



# User's Guide: PowerChute<sup>®</sup> *plus*

Version  
4.2.2

For  
SCO UNIX

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October, 1997  
Software Bundle, Version 3

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# Introduction to PowerChute *plus*

## About This Manual

In this manual you will find detailed information on how to configure and operate PowerChute *plus* 4.2.2 for SCO UNIX® in conjunction with your American Power Conversion (APC) Uninterruptible Power Supply (UPS).

## Background

PowerChute *plus* provides orderly shutdown of a network file server or a host computer in the event of an extended AC power failure. PowerChute *plus* offers user notification of impending shutdown, power event logging, auto-restart upon power return, and UPS battery conservation features. When PowerChute *plus* is used with a Smart-UPS or Matrix-UPS, the PowerChute UPS monitoring features are augmented by sophisticated diagnostic and management features. These include scheduled server shutdowns, interactive/scheduled battery testing, and detailed power quality logging. In addition, PowerChute *plus* shows real-time graphical displays of transient data such as battery voltage, UPS load, utility line voltage, run time remaining, battery capacity, and battery voltage.

## Manual Organization

In addition to this introduction, this user's guide contains the following main sections:

### ■ CHAPTER 1: STARTING AND VERIFYING OPERATION

Contains basic instructions on starting PowerChute *plus* and verifying operation of the UPS and the software.

### ■ CHAPTER 2: POWERCHUTE *PLUS* MAIN SCREEN

Discusses the various areas of the Main Screen and their functions as well as various status indicators. The Main Screen is what you will see and use to access all features available for your system.

**■ CHAPTER 3: CONFIGURING POWERCHUTE *PLUS***

Discusses the various submenus and dialog boxes which allow you to configure PowerChute *plus*.

**■ CHAPTER 4: POWERCHUTE *PLUS* FLEXEVENTS**

A tutorial which covers the various steps involved in the FlexEvents process. FlexEvents is a dynamic feature which allows you to configure up to seven possible actions for a single PowerChute *plus* event. An event may be merely informational, may also be a warning or a critical situation. Actions allow you to log the event in a file; notify users via broadcast message, e-mail, or pager; run external executable files; and/or shut down your operating system.

**■ CHAPTER 5: MONITORING OTHER SYSTEMS**

Discusses how to monitor other computers running PowerChute *plus*, schedule daily or weekly server shutdown times, and perform an immediate shutdown.

**■ CHAPTER 6: LOGGING DATA**

Discusses the two log files which PowerChute *plus* generates. The first log file is the Event Log file. Every time an event occurs, it is logged in this file. The second log file is the Data Log file. PowerChute *plus* logs transient data through this file which can then be used to analyze a site's power quality. PowerChute *plus* allows you to specify if you want these files enabled, the file names and path. In the case of the Data Log, you can also specify how often a data record will be written to the log file.

**■ CHAPTER 7: UPS DIAGNOSTICS**

Discusses various PowerChute *plus* diagnostics features. These allow you to remotely test a UPS, perform calibration and schedule UPS self-tests and calibration.

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■ **CHAPTER 8: CONFIGURING SYSTEM SHUTDOWN**

Provides various tips to give you additional insight into administering your PowerChute configuration.

■ **APPENDIX A: POWERCHUTE *PLUS* EVENTS**

Contains a detailed discussion of each event, explaining each event and what situations would generate it.

■ **APPENDIX B: MEASURE-UPS SUPPORT**

Discusses the Measure-UPS products: The stand-alone Measure-UPS I, and the SmartSlot Measure-UPS II. Both are remote environmental measuring devices produced by APC which can measure the ambient temperature and relative humidity. This appendix contains a detailed discussion about the function of a Measure-UPS and its integration with PowerChute *plus*.

■ **APPENDIX C: POWERCHUTE *PLUS* CONFIGURATION FILE**

Discusses the PowerChute *plus* configuration (initialization) file. The PowerChute *plus* configuration file controls the behavior of PowerChute *plus*. Although almost all modifications of this file are done through software, you can also modify this file manually. The file is in standard ASCII format, and can be updated using any editor which will save the file in the same ASCII format. The appendix examines various sections of this file.

■ **APPENDIX D: GRAPHING THE DATA LOG**

Discusses how you can use popular spreadsheet packages to import and graph the Data Log file.

■ **APPENDIX E: POWERCHUTE *PLUS* LOTUS NOTES SHUTDOWN**

Discusses the PowerChute *plus* Lotus Notes shutdown utility.

## PowerChute *plus* Structure

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The PowerChute *plus* software consists of two main components. The first is the **UPS Monitoring Module** which runs as a background process. It communicates with the UPS and the User Interface Module, logs data and events, notifies users of impending shutdowns, and when necessary, shuts down the operating system. The **UPS Monitoring Module** is also known as the **Server Module**.

The second component is the **User Interface Module**. It may also be referred to as the **Workstation Module**. After CHAPTER 1, however, it is also referred to as PowerChute *plus* since that is what you see and work with. The User Interface Module comprises the PowerChute *plus* **Main Screen** and the **System, Logging, Configuration and Diagnostics** menu options. The user interface communicates either locally or over a network to UPS Monitoring Modules running on other computers. It gathers real-time data such as UPS output, line minimum/maximum voltage, UPS temperature, output frequency, ambient temperature, humidity, and UPS status. It displays bar graphs for UPS run time remaining, battery capacity, battery voltage, UPS load, etc. It also displays events as they occur.

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If you have any questions concerning this or other APC products, please call the Technical Support Center nearest you. APC Technical Support is provided at no charge.

### Other APC Technical Support Contacts

APC Technical Support teams can also be accessed via:

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<b>Switzerland</b>	Toll Free:	0800 556177
<b>Turkey</b>	Toll Free:	0800 35390275
<b>United Kingdom</b>	Toll Free:	0800 132990



# Chapter 1: Starting and Verifying Operation

## Starting PowerChute *plus*

To start the PowerChute *plus* and access the PowerChute *plus* Main Screen:

1. Make sure you are logged in as the root user.
2. Change to the PowerChute *plus* installation directory, then type:

`powerchute<Enter>` (if using a character-based UNIX), or

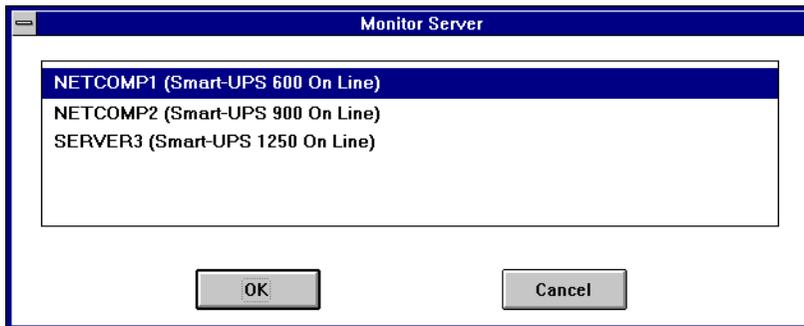
`xpowerchute<Enter>` (if using a motif-based UNIX)

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**Note:** From now on, the User Interface Module will be referred to as **PowerChute *plus***, since it is the User Interface Module you will see and work with. For character-based PowerChute *plus*, screen movement and menu navigation keys are listed in this chapter's **CHARACTER-BASED POWERCHUTE PLUS FOR UNIX** section.

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2. When the list of available systems running PowerChute *plus* appears, highlight the system you want to use PowerChute *plus* to monitor and click **OK**, or double-click on the system in the list:



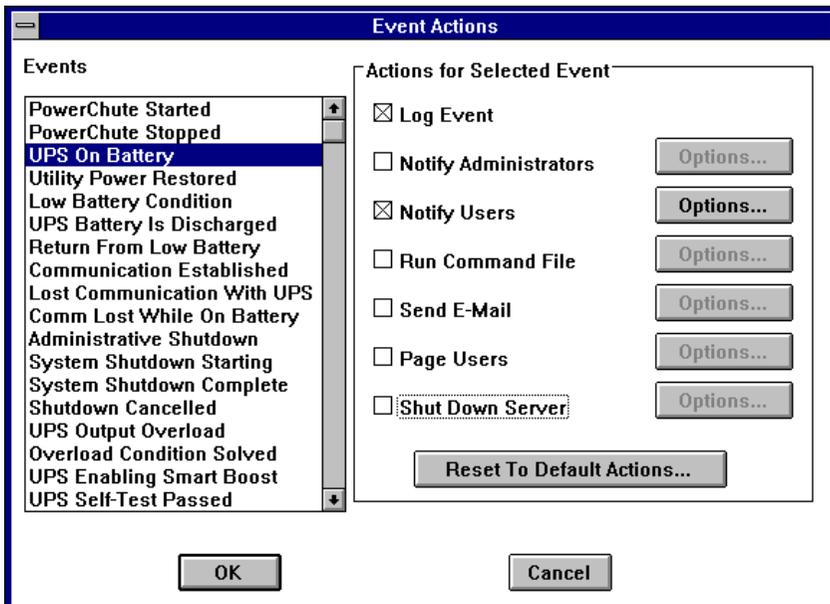
3. A dialog box will appear prompting you for the password. Use the password defined for the `pwrchute` user account during the PowerChute *plus* installation.
4. The PowerChute *plus* Main Screen will appear (discussed in detail in CHAPTER 2). Take a moment to become familiar with the Main Screen and menu structure.

## Verifying Proper Operation

To verify you have installed PowerChute *plus* correctly, follow the procedure below. This procedure should be run when there are no critical applications running on your system.

1

1. Disconnect the AC power cord from the wall. After a brief delay, the host computer and attached workstations will be notified of a power failure.
2. Plug the power cord back into the wall outlet. The host computer and workstations will be notified that power has been restored to the system.
3. Allow the UPS system to run on battery until run time is exhausted or low battery is reached. To configure this for all platforms, follow the steps below:
  - a. From the Configuration Menu, select the **Event Actions** menu option.
  - b. From the list box on the left, highlight the **UPS On Battery** event and configure this event as shown:



The default actions for this events are Log Event, Notify Users and Shut Down Server. As shown above, you need to uncheck the Shut Down Server check box. This will ensure the UPS is kept running while on battery without PowerChute *plus* shutting down your system. When you are done, the screen should look like the one above.

- c. Click OK to save your changes.
4. Unplug the AC power cord from the wall outlet again. The host computer and workstations will again receive messages that a power failure has been detected.
5. Let the UPS system run on battery until low battery is reached. A “**Low Battery Condition**” event will be generated and logged. You can monitor how long the UPS will run on battery through the Run Time Remaining graph on the Main Screen.
6. The host computer will send a message to the workstations notifying them of an impending shutdown. Following a short delay the system is stopped. PowerChute *plus* will put the UPS to “sleep” after the system has been shut down. If you are using a Smart-UPS, you will notice the UPS front panel lights continuously scrolling (Matrix-UPS models have no front panel lights).
7. Plug the UPS power cord back into the wall outlet. After a delay, you should see the UPS turn back on and reboot the system.
8. Check the **powerchute.log** file in the PowerChute *plus* installation directory to make sure all the above events were recorded.
9. Reset the “**UPS On Battery**” event to its default:
  - a. From the Event Actions dialog box, highlight the **UPS On Battery** event.
  - b. Click on the **Reset To Default Actions...** button.
  - c. Select the **This One** button from the next dialog.
  - d. Click OK to exit and save your changes.

If the installation is not functioning properly and you have checked your installation connections, please call American Power Conversion Technical Support. Please see “Introduction to PowerChute *plus*” at the beginning of this manual for a list of Technical Support Centers.

## Character-based PowerChute *plus* for UNIX

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To move the cursor in the character-based screen, the following keys (and key combinations) are used:

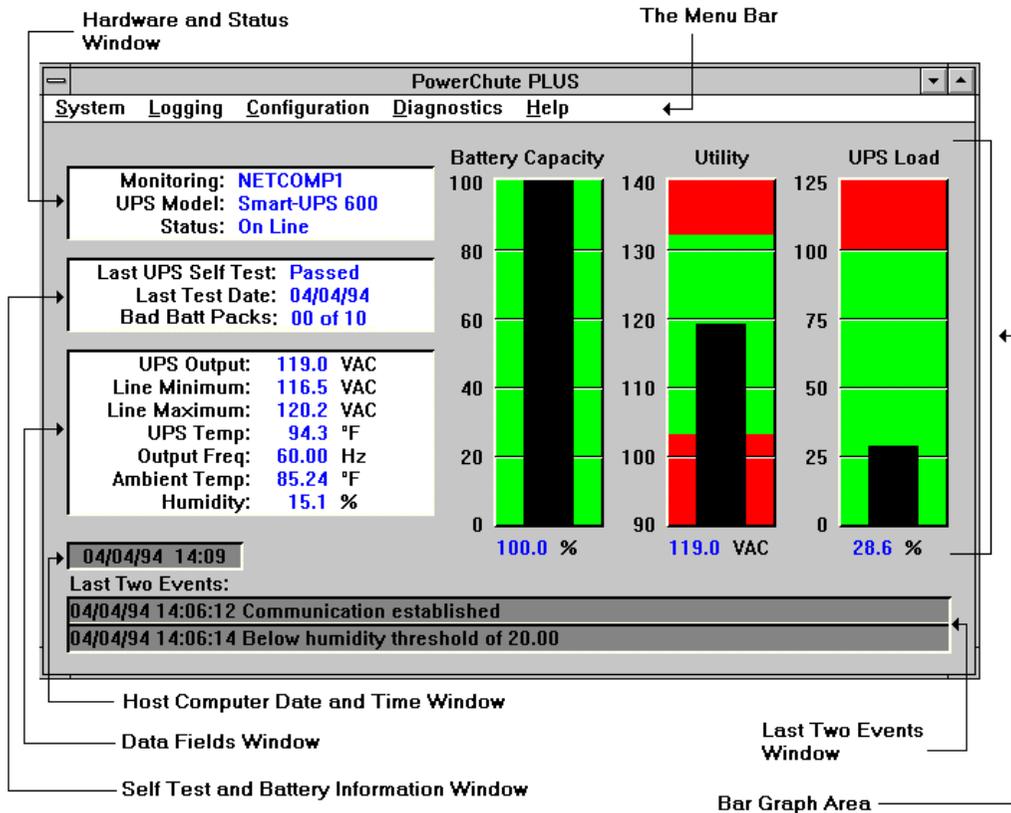
**1**

- Cursor Keys:** Moves from selection to selection within a field
- <TAB>:** Moves from field to field
- <ENTER>:** Selects OK button on screen
- <Space Bar>:** Selects highlighted button or field selection
- Ctrl-g:** Selects Pull down menus
- Ctrl-l:** Refreshes screen

# Chapter 2: PowerChute *plus* Main Screen

## PowerChute *plus* Main Screen

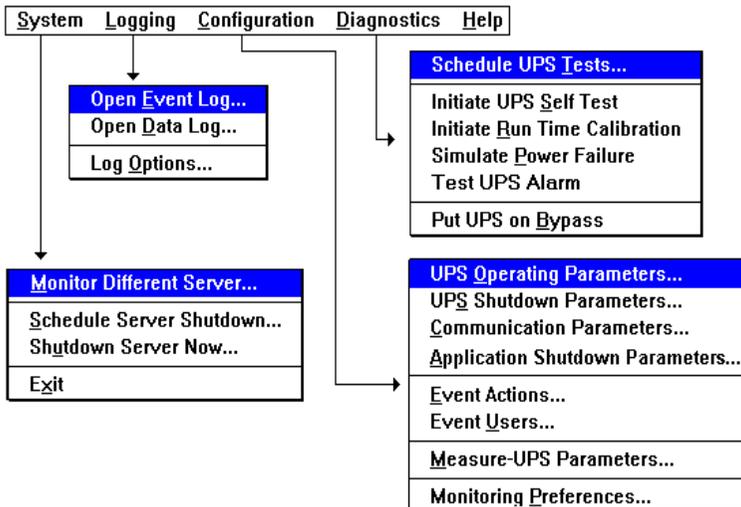
The PowerChute *plus* Main Screen is what you will see and work with. This screen allows you to monitor a UPS and graphically displays such data as Battery Capacity, Utility, UPS Load, Run Time Remaining and Battery Voltage. An example of the PowerChute *plus* main screen is shown below:



## The Menu Bar

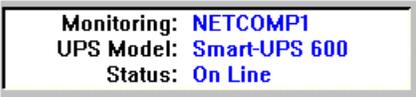
The Main Screen has four main menus. The figure below identifies the command options available for each of the main menus:

- **S**ystem. Allows you to monitor a different server, schedule server shutdown times and dates, shut down a server immediately and exit PowerChute *plus*.
- **L**ogging. Allows you to set logging options, and view event and data logs.
- **C**onfiguration. Allows you to set UPS operating parameters, configure UPS shutdown parameters, set communications parameters, configure FlexEvents and FlexEvents users, set Measure-UPS parameters and tailor monitoring preferences.
- **D**iagnostics. Allows you to test your UPS and make sure it is in good working order. Specifically, this menu allows you to schedule UPS tests, initiate UPS self-tests, initiate run time calibration, simulate a power failure, initiate a UPS alarm test and, if using a Matrix-UPS, allows you to put the UPS in bypass mode.



The main screen has six areas which present information on the operating status of your UPS. These areas are discussed in the following sections.

## Hardware and Status Window



Monitoring: **NETCOMP1**  
UPS Model: **Smart-UPS 600**  
Status: **On Line**

In the upper left-hand corner of the main screen is a display of the host computer's name, UPS model, and UPS status:

**Monitoring:** Identifies, by name, the host computer for which you are viewing UPS data. It is possible to be logged into one host computer while viewing the status of another host's UPS.

**UPS Model:** The UPS model which is being monitored.

**UPS Status:** Current condition of the UPS, including any of the following:

- **Abnormal Condition:** An internal fault within the UPS will generate this event. Call APC Technical Support for corrective procedures.
- **Alarm Test:** Selecting **Test UPS Alarm** from the **Diagnostics** menu will cause this status indicator to be displayed.
- **Battery Discharged:** Indicates the UPS battery is discharged and cannot support connected equipment with battery power. At the completion of a runtime calibration, the status indicator will read **Battery Discharged** since a deep discharge is part of the run time calibration process. Another reason for this message could be that the UPS has come back on line after an extended power failure. If, during the power failure, it supported connected equipment through battery power, the battery would be discharged.

- Byp Maintenance: Matrix-UPS is in bypass mode to conduct maintenance. Ensure maintenance activities are complete before returning from bypass. While in Bypass mode, the UPS acts only as a voltage conditioner: The connected equipment is not protected from power anomalies such as blackouts, brownouts, surges, etc.
- Byp Mod Failure: Indicates the Matrix-UPS is on bypass due to a hardware fault. Contact APC Technical Support.
- Byp Supply Failure: Indicates the Matrix-UPS is on bypass due to a power supply failure. Contact APC Technical Support.
- Calibrating: The UPS is executing a runtime calibration.
- Low Battery: The UPS battery has reached its runtime shutoff point.
- No Comm: There is no communication between PowerChute *plus* and the UPS. Ensure the interface cable is securely connected, the selected serial port is enabled and matches the serial port to which the cable is connected.

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**Note: Ensure the port to which the UPS is attached is configured according to the instructions given in the PowerChute *plus* for SCO UNIX - Installation Instructions (Pcsoig.txt).**

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- **No Server:** PowerChute *plus* has lost contact with the background process running on the selected host computer. This may be because the host is not currently running. The background process is responsible for logging all data and communicating with the UPS.
- **On Line:** The UPS is providing utility power.
- **On Battery:** The UPS is providing battery power to connected equipment.
- **Replace Battery:** The UPS senses the battery is no longer usable. Contact APC Tech Support.
- **Resetting Port:** You have selected a different serial port than the currently selected port. You can select serial ports from the Configuration menu's Communication Parameters option.
- **Self Test:** Indicates the UPS is undergoing a self-test. Self-tests can be user-initiated or scheduled. See CHAPTER 7 for more detail on self-tests.
- **Smart Boost:** The Smart-UPS is using its brownout correction feature, SmartBoost, which boosts a low utility line voltage without the UPS going on-battery.)
- **UPS Overloaded:** The rated load capacity of the UPS has been exceeded. Reduce the load on the UPS and perform the self-test using the diagnostic functions. If the UPS still indicates overload, contact APC Technical Support.

## Self-Test and Battery Information Window

---

```
Last UPS Self Test: Passed
Last Test Date: 04/04/94
Bad Batt Packs: 00 of 10
```

### 2

Self-Test and Battery information is shown below the hardware and UPS status. The result of the last UPS self-test is displayed:

**Last UPS Self Test:** Results of the last self-test. Possible results are as follow:

- **Failed:** The UPS has failed a self-test because of a bad battery. Charge the battery for 8 hours and perform the self-test again. If the UPS still fails the test, contact APC Technical Support.
- **Passed:** Self-test passed.
- **Invalid Test:** The UPS was in a state which prevented a valid self-test from being performed. Contact APC Technical Support.
- **Unknown:** When you first install PowerChute *plus*, the status is Unknown until the first self-test is performed. The PowerChute *plus* software saves self-test information, even when you stop and start PowerChute *plus*. However, if you uninstall and reinstall PowerChute *plus*, the self-test status is again Unknown.

**Last Test Date:** The date of the last user-initiated UPS self-test.

**Bad Batt Packs:** For a Matrix-UPS or Smart-UPS XL. Indicates the number of bad battery packs and the total number of packs:

**Bad Batt Packs: 00 of 10**

The above example means that out of 10 battery packs, none are bad. If the number of bad packs is greater than zero, check the pack indicator lights to determine which pack is bad, and contact APC technical support.

## Data Fields Window

UPS Output:	119.0	VAC
Line Minimum:	116.5	VAC
Line Maximum:	120.2	VAC
UPS Temp:	94.3	°F
Output Freq:	60.00	Hz
Ambient Temp:	85.24	°F
Humidity:	15.1	%

Below battery information, the Data Fields Window is displayed. UPS output is shown. Line minimum, line maximum, frequency and UPS temperature are displayed. In addition, if you have a Measure-UPS or SmartSlot Measure-UPS II environmental measuring accessory, ambient temperature and humidity will be displayed. All of these values are polled at 4 second intervals. This is the default (and minimum) value and can be changed via the PowerChute initialization file. To change the default polling interval, please see the [ **Ups** ] keyword in APPENDIX C'S INITIALIZATION FILE SETTINGS section.

**UPS Output Voltage:** The voltage supplied by the UPS to the attached equipment.

**Line Minimum:** The lowest utility line voltage detected since you started using PowerChute plus to monitor the server.

**Line Maximum:** The highest utility line voltage detected since you started using PowerChute plus to monitor the server.

**UPS Temp:** The internal temperature of the UPS in Celsius or Fahrenheit. See CHAPTER 3: CONFIGURING POWERCHUTE *PLUS* for how to configure your preferences. Under typical conditions with a charged battery, the temperature will be around 40°C (104°F). When the battery is charging heavily, the temperature will be as much as 50°C (122°F). At the end of a heavy load discharge, the temperature can be as much as 65°C (149°F). A temperature of over 75°C (167°F) indicates a malfunction, failed fan, or blocked ventilation.

**Output Frequency:** The frequency of the output voltage in Hertz.

**Ambient Temp:** The temperature measured by the Measure-UPS device. Readings can be in Celsius or Fahrenheit. See CHAPTER 3: CONFIGURING POWERCHUTE *PLUS* for how to configure your preferences.

**Humidity:** The humidity measured by the Measure-UPS device, measured as a percentage of total humidity.

## 2

### Host Computer Date and Time Window

---



04/04/94 14:09

This window displays the date and time of the host computer you are monitoring.

### Last Two Events Window

---



04/04/94 14:06:12 Communication established  
04/04/94 14:06:14 Below humidity threshold of 20.00

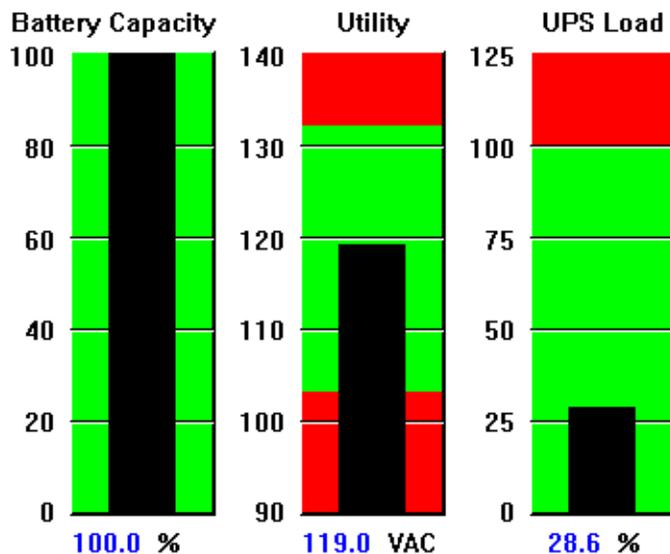
At the very bottom of the PowerChute *plus* main screen, the Last Two Events window displays the last two events in the PowerChute event log. The newer event is shown below the older one.

---

**Note:** Double-clicking anywhere on this window allows you to see all recorded events. This is the same as selecting the “Open Event Log” from the Logging menu.

---

## Bar Graph Area



To the right on the PowerChute *plus* main screen, three bar graphs are displayed. As shown on the next page, the first bar graph, Battery Capacity in this example, can be changed to show either Run Time or Battery Voltage. See CHAPTER 3: CONFIGURING POWERCHUTE *PLUS* for information on how to configure bar graph preferences:

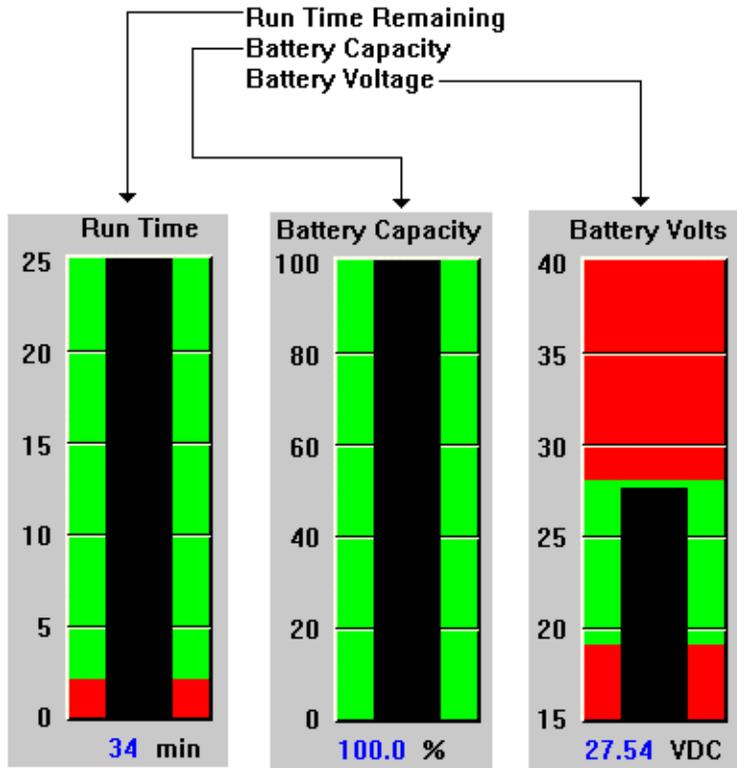
**Battery Capacity:**

The percent of battery capacity remaining. Please note that in order to perform Run Time Calibration, battery capacity must be at 100%.

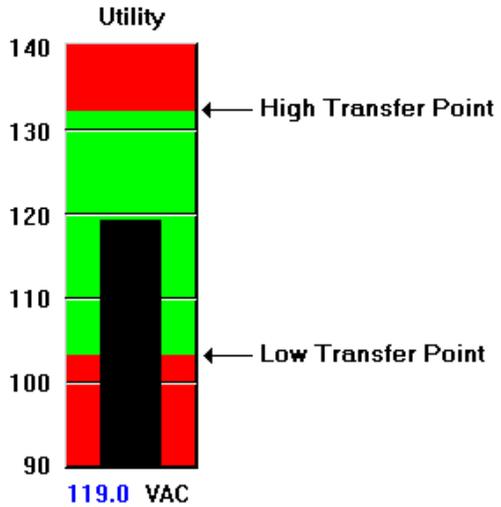
**Run Time Remaining:**

The number of minutes which the UPS will support the present load when running on battery. The red zone (on color displays) represents the user-defined Low Battery Signal Time. On B&W displays, the Low Battery Signal Time is shaded darker than the rest of the bar graph. See CHAPTER 3 for a discussion on Low Battery Signal Time and how to configure it.

**Battery Voltage:** The UPS battery voltage (VDC).



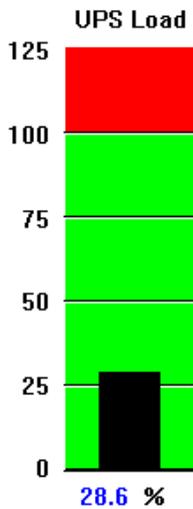
**Utility:** The utility line voltage (i.e. voltage which is being passed into the UPS from a wall outlet). This is the center graph in the Bar Graph area. The utility graph also shows High and Low Transfer Points as shown on next page:



See CHAPTER 3 for how to configure the High and Low Transfer Points.

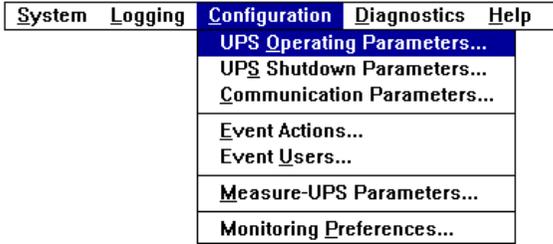
**UPS Load:**

The load, as a percentage of total capacity, currently placed on the UPS.



# Chapter 3: Configuring PowerChute *plus*

## The Configuration Menu



3

The Configuration menu allows you to tailor various PowerChute *plus* parameters. When you select the Configuration menu from the Main Menu bar, a drop down menu appears offering you seven menu options:

- **UPS Operating Parameters**
- **UPS Shutdown Parameters**
- **Communication Parameters**
- **Event Actions**
- **Event Users**
- **Measure-UPS Parameters** (disabled if Measure-UPS accessory is not attached)
- **Monitoring Preferences**

The following sections will describe the purpose and use of these menu options. Please note that a Smart-UPS 600 (Firmware Revision 6QD) has been used for demonstration purposes in this chapter. Thus, if you use a Smart-UPS 600, all values will correspond to those in this chapter. Values are specific to a UPS model and operating voltage, and may be different for other APC UPS models.

## UPS Operating Parameters

### Configuration

<b>UPS Operating Parameters...</b>
UPS Shutdown Parameters...
Communication Parameters...
Event Actions...
Event Users...
Measure-UPS Parameters...
Monitoring Preferences...

This option is available to Matrix-UPS and Smart-UPS models. If your UPS does not support configuring UPS operating parameters, such as a Back-UPS, this option will be unavailable.

Selecting this menu option will bring the **UPS Operating Parameters** dialog box on the screen. Through the options on this dialog box, you can set UPS internal operating parameters such as transfer points, sensitivity, UPS output voltage, etc., remotely:

The screenshot shows the 'UPS Operating Parameters' dialog box with several dropdown menus open to show their options:

- High Transfer Point:** 132 (dropdown menu shows 129, 132, 135, 138)
- Low Transfer Point:** 103 (dropdown menu shows 097, 100, 103, 106)
- Sensitivity:** High (dropdown menu shows High, Medium, Low)
- Nominal UPS Output:** 115 (dropdown menu shows 115)

Other fields in the dialog box include:

- Firmware Revision: 6QD
- UPS ID: Net UPS1
- Last Battery Replacement: 06/09/92
- UPS Serial Number: 10000042
- UPS Manufacture Date: 06/09/92

Buttons: OK, Cancel

## Firmware Revision

The first line of the UPS Operating Parameters dialog box shows you the Firmware Revision number of your UPS. This value is set at the factory and cannot be changed. Firmware Revision is an internal code indicating the revision status of the UPS internal software.

## High and Low Transfer Points

Use the **High Transfer Point** field to set the upper voltage limit for on-line operation. For a 2G Smart-UPS and Matrix-UPS, if the line voltage exceeds this value, the UPS switches to battery power.

However, a 3G Smart-UPS can reduce input voltage without going on battery. Therefore, if the line voltage exceeds the **High Transfer Point** value, these UPS models behave as follows:

- If the voltage is higher than the **High Transfer Point** value, but less than 12% above that value, the UPS reduces the voltage to its attached equipment without using battery power.
- If the line voltage goes 12% or more above the **High Transfer Point** value, the UPS switches to battery power.

Use the **Low Transfer Point** field to set the lower voltage limit for on-line operation.

---

**Note:** On a Matrix-UPS you cannot change the Low Transfer Point value. This UPS has an Automatic Voltage Regulator.

---

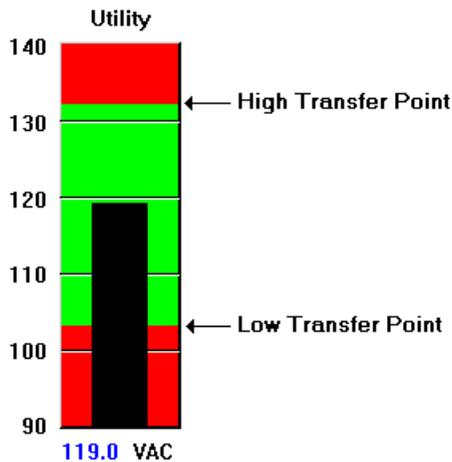
With a Smart-UPS, if line voltage falls below the **Low Transfer Point** value, the UPS behaves as follows:

- If the voltage is less than the **Low Transfer Point** value, but not 12% or more below that value, the UPS activates the SmartBoost™ feature, which boosts the voltage to attached equipment without using battery power, and PowerChute *plus* generates the **UPS Enabling SmartBoost** event.
- If the line voltage is 12% or more below the **Low Transfer Point** value, the UPS switches to battery power.

If your equipment tolerates a wide voltage range, you may want to increase the **High Transfer Point** voltage value and, if you have a Smart-UPS, decrease the **Low Transfer Point** voltage value. Most electronic equipment tolerates some voltage fluctuation.

A wide voltage range conserves the UPS battery for times when UPS battery power is essential. Increasing the **High Transfer Point** and decreasing the **Low Transfer Point** values reduces the number of times the UPS runs on battery to maintain an acceptable voltage range, especially in areas with chronically high or chronically low line voltage.

The High and Low Transfer Points are reflected in the Utility bar graph on the main screen:



In the figure above, the High and Low Transfer Points are 132 and 103 respectively.

## Sensitivity

This parameter relates to the amount of incoming line voltage distortion which the UPS will tolerate before switching to battery - that is, how sensitive the UPS is to power disturbances. The default value is High. Possible values are **Low**, **Medium** or **High**. For the Matrix-UPS, **Auto Sensitivity** is also an option.

If you use equipment which is sensitive to power disturbances, the setting should be **High**. If your UPS frequently transfers to battery, however, setting the value to Medium or Low might solve the problem.

Be sure to test the selected option by removing power to the UPS and making sure the supported computer does not reboot. Of course, you should test this only when no applications are running on the supported computer.

## Nominal UPS Output

The **Nominal UPS Output** field is the output voltage the UPS passes on to the attached equipment when the UPS is on battery. For 120 VAC models, the value is 115 volts and cannot be changed. For other APC UPS models, you can select from a predefined model-specific set of values in the drop-down list box for this field. For best results, set the **Nominal UPS Output** as close as possible to the typical utility input voltage so that no major voltage change occurs when the UPS switches to battery operation.

For a Matrix-UPS, if you reconfigure the UPS for a different input voltage (i.e. from 208V to 240V, or vice versa) by selecting a different input voltage tap, and installing a different power distribution plate, select a **Nominal UPS Output** appropriate for the new hardware configuration. With the 240V input voltage tap selected, **220**, **230**, or **240** are acceptable **Nominal UPS Output** voltage selections. With the 208V tap selected, select a **Nominal UPS Output** value of **208**.

## UPS ID

This parameter allows you to assign a unique name to your UPS. The UPS ID can be up to 8 characters and can accept either numbers or letters (alphanumeric).

## Last Battery Replacement Date

This is the date which the existing battery was installed in the UPS. This date should be changed by the user through PowerChute *plus* when the battery is replaced.

## UPS Serial Number

This is the serial number of the UPS. This value is set at the factory and cannot be changed. The serial number shown on screen pertains to the circuit board in the UPS and has no correlation to the serial number on the rear of the UPS.

## UPS Manufacture Date

This is the date which the UPS was manufactured. Like the UPS Serial Number, this value is set at the factory and cannot be changed.

## UPS Shutdown Parameters

### Configuration

UPS Operating Parameters...

**UPS Shutdown Parameters...**

Communication Parameters...

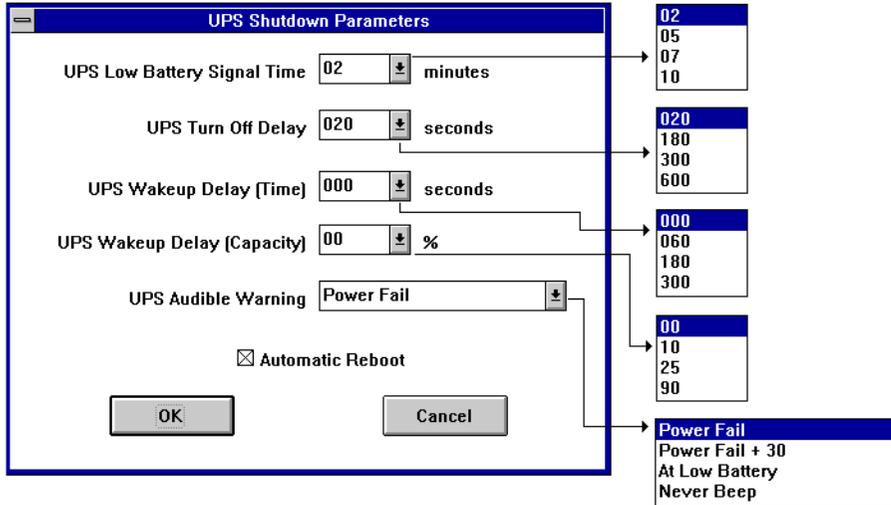
Event Actions...

Event Users...

Measure-UPS Parameters...

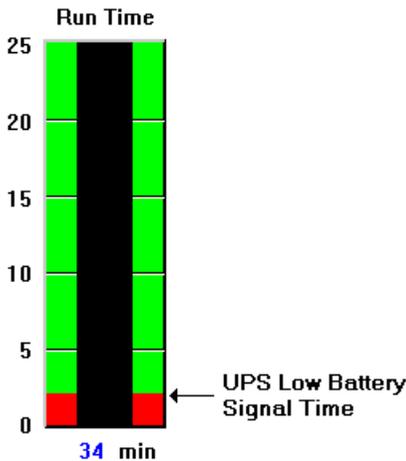
Monitoring Preferences...

Selecting this menu option will bring the **UPS Shutdown Parameters** dialog box on the screen. This menu option allows you to adjust the way your UPS reacts to a power failure and subsequent power return.



## UPS Low Battery Signal Time

This allows you to set the amount of battery run time remaining (in minutes) before there is a low battery condition. A value of “10” will cause PowerChute to initiate a shutdown due to low battery when the UPS is on battery and 10 minutes of run time remains. Setting this option affects the Run Time bar graph on the main screen. In the figure below, the UPS Low Battery Signal Time has been set to 2 minutes. On the screen, this is shown by a red block whose highest value indicates the value you set for the UPS Low Battery Signal Time.



## UPS Turn Off Delay

**UPS Turn Off Delay** sets the amount of time, in seconds, which the UPS will wait after being instructed to shut down before turning off or going to “sleep”. During sleep mode, the UPS turns off its power outlets and thus no longer supplies power to attached equipment. When the Turn Off Delay time has elapsed, the UPS will no longer supply power. When there is a shutdown due to power failure, the UPS will sleep until power returns. Upon return of line voltage, the UPS will turn back on as this will allow attached host computers to reboot. See the following Note.

Turn Off Delay is useful for systems which are monitoring the UPS and need time to shut themselves down before the UPS turns off.

---

**Note:** To allow automatic reboot, the Automatic Reboot check box must be checked (enabled).

---

## Wake-Up Delay (Time)

**Wake-Up Delay (Time)** and **Wake-Up Delay (Capacity)** affect a UPS which has been shut down (its power outlets turned off) due to power failure and/or battery exhaustion. When the utility power returns, the UPS will check battery capacity. If battery capacity is greater than Wakeup Delay (Capacity), it will wait for the Wake Up Delay (Time) to elapse. Once this time has elapsed, the UPS will turn its power outlets on.

Please note that on older UPS, this process is reversed. That is, the UPS will first wait for the Wake Up Delay (Time) to elapse and then check the capacity.

The delay time is helpful when you need to sequence the turning on of several systems on different UPS systems.

## Wake-Up Delay (Capacity)

The **delay capacity** makes sure the UPS has enough battery capacity to supply power to its supported equipment and power back down in the event of subsequent power failures.

The Wakeup Delay Capacity is measured as a percentage of total battery capacity. The possible choices are **0**, **10**, **25** or **90** percent of total capacity. The default is 0%.

This parameter sets the minimum UPS battery capacity to be available before the UPS will turn on its power outlets after shutting down. When line power returns, the UPS will recharge its batteries until the battery capacity exceeds the Wakeup Delay Capacity value. This ensures the UPS will not supply power to attached equipment until its battery can protect the equipment from another power failure.

---

**Note:** This function is not available with the Matrix-UPS; increase the Low Battery Run Time value to ensure greater UPS battery reserves after shutdown.

---

## UPS Audible Warning

This option sets the conditions under which the UPS sounds an audible alarm, or “beep.” If power interruptions are frequent, use this parameter to reduce the number of audible alarms. The possible settings are **Power Fail**, **Power Fail + 30**, **At Low Battery**

and **Never Beep**:

- **Power Fail** - UPS will beep at power fail
- **Power Fail + 30** - UPS will beep 30 seconds after power failure or not at all if power returns within 30 seconds
- **At Low Battery** - UPS will beep at Low Battery
- **Never Beep** - UPS will not beep under any circumstances

### 3

## Automatic Reboot

The options for this check box are checked or unchecked (enabled or disabled). With auto reboot checked (enabled), the UPS will turn connected equipment back on when power returns after an outage.

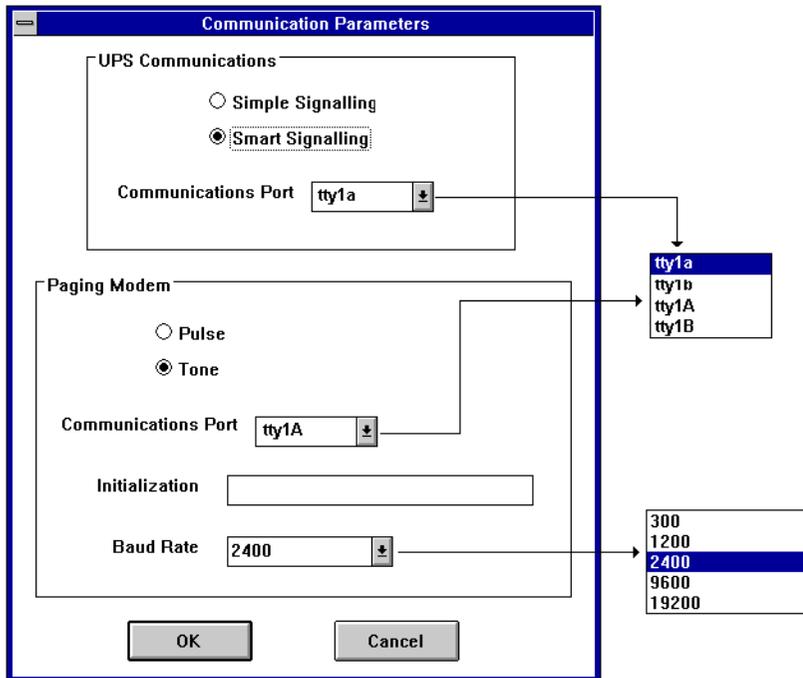
With auto reboot unchecked, the UPS will turn off after shutdown and stay off when power returns. Thus, it will not turn connected equipment back on when power returns. In this case, you must turn the UPS on through the UPS front panel On/Off switch. During earthquakes, for example, power failures occur repeatedly within short periods of time. If automatic reboot is enabled, this will cause servers or host computers to turn on and off repeatedly. In an area which is prone to frequent power failures, keeping the Automatic Reboot box unchecked may be of benefit.

## Communications Parameters

---

<b>C</b> onfiguration
UPS <b>O</b> perating Parameters...
UPS <b>S</b> hutdown Parameters...
<b>C</b> ommunication Parameters...
Event <b>A</b> ctions...
Event <b>U</b> sers...
<b>M</b> easure-UPS Parameters...
<b>M</b> onitoring <b>P</b> references...

This menu option allows you to configure UPS Communications parameters and parameters for a paging modem.



## UPS Communications

When you select the Communications Parameter option, the Communications Parameters box appears. This box allows you to select either simple or smart UPS signaling, select the communications port to which the UPS is connected, and designate Paging Modem Parameters.

---

**Note:** Communication Ports will be different for the various platforms.

---

If you are using a Back-UPS model, select the simple signalling button. For Smart-UPS and Matrix-UPS, select smart signaling (these UPS models are capable of simple signaling as well, however). Then, select the communications port which connects the UPS to your computer.

## Paging Modem options

Paging Modem options allow you to set up a modem which PowerChute *plus* will use to page users for certain events. For detailed information on paging users, please refer to CHAPTER 4 and APPENDIX A. The following are steps to configure a Paging Modem:

1. Select either the **Pulse** or **Tone** button depending on your phone dialing type.
2. Select the **Communications Port** to which the modem is connected.
3. In the **Initialization** box, enter the initialization string used by your modem. If the modem is Hayes-compatible, no initialization string is needed. Please refer to your modem Manual for Hayes compatibility and initialization strings.
4. Choose the **Baud Rate** for your modem. The available choices are 300, 1200, 2400, 9600, and 19200.

## 3

## Event Actions

---

### Configuration

UPS Operating Parameters...  
UPS Shutdown Parameters...  
Communication Parameters...

### Event Actions...

Event Users...

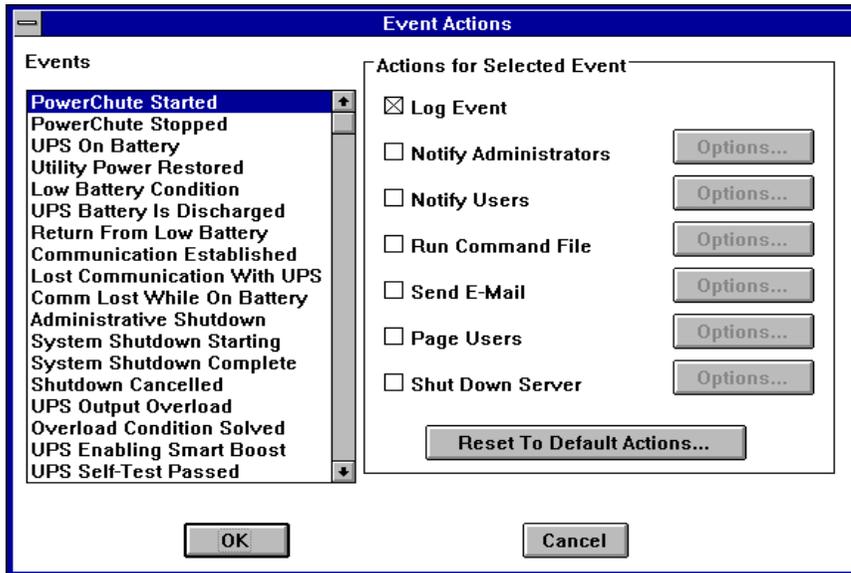
Measure-UPS Parameters...

Monitoring Preferences...

FlexEvents are a combination of events and actions (event actions). The **Event Actions...** option allows you to configure specific actions for events. PowerChute *plus* events are informational and/or significant events related to your APC UPS. Each event can be

configured for seven possible actions.

Selecting the **Event Actions...** option will bring a dialog box of the same name on screen:



Events are listed in the list box at the left. The corresponding seven actions for each event are diagrammed on the right. The seven actions allow you to log the occurrence of the event in a file, notify various people that the event has occurred, run external programs, and shut down an operating system.

By default, all events have the **Log Event** box enabled. In addition, the following actions have the **Shut Down Server** action enabled: **Base Module Fan Failure**, **Base Power Supply Failure**, **Comm Lost While On Battery**, **Low Battery Condition**, **UPS on Battery**, **UPS on Bypass: Failure** and **UPS Output Overload**. The rest is up to you to configure.

---

**Note:** FlexEvents are examined in detail in the next chapter. A complete list and description for all events is provided in APPENDIX A.

---

## Event Users

### Configuration

UPS Operating Parameters...

UPS Shutdown Parameters...

Communication Parameters...

Event Actions...

**Event Users...**

Measure-UPS Parameters...

Monitoring Preferences...

3

The **Event Users...** option brings up the Event Users dialog box on screen. This dialog box allows you to add users to be notified for events and looks like the one below.

The screenshot shows the 'Event Users' dialog box. It features a list box on the left containing the names 'Don', 'Doug', and 'Pete'. To the right of the list box is a text input field containing 'Don', with 'Add', 'Rename', and 'Delete' buttons below it. The dialog is divided into three sections: 'Messaging' with an 'Enabled' checkbox and a 'Notification Address' field containing 'don'; 'Paging' with an 'Enabled' checkbox, 'Access Number' (555-2222), 'Access Code' (4444), a 'Pager Service' dropdown menu (Skytel), and an 'Edit Services...' button; and 'E-Mail' with an 'Enabled' checkbox and an 'E-Mail Address' field containing 'don@apc.uri.edu'. At the bottom are 'OK' and 'Cancel' buttons. Annotations on the right side of the dialog point to: 1. The text input field (labeled '1. Type User name'); 2. The 'Rename', 'Delete', and 'Add' buttons (labeled '2. Rename - renames name', 'Delete - deletes name', 'Add - adds name to list'); 3. The list box (labeled 'List box for User names'); and 4. The 'Enabled' checkboxes in the Messaging, Paging, and E-Mail sections (labeled '3. Check boxes that are applicable to the user such as Messaging, Paging and/or E-Mail').

The top part of the dialog box allows you to add, rename or delete users from the list of users.

The dialog has three other sections called Messaging, Paging, and E-Mail. Each user you add to the list of users can be configured to receive broadcast messages and e-mail. The users can also be paged depending on modem and pager availability.

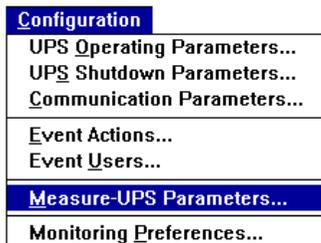
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**Note:** The Events Users menu option is examined in detail in CHAPTER 4.

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## Measure-UPS Parameters

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A Measure-UPS is a remote environmental measuring accessory. In order to supply data, it must be connected to a Smart-UPS or Matrix-UPS. The unit senses and reports ambient temperature and relative humidity. It can also monitor up to four external contact closure inputs and report on their changes in state.

If you do not have a Measure-UPS, this menu option is dimmed and not accessible.

When you have a Measure-UPS connected and select the Measure-UPS Parameters option, the Measure-UPS Parameters dialog box appears.

**Measure-UPS Parameters**

Firmware Revision: 4Gx

**Thresholds**

Low Temperature 20.00 °C     High Temperature 80.00 °C

Low Humidity 20.00 %     High Humidity 80.00 %

**Contacts**

	Normal State	Description
<input checked="" type="checkbox"/> Contact 1	Open	Contact 1
<input checked="" type="checkbox"/> Contact 2	Open	Contact 2
<input checked="" type="checkbox"/> Contact 3	Open	Contact 3
<input checked="" type="checkbox"/> Contact 4	Open	Contact 4

OK    Cancel

3 Possible states for Contacts 1,2,3,4

Open  
Closed

The top line on this box shows the Measure-UPS firmware revision. Like UPS firmware revision code, this value is set at the factory and cannot be changed.

The Thresholds area of the Measure-UPS box contains check boxes and data entry fields for high and low temperature thresholds and high and low humidity thresholds. To enable a threshold:

1. Click on the check box of that threshold.
2. Enter a low or high threshold value in the field next to the check box.

A measurement below the low threshold or above the high threshold will be reported and logged as an event.

For example, if the environmental temperature drops below the low threshold or rises above the high threshold value, PowerChute *plus* generates an **Ambient Temperature Out of Range** event. When the temperature returns to within the threshold values, an **Ambient Temperature in Range** event is generated. See APPENDIX A for a full description of other events.

Measure-UPS measures ambient temperature in Celsius. The temperature can be displayed on the Main Screen in either Celsius or Fahrenheit. However, the data log file records data in Celsius only. If you are used to measuring temperature in Fahrenheit, please use the following formulas to configure your low and high temperature thresholds:

$$F = (9/5 C) + 32 \text{ or } C = 5/9 (F-32)$$

The Contacts area of the Measure-UPS box contains check boxes and scroll boxes for four sets of contacts. You can configure each contact as normally Open or normally Closed. To enable event reporting for a contact:

1. Click on the check box of that contact
2. Select a normal state for the contact - either Open or Closed
3. You may optionally assign a description to each set of contacts. The event description is included in the PowerChute *plus* event text.

A change in the state of the contact will be reported and logged as an event: **Abnormal Contact Position**. You can use the contact feature of the Measure-UPS to monitor and log the operation of security, environmental control, or fire protection systems. For instance, a contact could be attached to the door of a remote data center. The contact would be configured as closed since it would be normal for the data center door to be closed. If the door were to be opened, an Abnormal Contact Position event would be generated.

For more information on the Measure-UPS, please see APPENDIX B. For a list of events, please see APPENDIX A.

## Monitoring Preferences

### Configuration

UPS Operating Parameters...  
 UPS Shutdown Parameters...  
 Communication Parameters...

Event Actions...  
 Event Users...

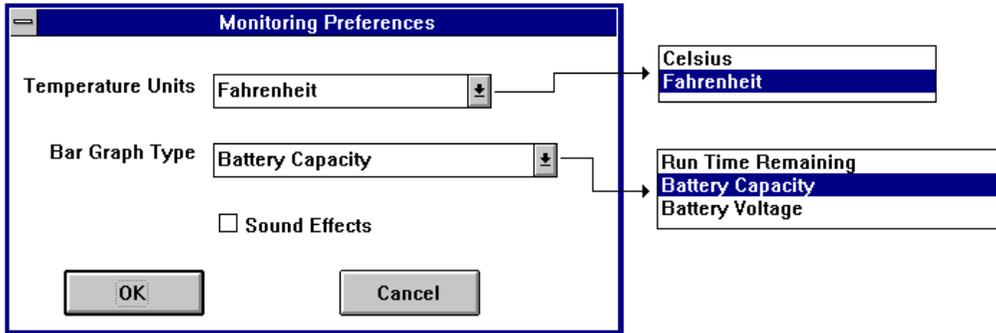
Measure-UPS Parameters...

**Monitoring Preferences...**

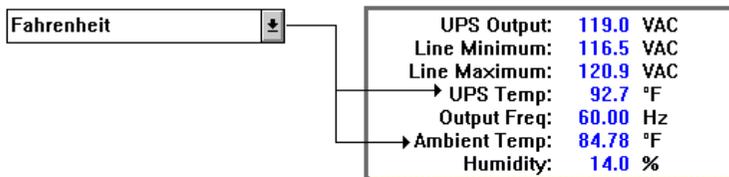
3

The Monitoring Preferences menu and dialog box allow you to change your preferences regarding temperature units and bar graph type.

### Temperature Units

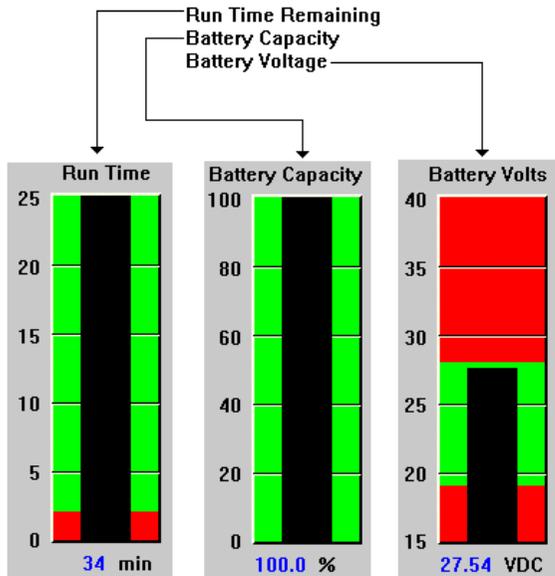


When you select a temperature unit, the temperature measurement on the main screen changes to reflect your preference:



## Graph Preferences

The Main Screen's left-most graph can display one of three graphs: Run Time Remaining, Battery Capacity or Battery Voltage. Changing Bar Graph Type preferences will replace the graph on screen with your selection:



## Sound Effects

PowerChute *plus* polls data at four second intervals from the UPS Monitoring Module. The UPS Monitoring Module, in turn, monitors and receives data from the attached UPS and Measure-UPS. Enabling the Sound Effects check box allows PowerChute *plus* to sound a tone (“beep”) every four seconds, letting you know the software is still operating.

# Chapter 4: PowerChute *plus* FlexEvents

---

## FlexEvents

---

FlexEvents consist of two parts: events and actions.

**Events:** Events are informational events related to your American Power Conversion UPS system and range in severity from informational (not severe) to critical (severe).

For instance, there is an event called “**UPS Output Overload**”. This event is considered a critical event and will be generated when the rated load capacity of the UPS has been exceeded. It is critical because if the situation is not remedied by disconnecting excess equipment from the UPS, the UPS cannot support the load if power fails.

A complete list of events, their function and severity is presented in APPENDIX A.

4

Events can be generated by five products manufactured by APC: Back-UPS, Smart-UPS and Matrix-UPS, as well as a Measure-UPS, or SmartSlot Measure-UPS II, environmental measuring accessory.

**Actions:** The second part of the FlexEvents process is actions. What makes the FlexEvents process dynamic is that PowerChute *plus* can be configured to take certain actions, depending on the event. PowerChute *plus* can:

- log that event,
- send early warning broadcast messages to specified administrators
- broadcast messages to users on the network
- shut down the host computer
- run a command file (an external executable file)
- page users
- send e-mail to notify users

Actions allow you to totally control PowerChute *plus* and efficiently manage your UPS environment.

## FlexEvents Tutorial

For **each** event, you can configure **seven** actions. Some events are informational in nature, so configuring all seven actions for that event may not be necessary. The following section contains a brief tutorial about how to use the FlexEvents feature.

To make it easier for you, there are default configurations for each event. If you are not sure of your requirements, try the default configurations to see if they meet your needs.

### Configuring Event Users

Before using FlexEvents, you should decide whether or not it is important in your environment to Mail, Page or Notify individual users. If it is important, the first task is to add users. From the “**Configuration**” menu, select the “**Event Users**” option.

System	Logging	Configuration	Diagnostics	Help
		UPS <u>O</u> perating Parameters...		
		UPS <u>S</u> hutdown Parameters...		
		UPS <u>C</u> ommunication Parameters...		
		<u>E</u> vent Actions...		
		<b>Event <u>U</u>ers...</b>		
		<u>M</u> easure-UPS Parameters...		
		<u>M</u> onitoring <u>P</u> references...		

You will see the Event Users dialog box. This box allows you to set up users who will be affected by FlexEvents. For instance, it allows you to set up a user who can receive E-mail or be paged by a pager or be able to receive broadcast messages sent by the host computer. Using the Event Users dialog box is the first step in enabling the FlexEvents process.

**Event Users**

Don  
Doug  
Pete

Don

Add Rename Delete

1. Type User name

2. Rename - renames name  
Delete - deletes name  
Add - adds name to list

List box for User names

3. Check boxes that are applicable to the user such as Messaging, Paging and/or E-Mail

**Messaging**  
 Enabled  
Notification Address: don.sales.myc

**Paging**  
 Enabled  
Access Number: 555-2222  
Access Code: 4444  
Pager Service: Skytel  
Edit Services...

**E-Mail**  
 Enabled  
E-Mail Address: don@apc.uri.edu

OK Cancel

4

In the example above, three users have been added. The first user, Don, whose configuration data you can see, has Messaging, Paging and E-Mail enabled. We have configured the second user, Doug, with Messaging and E-Mail enabled. The third user, Pete, is configured to have only Messaging enabled.

After adding and/or configuring users, click **OK**.

---

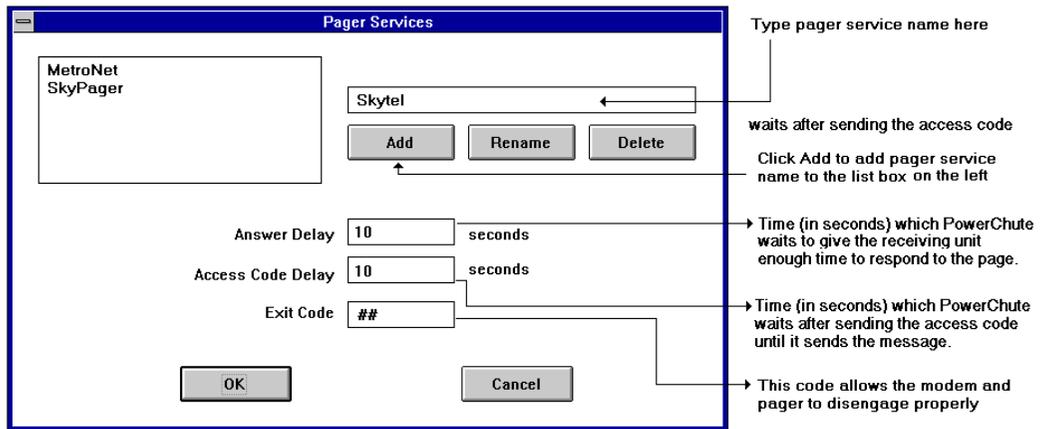
**Note:** If you don't want to configure individual users for Mailing, Paging, and Notification, you can select "Event Actions" directly.

---

## Configuring Paging Services

If **Paging** is enabled in the Event Users dialog box, all fields related to Paging such as Access Number, Pager Service and Access Code, should be provided. Please note that PowerChute *plus* supports **numeric pagers** only. Also note that for paging to work with PowerChute *plus* for UNIX, UUCP must be installed. To use the paging feature, please ensure UUCP is installed and running on all computers which are also running PowerChute *plus* for UNIX.

Notice the **Edit Services...** button in the Paging options area. Clicking on this button displays the **Pager Services** dialog box. This box allows you to set up Pager services for your users.

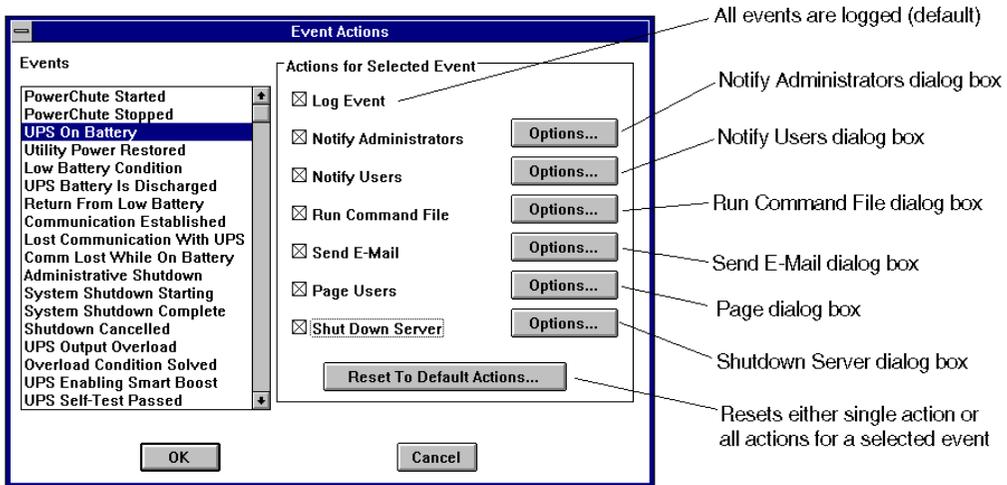


A modem is required in order to use the Paging feature. PowerChute *plus* and the attached modem sends information in a send-only mode. They are unable to receive information from the pager. This is the reason for the Answer Delay and Access Code Delay boxes.

We recommend you assign numbers to events and you configure Paging for only very critical events. Determining critical events and assigning numbers to them are discussed in detail in the “**Paging Users**” section of this chapter.

## Configuring Actions

From the **Configuration** menu, select the **Event Actions** option. You will see the Event Actions dialog box:



The left side of the dialog box lists all the events. The right side of the dialog box has the seven configurable actions. In the example screen above, the “**UPS On Battery**” event is being configured. All seven actions for this event have been enabled. For this event, PowerChute *plus* will:

1. Log this event in the PowerChute *plus* log file - default name is **powerchute.log**. See the CHAPTER 6: LOGGING DATA WITH POWERCHUTE *PLUS* for details on the log file.
2. Send early warning broadcast messages to Administrators that a **UPS On Battery** event has been generated. Administrators can be specified through the Notify Administrators dialog box.
3. Broadcast warnings to selected users that a **UPS On Battery** event has been generated. The Notify Users dialog box is used to select users for notification.
4. Run an external program (Command File). When this action is enabled (checked), PowerChute will run any external executable file. For example, for a certain event, you might run a tape backup program.

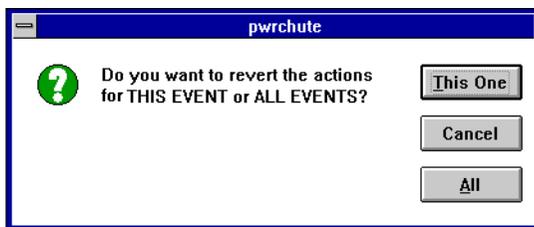
5. Send E-Mail to selected users. You can configure a message and users who will receive that message through the Send E-Mail dialog box.
6. Page selected users. You can configure a paging message and users who will receive that paging message through the Page dialog box.
7. Shut Down the Server (see `SYSTEM SHUTDOWN STARTING EVENT` later in this section for information on how to define how much delay occurs before a system shutdown occurs).

The above steps are shown as an example only. You may determine that the number of events which require all seven actions to be configured are quite few and certainly depend on your operating environment. However, please note that when you configure the “**UPS On Battery**” event, you should make sure to check the “**Shut Down Server**” action box. If this is not done and you have a power failure, the UPS will run until a low battery condition occurs and will turn off without properly shutting down the server.

By default, all events have the **Log Event** box enabled. In addition, the following actions have the **Shut Down Server** action enabled: **Base Module Fan Failure**, **Base Power Supply Failure**, **Comm Lost While On Battery**, **Low Battery Condition**, **UPS on Battery**, **UPS on Bypass Failure** and **UPS Output Overload**.

The last button on the right side of the dialog box is the **Reset To Default Actions...** button. Use this button if you have made a mistake while configuring an action and want to reset your actions.

Clicking on the **Reset To Default Actions...** button brings the following box on screen:

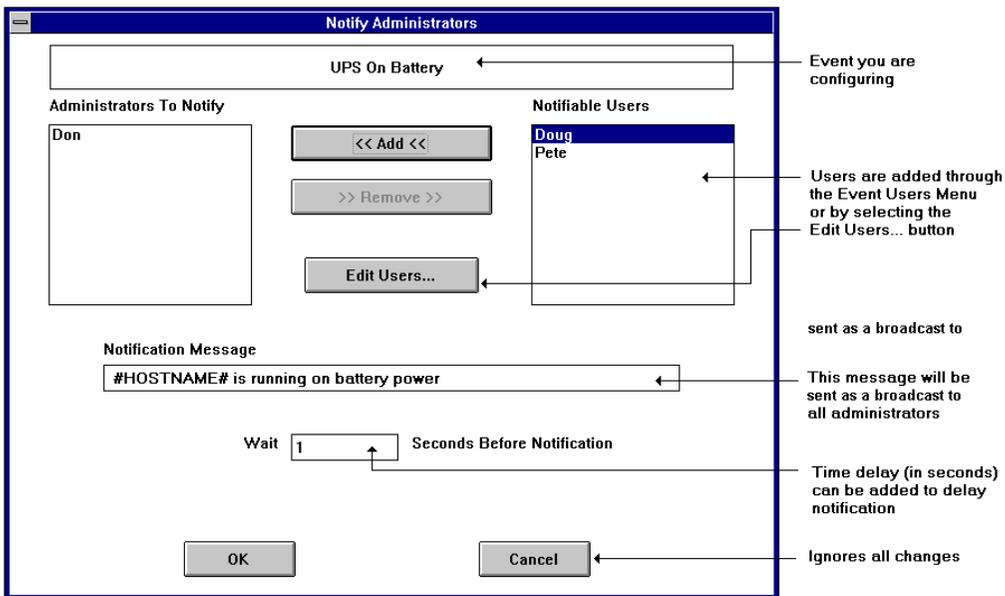


There are three buttons on this dialog box: This One, Cancel, All.

1. Selecting **This One** will reset default actions (all seven) for the event you are currently configuring.
2. Selecting **Cancel** will cancel the Reset to Default Actions... action.
3. Selecting **All** will reset your changes to the default configuration for all events.

## Notifying Administrators

This event action allows network or system administrators to be notified of an event, before their users, so they can address a problem before work is interrupted. To define this event action, select the **Notify Administrators** action in the “Event Actions” dialog box to open the **Notify Administrators** dialog box:



A title appears at the top of the dialog box to let you know what event you are configuring. In the example above, the event is UPS On Battery.

Select and Add users who will be Administrators for FlexEvents, fill in the Notification Message (this can be changed and/or edited), and add a wait delay. Click “OK” to exit this dialog box and save your changes.

Please note that for PowerChute *plus*, an Administrator is a **key user** to be notified when a certain event happens. This is not to be confused with an Administrator of a network system.

Notice the **Edit Users...** button in this dialog box. This button is also present in the dialog boxes for **Notify Users**, **Send E-Mail** and **Page Users**. Clicking on this button allows you to set up users. This button is the same as selecting the **Event Users** option from the Configuration menu.

The **Notification Message** area allows you to enter a message which will be sent to all users in the form of **broadcasts**, informational messages broadcast to users informing them of a particular event. The broadcast message for this event, UPS On Battery, is set, as follows:

```
Message from PowerChute@NETCOMP1 to * on 4/27/97 12:35PM
```

```
NETCOMP1 is running on battery power. NETCOMP1 shutdown in 29 minutes and 0 seconds.
```

The first line tells the user which host computer is sending the message - in this case, a host computer called NETCOMP1. The line also includes the date and time.

The second line contains the message entered in the Notification Message area. The second part, in this example, tells the user NETCOMP1 is shutting down. This is because we have enabled the Shut Down Server action for the UPS On Battery event. If the Shut Down Server action was disabled for this event, the second line would contain only the text entered in the Notification Message area.

Although you can change the messages in the Notification Message area, we have provided default messages which should suffice. For a list of user-configurable broadcasts, please refer to APPENDIX C.

All events will be reflected in the "**syslog**" file. These messages may be broadcast twice: Once by PowerChute *plus*, and once by **syslogd**, depending on your system configuration. Messages broadcast by **syslogd** will have brackets ([ ]) around the process IDs.

## Notifying Users

From the “Event Actions” screen, select **Notify Users** to access the following dialog box:

The dialog box is titled "Notify Users" and contains the following elements:

- UPS On Battery**: The event name.
- Users To Notify**: Radio buttons for  All Users and  Specific Users.
- Specific Users:** Two list boxes:
  - Users To Notify**: Contains "Don".
  - Notifiable Users**: Contains "Pete" and "Doug".
- Buttons**: "<< Add <<", ">> Remove >>", and "Edit Users...".
- Notification Message**: A text box containing "#HOSTNAME# is running on battery power".
- Wait**: A text box with "5" and "Seconds Before Notification".
- Notify**: Radio buttons for  Notify Once and  Notify Every, with a "Seconds" text box containing "30".
- Buttons**: "OK" and "Cancel".

Annotations:

- Causes a message to be broadcast to all users. This option should be reserved for critical events such as Shutdown Server (points to All Users).
- Shows a list of users in the Notifiable Users list box (points to Notifiable Users).
- Allows users to be notified once or periodically (points to Notify Once/Every).

This dialog box is much the same as the **Notify Administrators** dialog. The only difference is there are two categories of mutually-exclusive users you can select. If you select **All Users**, a message will be broadcast to all network users. The **Specific Users** option allows you to send notification to those users you select from the **Notifiable Users** list box.

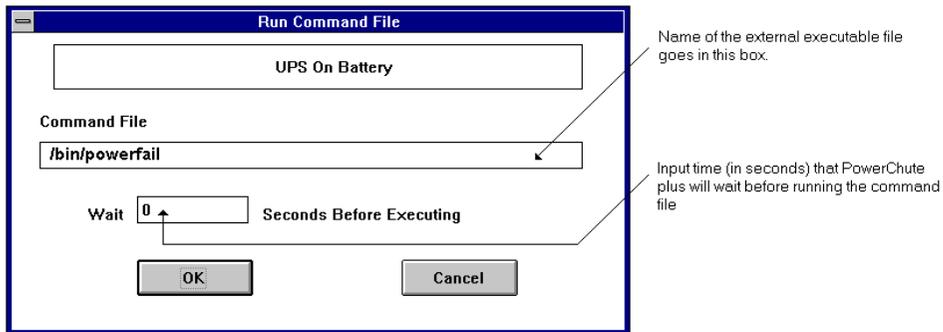
As with Notifying Administrators dialog box, there is a Notification Message area in the Notify Users dialog box. In fact, if you change the message in either dialog box, it will reflect that change in the other one.

The **Wait** area allows you to enter a time (in seconds) which PowerChute will wait before sending the message. Enter a Wait Time to delay user notification until the event has persisted for a specific length of time. For the example above, if the Wait Time were set to 10 seconds, and a power failure lasted only 9 seconds, users would not receive the notification message.

The section below the Wait Area contains radio buttons which allow you to send a message once or every few seconds. If an event is critical where the Shut Down Server action is enabled, you might want to send messages periodically to let the users know when the Server (host computer) is going to shut down.

### Running a Command File

The **Run Command File** action is next. This action is configured through a dialog box of the same name:



A command file is any external executable file. This action allows you to run a command file when a certain event is generated. For instance, for the event **Administrative Shutdown**, you might want to run a tape backup program, kill a running process, or run a batch file or script. This dialog allows you to run external executable files. APPENDIX E contains a discussion on how to use APC utilities to shut down Lotus Notes servers.

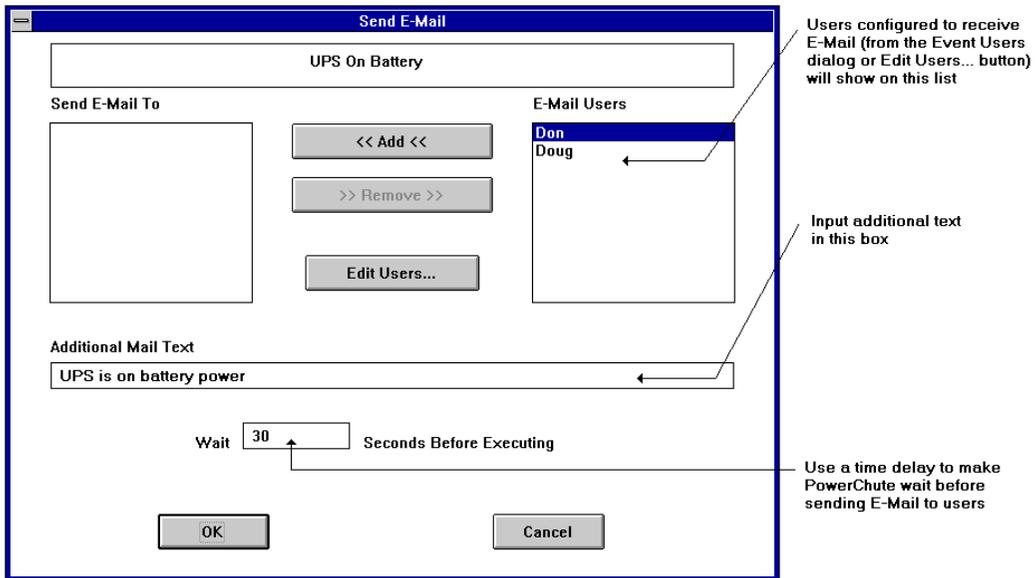
In the example above, **PowerChute *plus*** will run a file called **powerfail** every time the **UPS on Battery** event is generated.

Enter a Wait Time to delay command file execution until the event has persisted for a specific length of time. For the example above, if the Wait Time were set to 10 seconds, and a power failure lasted only 9 seconds, the command file would not be executed.

For UNIX platforms, external command files execute with “**root**” permissions. Thus, these files should be protected accordingly. Please refer to your UNIX system documentation on how to set file permissions.

## Sending E-Mail

The next action is **Send E-Mail**. The dialog box shown below allows you to configure the Send E-Mail parameters:



Recall from the Configuring Event Users section that for this example, we had three users configured through the Event users dialog box (see earlier section in this chapter). The first user, Don, had Messaging, Paging and E-Mail enabled. The second user, Doug, had Messaging and E-Mail enabled. The third user, Pete, had only Messaging enabled.

In the example dialog box above, the two users with the E-Mail option enabled show on the E-mail Users list box. This doesn't mean they will automatically receive E-Mail. This just means they have the capability to receive E-Mail.

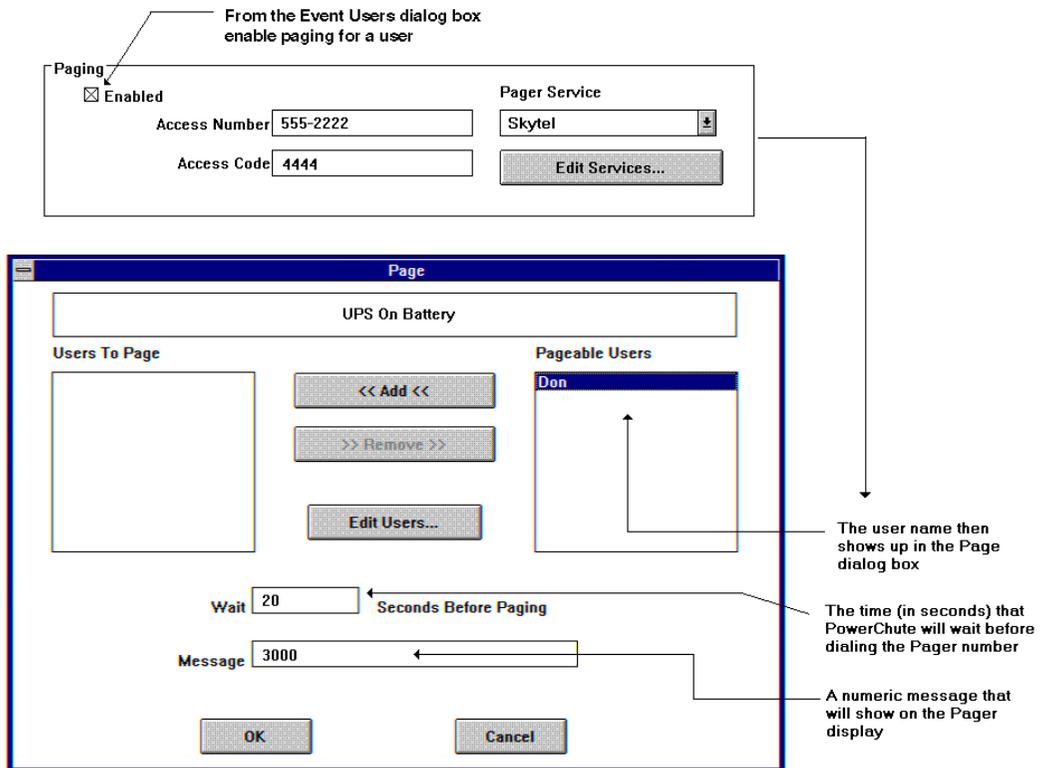
To ensure the users receive E-Mail for a given event, highlight a user listed in the E-mail Users list box and click the Add button. The user name will appear in the Send E-Mail To list box. This ensures that for the selected event, that user will receive E-Mail.

The **Additional Mail Text** box allows you to enter the E-mail message to be sent to E-mail users. There is no character limit to this message.

As explained in the previous sections, use the Wait Time (in seconds) to make sure E-mail is sent only if the event persists.

## Paging Users

The next action is **Page**. This action is configured through the Page dialog box:



In the example above, notice that only the user Don shows up on the Pageable Users list. This is because, in this example, he is the only one with the Paging option enabled. When we first set up users, we enabled the paging option for Don but not for our other two users.

To page a user or users, highlight their names from the “**Pageable Users**” box and click “Add”. Their names will then be transferred to the “**Users To Page**” box. They can then be paged. Please note that PowerChute *plus* supports only numeric pagers.

As in the other action dialog boxes, there is a “**Wait**” box in the “**Page**” dialog box. Use this to enter a Wait time before paging, to make sure an event persists long enough before paging users.

The area below the Wait Area allows you to enter a message which will be sent to a pager. Since PowerChute *plus* only supports numeric pagers, a number must be entered in the **Message** area. Each event has an associated ID Code number which we recommend you use as the pager message.

Each event has a four-digit code (called ID code) associated with it. This code identifies the event that occurred. The first digit of the four-digit code, is the **severity code** and is the most important for you to know.

Severities are categorized into three groups:

## 4

- severe problems (=3).
- warnings (=2)
- informational messages (=1).

**Severe problems**, unless resolved, may cause incorrect operation of the UPS, equipment connected to the UPS or PowerChute *plus* software. **Warnings** are events which indicate impending problems which may cause loss of operational status if conditions do not change. **Informational messages** indicate proper operation of the UPS and/or PowerChute *plus* and are used to keep you informed.

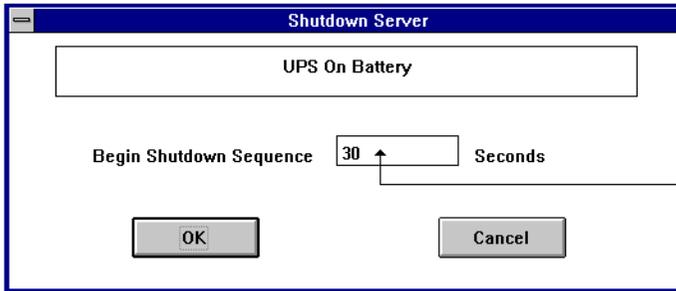
APC recommends you configure paging for events having a severity of **3** (severe problems) only, and use the four-digit code associated with the event. There are thirteen events which have a severity **3** associated with them.

The following table lists the ID code, the severity code, and all associated events. The check marks in the table indicate the type of UPS or accessory affected by a particular event. All events shown in the table will be reflected in the “**syslog**” file. These messages may be broadcast twice - once by PowerChute *plus*, and once by “**syslogd**”, depending on the configuration of your system. Messages broadcast by “**syslogd**” will have brackets ([ ]) around the process ID’s.

ID Code	Severity	Flex Event Names	Measure UPS	Matrix UPS	Smart UPS	Back UPS
3006	3	Abnormal Contact Position	✓			
1005	1	Administrative Shutdown		✓	✓	
1100	1	Ambient Temp In Range	✓			
3101	3	Ambient Temp Out Of Range	✓			
3014	3	Base Module Fan Failure		✓		
3015	3	Base Power Supply Failure		✓		
3016	3	Battery Needs Replacing		✓	✓	
3010	3	Check Smart Cell Signal		✓		
3004	3	Comm Lost While On Battery		✓	✓	
1002	1	Communication Established		✓	✓	✓
1010	1	Contact Normal	✓			
1101	1	Humidity In Range	✓			
3101	3	Humidity Out Of Range	✓			
3000	3	Lost Communication With UPS		✓	✓	
2003	2	Low Battery Condition		✓	✓	✓
1013	1	Overload Condition Solved		✓	✓	
1000	1	PowerChute Started		✓	✓	✓
1001	1	PowerChute Stopped		✓	✓	✓
1007	1	Return From Low Battery		✓	✓	
2004	2	Run Time Calibration Aborted		✓	✓	
1015	1	Run Time Calibration Finished		✓	✓	
1014	1	Run Time Calibration Started		✓	✓	
1006	1	Shutdown Cancelled		✓	✓	
1018	1	Smart Cell signal returned		✓		
2001	2	System Shutdown Complete		✓	✓	✓
1016	1	System Shutdown Starting		✓	✓	✓
3003	3	UPS Battery Is Discharged		✓	✓	
1009	1	UPS Battery Replaced		✓	✓	
2002	2	UPS Enabling Smart Boost			✓	
2000	2	UPS On Battery		✓	✓	✓
3013	3	UPS On Bypass: Failure		✓		
2013	2	UPS On Bypass: Maintenance		✓		
3001	3	UPS Output Overload		✓	✓	
1017	1	UPS Return From Bypass		✓		
3002	3	UPS Self-Test Failed		✓	✓	
1004	1	UPS Self-Test Passed		✓	✓	
1003	1	Utility Power Restored		✓	✓	✓

## Shutting Down the Server

The next action is **Shut Down Server**. This action should probably be reserved for critical (severity 3) events. Selecting Shut Down Server allows you to use the Shutdown Server dialog box:



PowerChute *plus* will begin the shutdown process at the end of the time period in the box. In this case, shutdown begins after 30 seconds have elapsed.

4

## Defining the System Shutdown Delay Value

The default setting for the shutdown delay is 30 seconds. For some systems, this may not be enough time to ensure orderly shutdown. You can increase this delay, as follows:

1. Open the “Event Actions” dialog box (Configuration menu’s **Event Actions...**).
2. Select the **System Shutdown Starting** event listed under **Events**.
3. Click on **Options** beside the **Shut Down Server** listing.
4. When the “Shutdown Server” dialog box appears, change the value displayed in the **Begin Shutdown Sequence** field to the shutdown value, in seconds, you want to use as the shutdown delay.

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### **Caution:**

**Do not select a shutdown value of less than 30 seconds.**

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# Chapter 5: Monitoring Other Systems

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## System Menu

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The System menu allows you to select other systems to monitor, shut down various systems and exit PowerChute *plus*. When you select the System menu from the Main Menu bar, a drop down menu appears offering you the following menu options:

- Monitor Different Server...
- Schedule Server Shutdown...
- Shutdown Server Now...
- Exit

The following sections will examine these menu options in detail.

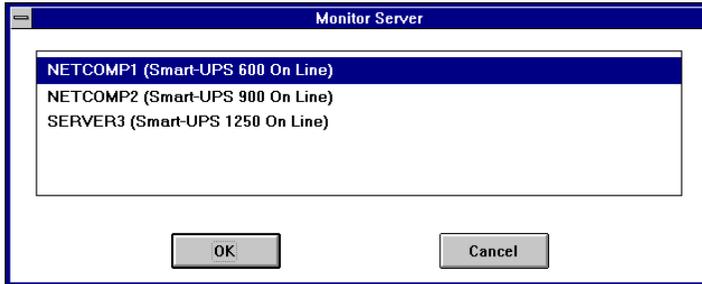
## Monitor Different Server...

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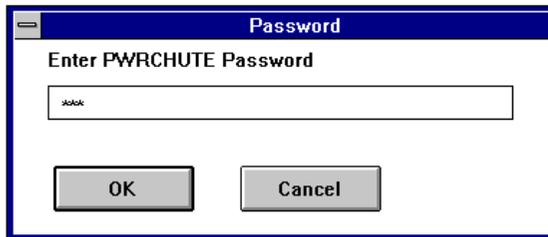


If you have a workstation which is not part of a network, this option will be dimmed and unavailable to you. If your workstation is part of a network, and you have the necessary authorization, you can use this option to monitor a Smart-UPS or Matrix-UPS connected to another server on the same subnetwork as your workstation.

When you select the Monitor Different Server... option, a list of other servers which are running PowerChute *plus*, and on the same subnetwork, appears:

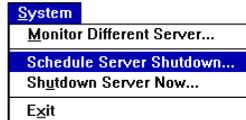


If you select one of the listed servers for monitoring, a password entry box appears.

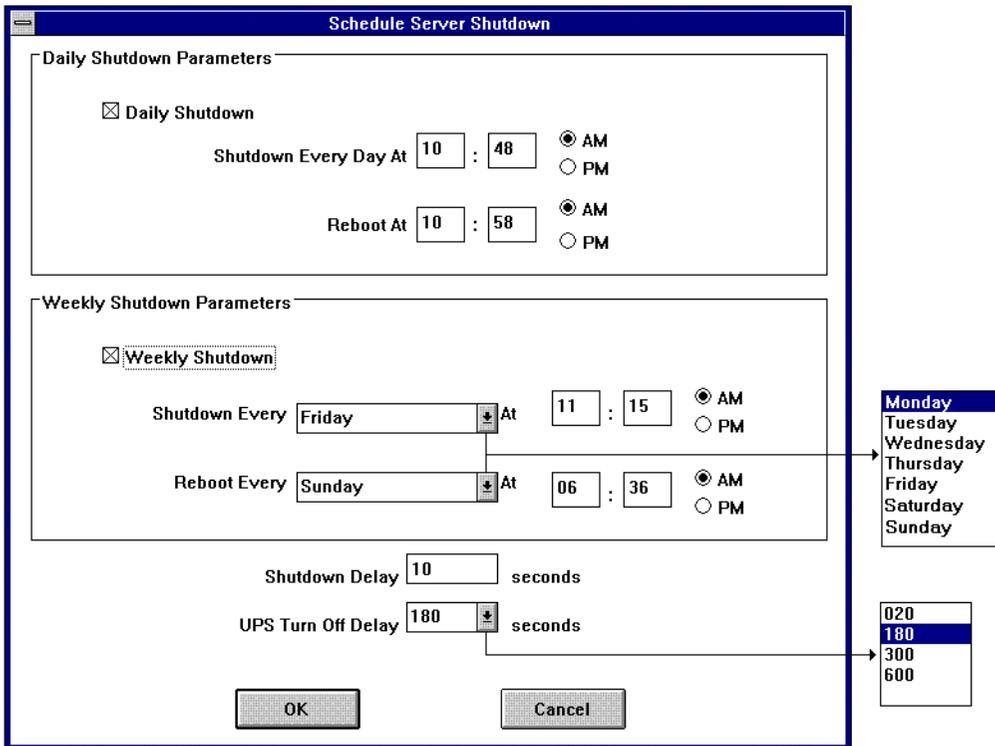


Enter the password and click on the **OK** button. The PowerChute *plus* Main screen for the selected server will appear. The selected server name appears in the Monitoring box in the main PowerChute *plus* screen.

## Schedule Server Shutdown...



When you select the **Schedule Server Shutdown...** option, the "Schedule Server Shutdown" dialog box appears:



This box has areas for daily and weekly shutdown parameters. Each of these areas has check boxes to enable or disable scheduled shutdowns on a daily or weekly basis. Each area has data entry fields for the time of shutdown and reboot. Radio buttons allow you to select AM or PM. The weekly shutdown area also has list boxes for selection of the day of the week for shutdown and reboot.

**Please note that Weekly Shutdown Parameters take precedence over Daily Shutdown Parameters. For example:**

1. Daily Shutdown is configured for 5:30 PM.
2. Weekly Shutdown is configured as Friday at 5:00 PM.

On Friday of every week, your system will shut down at 5:00 PM. For the rest of the week, your system will shut down at 5:30 PM.

At the bottom of the Schedule Shutdown box are two delay time entry boxes and OK and Cancel buttons. The **Shutdown Delay** data entry field sets the time period between the first shutdown warning message and actual shutdown. The **UPS Turn Off Delay** list box sets the time period the UPS will wait after server shutdown before going into **sleep mode**.

**Sleep mode** is a state where the UPS conserves energy by turning off its power outlets. That is, it will no longer supply power to connected equipment.

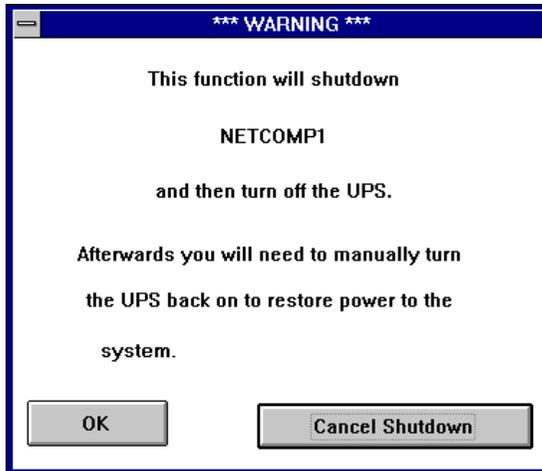
When you have completed entering/changing the shutdown parameters, select the OK button to store the new values or the Cancel button to exit without saving any changes.

## Shutdown Server Now...

---

System
Monitor Different Server...
Schedule Server Shutdown...
<b>Shutdown Server Now...</b>
Exit

When you select the Shutdown Server Now option, a warning box appears.



The server which is about to be shut down is identified. Please note that selecting this option will not put the UPS into “sleep mode”. Once the UPS has shut down the system, it will turn off. You will need to manually turn on the UPS to restore power to your system.

You have the option of continuing the shutdown by selecting (clicking) the OK button, or canceling by clicking on the Cancel Shutdown button. If you continue the shutdown, the normal shutdown sequence will be executed using the parameters in the Schedule Server Shutdown dialog box (see previous section).

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**Note:** During the Shutdown Server Now... process, the menu option will change to “Cancel Server Shutdown” in case you change your mind and wish to stop shutting down your system.

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## Exit

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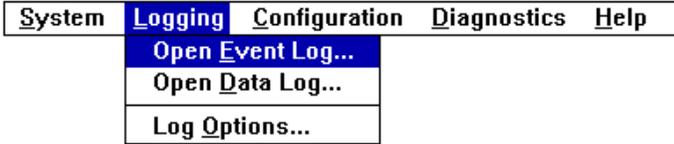
Selecting this option from the System menu causes you to exit the PowerChute *plus* program (the User Interface Module). The background program (Server Module) continues to monitor the UPS and log data.

# Chapter 6: Logging Data

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## Logging Menu

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The Logging menu allows you to log power event data and power data gathered from the UPS and Measure-UPS (if present). When you select the Logging menu from the Main Menu bar, a drop down menu appears offering you three menu options:

- Open Event Log...
- Open Data Log...
- Log Options...

The following sections will describe each menu option in detail.

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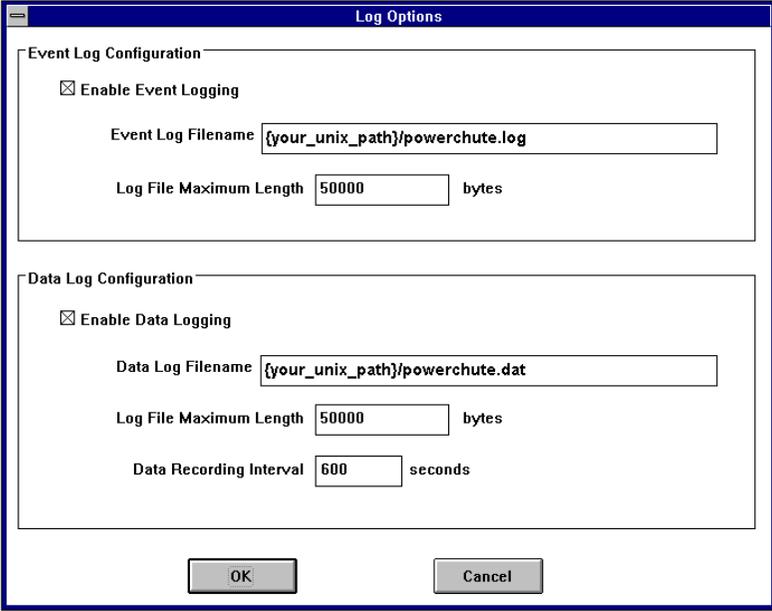
### Log Options...

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When you select **Log Options...** from the Logging menu (or from either the “Event Log” or “Data Log” dialog box), the “Log Options” dialog box appears.

This box has two main areas: **Event Log Configuration** and **Data Log Configuration**. Each of these areas has check boxes to enable or disable event and data logging. Each area has data entry fields for the log file path and file name, and the maximum file size in bytes.



The screenshot shows a dialog box titled "Log Options" with two main sections: "Event Log Configuration" and "Data Log Configuration".

**Event Log Configuration:**

- Enable Event Logging
- Event Log Filename:
- Log File Maximum Length:  bytes

**Data Log Configuration:**

- Enable Data Logging
- Data Log Filename:
- Log File Maximum Length:  bytes
- Data Recording Interval:  seconds

At the bottom of the dialog are "OK" and "Cancel" buttons.

## Event Log Configuration

This section of the dialog box relates to events. Every time an event is generated, it will be displayed on the bottom section of the main screen (in the Last Two Events window) and also written to the event log file. This section allows you to configure parameters for the event log file such as file name, location, and size of file. For more information on events, please see CHAPTER 4 and APPENDIX A.

### To configure event logging:

1. Click on the Enable Event Logging check box. This will ensure that PowerChute *plus* starts event logging.
2. Type the path and file name for the PowerChute *plus* event log file. The default file name is **powerchute.log**. The event log file is examined in detail at the end of this chapter.
3. Supply the log file maximum length in bytes.

When the event log file reaches its maximum length, PowerChute will erase the first 33% of the file and continue writing data.

## Data Log Configuration

This section of the dialog box pertains to data which is generated by the UPS and the Measure-UPS environmental measuring accessory. This section allows you to configure parameters for the data log file such as file name, location and size of file. The data log file will “fill up” more quickly than the event log file since you choose the data logging interval whereas the event log file is written to only when an event is generated.

To configure data logging:

1. Click on the Enable Data Logging check box. This will ensure that PowerChute *plus* starts data logging.
2. Type the path and file name for the PowerChute *plus* log file. The default file name is **powerchute.dat**. The data log file is examined in detail at the end of this chapter.
3. Supply the log file maximum length in bytes. To hold a week of data recorded at 10 minute intervals, the data log file size should be set to 50,000 bytes.
4. Type the data recording interval in seconds. The lowest interval is 5 seconds.

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When the log file reaches its maximum length, PowerChute will erase the first 33% of the file containing older data and continue writing data.

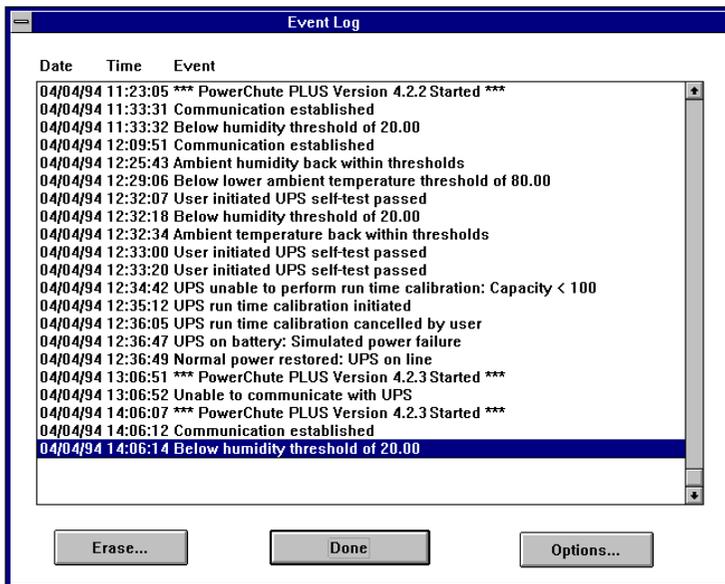
### Saving Configuration Parameters

At the bottom of the Log Options box are OK and Cancel buttons. When you have completed entering/changing the log parameters, select the OK button to save the new values. Selecting the Cancel button allows you to exit without saving any changes.

## Open Event Log...



When you select the Open Event Log option, the Event Log dialog box is displayed on screen.



This screen lists the message text for the most recently logged events, by date and time of occurrence. You can use the right hand scroll bar to view the entire log. See APPENDIX A for a complete list of events which may be logged. APPENDIX A also contains a discussion on message texts.

At the bottom of the Event Log screen are three buttons: Erase, Done and Options. You may use the **Erase** button to erase the event log. Use the **Done** button to return to the Main menu. The **Options** button takes you to the Log Options box - see previous section for more information.

Another way to open the event log is to double-click anywhere in the Last Two Events window in the Main Screen.

## Open Data Log...

### Logging

Open Event Log...

Open Data Log...

Log Options...

When you select the Open Data Log option, the Data Log dialog box is displayed.

Date	Time	V-Min	V-Max	V-Out	V-Batt	Freq	Load	T-UPS	T-Amb	Humidity
04/04/94	12:39:21	115.9	119.6	119.0	27.00	60.00	032.7	034.2	33.66	011.2
04/04/94	12:39:32	118.4	119.6	119.0	27.00	60.00	032.7	034.2	33.66	011.2
04/04/94	12:39:43	116.5	119.6	119.0	27.00	60.00	032.7	034.2	33.66	011.7
04/04/94	12:39:54	118.4	119.6	119.0	27.00	60.00	032.7	034.2	33.91	011.2
04/04/94	12:40:05	116.5	119.6	119.0	27.00	60.00	032.7	034.2	33.91	011.7
04/04/94	12:40:15	118.4	119.6	119.0	27.13	60.00	032.7	034.2	33.91	011.2
04/04/94	12:40:26	115.9	119.6	119.0	27.13	60.00	033.2	034.2	33.91	011.2
04/04/94	12:40:36	118.4	119.6	119.0	27.13	60.00	032.7	034.2	33.91	011.2
04/04/94	12:40:47	116.5	119.6	119.0	27.13	60.00	032.7	034.2	33.91	010.6
04/04/94	12:40:57	119.0	119.6	119.0	27.13	60.00	032.7	034.2	33.91	011.7
04/04/94	12:41:07	116.5	119.6	119.0	27.13	60.00	029.6	034.2	33.91	011.2
04/04/94	12:41:17	119.0	119.6	119.0	27.13	60.00	029.6	034.2	34.17	011.7
04/04/94	12:41:27	116.5	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.7
04/04/94	12:41:38	119.0	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.2
04/04/94	12:41:48	115.9	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.7
04/04/94	12:41:59	119.0	119.6	119.0	27.13	60.00	033.2	034.2	34.17	011.7
04/04/94	12:42:09	116.5	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.7
04/04/94	12:42:19	115.9	119.6	119.0	27.13	60.00	031.2	034.2	34.17	011.2
04/04/94	12:42:29	119.0	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.2
04/04/94	12:42:39	116.5	119.6	119.0	27.13	60.00	030.1	034.2	34.17	011.2
04/04/94	14:06:23	117.1	120.9	119.0	27.40	60.00	028.0	035.1	29.32	015.1
04/04/94	14:06:33	119.0	120.2	119.0	27.40	60.00	033.2	035.1	29.32	015.1
04/04/94	14:06:43	116.5	119.6	119.0	27.40	60.00	032.7	035.1	29.32	015.6
04/04/94	14:06:54	119.0	119.6	119.0	27.40	60.00	032.7	035.1	29.32	015.6
04/04/94	14:07:04	116.5	119.6	119.0	27.40	60.00	032.7	035.1	29.32	015.1
04/04/94	14:07:14	119.0	119.6	119.0	27.40	60.00	031.7	035.1	29.32	015.6
04/04/94	14:07:25	116.5	120.2	119.0	27.40	60.00	028.6	035.1	29.32	015.1

This screen lists the most recently logged data by date and time of recording. You may use the right hand scroll bar to view the entire log.

APPENDIX D contains a discussion on how to graph the Data Log to analyze a site's power quality.

The data in the data log is arranged as follows:

- **Date** Date of event, including month, day, and year as MM/DD/YY.
- **Time** Time the event occurred, in 24 hour format (HH:MM:SS).
- **V-Min** Minimum voltage recorded during the recording interval. Data shown is Volts.
- **V-Max** Maximum voltage recorded during the recording interval. Data shown is Volts (AC).
- **V-Out** Output voltage being supplied by the UPS to the attached (load) equipment. Data shown is Volts (AC).
- **V-Batt** UPS battery voltage. Data shown is Volts (DC).
- **Freq** UPS output frequency in Hertz.
- **Load** Percentage of the rated load of the UPS, as placed on the UPS by its attached equipment during the recording interval.
- **T-UPS** UPS temperature in Celsius. Under typical conditions, with a charged battery, the temperature will be around 40 degrees C. When the battery is charging heavily, the temperature will be as much as 50 degrees C. At the end of a heavy load discharge, the temperature can be as much as 65 degrees C. A temperature of over 75 degrees C would indicate a hardware failure.
- **T-Amb** This Measure-UPS parameter is the ambient environmental temperature and is always measured in Celsius.
- **Humidity** This Measure-UPS parameter is the relative humidity measured as a percentage of total humidity.

---

**Note:** If you are not using a Measure-UPS, the data log will not show the T-Amb and Humidity data.

---

At the bottom of the Event Log screen are three buttons: Erase, Done and Options. You may use the Erase button to erase the event log. Use the Done button to return to the Main menu. The Options button takes you to the “Log Options” box. Refer to the “**Log Options**” section in this chapter.

## PowerChute *plus* Event Log File

---

All events and associated message texts are logged in the event log file along with a date and time stamp. These entries are logged in the PowerChute *plus* Event Log file and are also sent to the Main Screen where the two most recent events are displayed.

The default file name **powerchute.log**.

The log file is an ASCII file and may be read by any ASCII text editor. The entries in the log file have the following form - “**date**”, “**time**”, “**message**”.

PowerChute *plus* can be used to view the Event Log file. The events in the Log File can also be output on screen by using the UNIX **more** command (i.e. “**more powerchute.log <Enter>**”).

The size of this file is limited. When the file exceeds its maximum size, the first 33% of the file containing older data is erased to allow more recent information to be saved.

You may turn event logging off by unchecking the “**Enable Event Logging**” check box in the “**Log Options**” box.

## 6

## PowerChute *plus* Data Log File

---

PowerChute *plus* records power as well as UPS information to the Data Log file at specified intervals. At the end of each interval a single data record is written to the file, summarizing the data for the period.

The default file name for the data log is **powerchute.dat**.

The data file can be viewed through PowerChute *plus*. As with the PowerChute Event Log file, the UNIX **more** command will output the file to screen.

The power data which is recorded in the PowerChute *plus* Data Log file is as follows:

- date
- time
- minimum utility line voltage for the period
- maximum utility line voltage for the period
- UPS output voltage
- current battery voltage
- UPS output frequency
- percentage of UPS rated load placed on the UPS during the period
- UPS temperature in degrees Celsius
- Ambient environmental temperature in degrees Celsius (must have Measure-UPS attached)
- Relative humidity as a percentage of total humidity (must have Measure-UPS attached)

Typical data records have the following format:

```
04/04/94,11:45:00,119.0,120.2,119.6,27.40,60.00,033.2,033.7,28.81,014.5
04/04/94,11:46:00,119.0,120.2,119.0,27.40,60.00,033.2,033.7,28.81,015.1
04/04/94,11:47:00,116.5,120.2,119.0,27.40,60.00,033.2,033.7,29.07,014.0
04/04/94,11:48:00,119.0,120.2,119.0,27.40,60.00,032.7,033.7,29.07,014.5
04/04/94,11:49:00,119.0,120.2,119.0,27.40,60.00,033.2,033.7,29.07,014.0
04/04/94,11:50:00,117.1,120.2,118.4,27.40,60.00,033.2,033.7,29.07,014.5
```

The Data Log file is limited in size. When it exceeds its maximum size, the first 33% of the file is erased to allow more recent information to be saved.

APPENDIX D contains a discussion on how to graph the data in the Data Log file using some popular spreadsheet/graphics software.

# Chapter 7: UPS Diagnostics

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## The Diagnostics Menu

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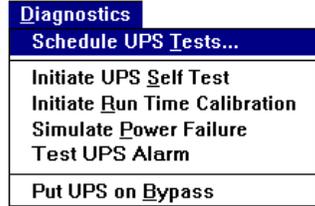
<u>S</u> ystem	<u>L</u> ogging	<u>C</u> onfiguration	<u>D</u> iagnostics	<u>H</u> elp
Schedule UPS Tests...				
Initiate UPS Self Test				
Initiate Run Time Calibration				
Simulate Power Failure				
Test UPS Alarm				
Put UPS on Bypass				

The Diagnostics menu allows you to test your UPS using the various menu options. It also allows you to put a Matrix-UPS into bypass mode. When you select the Diagnostics menu from the Main Menu bar, a drop down menu appears offering you six menu options:

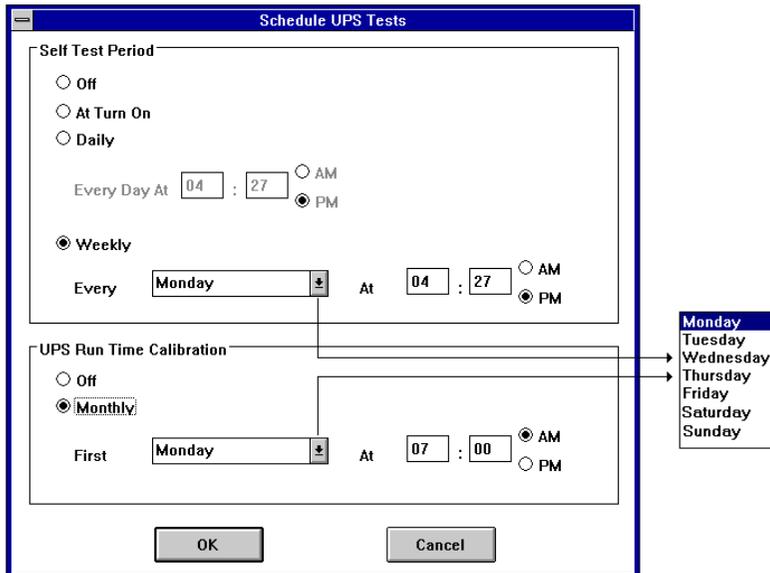
- Schedule UPS Tests...
- Initiate UPS Self-Test
- Initiate Run Time Calibration
- Simulate Power Failure
- Test UPS Alarm
- Put UPS on Bypass

The following sections will describe the purpose and use of these menu options.

## Schedule UPS Tests...



This menu option allows you to control the date and time the UPS will undergo a self-test and perform a run time calibration. Selecting the menu option will bring the Schedule UPS Tests dialog box on screen.



There are two areas in the dialog box: “Self Test Period” and “UPS Run Time Calibration”.

## Self Test Period

The Self Test Period area has four radio buttons. Selecting the first button turns off scheduled self-tests. The second button schedules a self-test at turn on only. The third selects a daily self-test schedule and the fourth selects a weekly self-test schedule.

If you select a daily schedule, enter the time at which you want the self-test done. If you choose a weekly schedule, select the day of the week and enter the time at which you want the self-test done.

APC recommends you perform self-tests periodically to ensure there are no faults with the UPS.

## UPS Run Time Calibration

The calibration process measures the UPS on-battery runtime based on the UPS Load over time. Essentially, the calibration process allows the UPS to compute its runtime given a specific load. The runtime calibration is lengthy, reduces runtime while it is in progress, and involves a deep discharge of the UPS battery. Because of this, a runtime calibration cannot be performed unless the UPS battery capacity is at 100%.

The UPS Run Time Calibration area has two radio buttons. The first button turns off run time calibration - calibration will not be performed unless you select the **“Initiate Run Time Calibration”** menu option on the Diagnostics menu. The second button selects a monthly run time calibration schedule. If you choose a monthly schedule, enter a day of the week and time you want the calibration done. If, for example, you choose Monday, Run Time Calibration will be started on the first Monday of each month.

Since accurate run time prediction is important and the calibration process is lengthy, APC recommends you schedule it once every month.

## Initiate UPS Self-Test

Diagnostics	
Schedule UPS Tests...	
<b>Initiate UPS Self Test</b>	
Initiate Run Time Calibration	
Simulate Power Failure	
Test UPS Alarm	
Put UPS on Bypass	

Monitoring: <b>NETCOMP1</b>	
UPS Model: <b>Smart-UPS 600</b>	
→ Status: <b>Self Test</b>	
Last UPS Self Test: <b>Passed</b>	
Last Test Date: <b>04/04/94</b>	
UPS Output: <b>119.6</b> VAC	
Line Minimum: <b>116.5</b> VAC	
Line Maximum: <b>120.9</b> VAC	
UPS Temp: <b>92.7</b> °F	
Output Freq: <b>60.00</b> Hz	
Ambient Temp: <b>89.37</b> °F	
Humidity: <b>12.3</b> %	

This menu option switches the UPS to battery momentarily and performs internal diagnostics. As shown in the figure above, the Status field on the main screen changes to “Self Test”. This menu option overrides an “Off” setting in the Schedule UPS Tests dialog box (see previous section).

## Initiate Run Time Calibration

Diagnostics	
Schedule UPS Tests...	
Initiate UPS Self Test	
<b>Initiate Run Time Calibration</b>	
Simulate Power Failure	
Test UPS Alarm	
Put UPS on Bypass	

Monitoring: <b>NETCOMP1</b>	
UPS Model: <b>Smart-UPS 600</b>	
→ Status: <b>Calibrating</b>	
Last UPS Self Test: <b>Passed</b>	
Last Test Date: <b>04/04/94</b>	

Initiates a calibration used to determine the UPS battery run time. This calibration process involves a deep discharge of the UPS battery and reduces UPS run time while the calibration is in progress. Once selected, this menu option changes to “**Cancel Run Time Calibration**”, allowing the calibration to be canceled at any time. This menu option overrides an “Off” setting in the Schedule UPS Tests dialog box (see earlier section).

While calibration is in progress, the Battery Capacity bar graph will periodically show lower values. This is normal since the UPS battery is undergoing a deep discharge.

Please note that Battery Capacity must be at 100% for the calibration to commence.

There are three events associated with calibration:

- **Run Time Calibration Started**
- **Run Time Calibration Finished**
- **Run Time Calibration Aborted**

Please see APPENDIX A for a description of these events.

## 7

### Simulate Power Failure

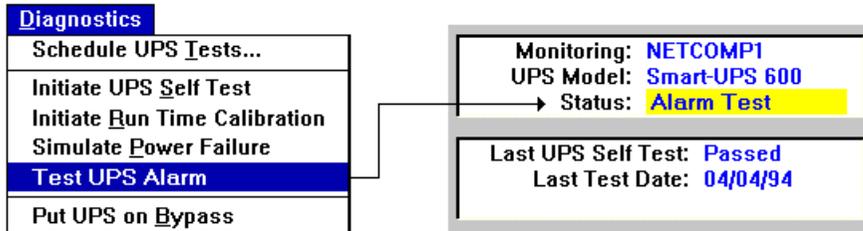
---

Diagnostics
Schedule UPS Tests...
Initiate UPS Self Test
Initiate Run Time Calibration
<b>Simulate Power Failure</b>
Test UPS Alarm
Put UPS on Bypass

Switches the UPS to battery momentarily. It allows you to test and make sure the UPS is capable of going on battery. This action generates the “**UPS on Battery: Simulated Power Failure**” event.

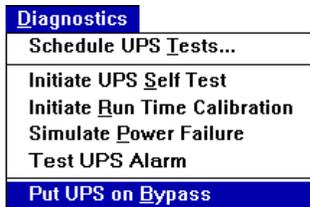
After a few seconds, the UPS will resume normal operation and generate the “**Utility Power Restored**” event.

## Test UPS Alarm



Causes the UPS to light its front panel lights momentarily and emit a beep. Although this is a diagnostic test to make sure PowerChute *plus* is communicating with the UPS, it may also be used to easily locate the UPS in a crowded machine room or wiring closet. The Status indicator on the main screen changes to “**Alarm Test**”. No event is generated by this menu option.

## Put UPS on Bypass



This option is only accessible if you have a Matrix-UPS. It puts the UPS into Bypass mode so maintenance can be performed. When in Bypass mode, the UPS functions only as a voltage conditioner. The UPS load is not protected from voltage sags, swells or blackouts.

The option toggles to “**Take UPS off Bypass**” when the UPS is placed in Bypass mode through PowerChute *plus*.

# Chapter 8: Configuring System Shutdown

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## Shutting Down a System Using FlexEvents

---

This section will provide information on correctly using Events. While reading this section, keep in mind that **the basic purpose of PowerChute *plus* is to safely shut down an operating system and server computer in the event of a power failure.** To do this properly, PowerChute *plus* needs the UPS to provide battery power to the system while PowerChute *plus* proceeds to shut down the system. This is where the correct sequencing of events becomes important and this is where you, the user, play a key role.

PowerChute *plus* provides all the flexibility you need to correctly sequence events. Make certain however, the **total of all delay periods are less than or equal to the UPS Run Time.** If not, PowerChute *plus* will be unable to properly shut down the operating system and server computers.

The following pages will discuss this in more detail and provide examples of various scenarios.

## Requirements

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The following discussion requires an understanding of FlexEvents and the various PowerChute *plus* features as discussed in Chapters 2 through 7.

## The System Shutdown Process

---

# 8

Here is how it works:

- a. Whenever a power failure occurs, the UPS immediately starts providing battery power to the system. This generates a “**UPS On Battery**” event from PowerChute *plus*. The default for this event is to shut down the system after a specified amount of time (the delay period) - the reason being the UPS can only provide battery power for a finite amount of time.
- b. The next event generated is the “**System Shutdown Starting**” event. This event will be generated automatically for any event whose “Shutdown Server” action box is enabled (checked). This event is where you should schedule external command files to run during shutdown time.

- c. After a user-specified amount of time, the “**System Shutdown Complete**” event is automatically generated. No actions, except “Log Event” can be configured for this event. **At this moment, PowerChute *plus* instructs the UPS to turn itself off.** No further processing is allowed.
- d. The UPS waits for the UPS Turn Off Delay time (specified by the user as 20, 180, 300 or 600 seconds) to elapse. It then turns off its outlets and waits for power to return. During this time, the UPS is in “sleep” mode. Please note that this is for Smart-UPS and Matrix-UPS only.
- e. During steps **a-d**, the UPS is continuously providing battery power. For each of the steps, there is a user-specified delay period. When specifying delay periods, make sure **the total of all delay periods is less than or equal to the UPS Run Time.**

The delay between **steps b** and **c** should be long enough to complete the execution of any command files, etc.

The delay between **steps c** and **d** (UPS Turn Off Delay) **must** be long enough for the system to finish processing shutdown instructions.

- f. When power returns, the UPS waits for a user-specified UPS Wakeup Delay time and/or UPS Wakeup Delay battery capacity.
- g. The UPS then switches on its power outlets and allows the system to boot up.

### Case 1: Power failure with enough UPS Run Time Remaining

Let's assume, for this example, the following times have been entered:

- i. **UPS On Battery.** 120 seconds. Shutdown will commence 120 seconds after the UPS has switched to battery power, unless normal power returns.
- ii. **System Shutdown Starting.** 60 seconds. This will be the amount of time required for execution of a user-specified command file.
- iii. **UPS Turn Off Delay.** 20 seconds. This is the amount of time elapsed between PowerChute *plus* instructing the UPS to turn off its outlets and the actual time the UPS will turn off power to its outlets. In this example, the UPS will wait 20 seconds to turn off power to the outlets.

## Analysis

The following two figures depict the sequence of events. The first figure shows the various screens and dialog boxes which are used to set up the configuration for an event such as this. The second figure shows the time-line of the events and indicates those areas controlled through user-specified times.

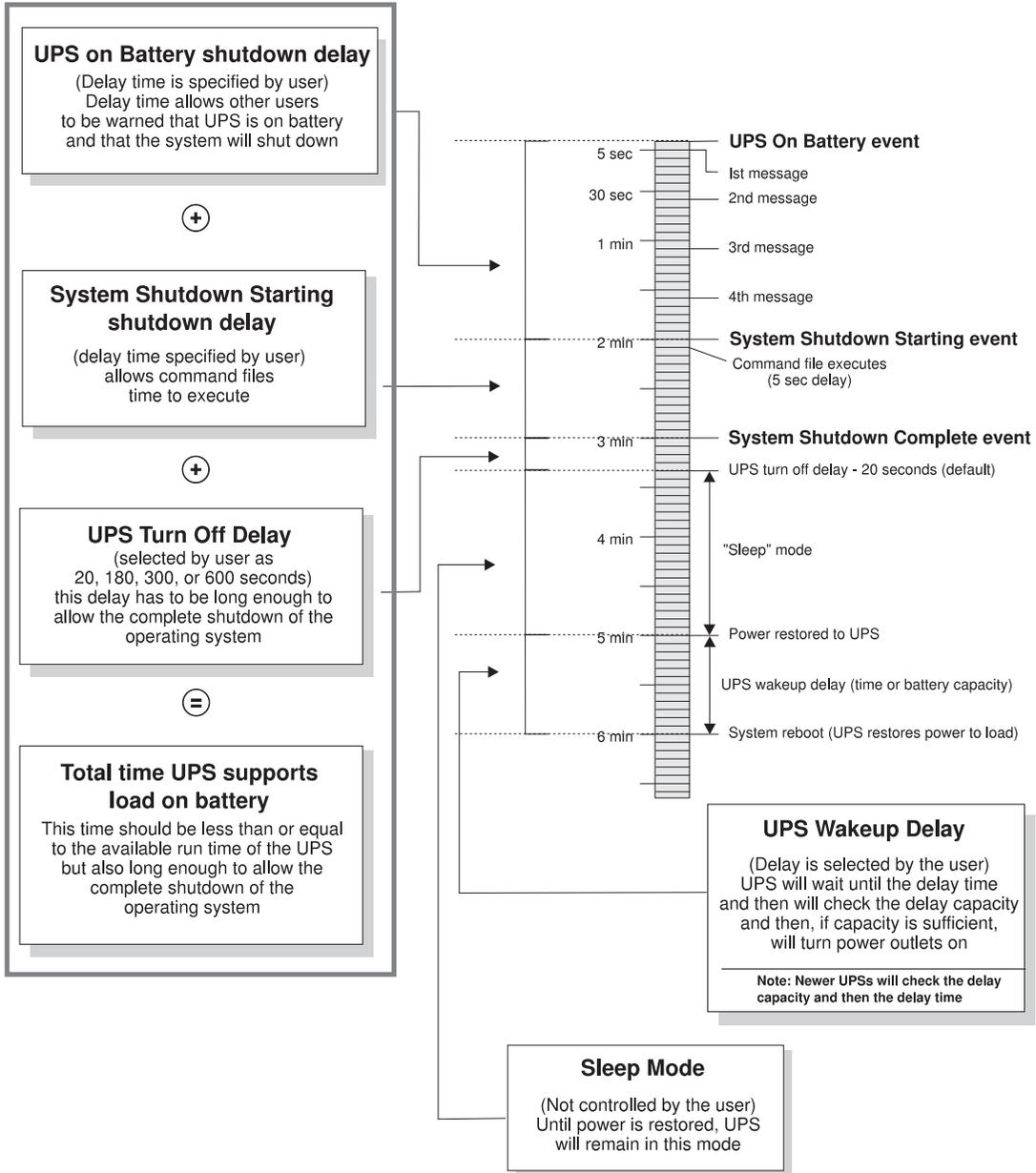
The area in the center of the first figure represents the time-line of events. Each horizontal line represents 5 seconds. The following is an analysis of the time-line of events:

1. At 0 seconds, there is a power failure and the UPS starts providing battery power. PowerChute *plus* generates the **UPS On Battery** event and starts counting down the 120 seconds of UPS On Battery shutdown delay.
2. The first message to users is broadcast at 5 seconds. This is due to a user-configured 5 second wait in the Notify Users action box for the UPS On Battery event. Succeeding messages are broadcast at user-specified 30 second intervals.
3. At 120 seconds (2 minutes) in the time-line, PowerChute *plus* generates the **System Shutdown Starting** event and starts the specified 60 seconds count-down.
4. At 125 seconds, a user-specified command file is executed.
5. At 180 seconds (3 minutes) a number of events take place:
  - i. Presumably the command file has finished execution.
  - ii. PowerChute *plus* instructs the operating system to shut down.
  - iii. PowerChute *plus* generates the **System Shutdown Complete** event.
  - iv. PowerChute *plus* instructs the UPS to turn off power outlets after the user-selectable **UPS Turn Off Delay** time. This delay time is selected through the UPS Shutdown Parameters dialog box (Configuration Menu). The default delay of 20 seconds has been used here as an example.
  - v. The UPS starts counting down the UPS turn off delay time.
6. At 200 seconds, the UPS turns off its outlets and goes into sleep mode.

In this example, the total time which the UPS supports this whole process on battery power is 200 seconds or 3 minutes and 20 seconds. Thus, **UPS Run Time** must be greater than or equal to 3 minutes and 20 seconds.



**Case 1: Timeline of events**



## **Recommendations**

- a. Perform Run Time Calibration about once a month to ensure accuracy of the reported Run Time minutes. When performing calibration, make sure the UPS is supporting its usual load i.e. do not unplug equipment which is normally plugged into the UPS. Please note that Run Time Calibration can only be performed on Smart-UPS and Matrix-UPS.
- b. Be certain **the total of all shutdown and turn off delays is less than or equal to the amount of available Run Time.**
- c. Make sure the command file necessary to the shutdown process is scheduled to execute from the System Shutdown Starting event.
- d. Using a stopwatch, time a command file execution from start to finish. This time should be the System Shutdown Starting shutdown delay time.
- e. Using a stopwatch, record the elapsed time for a manual shutdown of the operating system. This time is the UPS Turn Off Delay time. The UPS must not turn outlets off before the operating system has had the opportunity to shut down. The UNIX operating system, for example, needs to stop processes, close files, dismount devices, synchronize disks, etc., to shut down the operating system. This process for UNIX could take as long as 3 minutes. The UPS Turn Off Delay in this situation should be set at 300 seconds or higher.

## **Case 2: UPS Run Time = Low Battery Signal Time**

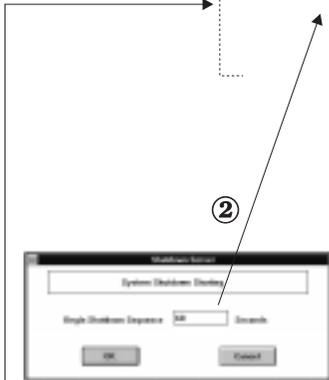
The Low Battery Signal Time is a user-selectable parameter (See “UPS Low Battery Signal Time” in CHAPTER 3.) . If UPS Run Time reaches the Low Battery Signal Time value, PowerChute *plus* will commence shutdown of the system. This is because the UPS has reached a “low battery” condition and cannot support the attached load in the case of a power failure. Let’s assume the following times have been entered for the various events:

- i. Low Battery Condition event - begin shutdown sequence in 30 seconds. This is the Low Battery shutdown delay.
- ii. System Shutdown Starting shutdown delay is equal to 60 seconds.
- iii. UPS Turn Off Delay is equal to 20 seconds.
- iv. Low Battery Signal Time is 2 minutes.

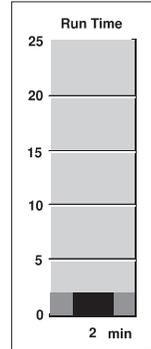
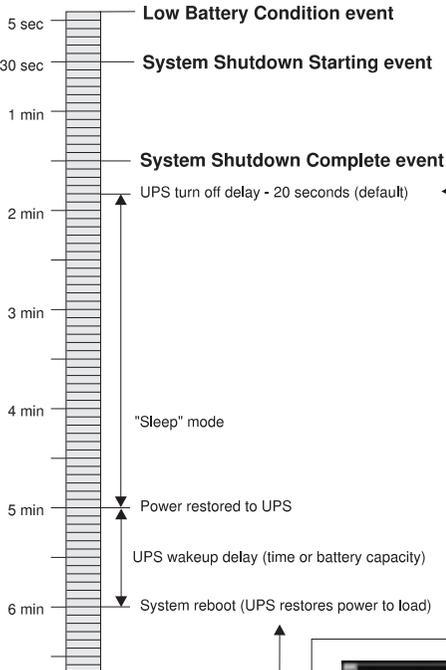
**Case 2: UPS Run Time = Low Battery Signal Time**



①

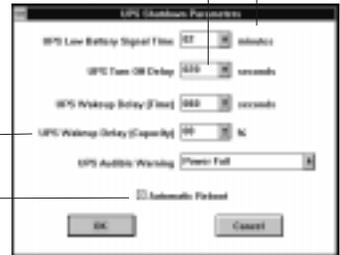


②



④

**Total time UPS supports load on battery (1min 50sec in this case)**



**Refer to the Run Time graph (Main Screen)**

**Low Battery shutdown delay + System Shutdown Starting shutdown delay + UPS turn off delay <= Run Time**

①

②

③

④

## Analysis

The preceding figure depicts the sequence of events and diagrams the various screens and dialog boxes which are used to set up the configuration for this event. The following is an analysis of the time-line of events:

1. When power fails, at 0 seconds, PowerChute *plus* detects that the UPS Run Time equals the Low Battery Signal Time. PowerChute *plus* generates the **Low Battery Condition** event and starts counting down the 30 seconds of Low Battery shutdown delay.
2. At 30 seconds in the time-line, PowerChute *plus* generates the **System Shutdown Starting** event and starts counting down the System Shutdown Starting shutdown delay of 60 seconds.
3. At 90 seconds, the following events will take place:
  - i. PowerChute *plus* instructs the operating system to shut down
  - ii. PowerChute *plus* generates the **System Shutdown Complete** event
  - iii. PowerChute *plus* instructs the UPS to turn off power outlets after the user-selectable **UPS Turn Off Delay** time. The delay in this example is 20 seconds.
  - iv. The UPS starts counting down the UPS turn off delay time.
6. At 110 seconds, the UPS turns of its outlets and goes into sleep mode.

The total time which the UPS supports this whole process on battery power is 110 seconds or 1 minute and 50 seconds.

## Assumptions

The key assumption made in this example is that a Run Time of 2 minutes is long enough for the operating system to shut down safely.

## Recommendations

The total of all shutdown and turn off delays must be less than or equal to the Low Battery Signal Time.

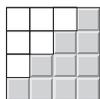
# Appendix A: PowerChute *plus* Events

## Overview

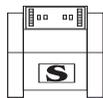
A

Events are generated by PowerChute *plus* for five products manufactured by American Power Conversion: Back-UPS, Smart-UPS, and Matrix-UPS, as well as the Measure-UPS I and SmartSlot Measure-UPS II environmental monitoring accessories. Both Measure-UPS devices measure ambient temperature and humidity of an area, and allow you the capability to shut down a server or another system if the ambient temperature or humidity reaches unacceptable levels. **For more information on the Measure-UPS accessories, see APPENDIX B.**

This appendix lists and describe all events generated by PowerChute *plus*. The list is in alphabetical order which makes it easy to locate a particular event. Because each event is specific to one or more of the four product groups, the following symbols have been used in this appendix to identify the products for which a certain event will be generated:



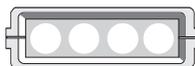
**Matrix-UPS**



**Smart-UPS**



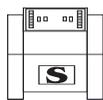
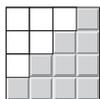
**Back-UPS**



**Measure-UPS and SmartSlot Measure-UPS II**

For example:

### Administrative Shutdown



would mean the Administrative Shutdown event is generated only if you are using a Matrix-UPS or Smart-UPS series.

Each event has a four-digit code associated with it. This code identifies the event which occurred. The first digit of the four-digit code, is the **severity code**. A table later in this appendix presents the various event names and their associated severity codes.

The following section lists the event names, describes the events, and includes the event text for a event. The event text is what you will see on your screen in the Last Two Events window. The event text will also be logged in the event log file. Event texts are also listed in the **powerchute.ini** file . Event texts include variables which are used by PowerChute *plus* to retrieve values from the UPS or Measure-UPS. The format of these variables is: **#variable#**. A list of variables and their functions is included at the end of this appendix.

For information on the Last Two Events window and the event log file, please see CHAPTER 2: POWERCHUTE *PLUS* MAIN SCREEN and CHAPTER 6: LOGGING DATA WITH POWERCHUTE *PLUS*. For information on the initialization file, please see APPENDIX C.

## Events Listed and Described

### Abnormal Contact Position



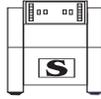
The Measure-UPS accessory has four contact closure inputs which can be used to monitor the external environment. The contact closures are configured as either normally **open** or normally **closed**. If PowerChute *plus* detects a change from the default configuration of a contact, this event will be generated. For instance, if the user has configured a contact closure as **open** and PowerChute *plus* detects it as **closed**, this event will be generated.

The counterpart to this event is the **Contact Normal** event which is a return from the Abnormal Contact Position state.

■ **Event text:**

Contact #CONTACT\_NUMBER# fault  
(#CONTACT\_POSITION#): #USER\_COMMENT#

## Administrative Shutdown



There are two types of Administrative Shutdowns:

### 1. User initiated shutdown

This event is triggered through PowerChute *plus*. This is done by selecting the **Shutdown Server Now...** menu option from the **System** menu.

### 2. Daily or Weekly shutdown

This event is triggered by a scheduled shutdown by the PowerChute *plus* software. You can schedule daily and weekly shutdown times by selecting the **Schedule Server Shutdown...** option from the **System** menu and configuring the relevant options in the “Schedule Server Shutdown” dialog box.

#### ■ Event text:

Administrative shutdown started

Administrative shutdown: User initiated

Administrative shutdown: Weekly shutdown

Administrative shutdown: Daily shutdown

## Ambient Temperature In Range

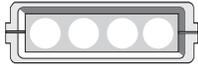


The Measure-UPS ambient temperature is within the upper and lower threshold specified by the user. This range is configured through the **Measure-UPS Parameters** menu option from the Configuration menu.

#### ■ Event text:

Ambient temperature back within thresholds

## Ambient Temperature Out Of Range



The Measure-UPS ambient temperature has exceeded the upper or lower threshold specified by the user.

■ **Event text:**

Below lower ambient temperature threshold of #LOW\_THRESHOLD#

Exceeded upper ambient temperature threshold of #HIGH\_THRESHOLD#

## Base Module Fan Failure



The Matrix-UPS has sensed a faulty fan.

■ **Event text:**

Base module fan needs repair

## Base Power Supply Failure



The Matrix-UPS power supply is malfunctioning (unit not able to go to bypass) .

■ **Event text:**

Base module bypass power supply needs repair

## Battery Needs Replacing



This event will happen when the UPS batteries can no longer hold a full charge (worn out) or are heavily discharged. If utility power were to fail under this condition, the UPS would run less than half its normal run time.

■ **Event text:**

UPS Battery needs replacing

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## Check Smart Cell Signal Cable

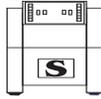


If a Matrix-UPS or Smart-UPS XL reports zero battery packs, PowerChute generates this event since the UPS needs battery packs to operate. The cause is usually a loose cable connection between the UPS and its battery packs.

■ **Event text:**

Check installation of battery packs signal cable

## Comm Lost While on Battery

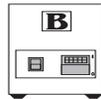


Communication with the UPS has been lost while the UPS is on battery. This is a high severity event and, although relatively rare, may be caused by a loose communication cable or a software conflict. For instance, if another application inadvertently blocks PowerChute *plus* monitoring of the serial port while the UPS is on battery, this event would be caused. In any case, PowerChute *plus* will immediately begin shutting down that system.

■ **Event text:**

Communication lost while on battery

## Communication Established

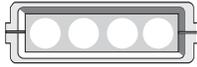


Communication with the UPS has been successfully established, either for the first time, or after it has been temporarily lost.

■ **Event text:**

Communication established

## Contact Normal



PowerChute *plus* detects a return from an abnormal contact position state and generates this event. This event will be generated only after an **Abnormal Contact Position** event.

■ **Event text:**

Contact #CONTACT\_NUMBER# normal  
 (#NORMAL\_POSITION#): #USER\_COMMENT#

## Humidity In Range



The humidity sensed by the Measure-UPS is within the upper and lower threshold specified by the user. This humidity range is configured through the **Measure-UPS Parameters** option from the Configuration menu.

■ **Event text:**

Ambient humidity back within thresholds

## Humidity Out Of Range



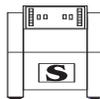
The humidity sensed by the Measure-UPS has exceeded the upper or lower threshold specified by the user.

■ **Event text:**

Below humidity threshold of #LOW\_THRESHOLD#

Exceeded upper humidity threshold of  
 #HIGH\_THRESHOLD#

## Lost Communication With UPS



The PowerChute *plus* software attempts to establish communication with the UPS and cannot, or communication had been established and is lost.

■ **Event text:**

Unable to communicate with UPS

## Low Battery Condition

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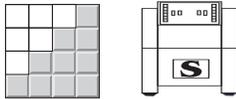
The UPS will go into a low battery condition when it has a certain amount of runtime remaining. On a Back-UPS, the low battery run time amount is set using dip switches located at the back of the UPS. On a Smart-UPS or Matrix-UPS, this value can be specified by the user through PowerChute *plus*. A value of “10 Minutes” will cause PowerChute *plus* to initiate low battery shutdown when the UPS is on battery and 10 minutes of run time remain.

■ **Event text:**

Low battery condition

Low battery condition: #BATTERY\_CAPACITY#

## Overload Condition Solved

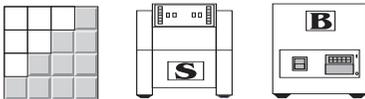


The load on the UPS has been decreased and the UPS is no longer in an overload condition.

■ **Event text:**

UPS Overload condition solved

## PowerChute Started

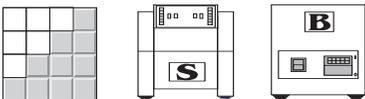


PowerChute *plus* software has been started.

■ **Event text:**

PowerChute PLUS Version 4.2.2 Started \*\*\*

## PowerChute Stopped

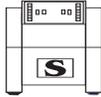


The PowerChute *plus* daemon (UPS Monitoring Module) has been stopped.

■ **Event text:**

\*\*\* PowerChute PLUS Stopped \*\*\*

## Return From Low Battery



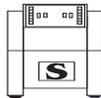
The UPS has returned from a low battery condition. Recharging a depleted battery will generate this event.

■ **Event text:**

UPS returned from low battery condition

UPS returned from low battery condition:  
#BATTERY\_CAPACITY#

## Run Time Calibration Aborted



There are three ways a Run Time Calibration can be aborted:

1. Cancelled by the user.
2. Cancelled because of a power anomaly such as low voltage, high voltage, power failure, etc.
3. Cancelled because the UPS battery capacity is less than 100%. In fact, calibration cannot even start if capacity is less than 100%.

■ **Event text:**

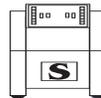
Run time calibration cancelled

Run time calibration cancelled by user

Run time calibration cancelled by power failure

UPS unable to perform run time calibration:  
Capacity <100

## Run Time Calibration Finished

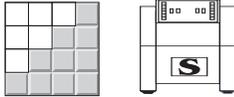


This tells you Run Time Calibration has been completed.

■ **Event text:**

Run time calibration completed

## Run Time Calibration Started

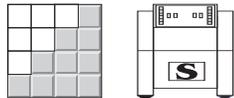


Run time calibration is used to determine the UPS battery run time. This involves a deep discharge of the UPS battery, which can take a long time and reduces UPS run time while the calibration is in progress. This event will be generated each time a calibration test is started by the user or through a scheduled calibration test. Note, however, that the UPS battery capacity must be at 100% for the calibration to commence.

■ **Event text:**

Run time calibration initiated

## Shutdown Cancelled



The user has cancelled a daily, weekly or user-initiated shut down through the PowerChute *plus* System menu.

■ **Event text:**

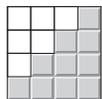
Shutdown cancelled

User initiated shutdown cancelled

Weekly administrative shutdown cancelled

Daily administrative shutdown cancelled

## Smart Cell Signal Returned



This event is the conclusion to the “Check Smart Cell Signal” event and informs you the Matrix-UPS or Smart-UPS XL has achieved connection with its battery packs.

■ **Event text:**

Smart Cell signal restored

## System Shutdown Complete

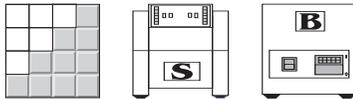


This event is generated just before the system is shut down and after all shutdown processing is done.

■ **Event text:**

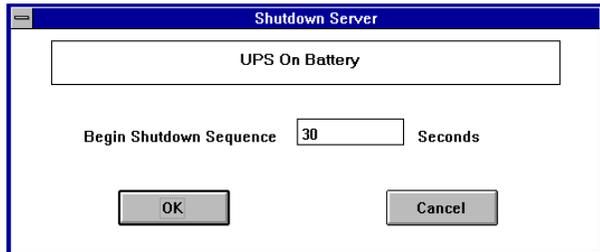
System shutdown complete

## System Shutdown Starting



This event will be generated for any event whose "Shut Down Server" action box is checked.

**For example:**



For the dialog box above, the event is "UPS On Battery". If this event is triggered, PowerChute *plus* starts the system shutdown process (**System Shutdown Starting** event) after 30 seconds have elapsed. You specify this value in the "Begin Shutdown Sequence" box. In this case, the **System Shutdown Starting** event is generated after 30 seconds.

■ **Event text:**

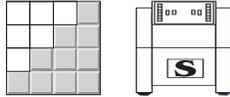
Shutdown started

User initiated shutdown started

Weekly administrative shutdown started

Daily administrative shutdown started

## UPS Battery Is Discharged



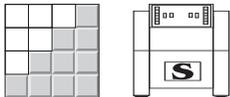
The UPS reports the battery is low while the UPS is on line. If a power failure were to happen, PowerChute would shut down the system immediately due to low battery.

■ **Event text:**

UPS battery is discharged

UPS battery is discharged: #BATTERY\_CAPACITY#

## UPS Battery Replaced

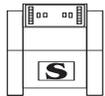


This event is generated only if the UPS returns from the **UPS Battery Needs Replacing** state.

■ **Event text:**

UPS batteries no longer need replacing

## UPS Enabling SmartBoost

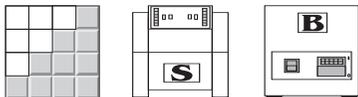


The UPS brownout correction feature, SmartBoost, is ON. SmartBoost is a special Smart-UPS function which boosts a low utility line voltage without the UPS having to run on battery.

■ **Event text:**

UPS enabling Smart Boost

## UPS On Battery



The UPS has switched to battery power. There are eight situations which would cause the UPS to go on battery power:

1. **High input line voltage**

The current line voltage is greater than the upper transfer voltage.

## 2. Brownout

The current line voltage is within the brownout voltage range for the UPS. A brownout is when the line voltage is severely reduced for a few minutes up to a few days.

## 3. Blackout

A blackout is the complete absence of AC power.

## 4. Small momentary power sag

## 5. Small momentary power spike

## 6. Deep momentary power sag

## 7. Large momentary power spike

## 8. Simulated power failure

Selecting the “Simulate Power Failure” menu item from the Diagnostics menu will cause this event.

### ■ Event text:

UPS on battery

UPS on battery: High input line voltage  
#MAX\_VOLTAGE# V

UPS on battery: Brownout #MIN\_VOLTAGE# V

UPS on battery: Blackout #MIN\_VOLTAGE# V

UPS on battery: Small momentary sag  
#MIN\_VOLTAGE# V

UPS on battery: Deep momentary sag  
#MIN\_VOLTAGE# V

UPS on battery: Small momentary spike  
#MAX\_VOLTAGE# V

UPS on battery: Large momentary spike  
#MAX\_VOLTAGE# V

UPS on battery: Simulated power failure

## UPS On Bypass: Failure

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When in the Bypass mode, the Matrix-UPS acts only as a voltage regulator. The UPS batteries have been bypassed. **Please call APC Technical Support.** There are five conditions which would cause a UPS to go into bypass mode:

### 1. Internal temperature over limit

The UPS is on bypass because the internal UPS temperature is over the acceptable limit.

### 2. Battery charger failure

The UPS is on bypass because the battery charger has failed and needs repair.

### 3. Severe DC imbalance overload

The UPS inverter needs repair.

### 4. Output voltage outside limits

The UPS had detected its output voltage is outside safety limits.

### 5. Top module fan needs repair

The UPS has sensed a faulty fan in the top box.

#### ■ Event text:

UPS on bypass: internal temp over limit

UPS on bypass: battery charger failure

UPS on bypass: severe DC imbalance overload

UPS on bypass: output voltage outside limits

UPS on bypass: top module fan needs repair

## UPS On Bypass: Maintenance



A Matrix-UPS is in bypass for maintenance. There are three ways in which a UPS can be put into this mode:

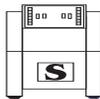
1. Through the manual switch on the UPS
2. Through the UPS front panel
3. Through PowerChute *plus*

■ **Event text:**

UPS on bypass: user set via software or panel

UPS on bypass: user set via rear switch

## UPS Output Overload



The rated load capacity of the UPS was exceeded. Reduce the load on the UPS by unplugging excess equipment from the UPS and run a self-test.

■ **Event text:**

UPS output overload

## UPS Return From Bypass

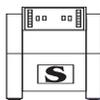
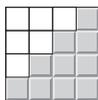


The Matrix-UPS has returned from bypass mode.

■ **Event text:**

UPS returned from bypass

## UPS Self-Test Failed



The UPS failed its self-test. There are two reasons a UPS fails its self-test:

1. **Bad Battery**

The scheduled UPS self-test failed due to a discharged or bad battery. Allow the UPS to recharge for several hours, then retest the UPS.

## 2. Invalid Test

Invalid test simply indicates the UPS was not in a condition to complete a meaningful test. For example, if the load is greater than 105% of rated capacity, you will see this. Try self-test again and if the situation persists, contact APC Technical Support.

### ■ Event text:

UPS self-test failed

Scheduled UPS self-test failed: Bad battery

Scheduled UPS self-test failed: Invalid test

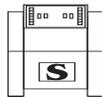
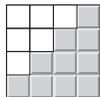
User initiated self-test failed: Bad battery

User initiated self-test failed: Invalid test

Self-test at UPS failed: Bad battery

Self-test at UPS failed: Invalid test

## UPS Self-Test Passed



The UPS passed its self-test.

### ■ Event text:

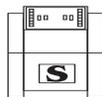
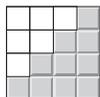
UPS self-test passed

Scheduled UPS self-test passed

User initiated UPS self-test passed

Self-test at UPS passed

## Utility Power Restored



The UPS has returned to utility power, after being on battery power due to a power failure.

### ■ Event text:

Normal power restored: UPS on line

## Events and Severity Codes

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As mentioned at the beginning of this section, each event has a four-digit identification (ID) code associated with it. The first digit of the four-digit code, is the **severity code**. Severities are categorized into three groups:

- severe problems (=3).
- warnings (=2)
- informational messages (=1).

**Severe problems**, unless resolved, will cause incorrect operation of the UPS, equipment connected to the UPS, or PowerChute *plus* software. **Warnings** are events which indicate impending problems which may cause loss of operational status if conditions do not change. **Informational messages** indicate proper operation of the UPS and/or PowerChute *plus* and are used to keep you informed.

The following table lists the ID code, the severity code, and the associated events. As in the “**Events Listed and Described**” section, the events are in alphabetical order. The check-marked blocks in the table indicate which UPS is affected by that event. For example, the “**Abnormal Contact Position**” event will be generated only if a Measure-UPS is present.

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ID Code	Severity	Flex Event Names	Measure UPS	Matrix UPS	Smart UPS	Back UPS
3006	3	Abnormal Contact Position	✓			
1005	1	Administrative Shutdown		✓	✓	
1100	1	Ambient Temp In Range	✓			
3101	3	Ambient Temp Out Of Range	✓			
3014	3	Base Module Fan Failure		✓		
3015	3	Base Power Supply Failure		✓		
3016	3	Battery Needs Replacing		✓	✓	
3010	3	Check Smart Cell Signal		✓		
3004	3	Comm Lost While On Battery		✓	✓	
1002	1	Communication Established		✓	✓	✓
1010	1	Contact Normal	✓			
1101	1	Humidity In Range	✓			
3101	3	Humidity Out Of Range	✓			
3000	3	Lost Communication With UPS		✓	✓	
2003	2	Low Battery Condition		✓	✓	✓
1013	1	Overload Condition Solved		✓	✓	
1000	1	PowerChute Started		✓	✓	✓
1001	1	PowerChute Stopped		✓	✓	✓
1007	1	Return From Low Battery		✓	✓	
2004	2	Run Time Calibration Aborted		✓	✓	
1015	1	Run Time Calibration Finished		✓	✓	
1014	1	Run Time Calibration Started		✓	✓	
1006	1	Shutdown Cancelled		✓	✓	
1018	1	Smart Cell signal returned		✓		
2001	2	System Shutdown Complete		✓	✓	✓
1016	1	System Shutdown Starting		✓	✓	✓
3003	3	UPS Battery Is Discharged		✓	✓	
1009	1	UPS Battery Replaced		✓	✓	
2002	2	UPS Enabling Smart Boost			✓	
2000	2	UPS On Battery		✓	✓	✓
3013	3	UPS On Bypass: Failure		✓		
2013	2	UPS On Bypass: Maintenance		✓		
3001	3	UPS Output Overload		✓	✓	
1017	1	UPS Return From Bypass		✓		
3002	3	UPS Self-Test Failed		✓	✓	
1004	1	UPS Self-Test Passed		✓	✓	
1003	1	Utility Power Restored		✓	✓	✓

## Event Texts and Variables

Event texts contain event names plus additional information. For instance, the **UPS Self-Test Passed** event name has four associated event texts:

1. UPS self-test passed
2. Scheduled UPS self-test passed
3. User initiated UPS self-test passed
4. Self-test at UPS passed

Each message pertains to specific activities for an event. In the example above, there is a scheduled self-test and a user-initiated self-test. The event texts above inform you about the kind of self-test which was passed.

Some event texts use variables, found in the PowerChute initialization file, which retrieve values from the UPS and/or Measure-UPS. The variable format is: **#variable\_text#**. The following table lists the variables used with event texts for PowerChute *plus*.

Variable	Description
#BATTERY_CAPACITY#	Battery capacity remaining
#CONTACT_NUMBER#	Measure-UPS contact number
#CONTACT_POSITION#	Position of a Measure-UPS contact - Open or Closed
#HIGH_THRESHOLD#	Value of the high threshold
#HOSTNAME#	Name of the server
#LOW_THRESHOLD#	Value of the low threshold
#MAX_VOLTAGE#	Maximum reported voltage
#MIN_VOLTAGE#	Minimum reported voltage
#NORMAL_POSITION#	Normal operating position for the Measure-UPS contact
#SHUTDOWN_DELAY#	Delay from the start of the shutdown process until the actual shut down
#USER_COMMENT#	User-defined description for the Measure-UPS contact

# Appendix B: Measure-UPS Support

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## Overview

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### B

Two self-contained, environment and contact status metering instruments are available for use with a Smart-UPS or Matrix-UPS: The stand-alone Measure-UPS and the SmartSlot Measure-UPS II. These Measure-UPS continuously measure ambient temperature, humidity and external contact closures from sources such as smoke, heat, water, door and motion detectors. Contact state changes and ambient conditions which exceed temperature and humidity thresholds are broadcast to system users in real time. Using FlexEvents, you can shut down the system if any Measure-UPS event is generated.

With a SmartSlot Measure-UPS II, you can use PowerChute *plus* in the following manner:

- You can monitor or set thresholds for ambient temperature and humidity for the first probe only.
- You can monitor or configure settings for one sensor for each of the four contact sensor zones. If you configure SmartSlot Measure-UPS II for multiple sensors for a contact zone (i. e. if you mix normally open and normally closed settings for the same zone), PowerChute *plus* recognizes the first sensor only.

## PowerChute *plus* and Measure-UPS Devices

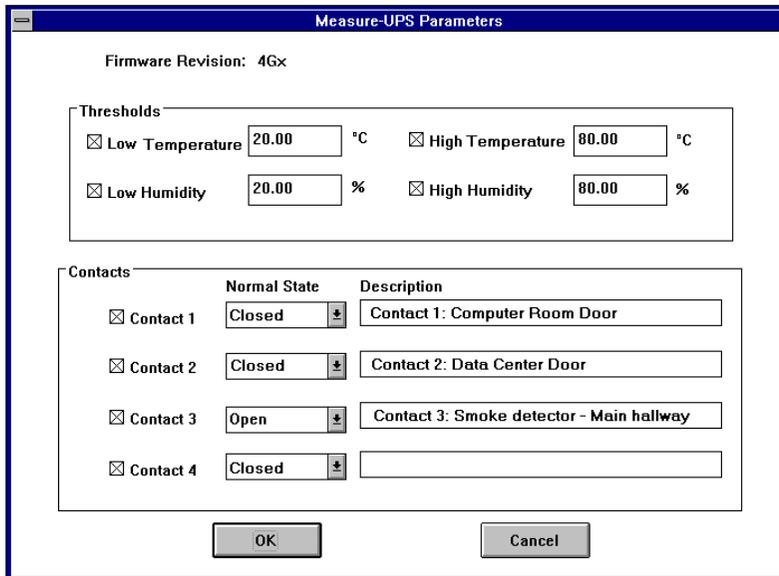
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If either Measure-UPS device is attached, the PowerChute *plus* Main Screen will automatically display Measure-UPS data. Also, the Configuration menu's Measure-UPS Parameters option will be enabled so that you can configure Measure-UPS options.

The Measure-UPS Parameters screen has upper and lower thresholds for temperature and humidity. If the Measure-UPS records a value which is outside the configured thresholds, an event will be generated and logged in the event log file. In addition, for those screens which can display color, the Measure-UPS values will be highlighted in red on the Main Screen. When a Measure-UPS measures a value which has returned to a range between the configured thresholds, an event is displayed on the Main Screen and recorded in the event log file.

Each Measure-UPS has four contact inputs. You configure these as normally open or closed. These permit the monitoring of external alert conditions. Contact closure inputs are ideal for enhancing safety and security through the remote monitoring of smoke, fire, water or door closure detectors.

If a contact changes state, an event is generated. PowerChute *plus* displays the event, records it in the event log file, and either does nothing or carries out any of the seven possible actions such as Shut Down the Server, Run a Command file, etc. To make it easier to identify the contacts, PowerChute *plus* allows you to edit a comment field for each set of contacts. The following dialog box allows you to configure Measure-UPS parameters (see Chapter 8 for details on configuration parameters) :



Measure-UPS Parameters

Firmware Revision: 4Gx

Thresholds

Low Temperature 20.00 °C     High Temperature 80.00 °C

Low Humidity 20.00 %     High Humidity 80.00 %

Contacts

	Normal State	Description
<input checked="" type="checkbox"/> Contact 1	Closed	Contact 1: Computer Room Door
<input checked="" type="checkbox"/> Contact 2	Closed	Contact 2: Data Center Door
<input checked="" type="checkbox"/> Contact 3	Open	Contact 3: Smoke detector - Main hallway
<input checked="" type="checkbox"/> Contact 4	Closed	

OK    Cancel

## Measure-UPS Capabilities

The Measure-UPS, combined with a UPS (Smart-UPS or Matrix-UPS) and PowerChute *plus*, provides:

1. Environmental and physical access monitoring of remote unmanned locations.
2. Continuous monitoring of ambient conditions.
3. The capability to integrate environmental and security detectors with network communications systems.
4. Uninterrupted event detection.
5. The option to shut down a computer system in the event of alarm conditions.

# Appendix C: PowerChute *plus* Initialization File

## Overview

The PowerChute initialization file (**powerchute.ini**), controls the behavior of PowerChute *plus*. Although almost all modifications of this file are done through software, you can also modify this file manually. The file is in standard ASCII format, and can be updated using any editor which will save the file in the same ASCII format.

The initialization file contains keywords, each of which has a group of related parameters. The keyword and parameters are listed in the initialization file in the following format:

```
[ keyword ]  
parameter = value
```

The items in the preceding format are as follows:

- [keyword]  
The name of a section, enclosed in brackets. Each section of the .ini file contains parameters for a specific PowerChute *plus* feature or function.
- parameter  
A descriptive term used to label and identify a value.
- Equals sign (=)  
Separates a parameter from its value.
- value  
A variable which for some parameters are limited to system-defined choices, while for others, the value is user-defined. Some system-defined values differ according to the type of APC UPS you are using. Any parameter whose value is Yes (enabled) can be set instead to No (disabled).

Certain keywords in the initialization file allow you to configure UPS EEPROM parameters directly from the initialization file. At start-up, PowerChute *plus* will configure the UPS based on the values you have specified through this file. These EEPROM parameters are discussed later in this section and have the following format:

```
[SensorName]  
InitialValue = xx
```

Unless you need to pre-configure UPS EEPROM parameters, APC strongly recommends you use the User Interface Module to configure PowerChute *plus* parameters. In case it is necessary for you to modify the initialization file, APC recommends you make a backup of the file **before** you make any changes. In case anything goes wrong, you can restore the original file from the backup.

The next section contains keywords, related parameters and parameter values in the general order these appear in a default initialization file.

## Initialization File Settings

---

This section relates to the type of UPS you are using. SignallingType and PortName parameters are configured through the Communications Parameters menu option in the Configuration menu.

### [ Ups ]

SignallingType = Smart	Options are Simple or Smart. A Back-UPS uses Simple Signaling. A Smart-UPS or Matrix-UPS can use either.
PortName = dev/ttyxx	The serial port used for the UPS communications. For example, this could be /dev/ttyla or /dev/ttylb.
AutoUpsRebootEnabled = Yes	Options are Yes or No. Configured through the UPS Shutdown Parameters menu option in the Configuration menu.
BatteryReplacementDate = 12/09/93	Configured through the UPS Operating Parameters menu option (Configuration menu).
UpsPollInterval = 4	Time (in seconds) which PowerChute <i>plus</i> will query the UPS for values. 4 seconds is the lowest possible value for this parameter since it takes about that time to query the UPS and get results.

---

This section enables or disables Event Logging. You can do this from the Logging menu by selecting the Log Options menu option. The default EventLogName is **powerchute.log**.

### [ EventLogging ]

EventLogEnabled = Yes	Choices are Yes or No. If set to No, Event Logging will be disabled.
EventLogName = powerchute.log	Value for this parameter contains the path and file name for the Log file.
EventLogMaxSize = 50000	Maximum size in bytes for the Log file.

---

This section enables or disables Data Logging. You can do this from the Logging menu by selecting the Log Options menu option. The default DataLogName is **powerchute.dat**.

[ **DataLogging** ]

DataLogEnabled = Yes	Choices are Yes or No. If set to No, Data Logging will be disabled.
DataLogName = powerchute.dat	Value for this parameter contains the path and file name for the Log file.
DataLogMaxSize = 50000	Maximum size in bytes for the Data Log file.
DataLogInterval = 600	Data Log interval time in seconds. PowerChute will record UPS and Measure-UPS data every 10 minutes in this example.

---

This section enables or disables Error Logging. This parameter can only be modified through the initialization file. The default ErrorLogName is **powerchute.err**.

[ **ErrorLogging** ]

ErrorLogEnabled = YES	Choices are Yes or No. If set to No, Error Logging will be disabled.
ErrorLogName = powerchute.err	Value for this parameter contains the path and file name for the Error Log file.
ErrorLogMaxSize = 50000	Maximum size in bytes for the Error Log file.

---

These parameters will be used for events for which no FlexEvents actions are defined. Refer to CHAPTER 4 for FlexEvents and actions.

[ **Messaging** ]

MessageDelay = 5	This is the time in seconds which PowerChute will wait before it will Notify Administrators or Notify Users.
MessageInterval = 30	This is the time interval, in seconds, which PowerChute will wait before it will Notify Users again.
NotifyType = Some	The values are All or Some. These are the radio buttons in the Notify Users dialog.
NotifyUsers =	Default users who will be notified for any event.
AdminNotifyUsers =	Default Administrators who will be notified for any event.

---

This section gets its values from Schedule UPS Tests dialog box (See CHAPTER 7).

[ SelfTests ]

EnableSelfTests = Yes	If the Self Test Period radio buttons are not configured as <b>Off</b> , the value for this parameter will be Yes.
SelfTestDay = Monday	The one day in a week which PowerChute will perform a self-test.
SelfTestSchedule = Daily	Options are Daily, Weekly or Never.
SelfTestTime = 08:00 AM	The self-test time.
LastSelfTestDay = 04/13/94	If a self-test has never been performed, the value will be Unknown.
LastSelfTestResult = Passed	If a self-test has never been performed, the value will be Unknown.

---

The following section retrieves all values from the Schedule Server Shutdown dialog (System menu). The values which are reasonably self-explanatory have not been discussed.

[ Shutdown ]

LowBatteryShutdownType = Quick	This parameter allows for faster shutdown using any Smart-UPS unit. Allowed values for the parameter are "Quick" or "Normal" (default value). The "Quick" value allows a shutdown by performing safe but minimal shutdown procedures in the event of a low battery.
ShutdownDelay = 300	Default time (in seconds) which PowerChute will wait before shutting down the server.
AdminShutdownDelay = 900	
DailyShutdownEnabled = Yes	Daily Shutdown check box has been enabled in the dialog box.
DailyShutdownTime = 8:00 PM	
DailyWakeupTime = 7:00 AM	
WeeklyShutdownEnabled = Yes	Weekly Shutdown check box has been enabled in the dialog box.
WeeklyShutdownDay = Friday	
WeeklyShutdownTime = 7:00 PM	
WeeklyWakeupDay = Monday	
WeeklyWakeupTime = 07:00 AM	

This section relates to the Monitoring Preferences dialog (Configuration menu). The choices for this section will affect the Main Screen.

[ **UserInterface** ]

TemperatureUnits = Fahrenheit	Values are either Fahrenheit or Celsius.
BarGraphType = Battery Capacity	Options are Battery Capacity, Run Time Remaining or Battery Voltage.
SoundEffects = No	Options are Yes or No.

The following sections are EEPROM configurable parameters. These, in essence, configure the UPS itself through the initialization file. They may also be configured through PowerChute *plus* and are discussed in CHAPTER 3.

The format for these sensors is as follows:

[**SensorName**]

**InitialValue = xx**

Please keep in mind that the allowed values will be different for Smart-UPS and Matrix-UPS, and also for the operating voltage of the UPS. For instance, American Power Conversion manufactures 100VAC, 120VAC, 208VAC and 230VAC UPS. For identification of the allowed values for the following parameters, see the UPS Owner's or User's Manual which came with the UPS, or the drop-down list boxes provided in the relevant PowerChute *plus* dialog boxes.

[ <b>AlarmDelaySensor</b> ]	Configures the audible alarm at Low Battery. Allowed values are O (Alarm upon power fail), T (Alarm 30 seconds after power fail), L (Alarm at low battery), and N (No alarm).
[ <b>HighTransferVoltageSensor</b> ]	The High Transfer Point (in Volts) configurable through the UPS Operating Parameters dialog box (Configuration menu). For 120VAC units, allowed values are 129, 132, 135, and 138.
[ <b>LowTransferVoltageSensor</b> ]	The Low Transfer Point (in Volts) configurable through the UPS Operating Parameters dialog box (Configuration menu). For 120VAC units, allowed values are 97, 100, 103, and 106.
[ <b>LowBatteryDurationSensor</b> ]	The Low Battery Signal Time in minutes configurable through the UPS Shutdown Parameters dialog box (Configuration menu). Allowed values are 2, 5, 7, and 10 minutes.

[MinReturnCapacitySensor]	The UPS Wake-Up Delay Capacity as a percentage of total capacity, configurable through the UPS Shutdown Parameters dialog box (Configuration menu). For newer Smart-UPS models, allowed values are 0, 15, 50 and 90. For other models, values are 0, 10, 25, and 90. This parameter is not available on a Matrix-UPS.
[RatedOutputVoltageSensor]	Nominal UPS Output in VAC. UPS Operating Parameters dialog box (Configuration menu). For 230VAC units, allowed values are 220, 225, 230, and 240. For 120VAC, and other units, this parameter may not be changed.
[SelfTestScheduleSensor]	Self-Test Schedule. Allowed values are On (for perform test at power on), Off (for no self-testing), 168 (for perform weekly) and 336 (for perform bi-weekly). If you configure self-tests using this initialization file parameter, and also configure self-tests using the Schedule UPS Tests dialog box, tests will occur according to both test schedule settings.
[ShutdownDelaySensor]	UPS Turn Off Delay (in seconds). UPS Shutdown Parameters dialog box (Configuration menu). Allowed values are 20, 180, 300, and 600 seconds.
[TurnonDelaySensor]	UPS Wakeup Delay Time in seconds. UPS Shutdown Parameters dialog box (Configuration menu). Allowed values are 0, 60, 180, and 300 seconds.
[UpsSensitivitySensor]	Sensitivity. UPS Operating Parameters dialog box (Configuration menu). Allowed values are A (Auto - Matrix-UPS only), L (Low), M (Medium), and H (High).

The following section is related to Battery Calibration parameters which are configured through the Schedule UPS Tests menu option (Diagnostics menu).

[ **BatteryCalibration** ]

LastCalibrationDate = 9/20/97	PowerChute stores the date of the last calibration. This helps in identifying the elapsed period since the last calibration.
BatteryCalibrationDay = Monday	This parameter is configured through the Schedule UPS Tests menu option (Diagnostics menu).
BatteryCalibrationTime = 07:00 AM	Configured through the Schedule UPS Tests menu option (Diagnostics menu).
Enabled = Yes	Configured through the Schedule UPS Tests menu option (Diagnostics menu).

This next section relates to FlexEvents. It contains the Message Text which PowerChute will include when logging the event in the Event Log File and displaying the event in the Last Two Events area of the Main Screen. The six-digit codes at the beginning of each line are internal codes. The first digit, however, indicates the severity of the event. Severity codes and message texts are discussed in APPENDIX A. Not all event texts have been shown here since the list is extensive. Please see APPENDIX A or your initialization file for a complete list.

[ **EventText** ]

```
100000 = *** PowerChute PLUS Version 4.2.2 Started ***
100100 = *** PowerChute PLUS Stopped ***
.
.
200000 = UPS on battery
200001 = UPS on battery: High input line voltage #MAX_VOLTAGE# V
.
.
300000 = Unable to communicate with UPS
300100 = UPS output overload
```

This next section also relates to FlexEvents. It contains the message text which PowerChute *plus* will include in broadcasted notification messages. For the Notify Administrators and Notify Users actions (discussed in CHAPTER 4), these are the messages which PowerChute *plus* uses for the default Notification Message. For events which do not have a defined message text, as described in this section, the event text is used.

**[ PopupText ]**

1003 = Normal utility power at #HOSTNAME# has been restored.  
1006 = Shutdown of #HOSTNAME# has been cancelled.  
1007 = UPS batteries at #HOSTNAME# are no longer discharged.  
1016 = Shutdown process started #HOSTNAME# will shut down in #SHUTDOWN\_DELAY#.  
2000 = #HOSTNAME# is running on battery power.  
2001 = #HOSTNAME# has been shut down.  
2003 = Low battery power at #HOSTNAME#.  
3000 = #HOSTNAME# has lost communications with the UPS.  
3003 = UPS batteries at #HOSTNAME# are discharged.

---

This next section contains the names of the various events. APPENDIX A discusses these names and their purpose in detail. As in the [EventText] section, not all names have been included in this section. Please refer to APPENDIX A or your initialization file for a complete list.

**[ FlexEventNames ]**

1000 = PowerChute Started  
1001 = PowerChute Stopped  
.  
.  
2000 = UPS On Battery  
2001 = System Shutdown  
.  
.  
3000 = Lost Communication With UPS  
3001 = UPS Output Overload

The following seven sections relate to the Measure-UPS. If your Measure-UPS is not recording data or the Measure-UPS values are not showing on the Main Screen, check the **[Devices]** section. Chances are that Measure-UPS may be set to NO. Excluding the **[Devices]** section, the remainder can be configured through the Measure UPS Parameters dialog (Configuration menu).

**[ Devices ]**

MeasureUps = Yes

If this value is set to No, Measure-UPS data will not show on the Main Screen or be logged in the Data Log.

**[ AmbientTemperatureSensor ]**

EnableLowThreshold = Yes

Low temperature check box - Measure UPS Parameters dialog.

EnableHighThreshold = Yes

High temperature check box - Measure UPS Parameters dialog.

LowThresholdValue = 20

Low Temperature in Celsius - Measure UPS Parameters dialog.

HighThresholdValue = 80

High Temperature in Celsius - Measure UPS Parameters dialog.

**[ HumiditySensor ]**

EnableLowThreshold = Yes

Low humidity check box - Measure UPS Parameters dialog.

EnableHighThreshold = Yes

High humidity check box - Measure UPS Parameters dialog.

LowThresholdValue = 20

Low Humidity as a percentage of relative humidity - Measure UPS Parameters dialog.

HighThresholdValue = 80

High Humidity as a percentage of relative humidity - Measure UPS Parameters dialog.

The four contact sensor sections, **[Contact Sensor x]**, relate to the four external contacts which the Measure-UPS can monitor. These have been discussed in CHAPTER 3 and in APPENDIX B. The Enabled parameter can have a value of Yes or No. The Description parameter allows you to enter a description of the contact and the DefaultState parameter allows you to configure the default state as either Open or Closed.

**[ ContactSensor1 ]**

Enabled = Yes

Description = Contact 1: Computer Room Door

DefaultState=Closed

**[ ContactSensor2 ]**

```

Enabled = Yes
Description = Contact 2: Data Center Door
DefaultState=Closed
[ ContactSensor3 ]
Enabled = Yes
Description = Contact 3: Smoke Detector - Main Hallway
DefaultState=Open
[ ContactSensor4 ]
Enabled = Yes
Description = Contact 4: Mainframe Area
DefaultState=Closed

```

---

This section relates to a Paging Modem. An example of a PortName is `/dev/tty1B`.

[ Modem ]

PortName=/dev/tty1B	The port name to which the modem is connected.
InitializationString=	Not required for Hayes-compatible modems. If your modem is not Hayes-compatible, check the modem manual for the initialization string.
DialType = Tone	Either Tone or Pulse.
BaudRate = 19200	Allowed Baud rates are 300, 1200, 2400, 9600, 14400, 19200

---

This section relates to FlexEvents. Configuring event users from the Configuration menu will result in user names as the values for the Users parameter. Three users were configured in CHAPTER 4 - these are reflected in the initialization file.

[ EventUsers ]

```
Users = Don,Pete,Doug
```

---

The following sections relate to the example users which were set up for CHAPTER 4. The configuration presented below is only for the user Don who has the most privileges for FlexEvents. You can set up users from the Event Users menu option - Configuration menu.

[ Don ]

NotificationAddress = don	Notification address in the Messaging section of the Users dialog box.
EEmailAddress = don	E-mail address in the E-Mail section of the Users dialog box.
NotificationEnabled = Yes	"Enabled" check box in the Messaging section of the Users dialog box.

---

PagingEnabled = Yes	"Enabled" check box in the Paging section of the Users dialog box.
EMailEnabled = Yes	"Enabled" check box in the E-Mail section of the Users dialog box.
PagerNumber = 555-2222	Access Number in the Paging section for the user Don.
PagerAccessCode = 4444	Access Code in the Paging section for the user Don.

---

## C

To configure this next section through PowerChute *plus*, select the **Edit Services...** button from the Users dialog box. Using the Edit Services button is discussed in CHAPTER 3.

[ **Pager** ]

Enabled = No  
 Delay = 10  
 Retries = 1  
 Services = Skytel  
 AnswerDelay = 10  
 AccessCodeDelay = 10  
 ExitCode = ##

---

The following section contains example configurations which you might see for events. The keyword is [AmbientTemperatureOutOfRange]. This is a Measure-UPS related event. The actual event name is Ambient Temperature Out of Range.

---

Keep in mind that this is an example. If you leave events at their default settings, they will not be reflected in the initialization file. Once you configure them, they will be written to this file.

Each event has seven possible actions. The possible actions might be **L** (Log Event), **U** (Notify User), **A** (Notify Administrator), **C** (Run Command File), **S** (Shutdown Server), **M** (Send E-Mail) and/or **P** (Page Users).

[ **AmbientTemperatureOutOfRange** ]

Actions = LUAS	These are the actions which have been selected for this event. See the list above.
NotifyDelay = 10	The delay time (in seconds) before PowerChute notifies users.
NotifyInterval = 30	After the first notification message, there will be a delay of 30 seconds before PowerChute sends another message.
NotifyType = Some	Options are All or Some.

---

NotifyRepeat = No	Options are Yes or No. If set to Yes, PowerChute will use the NotifyInterval to wait before sending another message.
ShutdownDelay = 10	Shut Down Server delay time.
AdminNotifyUserList = Don	Administrators to be notified if this event occurs.
AdminNotifyDelay = 5	Time (in seconds) which PowerChute will wait before notifying administrators.
NotifyUserList =	The list of users to be notified - names separated by commas.
NotifyMessage =	User-configured notification message for this event.

---

The following section contains an example configuration for shutdown in case you do not have access to the User Interface Module and need to enter parameters manually. The keyword is [PrepareForShutdown]. All parameters and the keyword would have to be entered manually.

Each event has seven possible actions. The possible actions might be **L** (Log Event), **U** (Notify User), **A** (Notify Administrator), **C** (Run Command File), **S** (Shutdown Server), **M** (Send E-Mail) and/or **P** (Page Users).

[ **PrepareForShutdown** ]

Actions = LUSC	In this example, the actions chosen are to Log the event, Notify User, Shut down Server and Run Command File.
CommandFile = <i>filename</i>	Specify an appropriate filename.
CommandFileDelay = 5	The delay time (in seconds) before the command file is executed. This is an optional parameter.
ShutdownDelay = 120	This is an optional parameter. The default delay time (in seconds) is 30. Configure a time interval in which the command file will have finished execution.

# Appendix D: Graphing the Data Log

---

## Overview

---

The PowerChute *plus* data file (`powerchute.dat` is the default) can be used to graph power-related data which PowerChute *plus* monitors and logs.

The data file is an ASCII file in comma-delimited format, i.e. each data field is separated by a comma. This file can be used with spreadsheet programs such as Microsoft Excel and Lotus 1-2-3 and other graphing software. Guidelines for graphing the data with Excel are in the following section.

D

Typical data records have the following format:

04/04/94,11:46:00,119.0,120.2,119.0,27.40,60.00,033.2,033.7,28.81,015.1

04/04/94,11:47:00,116.5,120.2,119.0,27.40,60.00,033.2,033.7,29.07,014.0

Each line in the Data Log contains the following data. The last two values require a Measure-UPS to be attached to the UPS. From left to right, data log values are as follows:

1. date; 2. time; 3. minimum utility line voltage for the period; 4. maximum utility line voltage for the period; 5. output voltage of the UPS; 6. current battery voltage; 7. frequency; 8. percentage of UPS rated load placed on the UPS during the period; 9. UPS temperature in degrees Celsius; 10. ambient environmental temperature in degrees Celsius; 11. relative humidity.

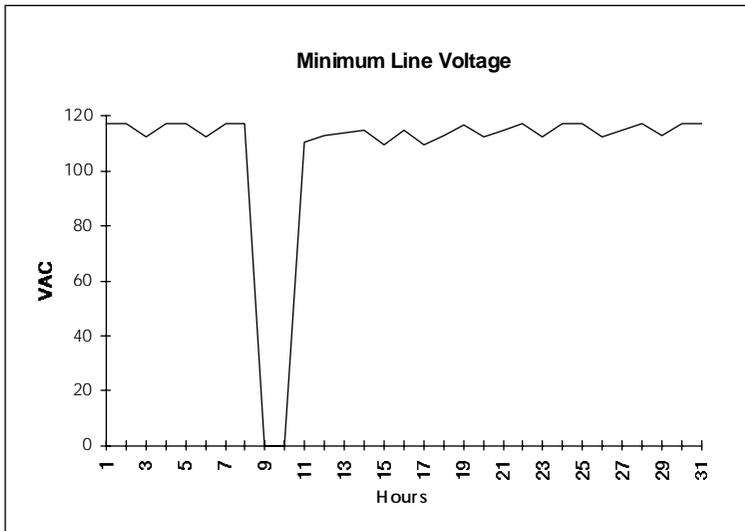
## Graphing the Data Log with Excel 5.0 Through 7.0

---

To graph the data log file with Microsoft Excel, versions 5.0 through 7.0, perform the following steps:

- 1) Start Microsoft Excel, and from the **File** menu, select **Open**.
- 2) In the “Open” dialog box, do the following:
  - a) Change from your current directory to your PowerChute *plus* directory.
  - b) Select Text Files (\*.prn;\*.txt;\*.csv) in the **List Files of Type:** list box.
  - c) In the **File Name:** field, enter \*.DAT and double-click on the **OK** or **Find Now**

- button. (The button name differs, depending on which version of Excel you are running.) The data log file name appears in the files list box.
- d) Double click on the data log file name in the files list box to display the first of the series of “Text Import Wizard” dialog boxes.
- 3) In the “Text Import Wizard” series of dialog boxes, do the following
    - a) In the “Step 1 of 3” dialog box, click on the **Delimited** radio button in the “Original Data Type” section. Then click on the **Next>** button.
    - b) In the “Step 2 of 3” dialog box, in the “Delimiters” section, click on the Tab box to unmark it, and click on the **Comma** box to mark it, since the format of the data log file is comma-delimited. Then click on the **Finish** button, not the **Next>** button, since no changes are needed in the “Step 3 of 3” dialog box.
  - 4) Use the ChartWizard tool to create a graph of any data series. The following Minimum Line Voltage graph for a 31 hour period shows a power failure between hours 8 and 11. Graphs of this type can help you analyze a site’s power quality.



The procedure to graph the data log file with Lotus 1-2-3 is similar to the procedure you use with Microsoft Excel.

Another way to retrieve a comma-delimited file (using either Microsoft Excel or Lotus 1-2-3) is to “parse” the data. For more information on parsing and graphing data, see your Excel or Lotus 1-2-3 documentation.

# Appendix E: PowerChute *plus* - Lotus Notes Shutdown

The PowerChute *plus* Lotus Notes shutdown utility provides shutdown for Lotus Notes servers on UNIX platforms.

The sole purpose of this utility is to shut down a Lotus Notes server. Although this utility can be used separately, it is very effective when used with FlexEvents. FlexEvents are discussed in CHAPTER 4 and APPENDIX A.

Lotus Notes is a groupware application which helps people work together more effectively. The Notes server controls such activities as opening and closing server databases, writing and reading database documents, as well as sending and receiving mail.

If the Administrator does not shut down the Notes server software first, but instead proceeds directly to the operating system shutdown, Notes will **NOT** be properly closed. This can lead to improperly closed files, lost requests, and potentially corrupted databases.

APC has developed a special shutdown utility which shuts down Notes servers. During any PowerChute *plus* initiated shutdown, PowerChute *plus* can properly close a Notes server in addition to performing a complete system shutdown. In order to shut down Notes via PowerChute *plus*, you should use FlexEvents to configure a Notes shutdown command file to be executed prior to final system shutdown. The specified command file calls the APC shutdown utility for Notes. Once Notes is shut down, PowerChute *plus* proceeds with its normal system shutdown.

When the operating system has been completely shutdown, PowerChute *plus* puts the UPS into sleep mode to be restarted when the power returns.

To configure PowerChute *plus* to shut down Notes servers through FlexEvents, refer to the following steps.

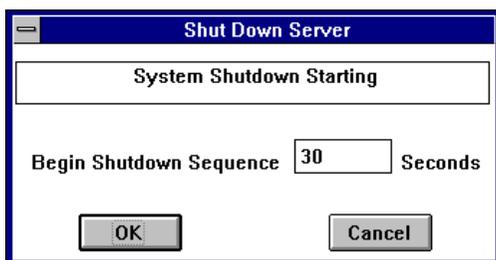
1. Start PowerChute *plus*. Connect to the server on which your Notes server is running.
2. Select the “Event Actions” menu item from the Configuration menu on the PowerChute *plus* screen. The “Event Actions” dialog box will appear.
3. Select the “System Shutdown Starting” event from the list of events displayed in the dialog box.

4. Check (enable) the “Run Command File” check box, indicating a command file is to be run for each PowerChute *plus* shutdown. This will automatically bring up the “Run Command File” dialog, requesting the user to enter the name of the program to execute. The Wait delay should be left at 0 seconds.
5. Specify the command file to execute in the “Command File” text entry field. The command to shut down Notes must be included in this command file:

### LotusNotes.sh

The Notes shutdown utility is installed in the PowerChute *plus* installation directory as a script called **LotusSetup.sh** during the PowerChute *plus* installation. Once this script is executed, it will ask you to specify the Lotus Notes directory. Once the directory is confirmed, the script will generate the **LotusNotes.sh** script. It is this **LotusNotes.sh** script you will specify as the external command file for the **System Shutdown Starting** FlexEvent.

6. Verify you have allowed enough time to shut down Notes properly. The amount of time allotted for Notes shutdown processing is configured through the “Options” dialog for the “Shut Down Server” action for the “System Shutdown Starting” event:



The default value is 30 seconds. If your Notes server takes longer than 30 seconds to shut down, increase this value.

7. PowerChute *plus* will now shut down Notes whenever a PowerChute *plus* initiated shutdown occurs.

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