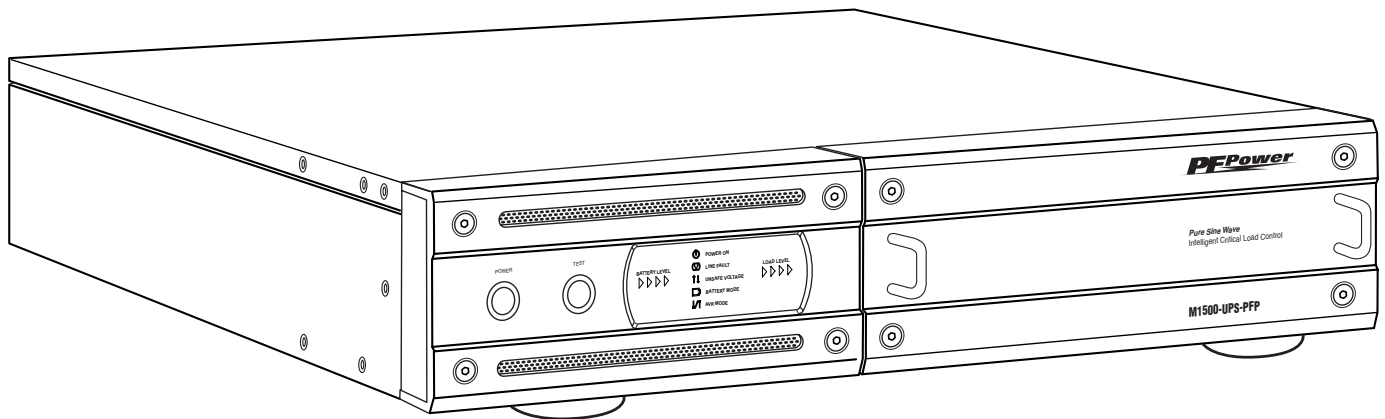


# M1500-UPS-PFP

## Programmable UPS

### Owner's Manual



The M1500-UPS-PFP is a Programmable  
Uninterruptible Power Supply,  
Voltage Regulator & Power Conditioner.



**PFPower** By Panamax-Furman

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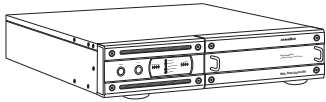
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## Before You Begin

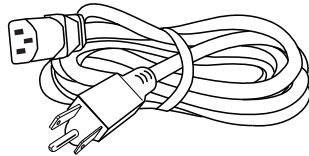
### UNPACKING

Inspect the UPS upon receipt. In addition to this manual the box should contain the following:

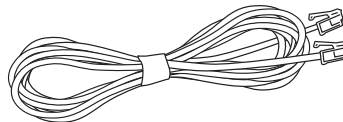
#### 1. UPS Unit



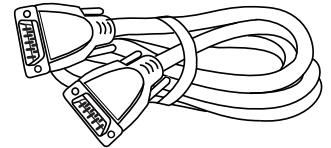
#### 2. Power Cord



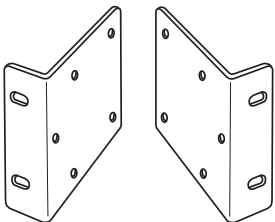
#### 3. Phone Cord



#### 4. DB 9 Serial Cable



#### 5. Rack Mounting Kit



#### 6. Power Control Software CD



# Important Safety Instructions

This manual contains important instructions that should be followed during installation and maintenance of the UPS and batteries. Please read and follow all instructions carefully during installation and operation of the unit. Read this manual thoroughly before attempting to unpack, install, or operate.

**CAUTION!** The UPS must be connected to an AC power outlet with fuse or circuit breaker protection.

**DO NOT** plug the machine into an outlet that is not grounded. If you need to de-energize this equipment, turn off and unplug the UPS.

**CAUTION! DO NOT USE FOR MEDICAL OR LIFE SUPPORT EQUIPMENT!** PF Power does not sell products for life support or medical applications. **DO NOT** use in any circumstance that would affect operation or safety of any life support equipment, with any medical applications, or patient care.

**CAUTION!** The battery can energize hazardous live parts inside even when the AC input power is disconnected.

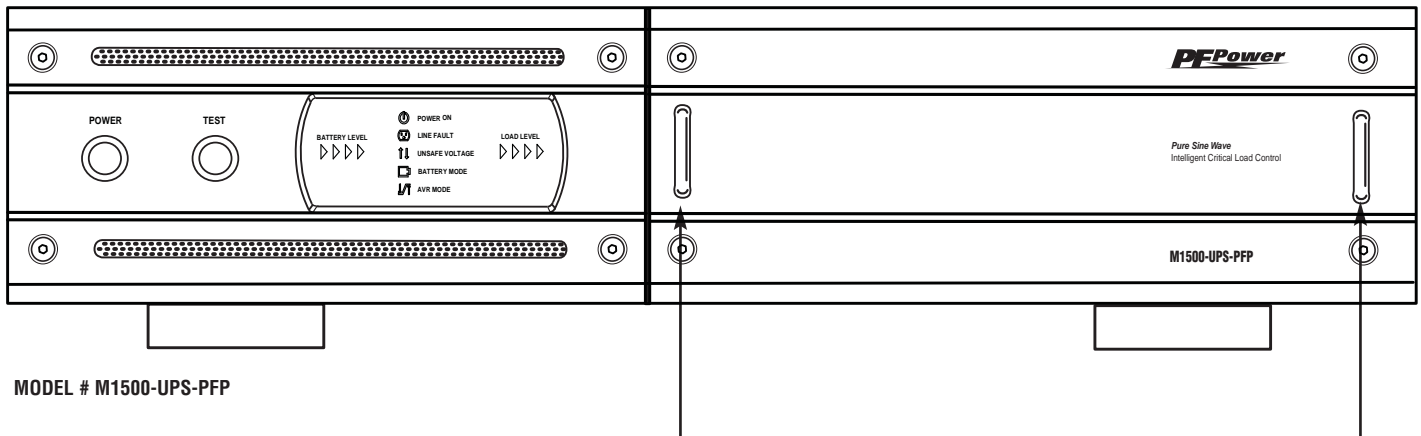
**CAUTION!** To prevent the risk of fire or electric shock install in a temperature and humidity controlled indoor area, free of conductive contaminants. (Please see specifications for acceptable temperature and humidity range).

**CAUTION!** To reduce the risk of electric shock, do not remove the cover, except to service the battery. No user serviceable parts inside, except for the battery.

**CAUTION!** To avoid electrical shock, turn off the unit and unplug it from the AC power source before servicing the battery or installing a component.

**CAUTION! DO NOT USE WITH OR NEAR AQUARIUMS!** To reduce the risk of fire, do not use with or near aquariums. Condensation from the aquarium can come in contact with metal current contacts and cause the machine to short out.

**Note:** AC Power management devices, such as a UPS, have certain limitations with regard to reactive loads and wattage. The M1500-UPS-PFP has a handling capacity of 1.5kVA or approximately 1000 watts. Excessive power consumption beyond these specifications can affect battery life and performance.



**CAUTION!** The 2 silver handles on the battery access panel are for removing the panel only. **THEY ARE NOT FOR LIFTING PRODUCT.**



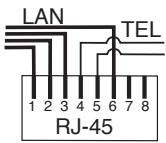
# Installing Your UPS

## HARDWARE INSTALLATION GUIDE

**1.** Your new UPS may be used immediately upon receipt. However, **recharging the battery for at least four hours is recommended** to insure that the battery's maximum charge capacity is achieved. Charge loss may occur during shipping and storage. To recharge the battery, simply leave the unit plugged into an AC outlet. The unit will charge in both the ON as well as the OFF position. If you wish to use the software, connect the enclosed serial interface cable to the serial port on the UPS and an open serial port on the computer.

**2.** With the UPS unit OFF and unplugged, plug your equipment into the unit's rear panel AC outlets. **DO NOT** plug a laser printer, copier, space heater, vacuum cleaner, paper shredder or other large electrical device into the UPS. The power demands of these devices will overload and possibly damage the unit.

**3.** To protect a telephone modem line (DVR or Satellite TV receiver) or network cable, connect a telephone cable or network cable from the wall jack outlet to the IN jack of the UPS. Then connect a telephone cable or network cable from the OUT jack on the UPS to the equipment's telephone jack or network device.



**Note:** This unit provides both telephone and LAN protection on one set of RJ-11/45 jacks. The telephone circuit uses pins 4 & 5 while the LAN circuit uses pins 1, 2, 3 & 6. Adapters or custom cables (not included) must be used

when utilizing both protection circuits at the same time.

**4.** Plug the UPS into a 2 pole, 3 wire grounded receptacle (wall outlet). Make sure the wall branch outlet is protected by a fuse or circuit breaker and does not service equipment with large electrical demands (e. g. refrigerator, copier, etc.) Avoid using extension cords. If used, the extension cord must be UL or CSA Listed, minimum 14 AWG, 3-wire grounded, and rated for 15 Amps.

**5.** Press the power switch to turn the UPS on. The Power ON indicator light will illuminate.

**6.** The rear panel circuit breakers will open and power to the connected equipment will be turned OFF if an overload is detected. To correct this, turn the UPS off, unplug at least one piece of equipment, wait 10 seconds, check to make sure that the circuit breakers are reset, and turn the unit on.

**7.** The UPS will automatically charge the battery whenever it is plugged into an AC outlet,

**8.** To maintain optimal battery charge, leave the UPS plugged into an AC outlet at all times.

**Note:** To store your UPS for an extended period, cover it and store with the battery fully charged. Recharge the battery every three months to ensure battery life.

## Basic Operation

### FRONT PANEL DESCRIPTION

#### Power Switch

Press the power button to turn the UPS ON or OFF.

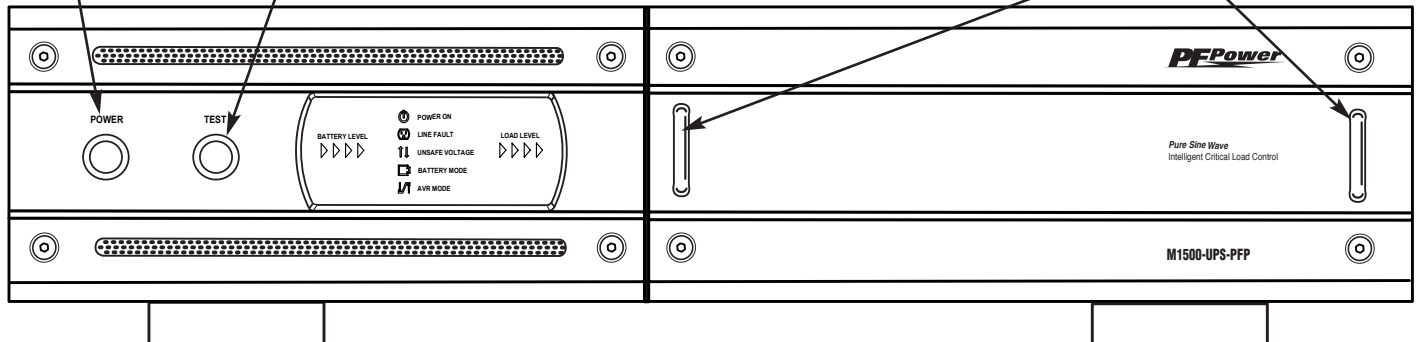
#### Test Switch

This UPS performs a self-test automatically when powered on. The test switch allows you to test the system at any time. When the UPS passes the test, it returns to on-line operation. If the UPS fails the self-test, please recharge the battery for 4 hours and perform another self-test. If it fails after recharging the battery, please replace the battery. In battery mode, you can press this button to silence an audible alarm.

#### Removable Access Panel

Easy to remove for battery access and replacement.

**Note: DO NOT lift product with handles. They are for panel removal only.**



# Basic Operation (continued)

## FRONT PANEL DISPLAY LED DESCRIPTIONS

### Power On Indicator

This LED is illuminated when the utility condition is normal and the UPS outlets are providing clean, protected power.

### Line Fault Indicator

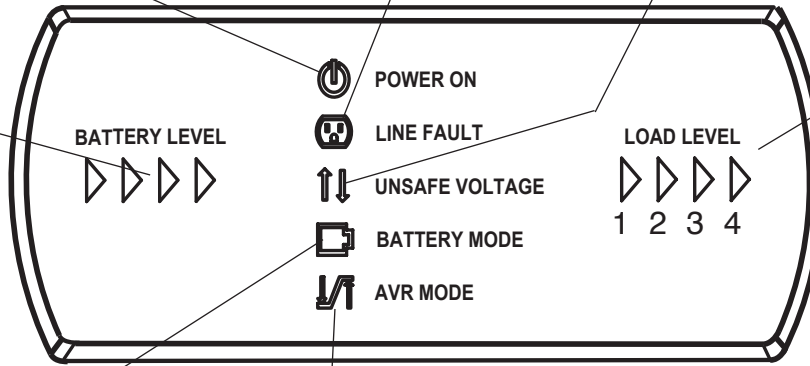
This LED will illuminate to warn the user that a wiring problem such as a bad/missing ground or reversed wiring exists within the AC receptacle. If illuminated, disconnect all equipment and contact an electrician to insure outlet is properly wired.

### Unsafe Voltage Indicator

This LED will illuminate to inform the user that an unsafe line voltage is present and that the UPS has switched to battery power. This could be either an over-voltage or under-voltage.

### Battery Level Indicator

This is a visual indication of the battery charge. If battery capacity is under 25%, no indicator LED will illuminate and UPS starts beeping (if the audible alarm is enabled).



### Load Level Indicator

This is a visual indication of the UPS load.

The **1st** arrow will illuminate when the load is above 25%, the **2nd** above 50% and the **3rd** above 75%. The **4th** arrow will flash when the load is between 85% and 100%.

### Battery Mode Indicator

This illuminates during utility failure or an unsafe voltage condition, indicating that the battery is supplying power to the connected equipment.

### AVR Indicator

This indicates that the UPS is operating in automatic voltage regulation mode. When the LED is illuminated continuously, it indicates an input over-voltage and the UPS unit reduces (bucks) the voltage to the normal operating range. When the LED is flashing, it indicates that the input line voltage is low and that the UPS is increasing (boosts) input voltage to the normal range.

## REAR PANEL DESCRIPTION

### Non-Critical-Load Outlets

Four battery powered, surge protected and AVR outlets for connected equipment insures temporary uninterrupted operation of connected equipment during a power failure.

### Critical Load Outlets

Two battery powered, surge protected and AVR outlets for critical-load equipment insures temporary uninterrupted operation of connected equipment during a power failure.

### AC Power Cord Input Receptacle

### IR Control Section

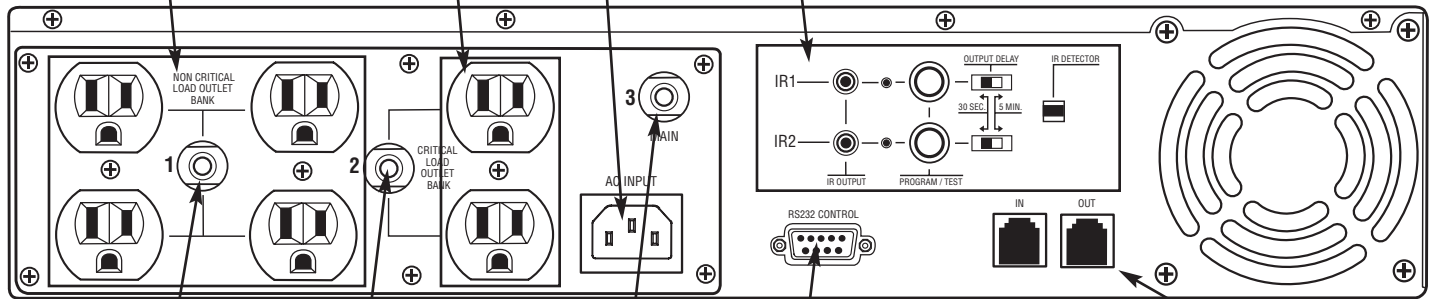
Learning Control Switches – Push to program or test the IR function

IR Detector Window – Receives the IR signal to be learned

Indicator LED's – Indicates learning status

Output Delay Switches – Sets the desired time delay between a power failure and when the IR signals are sent to the connected equipment

IR Output Jacks – Standard 1/8" (3.5mm) mono jack for connection to an IR flasher (IR flashers not included)



### Circuit Breakers for Overload Protection

Resettable circuit breakers provide optimal overload protection.

### RS232 Serial Communication Port

The serial port allows connection and communication between the UPS and a computer system. This allows the installer to program a number of variables including the Critical Load Battery Threshold. See the software documentation for more information.

### RJ11/RJ45 Jacks

Ports protect standard telephone line, modem, or network cable.

# Advanced Operation

A connection to a UPS can benefit the volatile electronic memories found in but not limited to Pro Audio, Broadcast and High-End Home Theater equipment. The M1500-UPS-PFP takes this to the next level with a number of features designed specifically for AC Power back up applications.

## Critical Load Function

One of the user programmable settings in the M1500-UPS-PFP software is the Low Battery NCL Shutoff threshold. This sets the battery capacity level at the point where the non-critical load outlets are turned off and all remaining battery power is reserved for equipment plugged into the 2 critical load outlets. This value is stored internally by the UPS and is not dependent on having the software running on a computer.

## Patented Learning IR Control

The learning IR function lets you program the UPS to send standby or shut-down commands to components such as DLP ceiling projectors. If the power fails, the projector's lamps are turned off while the UPS continues providing battery power to the projector's cooling fan. Proper shutdown is ensured and expensive lamps are protected from damage.

**Note: This function should only be used with discrete IR codes. Programming an On/Off toggle command could result in the equipment being turned ON during a power failure!**

## IR Power Failure Operation

The UPS can learn two IR commands. The learned commands will be transmitted on both output jacks so you have the ability to control 2 different pieces of equipment or use a 2-step macro for one component.

The IR Output Delay switches provide the ability to "ride-through" brief power outages without sending a shut-down signal to the connected device. You have a choice of a 30 second or 5 minute delay.

**1.** After a power failure and the selected delay, the IR codes will be sent to both outputs. The IR LED's will flash once per second during the delay time and will stop flashing after the IR code is sent.

**2.** If the delay settings are the same for both IR1 and IR2, the IR2 code will be sent to both outputs 2 seconds after IR1.

**3.** The IR commands will also be transmitted immediately after the battery charge falls below the critical load battery threshold. This ensures that equipment will be shutdown properly if the UPS's load level is extremely high and the backup time would be less than the 5 minute ride-through delay.

**4.** There is no IR output after the power is restored to the system.

## IR LED Color & Status

LED COLOR	STATUS
Off	Idle
Green, solid	Waiting to receive IR signal
Green, flashing	IR signal sampled
Red, flashing	Failed to learn IR signal

### To program IR output:

- 1.** Press and hold the IR1 button for approximately 2 seconds.
- 2.** When the IR1 LED turns solid GREEN, release the button (after approx. 2 seconds)
- 3.** Point the remote control at the detector window and quickly press and release the appropriate button on the remote control. If no signal is received within 10 seconds, the programming mode is cancelled, the IR1 LED turns off and you will have to start over.
- 4.** The IR1 LED flashes GREEN if the IR signal is sampled and stored in memory.
- 5.** The IR1 LED will flash RED if the IR signal was not learned. Start over at Step 1.
- 6.** Repeat steps 1-5 for IR2.

### To clear IR programming:

- 1.** Press and hold the appropriate IR button, release after 2 sec.
- 2.** The IR LED turns solid Green
- 3.** Press the button again. The IR code will be erased from memory and the LED will turn off.

### IR Output Test

- 1.** An IR flasher must be connected to the UPS and in line-of-sight to the IR receiver window of the equipment to be controlled in order to verify that the code was learned correctly.
- 2.** Make sure that the component to be controlled is turned ON.
- 3.** Press and release the IRx button. The code for IRx will be transmitted on both IR1 and IR2 outputs.
- 4.** If you are testing a 2-step macro, be sure to press the second IR button to transmit that code.

# Advanced Operation (continued)

**5.** If the learning process was successful, the controlled equipment should accept the IR command and turn off or go into standby mode.

**6.** Reprogram the IR command if the controlled equipment does not respond.

**a.** Be sure that the batteries in the “teaching remote” are fresh and do not need to be replaced.

**b.** If “press & release” (Step 3 in Programming) doesn’t work, try “press & hold” on the remote control button being taught to the UPS.

## RS232 Control with Open Protocol

The RS232 serial interface can be used in the following ways:

**1. Initial system setup.** An installer can use a notebook computer to set the variables within the Power Control software. Once the setup is completed, the notebook computer can be disconnected. All settings are stored in the UPS.

**2. Connection to a PC or Network:** Functionality is very similar to a standard UPS with a PC.

The UPS can provide continued power to maintain recording capabilities of any number of devices in the event of a black out or brown out. It is also capable of saving open documents and shutting down the PC during extended power failures. This requires a permanent RS232 connection to the PC and having the Power Control software running in the background on the PC. (Windows based OS only; Macintosh OS is not supported at this time)

## 3. Integration with sophisticated automation systems like AMX and Crestron:

The serial communications command set and protocol is open and is published later in this manual. This information can be used by the automation system programmer for both UPS control by the automation system and reporting of power events by the UPS to the automation system.

# Power Control Software

The M1500-UPS-PFP has one rear-panel serial port that provides the ability to program special functions i.e. safely shutdown a PC application or integrate the UPS with a home automation system.

**Use of the software is optional. The communications protocol is “open”; a programmer can write their own control program or integrate the UPS’s programming/control functions into the M1500-UPS-PFP software if desired. The UPS will provide surge suppression, automatic voltage regulation and battery backup without the software. Note: Automatic shutdown of controlling PC requires the use of the M1500-UPS-PFP software.**

## Software Installation

### For Windows XP™ (Home and Professional)

1. Click on Start and then click on Control Panel.
2. Double-click on Power Options then click on the UPS tab.
3. Set the manufacturer to none.
4. Exit to the desktop and shutdown your computer.
5. Turn the UPS off and unplug it.
6. Connect the serial interface cable to the UPS and an open serial port on the back of the computer. (**Note:** You must use

the serial cable that was supplied with the unit).

**7.** Plug the UPS into an AC outlet, turn the UPS on and start your computer.

**8.** Windows™ will recognize your UPS as “New Hardware”.

**9.** Insert the software disk into the computer’s drive. The installation program should start automatically. If the installation program does not start automatically, open it manually with the Windows™ “Run” command.

**10.** Follow the on-screen instructions.

**11.** Once the software has finished installing, remove the disk and restart your computer.

### For Windows 95/98/Me™

1. Turn off your UPS.
2. Connect the Serial Cable to your UPS and the open serial port on the rear panel of the computer. (**Note:** You must use the serial cable that was supplied with the unit).
3. Plug the UPS into an AC outlet, turn the UPS on and then start your computer.
4. Follow the instructions below for your PC’s operating system.

# Power Control Software (continued)

5. Windows™ will recognize your UPS as “New Hardware”.

6. Insert the software disk into the computer's drive. The installation program should start automatically. If the installation program does not start automatically, open it manually with the Window's™ “Run” command.

7. Follow the on-screen instructions.

8. Once the software is installed, remove the disk and restart your computer.

## For Windows 2000™

1. Click on Start, point to Settings then click Control Panel.

2. Double-click on Power Options.

3. On the UPS Tab, click Select.

4. In the UPS Selection Dialog Box, under Manufacturers, click None.

5. Exit to the desktop.

6. Shutdown the computer.

7. Turn the UPS off and unplug it.

8. Connect the serial interface cable to the UPS and an open serial port on the back of the computer. (**Note:** You must use the serial cable that was supplied with the unit).

9. Plug the UPS into an AC outlet, turn the UPS on and start your computer.

10. Windows™ will recognize your UPS as “New Hardware”.

11. Insert the software disk into the computer's drive. The installation program should start automatically. If the installation program does not start automatically, open it manually with the Windows™ “Run” command.

12. Follow the on-screen instructions.

13. Once the software has finished installing, remove the disk and restart your computer.

## For Windows NT 4.0™

1. Click on Start, point to Settings then click Control Panel.

2. Double-click on the UPS Icon.

3. Remove the check mark from the box labeled UPS is installed on.

4. Click OK.

5. Acknowledge the message that the UPS is in an unknown state.

6. Exit to the desktop.

7. Shutdown your computer.

8. Turn the UPS off and unplug it.

9. Connect the serial interface cable to the UPS and an open serial port on the back of the computer. (**Note:** You must use the serial cable that was supplied with the unit).

10. Plug the UPS into an AC outlet, turn the UPS on and then start your computer.

11. Click on Start, point to Settings then click Control Panel.

12. Double-click on Add/Remove Programs.

13. Insert the software disk into the computer's drive. The installation program should start automatically. If the installation program does not start automatically, open it manually with the Windows™ “Run” command.

14. Click Install.

15. Follow the on-screen instructions.

16. Once the software is installed, remove the disk and restart your computer.

When your computer restarts, the M1500-UPS-PFP software will appear on your screen for a few seconds, and then minimize. It will appear as a blue and white battery icon located in the system tray, near the clock.





# Power Control Software Instructions

## Overview

As indicated, the M1500-UPS-PFP software is designed for use with Windows 95™, Windows 98™, Windows Me™, Windows NT™, Windows 2000™ and Windows XP™. The computer's operating system works in conjunction with the UPS to provide full protection of professional equipment (such as automation controllers, digital audio work stations and small format digital consoles) and is equally effective for high-end home theater use (such as digital video recorders, video projectors and satellite networking).

As far as the professional contractor, one can use the advanced options and user interface to maintain complete power management (such as the Data Recorder Log as a diagnostic tool). In no way does this mean the novice cannot understand the many advantages of M1500-UPS-PFP software.

This program may be used temporarily during the initial system setup. An installer can use a notebook computer to set the variables within the M1500-UPS-PFP software. Once the setup is completed, the notebook computer can be disconnected. All settings are stored in the UPS.

The software can also be used to manage a Personal Computer. Functionality is very similar to a standard UPS with a PC. The UPS can

provide continued power to the PC to maintain recording capabilities if it is being used as multimedia source or digital workstation. It is also capable of saving open documents and shutting down the PC during extended power failures. This requires a permanent RS232 connection to the PC and having the M1500-UPS-PFP software running in the background on the PC. When a power failure occurs, open files are saved under auto-assigned file names or existing file names and the files closed. The computer and UPS are automatically shut down to conserve battery power. Files with auto-assigned names will be saved under C:\PCTemp, where C is the name of your main hard drive. Files that have previously been saved will be saved in their original location.

There is also a Schedule feature that can automatically save and close open files and then shut down the computer and UPS at a user specified date and time as well as re-start the computer at a user specified date and time. Use of this feature is optional and is not required for the power failure shutdown to occur.

**Note:** The M1500-UPS-PFP software may not always be capable with various recording software. Please check your program requirements. Running background software may affect the recording application's performance. This will depend on the various user preferences available in the multimedia device or digital workstation's recording application. The M1500-UPS-PFP is a true power management user interface.

## MAIN MENU

**1. Log Button:** Opens the Event Log Window.

**2. Power Button:**  
Closes the program window.

**3. Minimize Button:**  
Minimize the program window.

**4. Setup Button:**  
Opens the Setup Window.

**5. Model:** Shows the model of UPS that is being used.

**6. Schedule Button:**  
Click this button to access the Schedule Window.

**7. Status Bar:** Displays messages about the status of the software.



# Power Control Software Instructions (continued)

## MAIN WINDOW DESCRIPTIONS

**1. Battery Level:** Displays the current charge on the battery. The indicator will display a red color when a power failure occurs.

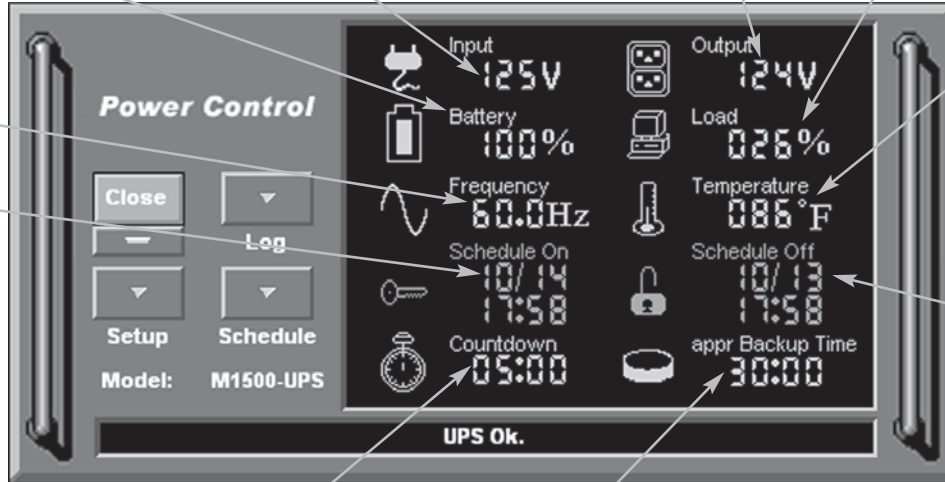
**2. Input Voltage:** Shows the current input voltage. The input normally appears in green, but will turn red if the input voltage is lower than 85v or higher than 150v.

**3. Output Voltage:** Shows the output voltage of the UPS.

**4. Load Level:** Shows the % of capacity that is currently being used. If the load level exceeds 90%, the indicator will change to a red color.

**10. Frequency:** This indicator displays the frequency of the utility power.

**9. Scheduled On:** The M1500-UPS-PFP software can be scheduled to turn your connected equipment on. It can only be set when a Scheduled Off is also set. Scheduled On settings that are set to occur within seven days will be displayed.



**5. Temperature:** Displays the internal operating temperature of the unit. If the temperature exceeds 158°F (70°C), the indicator will change from green to red.

**6. Scheduled Off:** The program can be set to automatically shutdown the system at a user specified time. Scheduled Off settings that are set to occur within seven days will be displayed. When combined with the Scheduled On function, connected equipment can automatically be rebooted.

**8. Countdown:** For use with a PC. When the program detects that the utility voltage is below 88 volts or above 147 volts, the countdown will begin. When the countdown reaches zero, the program will save and close any open applications, and then shut down the operating system in an intelligent and orderly manner.

**7. Approximate Backup Time:** Indicates the approximate amount of backup time that is available, based upon the battery capacity and the load on the system. This indicator can appear in red, yellow, or green, depending upon the number of minutes available.

## SETUP MENU

**12. Time between power failure and shutdown:** For use with a PC. This is the user controllable delay between when the power fails and the software starts the shutdown process. If unchecked and plugged into one of the critical load outlets the PC will run on battery until the low battery signal is received (2 minutes of backup time remaining) and then start the shutdown process.

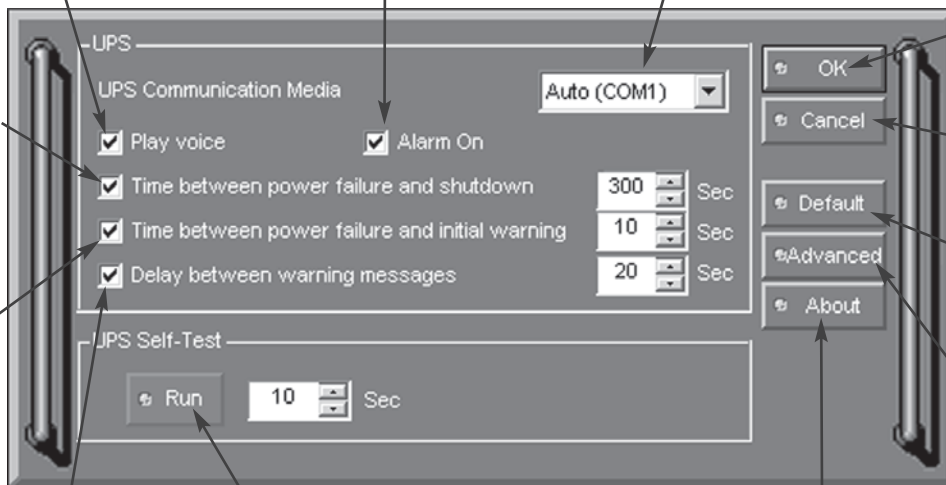
**11. Time between power failure and initial warning:** Sets the time delay between a power failure and the first audible alarm.

**10. Delay between warning messages:** Sets the delay between the audible alarms (during a power failure).

**1. Play voice:** Enables audible voice messages through your computer speakers. A sound card and speakers are required.

**2. Alarm On:** Toggles the audible alarm on and off.

**3. UPS Communication Media:** Leave this on "Auto" for automatic detection or select the correct communications port from the drop-down list. The port assigned to the UPS needs to be used exclusively for the UPS software.



**4. OK:** Closes the window and saves changes.

**5. Cancel:** Closes the window without saving changes.

**6. Default:** Returns the software to original factory settings.

**7. Advanced:** Opens the Advanced Setup Window.

**9. UPS Self-Test:** Allows the user to test the UPS without having to unplug the unit from the wall. When Run is clicked, the UPS will switch to battery power and the unit will beep.

**8. About:** This button will display information about the software, as well as contact information.

# Power Control Software Instructions (continued)

## ADVANCED SETUP MENU

**1. Low Battery PC Shutoff:** For use with a PC. Sets the low battery cutoff level. The user can slightly extend the UPS run time by adjusting this setting. This setting must be higher than the Critical Load Threshold if the PC is plugged into a non-critical load outlet.

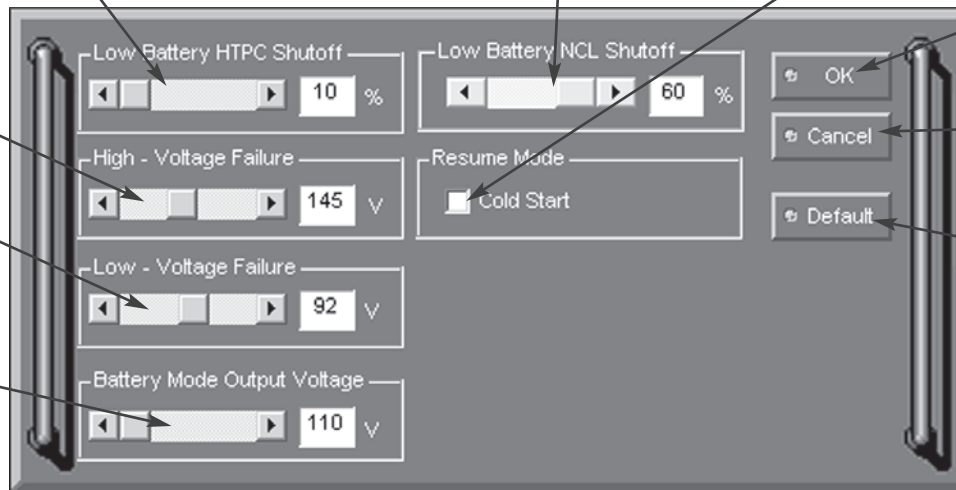
**2. Low Battery NCL Shutoff:** NCL stands for Non-Critical Load. Sets the % of battery capacity at which all remaining battery power is reserved for the equipment plugged into the critical load outlet bank. Power to the 4 NCL outlets will be turned off at this point.

**3. Cold Start:** When this is enabled, the UPS can start in the absence of AC power. To maximize battery life, it is recommended to keep this disabled.

**9. High-Voltage Failure:** Sets the upper level where the UPS will cycle to battery. This level can be adjusted from 137V to 147V.

**8. Low-Voltage Failure:** Sets the lower level where the UPS will cycle to battery. This level can be adjusted from 88V to 97V.

**7. Battery-mode Output Voltage:** Sets the voltage that the unit will output. This level can be adjusted from 110V to 130V when running on battery.



**4. OK:** Closes the windows and saves changes.

**5. Cancel:** Closes the window without saving changes.

**6. Default:** Restores the settings to the factory defaults.

## SCHEDULE MENU - SPECIAL

**1. Special Setting:** Allows you to schedule a one-time shutdown/startup.

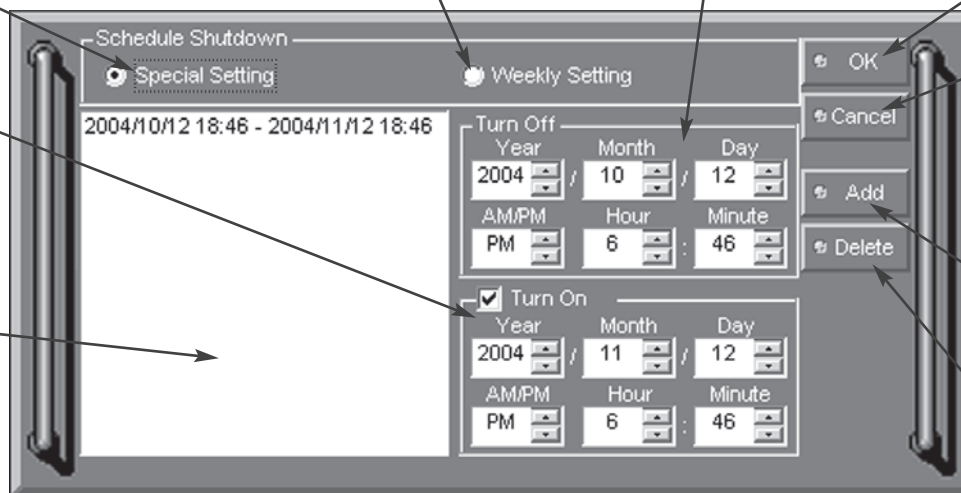
**2. Weekly Setting:** Allows you to schedule a shutdown and start up based upon the day of the week.

**3. Turn Off:** Select the day/date and time that you want the computer system to shutdown. This is optional and has no effect on whether your computer will shut down during a power failure.

**4. OK:** Closes the window. Please note: You must click Add to add the item to the schedule.

**9. Turn On:** Select the day/date and time that you want the computer system to restart. Can only be used in conjunction with a scheduled shutdown.

**8. Schedule Display:** Window display of the days/dates and times of any scheduled startups and shutdowns.



**5. Cancel:** Closes the window without saving any schedules even if one was added to the Schedule Display Window. Does not cancel previously applied schedules.

**6. Add:** Adds an item to the schedule.

**7. Delete:** Clears the selected item from the schedule.

# Power Control Software Instructions (continued)

## LOG MENU

### 1. Log Display:

This window displays the information as selected by the Event, Closed Application Information, or Data Record option buttons.

**2. Event:** When this option is selected, the log will display a list of events such as power failure, program start, and program end.

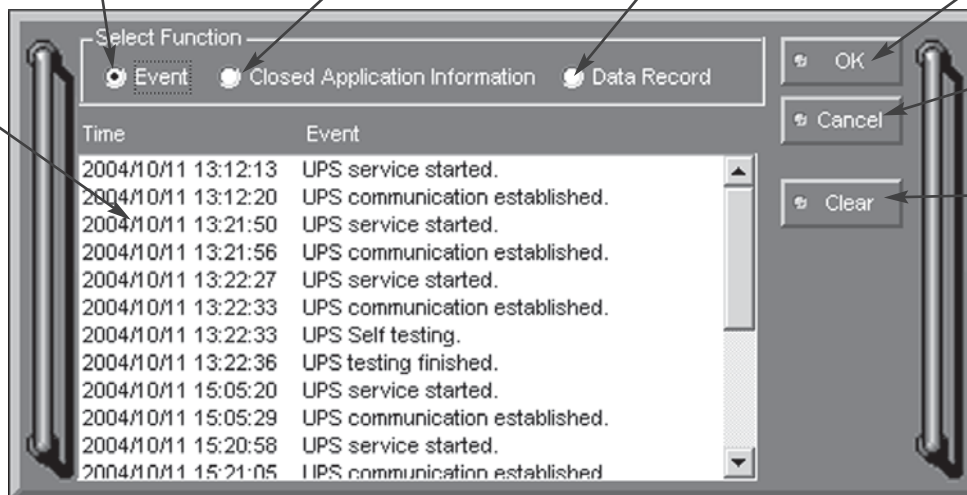
**3. Closed Application Information:** When this option is selected, the log will display the names and location of any files that were auto-saved by the software.

**4. Data Record:** When this option is selected, the log will display a record of the items that are shown in the main window.

**5. OK:** Closes the window and saves any changes.

**6. Cancel:** Closes the window without saving any changes.

**7. Clear:** Clears the selected log.



## Battery Features

### Testing The Battery Backup Function

Once you have set up your UPS system, you may wish to test it. Make sure that the UPS has been charged for at least 4 hours before testing.

To test the UPS, simply depress the test button located on the front of the unit. The unit will cycle to battery and emit an audible beep. The unit will stop beeping when the test is complete.

You may also use the self-test function in the software. To use the software self-test, open the main window, and then click mode on Setup. Click the red run button. The unit will cycle to battery mode and emit an audible beep. With the software self-test, the unit will switch back to AC power automatically.

### Battery Replacement

Read and follow the **IMPORTANT SAFETY INSTRUCTIONS** before servicing the battery.

### M1500-UPS-PFP Battery Replacement Policy

Batteries are included under the M1500-UPS-PFP 3 year warranty.

PF Power will replace M1500-UPS-PFP batteries if they fail within the 3 year product warranty period. For battery replacement information and instructions please contact Panamax Customer Service at [www.panamax.com](http://www.panamax.com) or call 800-472-5555.

If batteries fail after the M1500-UPS-PFP 3 year product warranty then the customer is responsible for battery replacement. For detailed battery replacement information and instructions please contact Panamax Customer Service at [www.panamax.com](http://www.panamax.com). or call 800-472-5555.

Service the battery under the supervision of personnel knowledgeable

of batteries and their precautions. **Servicing the battery should only be performed by qualified personnel.**

**CAUTION!** USE ONLY THE SPECIFIED TYPE OF BATTERY.

Contact Panamax Customer Service at [www.panamax.com](http://www.panamax.com) or call 800-472-5555 for battery replacement information.

**CAUTION!** The battery may present the risk of electrical shock. **Do not dispose of batteries in a fire** as they may explode. Follow all local ordinances regarding proper disposal of batteries.

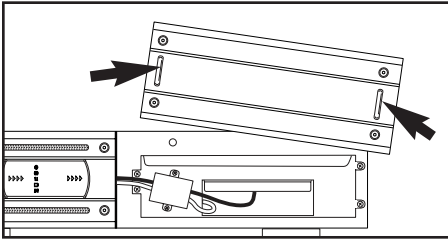
**CAUTION!** Do not open or mutilate the batteries. Released electrolyte is harmful to the skin and eyes and may be toxic.

**CAUTION!** A battery can present a high risk of short circuit current and electrical shock. Take the following precautions before replacing the battery:

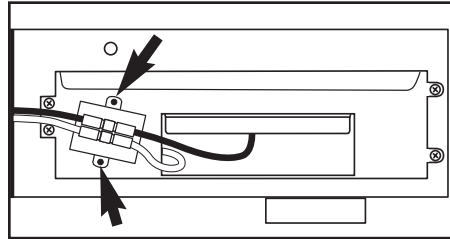
1. Remove all watches, rings or other metal objects.
2. Only use tools with insulated handles.
3. Do not lay tools or metal parts on top of battery or any terminals.
4. Wear rubber gloves and boots.
5. Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground. **CONTACT WITH A GROUNDED BATTERY CAN RESULT IN ELECTRICAL SHOCK!** The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance (applicable to a UPS and a remote battery supply not having a grounded circuit).

# Battery Features (continued)

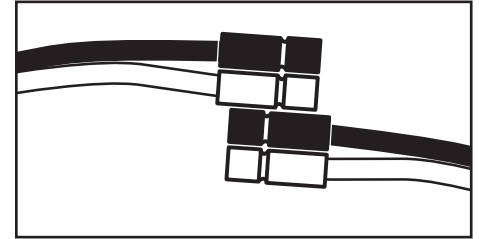
## Battery Replacement Procedure



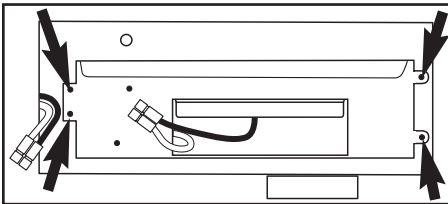
1. Remove the right side front panel using pull-out handles.



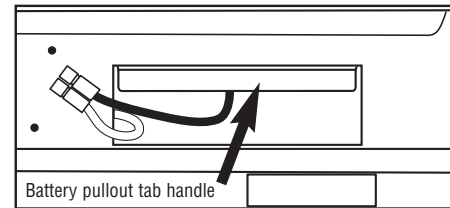
2. Remove the two retaining screws of the cable protection cover then remove the cover.



3. Disconnect the black and red cable.



4. Remove the four retaining screws.









5. Pull the battery pack out from the unit.

6. Slide a new battery pack into the unit. Assemble the screws, cover, cable and front panel in the reverse sequence of above steps.

7. Recharge the unit for 4-8 hours to ensure the UPS performs expected runtime.

## Diagnostics

 Power On LED	 Wiring Fault LED	 AVR LED	 Using Battery LED	 Circuit Breaker	 Audible Alarm	Condition
On	Off	Off	Off	Set	Off	Normal
On	Off	Slow Flash	Off	Set	Off	<b>AVR-</b> Max. boost 13% of input voltage for output regulation while input voltage is from 8% to 15% under nominal.
On	Off	Rapid Flash	Off	Set	Off	<b>AVR-</b> Max. boost 26% of input voltage for output regulation while input voltage is from 15% to 26% under nominal.
On	Off	On	Off	Set	Off	<b>AVR-</b> Max. buck 15% of input voltage for output regulation while input voltage is from 8% to 26% over nominal.
Off	Off	Off	On	Set	Two Beeps	<b>Utility Failure-</b> The UPS is providing battery power to the connected equipment.
Off	Off	Off	On	Set	Rapid Beeps	<b>Utility Failure-</b> The UPS is providing battery power. Rapid beeps indicate the battery will run out of charge within a few minutes.
On/Off	Off	On/Off/Flash	On/Off	Set	Long Beep	<b>Overload-</b> Turn the UPS off and unplug at least one piece of equipment from the UPS. Wait 5 seconds, reset the circuit breaker and restart the UPS.
Off	Off	Off	On	Up	Long Beep	<b>Overload-</b> Turn the UPS off and unplug at least one piece of equipment from the UPS. Wait 5 seconds, reset the circuit breaker and restart the UPS.
On	Off	On/Off/Flash	Off	Set	None	<b>Weak Battery-</b> Recharge the battery for at least 8 hours. If Check Battery is illuminated, contact Panamax for battery replacement information.
Off	Off	Off	Off	Set	Off	<b>Surge Protection Malfunction-</b> Power surge has damaged the unit. Please contact Panamax.
On/Off	On	On/Off/Flash	On/Off	Set/Up	None	<b>Electrical Wiring Fault-</b> Indicates wiring problems such as a bad ground, missed ground or reversed wiring within the AC outlet. User is advised to disconnect all electrical equipment from the outlet and have the outlet checked by an electrician.

# Troubleshooting

Problem	Possible Cause	Solution
Outlets do not provide power to equipment.	Circuit breaker is tripped due to overload	Turn the UPS off and unplug at least one piece of equipment. Wait 10 seconds, reset the circuit breaker and then turn the UPS on.
	Batteries are discharged.	Recharge the unit for at least 4 hours.
	Unit has been damaged by a surge or spike.	Recharge the battery by leaving the UPS plugged in.
The UPS does not perform to expected runtime.	Battery is not fully charged.	Recharge the battery by leaving the UPS plugged in.
	Battery is slightly worn out.	Contact Panamax about replacement batteries.
The UPS will not turn on.	The on/off switch is designed to prevent damage by rapidly turning it off and on.	Turn the UPS off. Wait 10 seconds and then turn the UPS on.
	The unit is not connected to an AC outlet.	The unit must be connected to a 110/120v 60Hz outlet.
	The battery is worn out.	Contact Panamax about replacement batteries.
	Mechanical problem.	Contact Panamax.
Software is inactive.	The serial cable is not connected.	Connect the serial cable to the UPS unit and an open serial port of your computer. You must use the cable included with the unit.
	The serial cable is connected to the wrong port.	Try another serial port on your computer.
	The unit is not providing battery power	Shut down your computer and turn the UPS off. Wait 10 seconds and turn the UPS on. This should reset the unit.
	The serial cable is not the cable that was provided with the unit.	You must use the cable included with the unit for the software.

# Technical Specifications

<p><b>AC SPECIFICATIONS</b></p> <p><b>CAPACITY</b>            (VA) _____ 1500VA            (Watts) _____ 1000W</p> <p><b>INPUT</b>            Voltage Range _____ 88Vac - 147Vac            Frequency Range _____ 47 - 63 Hz</p> <p><b>OUTPUT</b>            On Battery Output Voltage _____ Pure Sine Wave at 120VAC +/- 5%            On Battery Output Frequency _____ 60 Hz +/- 1%            Transfer Time _____ 4ms</p> <p><b>PROTECTION &amp; FILTRATION</b>            On Utility _____ Over/Under voltage protection            On Battery _____ Internal Current Limiting            Patented Power Management Circuit _____ Yes            Overvoltage Shutoff _____ 144V ±8V            Undervoltage Shutoff _____ 90V ±6V            Thermal Fusing _____ Yes            Protection Modes _____ L-N, L-G, N-G            Response Time _____ &lt; 1 n            Single Pulse Energy Dissipation _____ 1650 Joules            EMI/RFI Noise Filtration _____ 50dB (100kHz – 1 MHz)</p> <p><b>TELCO PROTECTION</b>            Fuseless/Auto-Resettable _____ Yes            Clamping Level _____ 260V            Capacitance _____ 30 pf (approx.)            Suppression Modes _____ Metallic &amp; Longitudinal            Wires Protected _____ 2 wire, 1 pair (4 &amp; 5)            Connectors _____ RJ-11/45 Shared with LAN</p>	<p><b>LAN PROTECTION</b>            Compatibility _____ 10/100bT            Clamping Level _____ 7V            Suppression Modes _____ Differential &amp; Common Ground            Wires Protected _____ Pins 1, 2, 3, &amp; 6            Connectors _____ RJ/11-45 Shared with Telco</p> <p><b>BATTERY</b>            Sealed _____ Yes            Maintenance-free _____ Yes            Lead acid _____ Yes            User replaceable _____ Yes            Typical recharge time _____ 8 hrs.</p> <p><b>COMMUNICATION</b>            Software _____ Included (Windows95/98/ME/NT/2000/XP)            Hardware _____ RS232 (open command set)            Programmable IR _____ (learning) sends IR signals to equipment after power failure</p> <p><b>PHYSICAL</b>            Rack Mountable _____ Yes (rack mount kit included)            Maximum Dimensions _____ 17" x 3.5 x 15.3"            Weight (lbs.) _____ 59            Outlets _____ 6 Total (2 assigned critical load)</p> <p><b>GENERAL</b>            Lightning protection _____ Yes            Product Warranty _____ 3 Years</p> <p>Design and specifications subject to change without notice due to product improvement.</p>
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# RS232 Communications Protocol & Command Set

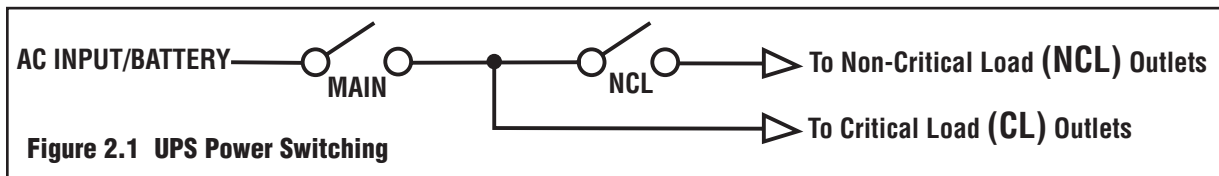
## Communications Protocol

Baud rate: _____ 2400 bps	Stop bit: _____ 1 bit
Start bit: _____ 1 bit	Parity: _____ None
Data length: _____ 8 bits	Flow control: _____ one

## Controller Commands

Commands and responses are in the form of ASCII character strings terminated with a carriage return <CR> ASCII character 13 (hex).

It is important to understand how the UPS circuitry switches power to the outlets in order to use the outlet switching commands effectively. The following diagram provides a basic illustration:



The UPS provides one bank of switched outlets (Outlet Bank 1) that can be controlled independently. These are referred to as Non-Critical Load (NCL) Outlets.

The other outlet bank (Outlet Bank 2) will be referred to as Critical Load (CL) Outlets.

Note that NCL outlets cannot be energized unless the critical load outlets are on.

NCL outlets are designated for equipment that is considered non-critical. Power will be turned off if the battery charge falls below a set threshold (refer 2.5).

It is desirable to have the ability to switch the power to the outlets on and off to force a “hard” reboot of equipment. Devices such as satellite receivers often “crash” and must be reset.

The following are commands made by the controller to the UPS:

### Main Power On

Send to UPS: MAIN\_ON<CR>

*If power is not switched off due to low battery conditions:*  
Action: AC power is switched ON to the CL outlets by closing the AC input relay or turning on the inverter.

Response from UPS: CL\_OUTLETS\_ON<CR>

NCL\_OUTLETS\_ON<CR> (if NCL relay is closed)

*If power is already switched off due to low battery conditions:*  
Action: None

Response from UPS: LOWBATT<CR>

### Main Power Off

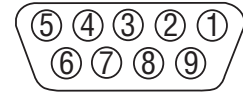
Send to UPS: MAIN\_OFF<CR>

Action: All outlets are de-energized by disconnecting the AC input relay and turning off the Inverter.

Response from UPS: NCL\_OUTLETS\_OFF<CR>

CL\_OUTLETS\_OFF<CR>

## DB9 Pinout Diagram



PIN NO.	SIGNAL
1	-
2	TRANSMIT
3	RECEIVE
4	DTR
5	SIGNAL GROUND
6	-
7	RTS
8	-
9	-

DTR - Data Terminal Ready  
 RTS - Request To Send

# RS232 Communications Protocol & Command Set (continued)

## Non Critical Load Outlets On

This command controls the relay that feeds power to the NCL Outlets. Note that if the MAIN relay is off, the outlets will still be un-energized.

Send to UPS: NCL\_ON<CR>

Action: NCL relay closes.

Response from UPS: NCL\_OUTLETS\_ON<CR> (if MAIN relay is ON)

NCL\_OUTLETS\_OFF<CR> (if MAIN relay is OFF)

## Non Critical Outlets Off

Send to UPS: NCL\_OFF<CR>

Action: NCL relay opens.

Response from UPS: NCL\_OUTLETS\_OFF<CR>

## Set Low Battery NCL (Non-Critical Load) Shutoff

It is desirable to allow the user to set the battery storage threshold in which the non-critical load outlets will shut off therefore reserving the remaining battery charge for the critical equipment. If the battery charge falls below the threshold, Non Critical Load Outlets are turned OFF.

A common example of critical equipment would be a projector. It is critical that power be maintained to a projector to allow its fan to run and cool the bulb. If the bulb is allowed to overheat, it will be damaged and is very expensive to replace.

Send to UPS: BATTRESH<SP>XX<CR>

<SP> represents a space: 20 Hex

XX is a number between 25 and 60 represented in ASCII.

*If XX is a valid number, between 25 and 60:*

Action: Assigns the battery threshold variable with the value XX

Response from UPS: BTHRESH<SP>XX<CR>

*If XX is not valid:*

Action: None

Response from UPS: INVALIDCMD<CR>

## Enable Audible Alarm

It is important that the UPS be as quiet as possible as it will be located in a home theater environment. It is desirable to control the warning beeper. The default setting for the alarm is OFF.

Send to UPS: BEEPON<CR>

Action: The beeper will sound when running from battery.

Response from UPS: BEEPISON<CR>

## Disable Warning Beeper

Send to UPS: BEEPOFF<CR>

Action: The beeper will not sound when running from battery.

Response from UPS: BEEPISOFF<CR>

## Restore Default Settings

Send to UPS: RESTORE<CR>

Action: Set Non-critical load threshold (2.5) to 66%

Disable the warning beeper (2.7)

Set High Voltage Failure Threshold to 147V (2.8)

Set Low Voltage Failure Threshold to 88V (2.9)

Set Battery Mode Voltage to 120V (2.10)

Response from UPS: DEFAULTSRESTORED<CR>

## QUERIES

### Request Outlet Status

Transmit the ON/OFF status of the outlet banks.

Send to UPS: ?OUTLETSTAT<CR>

*If NCL Outlets are ON:*

Response from UPS: NCL\_OUTLETS\_ON<CR>

*If NCL Outlets are OFF:*

Response from UPS: NCL\_OUTLETS\_OFF<CR>

*If CL Outlets are ON:*

Response from UPS: CL\_OUTLETS\_ON<CR>

*If CL Outlets are OFF:*

Response from UPS: CL\_OUTLETS\_OFF<CR>



# RS232 Communications Protocol & Command Set (continued)

## Request Input Voltage Level

Transmit the input AC voltage status

Send to UPS: ?INPUTVOLTS<CR>

Response from UPS: XXX<SP>VAC<SP>IN<CR>

XXX is the input AC voltage represented in ASCII.

## Request Output Voltage Status

Transmit the output voltage state

Send to UPS: ?OUTPUTSTAT

Response from UPS: XXX<SP>VAC<SP>OUT<CR>

XXX is the output voltage represented in ASCII.

*If the UPS is not in AVR or BATTERY mode:*

Response from UPS: NORMAL<CR>

*If the UPS is in AVR mode and boosting voltage by 13%*

Response from UPS: AVRBOOST1<CR>

*If the UPS is in AVR mode and boosting voltage by 26%*

Response from UPS: AVRBOOST2<CR>

*If the UPS is in AVR mode and bucking voltage by 11%*

Response from UPS: AVRBUCK1<CR>

*If the UPS is in BATTERY mode*

Response from UPS: BATTERY<CR>

## Request Load Level Status

Transmit the load level percentage.

Send to UPS: ?LOADSTAT<CR>

Response from UPS: XX<SP>%LOAD<CR>

XX is the load percentage represented in ASCII.

## Request Battery Charge Level Status

Transmit the remaining battery charge percentage.

Send to UPS: ?BATTERYSTAT<CR>

Response from UPS: XX<SP>%BATTERY<CR>

XX is the battery charge percentage represented in ASCII.

## Identify Equipment

Transmit the model number, firmware number and revision.

Send to UPS: ?ID<CR>

Response from UPS: PANAMAX<CR>

M1500-UPS<CR>

FW<SP>PARTNUMBER<CR>

REV<SP>REVISION<CR>

## List all Commands and Queries

Send to UPS: HELP<CR>

Response from UPS: MAIN\_ON<CR>

MAIN\_OFF<CR>

NCL\_ON<CR>

NCL\_OFF<CR>

BATTHRESH<CR>

BEEPON<CR>

BEEPOFF<CR>

RESTORE<CR>

?OUTLETSTAT<CR>

?INPUTVOLTS<CR>

?OUTPUTSTAT

?LOADSTAT<CR>

?BATTERYSTAT<CR>

?ID<CR>

HELP<CR>

# RS232 Communications Protocol & Command Set (continued)

## Responses and Warning Messages

A warning message is to be transmitted whenever the status of the following systems changes:

### Outlet Bank Status Messages

Whenever an outlet bank switches state (ON or OFF) the UPS sends a message to the controller:

Condition	Response from UPS
CL Outlet Bank switches ON	CL_OUTLETS_ON<CR>
CL Outlet Bank switches OFF	CL_OUTLETS_OFF<CR>
NCL Outlet Bank switches ON	NCL_OUTLETS_ON<CR>
NCL Outlet Bank switches OFF	NCL_OUTLETS_OFF<CR>

## Power Status Messages

Whenever the power changes state the UPS sends a message to the controller:

Condition	Response from UPS
UPS is not in AVR or BATTERY mode	NORMAL<CR>
UPS is in AVR boosting 13%	AVRBOOST1<CR>
UPS is in AVR boosting 26%	AVRBOOST2<CR>
UPS is in AVR bucking 15%	AVRBUCK1<CR>
UPS is in BATTERY mode	BATTERY<CR>
Battery charge falls below critical load threshold	LOWBATT<CR>
Input voltage exceeds high voltage failure t'hold	OVERVOLTAGE<CR>
Input voltage falls below low voltage failure t'hold	UNDERVOLTAGE<CR>
Battery charge falls below critical load threshold	LOWBATT<CR>

### Invalid Command or Query

*If the UPS receives a command or query ASCII string that it does not understand, an error message is transmitted.*

Condition: Command or query not recognized or properly formatted

Response from UPS: INVALIDCMD<CR>

# FCC Notice and Warranties

## FCC Notice

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- (1)** Reorient or relocate the receiving antenna.
- (2)** Increase the separation between the equipment and receiver.
- (3)** Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- (4)** Consult the dealer or an experienced radio/TV technician for help. Any special accessories needed for compliance must be specified in the instruction.

**CAUTION:** A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used. Use only shielded cables to connect I/O devices to this equipment.

**CAUTION:** Any changes or modifications not expressly approved by the guarantee of this device could void the user's authority to operate the equipment.

### PFPower M1500-UPS-PFP LIMITED PRODUCT WARRANTY

PFPower warrants to the purchaser of this PFPower audio/video component style uninterruptible power supply, for a period of three (3) years from the date of purchase, that the unit shall be free of defects in design, material, or workmanship, and Panamax will repair or replace any defective unit.

### Panamax Power Conditioner Limited Product Warranty

PFPower warrants to the purchaser of this PFPower audio/video component style power conditioner, for a period of three (3) years from the date of purchase, that the unit shall be free of defects in design, material or workmanship, and PFPower will repair or replace any defective unit.

### Upgrade Policy

Valid only in the United States and Canada

If your PFPower UPS sacrifices itself while protecting your connected equipment, you have an option to upgrade to the latest technology. Please go to our web sites [www.panamax.com](http://www.panamax.com) or [www.furmansound.com](http://www.furmansound.com) or contact Customer Relations at 800-472-5555 for details.

### Warning Notice

#### WARRANTY LIMITATION FOR INTERNET PURCHASERS

PFPower products purchased through the Internet do not carry a valid Connected Equipment Protection Policy unless purchased from an Authorized PFPower Internet Dealer! Authorized PFPower Internet Dealers have sufficient expertise to insure warranty compliant installations. For a list of Authorized PFPower Internet Dealers go to [www.panamax.com](http://www.panamax.com) or [www.furmansound.com](http://www.furmansound.com)

**CAUTION** Audio/Video, computer and/or telephone system installations can be very complex systems, which consist of many interconnected components. Due to the nature of electricity and surges, a single protector may not be able to completely protect complex installations. In those cases, a systematic approach using multiple protectors must be employed. Systematic protection requires professional design. AC power, satellite cables, CATV cables, A/V signal line cables or telephone/network lines entering the system that do not pass through a PFPower surge protector will render the PFPower connected equipment protection policy null and void. For additional information on how to protect your system, please contact PFPower before connecting your equipment to the surge protector.

More detailed information is available at [www.panamax.com](http://www.panamax.com) or [www.furmansound.com](http://www.furmansound.com).

If you have any questions regarding these requirements, please contact Customer Relations.

MODEL - M1500-UPS-PFP  
DOC. NO. Q01L0047\_EN REV. B  
Effective Date 5/08



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