APC

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User's Manual

English

APC Smart-UPS®

1400 VA 2U Rack Mount

Uninterruptible Power Supply

100 Vac

Chapter 5: Maintenance and Troubleshooting

CHAPTER 1: SAFETY INFORMATION

This Safety Guide contains important instructions that should be followed during installation and maintenance of the APC equipment and batteries. It is intended for APC customers who setup, install, relocate, or maintain APC equipment.

Conventions Used in this Manual

This section defines the symbols used throughout this manual. Carefully read all information boxes and abide by the instructions.

The WARNING sign denotes a serious hazard. It calls attention to a procedure, practice, condition, or the like, which, if not correctly performed or adhered to, could result in injury to personnel.

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of all or part of the product.

The NOTE sign denotes important information. It calls attention to a procedure, practice, condition, or the like, which is essential to highlight.

Handling Safety

- Be careful. Do not lift heavy loads without assistance.

    18 – 32 kg (40 – 70 lb.)

- This equipment is intended for installation in a temperature-controlled indoor area (see the *Specifications* at the APC web site for exact temperature range), free of conductive contaminants.

Electrical Safety

- To reduce the risk of fire, connect only to a circuit provided with a 20 A maximum branch circuit overcurrent protection in accordance with the National Electrical Code ANSI/NFPA.

- Do not work alone under hazardous conditions.

- Check that the power cord(s), plug(s), and sockets are in good condition.

Deenergizing Safety

- This UPS has an internal energy source (the battery), the output may be energized when the unit is not connected to an AC power outlet.

- To deenergize the UPS: first press the Off button to switch the outputs off. Next disconnect the UPS from the AC power outlet, then, disconnect the battery and finally, press the ON button to ensure that the internal capacitors are discharged.

- The UPS includes a protective earth conductor which carries the leakage current from the load devices (computer equipment). Total leakage current must not exceed 3.5 mA.

- Use of this equipment in life support applications where failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly effect its safety or effectiveness is not recommended.

Battery Safety

- This equipment contains potentially hazardous voltages. Do not attempt to disassemble the unit. The only exception is for battery replacement using the procedures below. Except for the battery, the unit contains no user serviceable parts. Repairs are performed only by factory trained service personnel.

- Do not dispose of batteries in a fire. The batteries may explode.

- Do not open or mutilate batteries. They contain an electrolyte which is toxic and harmful to the skin and eyes.

- To avoid personal injury due to energy hazard, remove wrist watches and jewelry such as rings when replacing the batteries. Use tools with insulated handles.

- Replace batteries with the same number and type of batteries as originally installed in the equipment.

Recycling of Batteries

Return the battery tray to APC using the package in which your replacement tray shipped. (See *How to Contact APC*, page 3, for details.) The battery replacement kit includes a new battery tray. See your dealer or *Replacing the Battery*, page 16, for information on replacement battery kits.

CHAPTER 2: BASICS

About APC

American Power Conversion Corporation (APC) is the leading national and international manufacturer of state of the art uninterruptible power supplies, redundant switches, power management software, and related equipment. APC products protect hardware, software, and data from the threat of power disturbances in business and government offices throughout the world.

About Your New UPS

This APC Uninterruptible Power Supply (UPS) is designed to prevent blackouts, brownouts, sags and surges from reaching your computer and other valuable electronic equipment. This UPS also filters out small utility line fluctuations and isolates your equipment from large disturbances by internally disconnecting from the utility line, while supplying power from its internal batteries until the utility line returns to safe levels.

The UPS is ready to be mounted in a 46.5 cm (19-inch wide) EIA/IEC rack cabinet.

How to Contact APC

Internet: http://www.apcc.com/support/contact

CHAPTER 3: INSTALLATION

Unpacking

APC has taken care to design robust packaging for your product. However, accidents and damage may occur during shipment.

Inspection

Inspect the UPS upon receipt. Notify the carrier and dealer if there is damage. The packaging is recyclable; save it for reuse or dispose of it properly.

Contents

The shipping package contains the UPS, its front panel bezel (disconnected from the unit), mounting rails, and a literature kit (containing mounting hardware and product documentation).

Placement
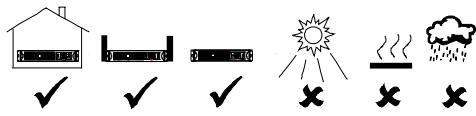
Install the UPS in a protected area that is free of excessive dust and has adequate air flow. Do not operate the UPS where the temperature and humidity are outside the specified limits.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the warranty.

How to Install Your Smart-UPS

To install the UPS follow these steps:

1. Mount the UPS in the rack.
2. Connect the battery and attach the front panel bezel.
3. Connect power and the equipment to the UPS.
4. Turn on the UPS.
5. Install optional PowerChute® software (sold separately).

This section describes each step in detail.

Mount the UPS in the Rack

STOP | **Select a location with adequate air flow that is free from excessive dust. Ensure that the air vents on the front and rear of the UPS are not blocked. Allow at least 2.54 cm (1 inch) of space on both sides.**

⚠ | The UPS requires two people to install due to its weight.

To lighten the UPS, you may remove the batteries while you mount the unit in the rack. Refer to *Replacing the Battery*, page 15, for instructions on removing the batteries.

The UPS comes with standard 46.5-cm (19-inch) rack mount brackets (ears) and cleats installed and mounting rails for rack mounting included. The rails support the UPS and allow adequate air flow. There are two steps to install the UPS in a rack. This section describes each in detail.

1. Install the mounting rails in the rack (required for four-post racks only).

2. Load the UPS into the rack.

STOP | **Check the rack to make sure it will not tip after moving the mounting brackets.**

Install the Mounting Rails in the Rack (Four-Post Rack Installation Only)
Install the mounting rails in the rack. Directions are included with the rail kit.

Load the UPS into the Rack

⚠ | Due to the weight of the UPS, two people are required to install it in the rack. To lighten the UPS, you may remove the batteries while you mount it in the rack. Refer to *Replacing the Battery*, page 16, for instructions on how to remove the batteries.

Four-Post Racks
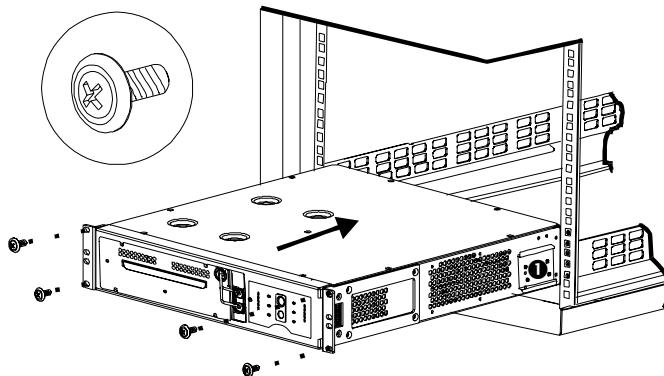
1. Supporting the UPS from both sides, carefully align the unit with the rails.

2. Each side of the UPS has a cleat ❶ that must slide into the groove on the rail. Insert each cleat into its groove and slide the UPS into position.

3. Insert the four (4) ornamental screws supplied with the UPS through the mounting brackets and into the top and bottom holes in the U-space.

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Two-Post Racks
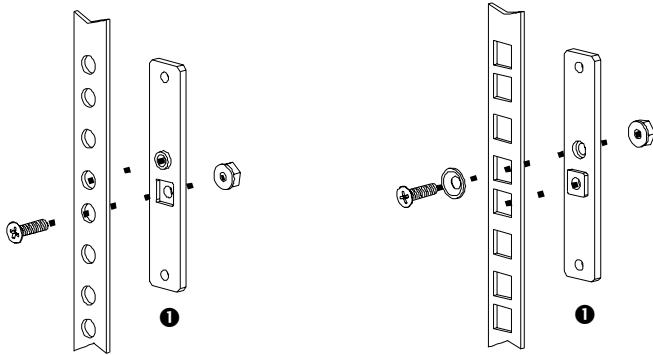
1. If the rack holes are not 10-32 threaded, first attach the backing plate supplied (870-1148) ❶ to the rack.

2. Support the UPS from the front and back. Insert the four (4) ornamental screws supplied with the UPS through the mounting brackets and into the top and bottom holes in the U-space as shown for the Four-Post Rack. Screw them into the threaded holes of the backing plate.

Removing the UPS from the Rack

Due to the weight of the UPS, two people are required to remove it from the rack.

1. Remove the front panel bezel: Face the front of the UPS, and, using both hands, insert each index finger behind the lip of the curved section of the front panel bezel and pull towards you.

2. Unscrew the four ornamental screws (two screws on each mounting bracket).

3. Position one person in front of the rack and the second person either behind or on one side of the UPS for additional support.

4. Using the battery tray handle to support the front of the unit, slide the UPS partially out of the rack.

5. Supporting the UPS from the bottom or rear of the unit, slide the UPS fully out of the rack.

Connect the Battery and Attach the Front Panel Bezel

The UPS is shipped without its battery connected and the front panel bezel installed (it is packaged separately within the main box). You must connect the battery and install the plastic front panel bezel before the installation is complete.
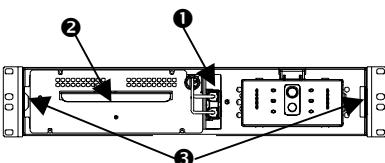
1. Facing the front of the UPS, locate the battery cable (in the center of the unit) and remove the tape to expose the cable connector.

2. Locate the UPS battery connector ❶ which is to the right of the battery tray ❷ and recessed. Connect the battery cable connector to the UPS connector. Press firmly to ensure that the connection is tight. You will hear a "snap" when the connector is properly seated. Also, as a visual indication, the back of the connector should be recessed (~0.64 cm) from the sheet metal

on the front of the unit. You may see small sparks when connecting the battery.

3. Tuck the white battery cable cord into the space above the UPS connector.

4. Unpack the front panel bezel and hold it with the cutout section on the right. Align the tabs on the side of the bezel with the slots on the front of the UPS ❸ and firmly snap it into place.

Connect Power and Equipment to the UPS

STOP
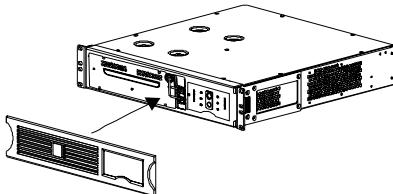
Use an APC supplied cable to connect to the Computer Interface Port. DO NOT use a standard serial interface cable since it is incompatible with the UPS connector.

- Plug the UPS into a standard receptacle.

- Plug the equipment into the back of the UPS.

- Do not plug laser printers into a UPS of 1000 VA or less, due to the large increase in power consumption when printing.

- Turn on all connected equipment (the equipment will not be powered until the UPS is turned on).

- Add any optional accessories. See the literature accompanying the accessory for details.

- Connect ground leads to the TVSS screw (optional). The transient voltage surge suppression (TVSS) screw provides grounding through the UPS's power cord ground conductor. See *Rear Panel,* page 13**,** for the location of the screw. To make the connection, loosen the screw and connect the surge suppression device's ground lead. Tighten the screw to secure the lead.

Turn on the UPS

⚠ Make sure the battery is connected before turning on the UPS!

- Press the UPS's on button, located on the front panel, to power-up your UPS. This will power-up connected equipment.

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⚠ The UPS charges its battery whenever it is connected to utility power. The battery charges fully during the first four hours of normal operation. ***Do not*** expect full run time during this initial charge period.

- The unit performs a self-test automatically when turned on, and every two weeks thereafter (by default).

Install Optional PowerChute Software (sold separately) and Accessories

For additional computer system security, install PowerChute UPS monitoring software. PowerChute is sold separately. It provides automatic unattended shutdown capabilities on most major network operating systems.

⚠ This UPS is equipped with an accessory slot. See the APC website (apcc.com) for available accessories.

If a standard accessory is installed on this UPS, follow the installation instructions included with the accessory.

CHAPTER 4: OPERATION

Front Panel

This rack mount UPS has the power control and operating indicators located on the front panel.
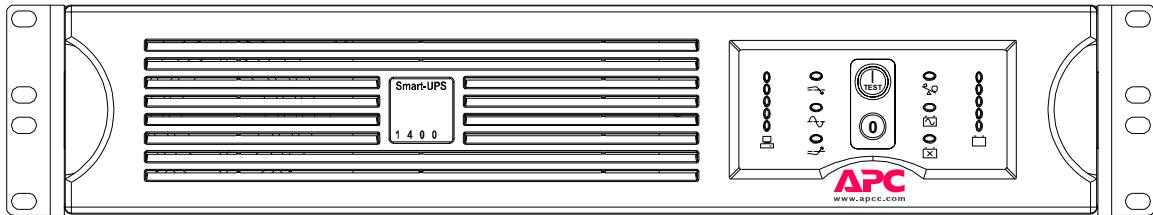
Operation

The ON and OFF buttons control the power to the outlets on the UPS. They can be used as a master On/Off switch for the connected equipment. The charger and communication circuits of the UPS remain operational as long as it is plugged into an acceptable utility power outlet.

Power On

Press and release the large, upper button labeled "I TEST" to supply power to the connected equipment. The equipment is immediately powered while the UPS performs a self-test.

Power Off

Press and release the small, lower button labeled "0" to turn off power to the connected equipment.

> ⚠ Whenever the UPS is plugged in and utility voltage is present, the charger maintains battery charge.

Load Bar Graph
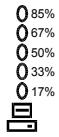
The 5-LED display on the left of the front panel shows the percentage of available power being used by the connected equipment (load). The display shows the voltage level between the highest LED lit and the next higher value. For example, if three LEDs are lit, the connected equipment is drawing between 50% and 67% of the UPS's capacity. If all five LEDs are lit, the connected equipment is drawing between 85% and 100% of capacity. Thoroughly test your complete system to make sure that the UPS will not become overloaded. In the graphic to the left, the load capacity threshold is listed next to the LED (these are not shown on the actual UPS).

Self-Test

During the self-test, the UPS briefly operates the connected equipment on-battery. If the UPS passes the self-test, it returns to on-line operation. If the UPS fails the self-test it immediately

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returns to on-line operation and lights the replace battery LED. The connected equipment is not affected by a failed test. Recharge the battery for 24 hours and perform another self-test. If it fails, the battery must be replaced. See ***Replacing the Battery***, page 16, for details.

Automatic Self-Test

The UPS performs a self-test automatically when turned on, and every two weeks thereafter (by default). Automatic self-test eases maintenance requirements by eliminating the need for periodic manual self-tests.

Manual Self-Test

Press and hold the on button (on the front panel) for a few seconds before the self-test will begin.

Utility Power

During normal operation, the UPS monitors the utility power and delivers power to the connected equipment. If your system is experiencing excessive periods of high or low voltage, have a certified electrician check your facility for electrical problems. If the problem continues, contact the utility company for further assistance.

On-line Indicator

The on-line indicator illuminates when the UPS is supplying utility power to the connected equipment. If the indicator is not lit, the UPS is supplying battery power and the UPS will sound an alarm, four beeps every 30 seconds.

Utility Voltage Bar Graph

O 119
O 109
O 100
O 91
O 81

This UPS has a diagnostic feature that displays the utility voltage. With the UPS plugged into the normal utility power, press and hold the on button to see the utility voltage bar graph display. After a few seconds the 5-LED display on the right of the front panel shows the utility input voltage. Refer to the figure to the left for the voltage reading (values are not listed on the UPS).

The display indicates that the voltage is between the highest LED lit and the next higher value. For example, with three LEDs lit, the input voltage is between 91 and 109 Vac. If no LEDs come on and the UPS is plugged into a working AC power outlet, the line voltage is extremely low. If all five LEDs come on, the line voltage is extremely high and should be checked by an electrician.

The UPS starts a self-test as part of this procedure. The self-test does not affect the voltage display.

Voltage Trim

This LED comes on to indicate that the UPS is compensating for a high utility voltage.

Voltage Boost

This LED comes on to indicate that the UPS is compensating for a low utility voltage.

Battery Power

If the utility power fails, the UPS can provide power to the connected equipment from its internal battery for a finite period. The UPS sounds an alarm, four beeps every 30 seconds, while operating on battery power. The alarm stops when the UPS returns to on-line operation.

On-Battery Power Indicator

When the on-battery power indicator is lit the UPS is supplying battery power to the connected equipment. Refer to ***On-Battery Operation***, page 13, for details.

Battery Charge Bar Graph

96%
72%
48%
24%
0%
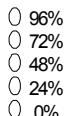
The 5-LED display on the right of the front panel shows the present charge of the UPS's battery as a percentage of the battery's capacity. When all five LEDs are lit, the battery is fully charged. The LEDs extinguish, from top to bottom, as the battery capacity diminishes. The battery capacity threshold is shown in the figure to the left (it is not listed on the front panel display).

As a low battery warning, any LEDs illuminated (for the given capacity) will flash. The low battery warning setting can be changed from the rear panel (see ***Low Battery Warning Level***, page 13) or through the optional PowerChute software.

Overload

When the UPS is overloaded (when the connected equipment exceeds the maximum specified in the maximum load defined in the *Specifications* at the APC web site), the overload LED comes on and the UPS emits a sustained tone. The alarm remains on until the overload is removed. The UPS continues to supply power as long as it is on line and the breaker does not trip, but it will not provide power from batteries in the event of a utility voltage interruption. Disconnect nonessential equipment from the UPS to eliminate the overload. If a continuous overload occurs while the UPS is on battery, the UPS will turn off its output in order to protect itself from possible damage.

Replace Battery

If the battery fails a self-test, the UPS emits short beeps for one minute and the replace battery LED illuminates. (If the LED flashes, the battery is disconnected.) The UPS repeats the alarm every five hours. Perform the self-test procedure after the battery has charged for 24 hours to confirm the replace battery condition. The alarm will stop if the battery passes the self-test.

Low Battery

When the UPS is operating on-battery and the energy reserve of the battery runs low, the UPS beeps continuously (by default) until the UPS shuts down from battery exhaustion or returns to on-line operation. The low battery warning interval can be changed through optional software.

Shutdown Mode (via optional software or an accessory)

In shutdown mode the UPS stops supplying power to the connected equipment, waiting for the return of utility power. If there is no utility power present, external devices (e.g., servers) connected to the computer interface or the accessory slot can command the UPS to shut down. This is normally done to preserve battery capacity after the graceful shutdown of protected servers. The UPS will scroll the front panel indicators sequentially in shutdown mode.

Rear Panel

The rear panel has the input and output connectors, computer interface port, and manual settings for the low battery warning level and voltage sensitivity indicator.
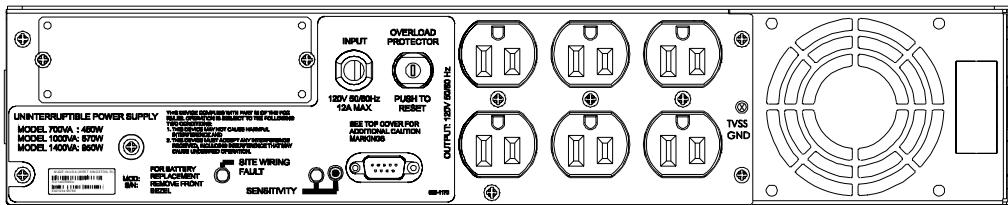
Computer Interface Port

Optional power management software and interface kits can be used with this UPS. **Use only interface kits supplied or approved by APC.** If used, connect the interface cable to the 9-pin computer inter-face port on the back panel of the UPS. Secure the connector's screws to complete the connection.

Use an APC supplied cable to connect to the Computer Interface Port. DO NOT use a standard serial interface cable since it is incompatible with the UPS connector.

TVSS Screw

The UPS features a transient voltage surge-suppression (TVSS) screw for connecting the ground lead on surge suppression devices, such as telephone and network line protectors. Refer to *Connect Power and Equipment to the UPS,* page 7, for information.

Voltage Sensitivity

The UPS detects line voltage distortions such as spikes, notches, dips, and swells, as well as distortions caused by operation with inexpensive fuel-powered generators. By default, the UPS reacts to distortions by transferring to on-battery operation to protect the connected equipment. In areas where power quality is poor, the UPS may frequently transfer to on-battery operation. If the connected equipment can operate normally under such conditions, reduce the sensitivity setting to conserve battery capacity and service life.

To reduce UPS sensitivity, press the Sensitivity button on the rear panel. Use a pointed object such as a pen to press the button. Press it once to set the UPS's sensitivity to **reduced**. Press it again to set the sensitivity to **low**. Press the button a third time to reset **normal** sensitivity. The Sensitivity can also be changed through software.

normal **Normal:** When the UPS is set to normal sensitivity, the LED is brightly lit.

reduced **Reduced:** When it is set to reduced sensitivity, the LED is dimly lit.

low **Low:** When it is set to low sensitivity, the LED is off.

Low Battery Warning Level

By default, the low battery warning occurs when there are approximately two minutes of on-battery run time remaining. This may not be enough time to gracefully shut down some protected computer systems.

To change the warning interval, press the rear panel Sensitivity button while pressing and holding the front-panel on button.

☼ 2 min.   **Brightly lit:** The low battery warning interval is approximately two minutes.

☼ 5 min.   **Dimly lit:** The low battery warning interval is approximately five minutes.

● 7 min.   **Off:** The low battery warning interval is approximately seven minutes.

On-Battery Operation

The Smart-UPS will switch to battery operation automatically should the utility power fail. While running on battery, an internal alarm will sound (periodic beeps). Press the on button, on the front panel, to silence the UPS alarm (for the current alarm only). The optional PowerChute software allows you to change the audible indicator.

If the utility power does not return, the UPS will continue supplying power to the connected equipment until exhausted. A continuous beeping will sound approximately two minutes before the UPS's final low battery shutdown. If using a computer, you must manually save your files and power down before the UPS turns itself off, unless you are using optional PowerChute interface software that provides automatic, unattended shutdown.

Refer to On-Battery Run Time, page 20, for approximate run time data.

User Configuration Items

Note: Setting these items requires software or optional hardware.			
Function	**Factory Default**	**User Selectable Choices**	**Description**
Automatic Self-Test	Every 14 days (336 hours)	Every 7 days (168 hours), On Startup Only, No Self-Test	Sets the interval at which the UPS will execute a self-test. Refer to your software manual for details.
UPS ID	UPS_IDEN	Up to eight characters to define the UPS.	Use this field to uniquely identify the UPS for network management purposes.
Date of Last Battery Replacement	Manufacture Date	Date of Battery Replacement	Reset this date when you replace the battery tray.
Minimum Capacity Before Return from Shutdown	0 percent	15, 25, 35, 50, 60, 75, 90 percent	The UPS will charge its batteries to the specified percentage before return from a shutdown.
Sensitivity	Normal	Reduced, Low	Set lower than normal sensitivity to avoid lowered battery capacity and service life in situations where the connected equipment can tolerate minor power disturbances.
Duration of Low Battery Warning	2 minutes	5, 7, 10, 12, 15, 18, 20 minutes	Sets the time before shutdown at which the UPS issues a low battery warning. Set it higher than the default if the OS needs more time for a graceful shutdown.
Alarm Delay After Line Fail	5 second delay	30 second delay, At Low Battery Condition, No	To avoid alarms for minor power glitches, set the alarm delay.
Shutdown Delay	20 seconds	0, 60, 120, 240, 480, 720, 960 seconds	Sets the interval between when the UPS receives a shutdown command and when shutdown occurs.
Synchronized Turn-on Delay	0 seconds	20, 60, 120, 240, 480, 720, 960 seconds	The UPS will wait the specified time after the return of utility power before turn-on; for example, to avoid branch circuit overload.
High Transfer Point	108 Vac	110, 112, 114 Vac	To avoid unnecessary battery usage, set the High Transfer Point higher if the utility voltage is chronically high and the connected equipment is known to work under this condition.
Low Transfer Point	92 Vac	86, 88, 90 Vac	Set the Low Transfer Point lower if the utility voltage is chronically low and the connected equipment can tolerate this condition.

CHAPTER 5: MAINTENANCE AND TROUBLESHOOTING

Storage

This section describes how to store the UPS while it is not in use. To remove the UPS from the rack, see *Removing the UPS from the Rack*, page 6.

Storage Conditions

Store the UPS covered and flat (rack mount orientation) in a cool, dry location, with its battery fully charged. Disconnect any cables connected to the computer interface port to avoid unnecessarily draining the battery

Extended Storage

At -15 to +30 °C (+5 to +86 °F), charge the UPS's battery every six months.
At +30 to +45 °C (+86 to +113 °F), charge the UPS's battery every three months.

Replacing the Battery

Please read *Chapter 1: Safety Information*, page 1, before replacing the battery tray. Once the battery is disconnected, the connected equipment is not protected from power outages.

This UPS has an easy to replace hot-swappable battery tray. Battery replacement is a safe procedure, isolated from electrical hazards. You may leave the UPS and the protected equipment on for the following procedure. See your dealer or APC (refer to *How to Contact APC*, page 3) for information on replacement battery cartridges.

Smart-UPS Model	Replacement Battery Cartridge
SU1400RMJ2U	RBC24-J

1. The battery tray is accessible from the front of the UPS.
2. Be careful removing the battery tray – it is heavy.
3. This procedure requires a Phillips head screwdriver.
4. Small sparks at the battery connectors are normal during re-connection.
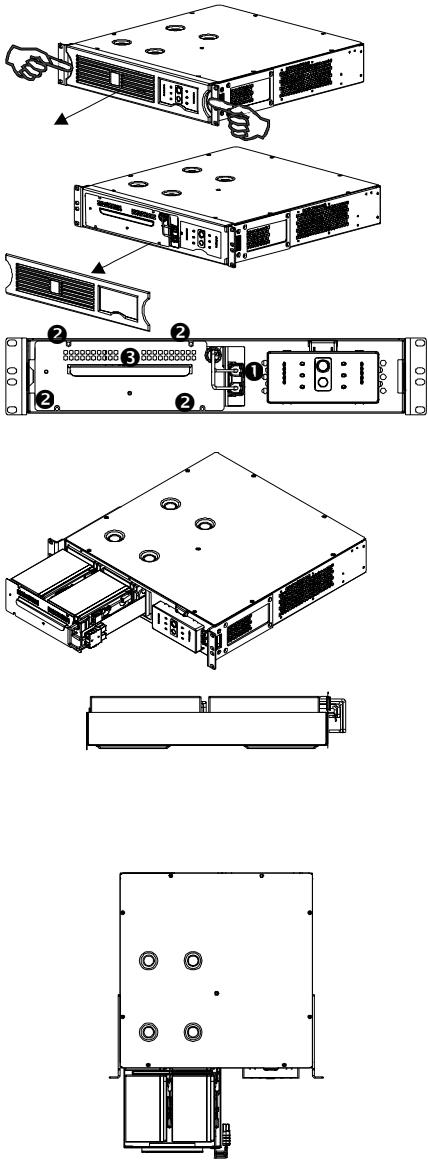
1. Face the front of the UPS and, using both hands, insert each index finger behind the lip of the curved section of the front panel bezel and pull towards you. The front panel bezel will unsnap.

2. Set the bezel aside.

3. Take out the white cord, which is tucked into the space above the battery connector ❶. Grasp the cord and pull firmly towards you to disconnect the battery.

4. Use a Phillips head screwdriver to remove the four (4) screws ❷ that secure the battery tray. Set the screws aside.

5. Use the battery tray handle ❸ to slide the tray out halfway. Then hold the tray from the sides and slide it out to the maximum extended position. A stop tab ❹ on the bottom of the tray will prevent the tray from coming out completely.

6. Carefully lift the tray up so that the stop tab ❹ clears the ledge on the unit.

7. Return the battery tray to APC using the package in which your replacement tray shipped. (See *How to Contact APC*, page 3, for details.) The battery replacement kit includes a new battery tray.

8. Hold the new tray on the sides and align it with the opening.

9. Raise the back of the tray up slightly to position the stop tab on the inside of the opening. Then level the tray and push it in completely.

10. Remove the tape on the new battery tray connector to expose the cable connector.

11. Locate the UPS battery connector ❶ which is to the right of the battery tray and recessed. Connect the battery cable connector to the UPS connector. Press firmly to ensure that the connection is tight. You will hear a "snap" when the connector is properly seated.

12. Replace the four (4) screws removed in step 4.

13. Tuck the white battery cable cord neatly into the space above the UPS connector.

14. Hold the front panel bezel with the cutout section on the right. Align the tabs on the side of the bezel with the slots on the front of the UPS ❸ and firmly snap it into place.

Troubleshooting

Use the chart below to solve minor UPS installation problems. Contact APC Technical Support Staff (see **How to Contact APC**, page 3) for assistance with complex UPS problems.

Problem and Possible Cause	Solution
UPS will not turn on.	
• ON button not pushed.	Press the ON button once to power the UPS and the connected equipment.
• UPS not connected to AC power supply.	Check that the power cable from the UPS to the utility power supply is securely connected.
• UPS's input circuit breaker tripped.	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker (on back of UPS) by pressing the plunger back in.
• Very low or no utility voltage.	Check the AC power supply to the UPS with a table lamp. If very dim, have the utility voltage checked.
• Battery not connected properly.	Check that the battery connector is fully engaged.
UPS will not turn off.	
• Internal UPS fault.	Do not attempt to use the UPS. Unplug the UPS and have it serviced immediately.
UPS operates on-battery although normal line voltage exists.	
• UPS's input circuit breaker tripped.	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker (on back of UPS) by pressing the plunger back in.
• Very high, low, or distorted line voltage. Inexpensive fuel powered generators can distort the voltage.	Move the UPS to a different outlet on a different circuit. Test the input voltage with the utility voltage display. If acceptable to the connected equipment, reduce the UPS's sensitivity. See **Voltage Sensitivity**, page 12, for procedures.
UPS beeps occasionally.	
• Normal UPS operation.	None. The UPS is protecting the connected equipment.
UPS does not provide expected backup time.	
• The UPS's battery is weak due to a recent outage or is near the end of its service life.	Charge the battery. Batteries require recharging after extended outages. Also, they wear faster when put into service often or when operated at elevated temperatures. If the battery is near the end of its service life, consider replacing the battery even if the replace battery indicator is not yet lit.
• The UPS is overloaded.	Check the UPS's load bar display. Unplug less needed equipment, such as printers.
Front panel indicators (the six in the center) light sequentially.	
• The UPS has been shut down by remote control.	None. The UPS will restart automatically when utility power returns. The indicators illuminate from top to bottom then bottom to top.
• The UPS has been put into sleep mode by remote control.	None. The UPS will restart automatically when the sleep timer expires. The indicators illuminate from top to bottom then back to the top.

UPS is plugged into wall outlet and only the battery charge bar graph is lit.	
• The UPS is shut down and the battery is discharged from an extended outage.	None. The UPS will return to normal operation when the power is restored and the battery has a sufficient charge.
Replace battery light is lit and the UPS beeps for one minute every five hours.	
• Weak batteries.	Charge the batteries for 24 hours and perform self-test (see *Self-Test*, page 9) to see if it clears.
• Bad or expired battery.	Replace the batteries. Refer to *Replacing the Battery*, page 15.
Replace battery light flashes, battery charge bar graph is off, and the UPS beeps continuously.	
• Battery not connected properly.	Check that the battery connector is fully engaged.
Some or all front panel indicators are flashing.	
• Internal UPS fault or battery charger failure.	Do not attempt to use the UPS. Turn the UPS off and have it serviced immediately.

With the warning interval setting shown above, the battery graph flashes, and the UPS operates normally when the battery capacity is insufficient to give the full warning time that the unit is set for. The table bellow shows all conditions that could be interpreted as "flashing".

Condition	Display	Beeper
Low battery, load still powered (Q bit 6 set)	One or more LEDs flashing on the battery capacity bar graph with either the on-line LED or on battery LED on	Continuous beeping (user settable)
Low battery shut down (8 bit 0 set, Q bit 6 set if flashing)	Only battery capacity bar graph LEDs on or flashing	None
Standby enable (~ bit 7 set, Q bit 6 set if flashing)	Only battery capacity bar graph LEDs on or flashing	None
Boost or trim relay fault (' bit 6 set)	Center 6 LEDs flashing in unison	None
Sleep, i.e., delayed wake up (8 bit 3 set)	Center 6 LEDs (boost, overload, on-line, on battery, trim, replace battery) scrolling down vertically (then back to top)	None
Shut down till power returns (8 bit 4 set)	Center 6 LEDs (boost, overload, on-line, on battery, trim, replace battery) scrolling up-down vertically	None
Battery overvoltage, i.e., charger failure (8 bit 5 set)	Center 6 LEDs flashing in unison with on-line, boost, trim, and/or on battery LEDs staying on and with both bar graphs functioning 'normally'	Continuous beeping
DC imbalance (' bit 4 set)	Left half of LEDs (power bar graph, boost, on-line, trim) flashing in unison.	None
Battery disconnected (' bit 5 set)	Replace battery LED flashing and battery capacity bar graph off; all other LEDs unaffected	Continuous beeping
Output overvoltage (' bit 7 set)	Right half of LEDs (battery capacity bar graph, overload, on battery, replace battery) flashing in unison.	None

Service and Transport

If the UPS requires service do not return it to the dealer! Follow these steps:

1. Review the problems discussed in *Troubleshooting*, page 17, to eliminate common problems.

2. Verify that no circuit breakers are tripped – this is the most common UPS problem!

3. If the problem persists, call customer service, refer to *How to Contact APC*, page 3, or visit the APC Internet website (www.apcc.com).

    - Note the model number of the UPS, the serial number, and the date purchased. A technician will ask you to describe the problem and try to solve it over the phone, if possible. If this is not possible the technician will issue a Returned Material Authorization Number (RMA#).

    - If the UPS is under warranty, repairs are free. If not, there is a repair charge.

4. Pack the UPS in its original packaging. If the original packing is not available, ask customer service about obtaining a new set.

    Pack the UPS properly to avoid damage in transit. Never use Styrofoam beads for packaging. Damage sustained in transit is not covered under warranty

5. Mark the RMA# on the outside of the package.

6. Return the UPS by insured, prepaid carrier to the address given to you by Customer Service.

Always DISCONNECT THE BATTERIES before shipping the UPS to avoid damage during transport. (U.S. Federal Regulation *requires* that batteries be disconnected during shipment.) The batteries may remain in the UPS; they do not have to be removed.

This requirement applies whether the UPS is moved indoors or out, alone or installed in an equipment rack or system.

Regulatory Agency Approvals

LISTED 42C2
E95463

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case, the user may be required to take corrective actions.

On-Battery Run Time

UPS battery life differs based on usage and environment.

Load (VA)	Load (watts)	Run Time (minutes)
50	30	251
100	60	163
200	125	90
300	185	57
400	250	39
500	320	29
600	385	21
700	450	18
800	515	15
900	580	12
1000	670	11
1200	830	8
1400	950	7

Limited Warranty

American Power Conversion (APC) warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. To obtain service under warranty you must obtain a Returned Material Authorization (RMA) number from customer support. Products must be returned with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. This warranty does not apply to equipment that has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser who must have properly registered the product within 10 days of purchase.

EXCEPT AS PROVIDED HEREIN, AMERICAN POWER CONVERSION MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

EXCEPT AS PROVIDED ABOVE, IN NO EVENT WILL APC BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THIS PRODUCT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise.