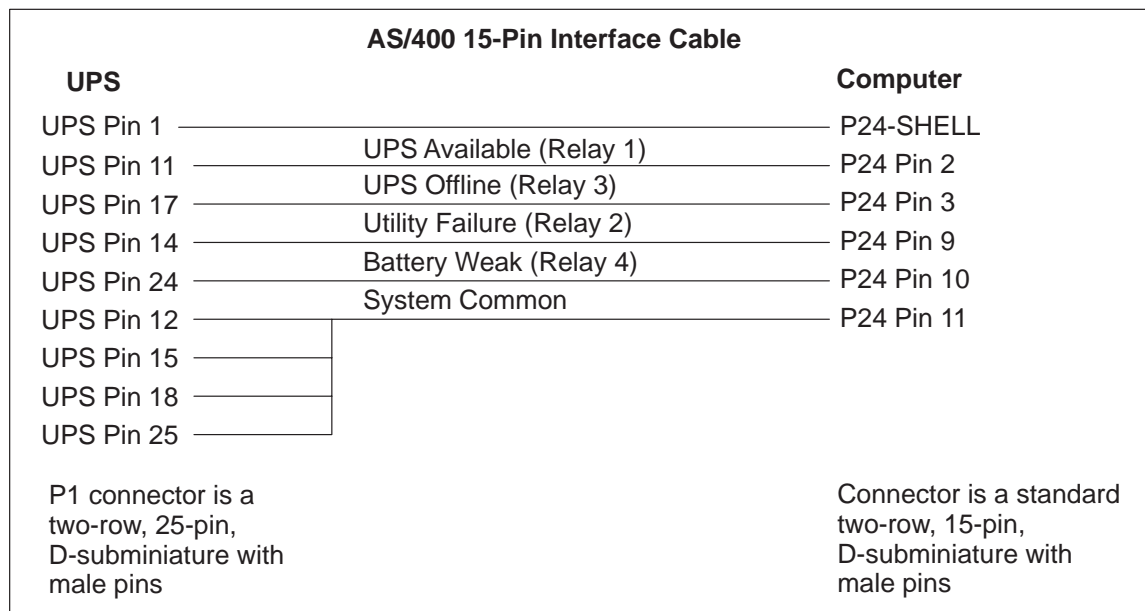
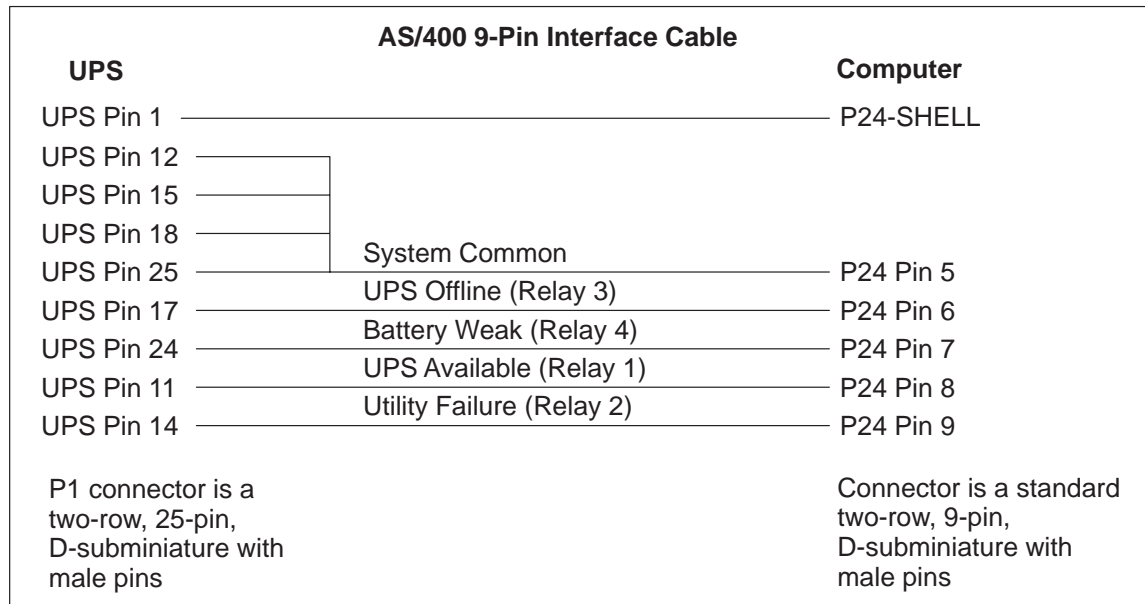
Set/Read Time

02:00

Use the up and down arrow keys to set the time. Press the **Select** key to save the time. Be sure that the time is less than or equal to the amount of battery time remaining. Press the **Menu** key to return to the AS/400 Menu.

AS/400 Interface Cables

The following diagrams show the AS/400 pin-outs for the 9-pin and 15-pin interface cables.



The Novell Configuration Option

Select **3. Novell** from the Relay Setup Menu to display the Novell option:

Novell Relays

1. Select Novell Relay Configuration

Press the **Select** key to select the configuration for Novell and Banyan systems; a message appears confirming that the Novell Relay was selected. Press the **Menu** key to return to the previous menu.

The Novell and Banyan relay configurations are identical. The relay configurations provide two signals to inform the Novell computer network of the UPS status.

Condition	Relay	Activated Pin when Condition is True*
On Utility Power	1	Pin 11 (Normally Open)
Low Battery Warning	4	Pin 23 (Normally Closed)
*Pin numbers are provided here for reference only and are subject to change. See Figure 2 on page 3 for pin numbers.		

Relay 1 energizes to indicate the UPS is running normally. Relay 1 de-energizes to indicate that the utility has failed.

Relay 4 de-energizes to indicate that there is insufficient battery power left and signals the computer to shut down immediately. The amount of battery time remaining in order to de-energize the relay is user-selectable through the Battery Time Remaining Alarm Level option on the Custom Configuration Menu. The default time is 2 minutes. See "The Custom Configuration Option" on page 19 for more information on setting the Battery Time Remaining Alarm Level.

The AT&T Configuration Option

Select **4. AT&T** from the Relay Setup Menu to display the AT&T option:

AT&T Relays

1. Select AT&T Relay Configuration

Use the right and left arrow keys to display the entire message. Press the **Select** key to select the configuration for AT&T; a message appears confirming that the AT&T Relay was selected. Press the **Menu** key to return to the Main Relay Menu.

The AT&T relay configuration provides four relay signals.

Condition	Relay	Activated Pin when Condition is True*
Battery DCUV	1	Pin 11 (Normally Open)
System On Battery	2	Pin 14 (Normally Open)
UPS On Bypass -OR- 125% Overload	3	Pin 19 (Normally Open)
Output DC Overvoltage -OR- Output AC Overvoltage -OR- FRU Failed Self Test	4	Pin 24 (Normally Open)
*Pin numbers are provided here for reference only and are subject to change. See Figure 2 on page 3 for pin numbers.		

Relay 1 energizes to inform the computer that the battery voltage has fallen below a preset level. The signal is only active when the UPS has lost the utility power and can only be deactivated by restoring the utility power.

Relay 2 energizes to indicate that the UPS is on battery and has lost utility power.

Relay 3 energizes to indicate that the UPS is on Bypass or in Overload. The UPS will automatically transfer to Bypass after 30 seconds of a 125% Overload.

Relay 4 energizes to indicate that the UPS is not functioning properly.

The Default 1 Configuration Option

Select **5. Default 1** from the Relay Setup Menu to display the Default 1 option:

Default 1 Relays

1. Select Default 1 Relay Configuration

Use the right and left arrow keys to display the entire message. Press the **Select** key to select the configuration for Default 1; a message appears confirming that the Default 1 Relay was selected. Press the **Menu** key to return to the Relay Setup Menu.

The Default 1 relay configuration provides four relay signals. Latched Battery Time Remaining Low is set using the BTM communications mode timer.

Condition	Relay	Activated Pin when Condition is True*
Latched Battery Time Remaining Low	1	Pin 11 (Normally Open)
System On Battery	2	Pin 14 (Normally Open)
UPS On Bypass -OR- 125% Overload	3	Pin 19 (Normally Open)
Output DC Overvoltage -OR- Output AC Overvoltage -OR- FRU Failed Self Test	4	Pin 24 (Normally Open)
*Pin numbers are provided here for reference only and are subject to change. See Figure 2 on page 3 for pin numbers.		

Relay 1 energizes to inform the computer that the battery time remaining has fallen below a preset level determined in the BTM Communications Setup Menu. The signal is only active when the UPS has lost the utility power and can only be deactivated by restoring the utility power.

Relay 2 energizes to indicate that the UPS is on battery and has lost utility power.

Relay 3 energizes to indicate that the UPS is on Bypass or in Overload. The UPS will automatically transfer to Bypass after 30 seconds of a 125% Overload.

Relay 4 energizes to indicate that the UPS is not functioning properly.

The Custom Configuration Option

The Custom configuration allows you to define a unique relay definition for each of the four relays. Select **6. Custom Configuration** from the Relay Setup Menu to display the custom relays options:

Custom Relays

1. Relay 1 Setup
2. Relay 2 Setup
3. Relay 3 Setup
4. Relay 4 Setup
5. Set/Read Battery Time Remaining Alarm Level

Use the up and down arrow keys to move within the menu. Press the **Select** key to select one of the custom relay options. Press the **Menu** key to return to the previous menu.

The Relay Number Setup Options

The Relay Number Setup options allow you to view or change the current configuration of a relay. Select options 1 through 4 from the Custom Configuration Menu to display the setup options:

Relay # Setup (# represents the actual relay number)

1. Set/Clear Relay Alarm Conditions
2. Clear All Relay Alarm Conditions
3. Display Relay Alarm Conditions
4. Invert Relay Output Polarity

Use the up and down arrow keys to move within the menu. Press the **Select** key to select one of the relay setup options.

NOTE: *If you select more than one status condition or alarm for a single relay, then only one of those conditions or alarms has to be true to energize the relay.*

Select **1. Set/Clear Relay Alarm Conditions** to view or change specific alarms. Use the up and down arrow keys to scroll through the list of alarms (see the “Set/Read Alarms” table on page 21 for a complete list). Press the **Select** key to set an alarm. An asterisk (*) indicates that the item is selected. To deselect or clear a specific alarm, press the **Select** key by an alarm with an asterisk.

Select **2. Clear All Relay Alarm Conditions** to clear all alarms on the relay setup. A message appears indicating that all alarms have been cleared: Relay’s Alarm Conditions Clear

Select **3. Display Relay Alarm Conditions** to view the selected alarms only. For example, the front panel displays:

Relay Alarms

- 1 Battery Time Remaining Low
- 23 Input Line Voltage Loss

If no alarms are selected, the front panel displays: No Alarms Selected

Select **4. Invert Relay Output Polarity** to invert the state of the relay. Usually, relays energize when the selected conditions are true. Inverting the relay causes it to energize when the selected conditions are false. An asterisk (*) indicates that the condition or alarm is inverted. Press the **Menu** key to return to the previous menu.

Set/Read Battery Time Remaining Alarm Level

Select **5. Set/Read Battery Time Remaining Alarm Level** to view or change the minutes of battery time remaining before UPS shutdown. The front panel displays the following information:

Set/Read Time

02:00

Use the up and down arrow keys to set the time. Press the **Select** key to save the time. Be sure that the time is less than or equal to the amount of battery time remaining. Press the **Menu** key to return to the previous menu.

Set/Read Alarms	
1 Battery Time Remaining Low	18 Input Over Voltage
2 System Normal	19 Rectifier Shut Down Imminent
3 System On Bypass	20 Input Phase Rotation Error
4 System Not On Bypass	21 DC Link Under Voltage
5 Load On Inverter	22 DC Link Over Voltage
6 System On Battery	23 Input Line Voltage Loss
7 Inverter Senses DC Link Over Voltage	24 Complete Battery Discharge
8 Output DC Over Voltage	25 Battery DC Under Voltage
9 Output Over Current Trip	26 Battery DC Over Voltage
10 Output Under Voltage	27 Power Supply Over Temp
11 Output Over Voltage	28 Heatsink Over Temp
12 Greater Than 150% Overload	29 Rectifier Current Over 100%
13 Greater Than 125% Overload	30 Rectifier Current Over 125%
14 Greater Than 106% Overload	31 Bypass Not Available
15 Bypass Under Freq/Over Freq	32 FRU Failed Self Test
16 Inverter Shutdown Imminent	33 Latched Battery Time Remaining Low
17 Input Under Voltage	

	Relay 1	Relay 2	Relay 3	Relay 4
AS/400	UPS Available 4,5	Utility Failure 6, 17, 23	UPS Offline 4, 5	Battery Weak (2 min. or less) 1, 16, 21, 24, 25
Novell	On Utility 6, 17, 23 (polarity inverted)	Not Used	Not Used	Low Battery 1, 16, 21, 24, 25 (polarity inverted)
AT&T	Battery DCUV 25	System On Battery 6	On Bypass or Overload 3, 13	UPS Malfunction 8, 11, 32
Default 1	Latched Battery Time Remaining Low (2 min. or less) 33	System on Battery 6	On Bypass or Overload 3, 13	UPS Malfunction 8, 11, 32
The numbers shown in this chart correspond with the numbered Set/Read Alarms.				