

June 1999  
ECG0141/0699-A

Prepared by ECG Technology  
Communications Group

Compaq Computer Corporation

**Contents**

**Product Overview**.....3  
**Benefits at a Glance** .....4  
**Support for Critical Equipment** .....5  
**Modes of Operation**.....5  
**Compaq UPS Hardware**  
**Option Cards** .....6  
    Multi-Server UPS Option Card .....6  
    Compaq Scalable UPS Option Card .....9  
**Compaq Power Management Software** ..... 11  
    Overview ..... 11  
    Software to support Multi-Server Configurations ..... 11  
    Software to Support the Compaq Scalable UPS Card ... 12  
    Field Upgradeable via Firmware Flash..... 12  
**Extension of System Uptime**.... 13  
    Compaq R6000 ERM Battery System ..... 13  
    Hot Swappable Batteries..... 14  
    Compaq Enhanced Battery Management ..... 14  
    Compaq High to Low Voltage Transformer (250VA) Kit..... 15  
**Compaq Quality Assurance** ..... 15  
    Warranty ..... 15  
**Questions and Answers**..... 16

# Compaq R6000 UPS Ownership Benefits



The Compaq R6000 Series Uninterruptible Power System is the most powerful and versatile disaster protection system for Compaq Rack Systems available today. The Compaq R6000 UPS, with a unity rating of 6000VA/6000W, is the ideal power protection solution for mission critical enterprises to reduce down time and to ensure data protection in case of power outages or anomalies.

The Compaq R6000 UPS offers extended back-up protection of up to approximately four hours (depending on the load) when Extended Run Modules are added. The Compaq R6000 can also be integrated with Compaq UPS Hardware Option Cards to further extend and customize current load management and configuration capabilities, while still minimizing the cost of additional power protection.

Occupying only 6 U of rack space, the Compaq R6000 UPS is a space efficient solution to protect your business from costly system interruption or loss of data.

Help us improve our technical communication. Let us know what you think about the technical information in this document. Your feedback is valuable and will help us structure future communications. Please send your comments to: [glenn.clowney@compaq.com](mailto:glenn.clowney@compaq.com)

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Compaq R6000 UPS Ownership Benefits  
White Paper prepared by ECG Technology Communications Group

First Edition (June 1999)  
Document Number ECG0141/0699-A

## Product Overview



**Figure 1. Compaq R6000 Uninterruptible Power System**

The Compaq R6000 Series is a hard-wired, line-interactive Uninterruptible Power System (UPS) that occupies only 6 U of space. The R6000 UPS has many features that makes it both versatile and user-friendly:

- 6000W/ 6000VA unity rating
- Two communication ports
- Load segment control with five load segments available
- Front Panel LCD backlit display for easy configuration, monitoring, and operation
- Expanded support for Compaq Power Management Software
- Support for Extended Run Modules, that extend R6000 battery operation time
- Support for Compaq UPS Hardware Option Cards to customize and extend load segmentation and configuration capabilities
- High to Low Voltage Transformer available

## Benefits at a Glance

**More Critical Equipment Supported** – Rated at 6000W /6000VA, the Compaq R6000 UPS achieves a unity power rating. As a unity rated UPS, the Compaq R6000 delivers more true power, as measured in watts, than non-unity rated Uninterruptible Power Systems. In addition, the Compaq R6000 UPS allow you to support up to 40 percent more load of today’s enterprise computing Power Factor Corrected (PFC) equipment.

**Easy to Use Front Panel LED/LCD Display** – The R6000 UPS is equipped with an LCD backlit display for easy configuration, monitoring, and operation.

**More Flexibility with Compaq UPS Hardware Option Cards and Additional Load Segments** – Compaq UPS Option Cards seamlessly integrate into the two option slots in the rear panel of your Compaq R6000 UPS.

The Multi-Server UPS Card allows a single uninterruptible power system, the R6000 UPS, to serially connect with up to three computers or servers. The R6000 UPS when combined with the Compaq Scalable UPS Card allows one server to control up to three Compaq Uninterruptible Power Systems with independent load segment combinations totaling up to an 18,000VA/18,000W configuration.

**Field Upgradeable via Firmware Flash** – The Compaq R6000 incorporates a flashable microprocessor that allows firmware upgrades through the communications port. Compaq field service personnel can upgrade the Compaq R6000 UPS without bringing down the load.

**Efficient Design Saves Rack Space** – Occupying only 6 “U” (10.5 inches) of rack space, the Compaq R6000 reserves more room for additional servers or CPUs. The state-of-art power processing system design of the Compaq R6000 provides power density of 1kW per 1 “U” of rack space.

**Increases System Uptime with Extended Run Modules and Hot Swappable Batteries** – The rack-mounted Extended Run Module, occupying only 3U (5.25 inches) of rack space, provides additional back-up protection time of up to three hours at 1KW and 6 minutes at 6KW. The Compaq R6000 UPS is equipped with Hot Swappable Batteries, so you can replace batteries without powering down the connected equipment.

**Investment Protection with Compaq Enhanced Battery Management** – The Compaq R6000 UPS incorporates Enhanced Battery Management, is an advanced battery technology that uses a patented, three-stage charging technique that doubles battery service life, optimizes battery recharge time, and provides up to 60-day advanced notification of pending battery failure. With Enhanced Battery Management, you have a lower total cost of ownership and industry leading protection.

**Compaq Quality** – Backed by extensive testing and an unsurpassed warranty, you are guaranteed the highest level of system protection and performance with your Compaq R6000 Uninterruptible Power System.

## Support for Critical Equipment

The unique power processing system design of the Compaq R6000 UPS has a power density of 1kW per 1 U of rack space, equaling a total unity power rating of 6000VA/ 6000W. The Compaq R6000 unity power rating status is advantageous in that more true power (energy) is delivered. True power is dependent on three major elements: voltage required = V (volts), current required = A (amps), and the Power Factor =PF. The total number of watts or true power can be determined by multiplying the power factor by the total voltage. Another unique advantage of a power supply is more accurate load determination. The Compaq R6000 UPS can support up to approximately 40% more of power factor corrected equipment.

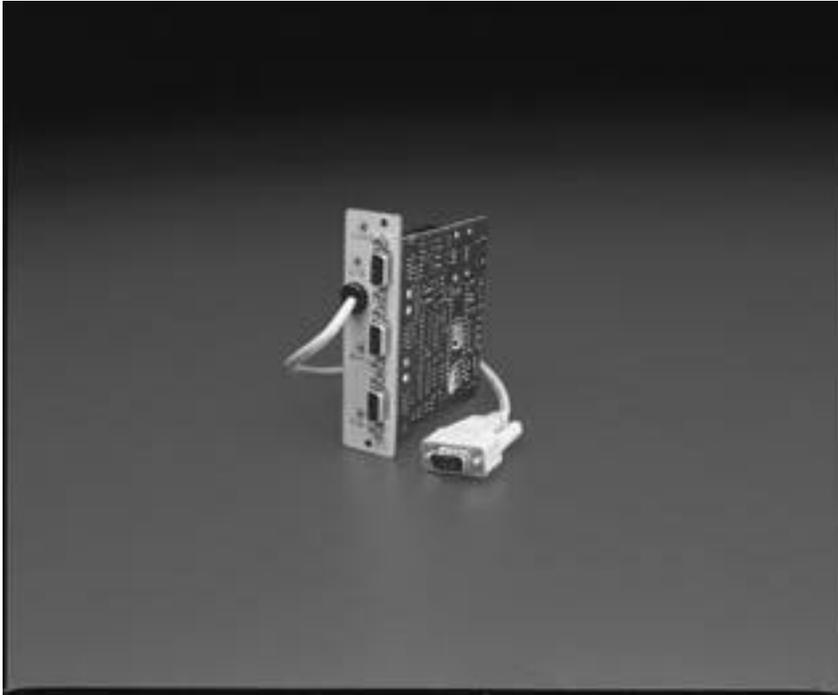
## Modes of Operation

The Compaq R6000 Uninterruptible Power System has five modes of operation, all of which can easily be manipulated through the ergonomic LCD display panel.

- **Standby Mode** – In standby mode, power is not available at the R6000 UPS output receptacles, but the battery supply is constantly being monitored and automatically charge when needed.
- **Operate Mode** – In operate mode, power is available at the R6000 UPS output receptacles, and the battery supply is constantly monitored and automatically charged when necessary.
- **Sleep Mode** – The Compaq R6000 UPS shuts down when the load that is supported is less than 8%. This is an optional mode and can be easily enabled or disabled using the LCD menu. This mode is helpful during shipping to ensure battery maintenance. Power automatically restores to the output receptacles when utility power is restored.
- **Bypass Mode** – The bypass switch is located on the rear panel and can easily be manually activated and deactivated. The R6000 UPS automatically switches to this mode when it is overloaded by 120%. Power is still available at the output receptacles; however, batteries are neither monitored nor charged in this mode.
- **Battery Mode** – Battery Mode indicates that UPS shutdown is in progress. When the R6000 UPS operates in battery mode, the batteries are not being charged, but power is still available at the UPS output receptacles.

## Compaq UPS Hardware Option Cards

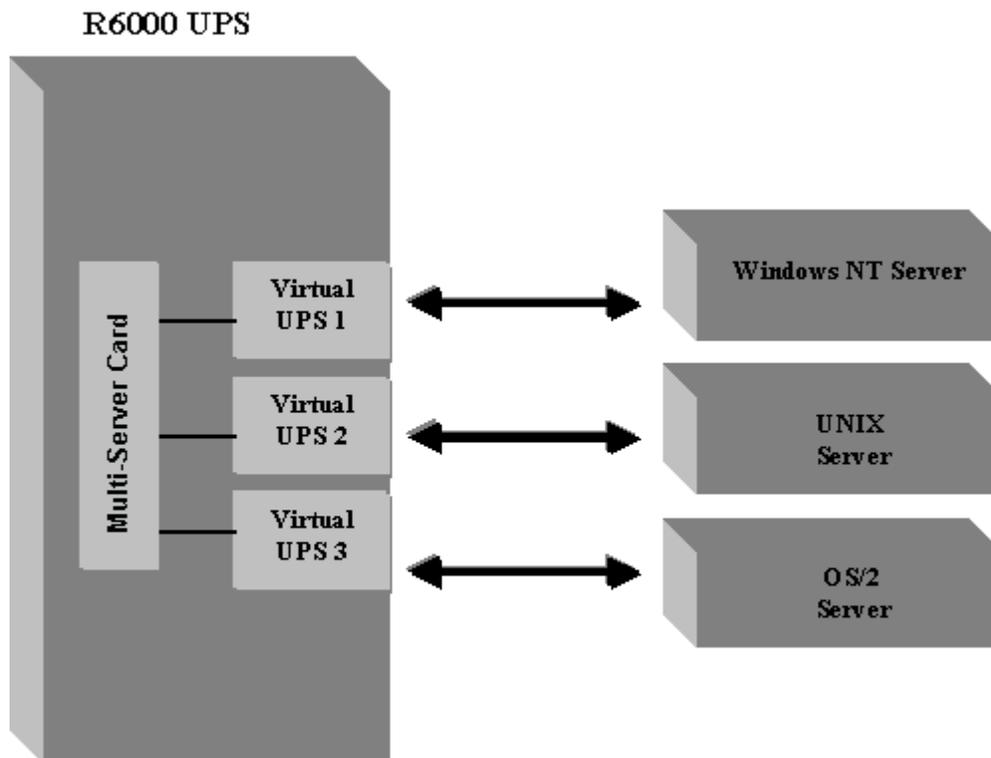
### Multi-Server UPS Option Card



**Figure 2. Compaq Multi-Server UPS Option Card**

The Compaq R6000 Uninterruptible Power System combined with the Compaq Multi-Server UPS Card manage independent workloads and optimize power management performance. The Multi-Server UPS Card allows a single uninterruptible power system, the R6000 UPS, to serially connect with up to three computers or servers. Each port on the Multi-Server Card creates a virtual UPS that can each be configured to control more than one load segment, resulting in one virtual UPS with multiple load segments per port. Each connected computer controls a virtual UPS.

The Compaq R6000 UPS can appear as one, two, or three virtual Uninterruptible Power Systems, instead of one, reducing the need to purchase an additional UPS for individual network management purposes. With the ability to split workloads on the R6000, each virtual UPS, created through the Multi-Server UPS Option Card, can easily be treated separately and can communicate with network servers independently. Each virtual UPS that connects to the Compaq R6000 can be run off of separate networks supported by different operating systems. For example, virtual UPS 1 can communicate with a Windows NT server on one network while virtual UPS 2 communicates with UNIX on a second network, and virtual UPS 3 communicates with OS/2 on a third network. Even if networks go down, this option allows direct communication from the R6000 to each server to conduct a graceful shutdown of each operating system. Refer to the following diagram for an example of multi-network communication.

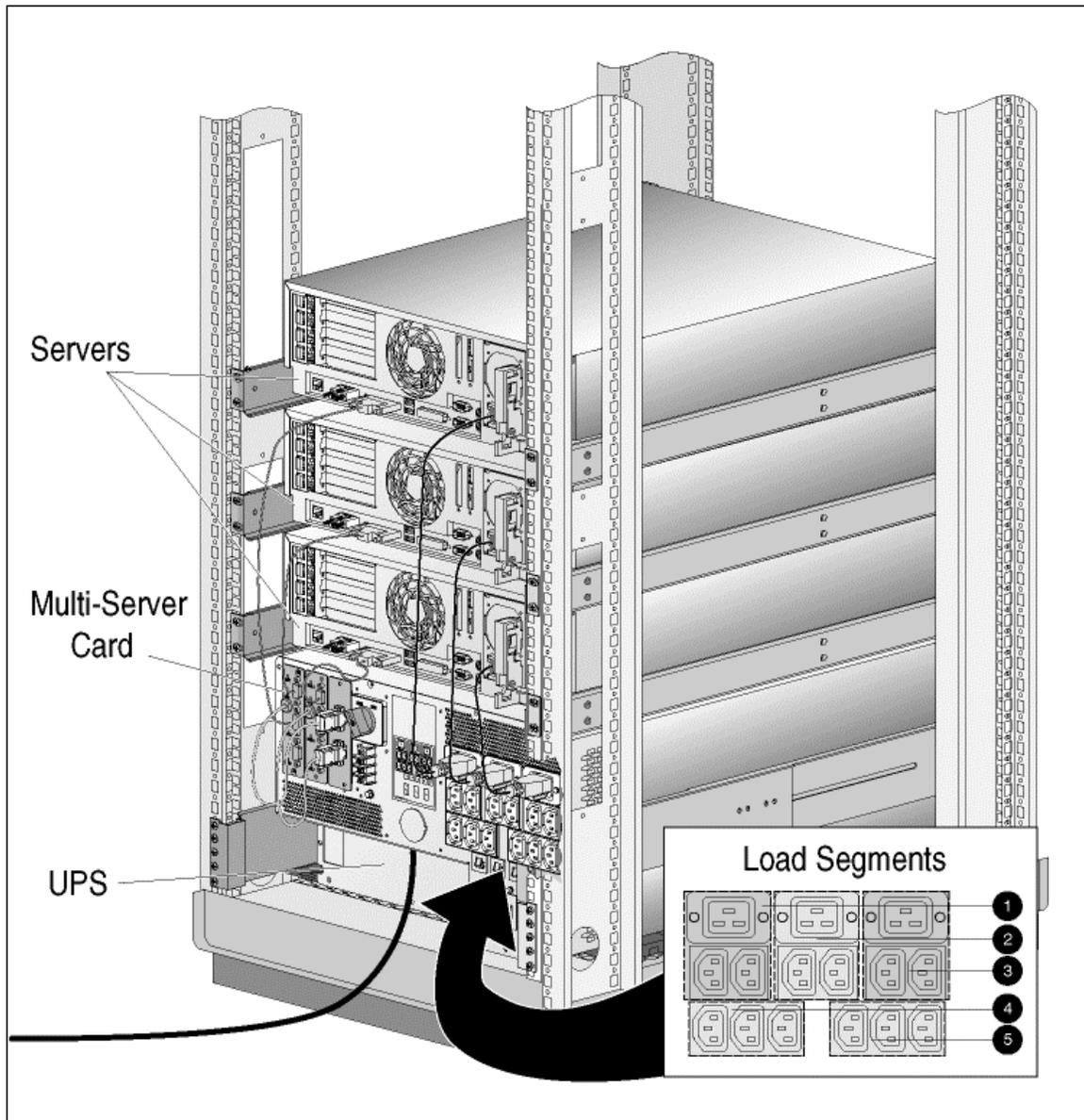


**Figure 3.** Diagram depicting the Compaq R6000 UPS communicating with three separate networks via the Multi-Server UPS Card.

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**Note:** Each Virtual UPS stems from load segmentation attached to the Multi-Server Card to allow communication to each operating system from only one UPS, the Compaq R6000.

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**Figure 4.** Three network devices connected serially to one Compaq R6000 UPS via the Multi-Server UPS Card

The Compaq UPS R6000 receptacles labeled Load Segment 1 act as the receptacles for one virtual UPS communicating through port 1 on the Multi-Server UPS Card. Similarly, port 2 is mapped to Load Segment 2, and port 3 is mapped to Load Segment 3.

**Note:** The Compaq R6000 can support up to five load segments. Refer to *UPS Options Supported and Available with the Compaq R6000* for additional information on combining Compaq UPS Options Cards.

## Compaq Scalable UPS Option Card



**Figure 5. Compaq Scalable UPS Option Card**

Because evolving system needs may require higher power availability to accommodate an increased workload, users can equip their Compaq R6000 UPS with the Compaq Scalable UPS Card. The Scalable UPS Card boosts the power capacity of the R6000 by combining independent workloads to optimize power management performance. The Compaq Scalable UPS Card gives you three serial ports in place of your existing UPS serial port. One port is for communication with your existing CPU, and the other two ports provide communication with other Uninterruptible Power Systems.

With the use of a Scalable UPS Card, one server can control up to three Compaq Uninterruptible Power Systems with independent load segment combinations totaling up to an 18,000W/18,000VA configuration. This allows the user to add UPS's incrementally as power requirements grow. Additional Uninterruptible Power Systems added via the Compaq Scalable UPS Card appear as one virtual UPS by Compaq Power Management Software.

The maximum number of load segments that can be supported with the Compaq Scalable UPS Card is nine. . See Figure 6 for Scaled UPS configuration.

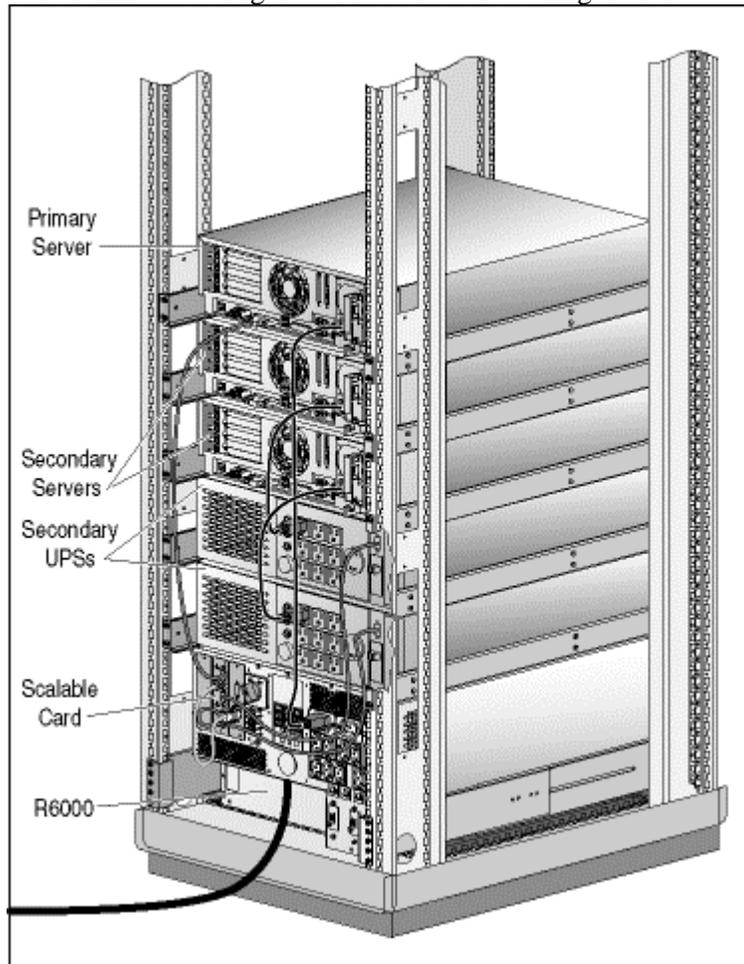


Figure 6. Sample Scalable UPS Card configuration in the Compaq R6000

# Compaq Power Management Software

## Overview

Compaq Power Management Software (CPM) constantly observes the power environment of each Compaq R6000 UPS. Should a power failure or other significant power disaster occur, the Compaq R6000 shifts the connected systems to battery back-up power and Compaq Power Management Software alerts the system administrator. As the power event continues, CPM begins a prioritized shutdown of all connected equipment, while at the same time saving data to a permanent storage medium. The fashion, in which CPM responds, is completely programmable by the user. The R6000 UPS when coupled with Compaq Power Management Software can also extend runtime of critical devices by dividing peripherals into individual groups, or load segments. When Compaq Hardware Option Cards are used in conjunction with Compaq Power Management Software, the manner in which load segments respond is easily custom-tailored. For more detailed information on configuring and utilization of CPM, refer to the *Compaq Power Management Software User Guide*.

## Software to support Multi-Server Configurations

The Compaq UPS Load Segment Configurator is a software utility that sets the mapping of up to five load segments while using a Multi-Server UPS Card with the UPS R6000. Compaq UPS Load Segment Configurator runs on any Windows 95, Windows 98, or Windows NT computer and is located on the *UPS Management and CPM FailSafe CD for Standalone Units* that accompanied the R6000. For more detailed configuration instruction, refer to the configuration instruction documentation.

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**Note:** Configure the load segments for the R6000 prior to installing Compaq Power Management Software for any of the servers attached to the Multi-Server UPS Card that require changes in their default mapping.

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After Compaq UPS Load Segment Configurator has been successfully installed and configured, proceed with the installation of Compaq Power Management Software (CPM). CPM software is an intelligent management utility that works integrally with Compaq Insight Manager allowing complete configuration of alert responses to advance the operating and control capacity of any Compaq R6000 in a network environment. CPM Software, in conjunction with the Multi-Server UPS Card, permits individual shutdown configuration, resulting in customized prioritization of workloads. Extended Run and separate shutdown or reboot times of loads you select is also available to independently manage workloads.

Compaq Power Management Software will automatically recognize the Multi-Server UPS Card once installation is complete. Compaq Power Management software can be installed from the *Compaq Power Management CD* or the *Compaq Management CD* included with SmartStart. For complete instructions on the operation of the software, reference the *Compaq Power Management Software User Guide*. The guide is downloadable from the [www.compaq.com](http://www.compaq.com) web site.

## Software to Support the Compaq Scalable UPS Card

Compaq Power Management Software is an intelligent management utility that is tightly integrated with Compaq Insight Manager, allowing complete configurable alert responses to advance the operating capacity of your Compaq UPS R6000. Compaq Power Management Software (CPM), along with the Scalable UPS Card, allows the configuration of combined workloads to deliver the maximum capacity of your Uninterruptible Power Systems. Additional Uninterruptible Power Systems added to the Compaq R6000 via the Scalable UPS Card appear as one virtual UPS by Compaq Power Management Software.

Compaq Power Management Software will automatically recognize the Scalable UPS Card once installation into the R6000 is complete. Compaq Power Management software can be installed from the *Compaq Power Management CD* or the *Compaq Management CD* included with SmartStart. For complete instructions on the operation of the software, reference the *Compaq Power Management Software User Guide*. The guide is downloadable from the [www.compaq.com](http://www.compaq.com) web site.

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**Note:** Although the Compaq R6000 UPS incorporates two option card slots, only one Compaq Scalable Option Card is supported. Please refer to the *Options Available and Supported with the R6000* White Paper for more detailed information.

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## Field Upgradeable via Firmware Flash

The R6000 UPS comes equipped with field upgradeable firmware flash. When it is time to update Compaq Power Management Software, simply download the latest version updates off of the Compaq website, and then follow the easy to operate LCD/LED display instruction.

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**IMPORTANT:** It is vital that the R6000 is left undisturbed during firmware flash process to ensure proper installation and maintenance.

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## Extension of System Uptime

### Compaq R6000 ERM Battery System



**Figure 7. Compaq Extended Run Module**

The Compaq R6000 UPS has optional Compaq Extended Run Modules (ERMs) that are rack mounted battery modules that extend the overall back-up time for full load (6000 watts of power) to 28 minutes. Each optional Compaq Extended Run Module fits into 3 “U” of rack space and includes a single battery connector for easy interconnection to the R6000 UPS. The ERM consists of two pullout “hot-swap” battery trays that are compatible with the standard integrated battery trays and each incorporates a circuit breaker to isolate the ERM battery module during installation, maintenance and removal.

The Compaq R6000 offers a wide-range of battery back-up times over a variety of loads. Starting with the standard integral batteries and moving to either one or two add-on Extended Run Modules, the Compaq R6000 can provide battery back-up protection for critical loads ranging from minutes to hours. Table 1 shows a matrix of load and battery back-up times that can be achieved with the Compaq R6000 and optional Extended Run Modules.

**Table 1. Compaq R6000 UPS Battery Back-up Time**

Load in Watts	Standard Batteries	One Additional ERM	Two Additional ERMS
1000	Up to 1 hour 2 minutes	Up to 2 hours 24 minutes	Up to 3 hours 56 minutes
2000	Up to 28 minutes	Up to 1 hour 6 minutes	Up to 1 hour 47 minutes
3000	Up to 18 minutes	Up to 40 minutes	Up to 1 hour 6 minutes
4000	Up to 12 minutes	Up to 28 minutes	Up to 47 minutes
5000	Up to 8 minutes	Up to 21 minutes	Up to 36 minutes
6000	Up to 6 minutes	Up to 18 minutes	Up to 28 minutes

**Note:** This chart is based on typical information. Battery times are approximate and may vary with equipment, configuration, disk access, battery use, temperature, etc.

## Hot Swappable Batteries

The batteries used in the Compaq R6000 are maintenance-free, sealed, lead-acid cells with an immobilized electrolyte. Each slide out battery tray in the standard unit and the Extended Run Modules consists of fourteen individual 12 volt batteries rated at five amps each. These individual batteries are connected in series within each tray to provide two 168 VDC strings that are connected in series and add up to a DC bus voltage of 336 VDC. This high voltage DC bus enables an efficient conversion of DC to AC voltage within the power inverter stage without the need of DC boost circuitry. The DC bus is protected with an internal circuit breaker for DC bus isolation, a special one-way connector and additional reverse polarity protection built into the Compaq R6000 ensuring safety to both personnel and equipment, allowing replacement without powering down the connected equipment.

For information on changing the configuration of the Compaq UPS R6000 to recognize the Extended Run Module, refer to Chapter 4, "Configuration" of *The 6000 Series UPS Operation and Reference Guide*.

## Compaq Enhanced Battery Management

The Compaq R6000 UPS operates with enhanced battery management. This technique actually doubles the life of your batteries, gives advanced warning of a power failure, and provides the fastest safe battery recharge time.

## Compaq High to Low Voltage Transformer (250VA) Kit



**Figure 8. Compaq High to Low Voltage Transformer**

The Compaq High to Low Voltage Transformer (250VA) is a low voltage 100–127 VAC Power Distribution Unit (PDU). This device will provide low voltage power for products that cannot be run on the 200-240V outputs on the R6000.

The Power Distribution Unit is equipped with a Circuit Breaker function to protect any devices connected to the Compaq R6000 from damage in the event of an incoming electrical surge or external equipment malfunction.

The Power Distribution Unit provides two receptacles for rack-mounted devices and attaches between the frame members of a rack to preserve interior and front panel rack space.

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**Note:** Refer to the installation documentation that accompanied the High to Low Voltage Transformer for installation and Circuit Breaker information.

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## Compaq Quality Assurance

### Warranty

To back up the wide range of features offered with the Compaq R6000 Uninterruptible Power System, Compaq offers a three-year limited warranty. In addition, Compaq provides a \$25,000 Computer Load Protection Guarantee and a Pre-Failure Battery Warranty on all Uninterruptible Power Systems. Compaq's Pre-Failure Battery Warranty applies the warranty to the battery before it actually fails. When Compaq Power Management Software notifies the customer that the battery may fail, the battery is replaced free of charge under the warranty. The Compaq Pre-Failure Warranty is beneficial in reducing the total cost of UPS ownership and limiting system downtime.

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**Note:** For more detailed warranty information, refer to Chapter One of the *Compaq 6000 Series UPS Operation and Reference Guide*.

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## Questions and Answers

### *Question*

How can I protect my mission critical systems from loss of data due to power failure?

### *Answer*

Add a Compaq R6000 Series Uninterruptible Power System to ensure data protection in case of power emergency.

### *Question*

How is the Compaq R6000 UPS power back-up ability measured?

### *Answer*

The Compaq R6000 UPS achieves a unity power rating that delivers more true power in watts, and supports up to 40 percent more load capacity than non-unity rated devices.

### *Question*

How can I extend the back-up time of my Compaq R6000 UPS?

### *Answer*

Adding Compaq Extended Run Modules can extend the battery back-up time of up to almost four hours (depending on the load).

### *Question*

My system is in a rack-mount configuration, is there enough space to add a Compaq R6000 UPS?

### *Answer*

Yes. The Compaq R6000 UPS occupies only 6 U of rack space providing an efficient solution to a rack-mounted configuration.

### *Question*

What sort of battery back-up system does the Compaq R6000 UPS utilize?

### *Answer*

The Compaq R6000 UPS incorporates Enhanced Battery Management (EBM) that doubles battery life and supplies advance notice of the end of battery lifecycle.

### *Question:*

Currently I have a Compaq R6000 protecting one of the servers (running Windows NT) on my network. How can I protect the other two servers on my network, one of which is running Novell, the other Unix?

### *Answer:*

Install a Compaq Multi-Server Card in your existing R6000 UPS. Use the card to establish direct communications with each server; connect the power cord from each server to a different UPS load segment.

*Question:*

How can I shut down an individual server in my network for maintenance purposes? All of my servers are protected by the same Compaq R6000 UPS, but I only have direct communications with one server.

*Answer:*

Install a Compaq Multi-Server Card in your existing R6000 UPS. Use the card to establish direct communications with each server; connect the power cord from each server to a different UPS load segment. Then, through Compaq Power Management software, configure the individual load segment for scheduled shutdown.

*Question:*

Currently I have an R6000 UPS protecting one of the servers on my network. I need to maximize my server capacity to achieve a more powerful system. What can I do without replacing my existing UPS?

*Answer:*

Install a Compaq Scalable UPS Card in your R6000 UPS. Use the card to establish direct communications with the server and then through Compaq Power Management software, configure the UPS to maximize system capacity.

*Question:*

What is the maximum capacity that my existing system can be expanded with the installation of a Compaq Scalable UPS Card?

*Answer:*

Up to three UPSs can be supported by one Scalable UPS Card to operate as one powerful virtual unit.

*Question:*

When using the Scalable UPS Card, am I able to add UPS VA power rating quantities as my individual needs increase?

*Answer:*

Yes. UPS VA power ratings can be added incrementally due to the fact that one server can control up to three Compaq Uninterruptible Power Systems totaling 18,000VA/18,000W.

*Question*

How do I customize the manner in which my Compaq R6000 UPS monitors and responds to connected load segments?

*Answer*

Compaq Power Management Software (CPM) allows customized programming of which the R6000 UPS monitors and responds to connected system devices.

*Question:*

How can low voltage peripherals run concurrently with high power devices on the R6000?

*Answer:*

Add the Compaq High to Low Voltage Transformer to simultaneously support peripherals that use low voltage.

*Question:*

In the event of power emergency, how does the Compaq High to Low Voltage Transformer prevent damage from incoming electrical surges to my externally attached equipment?

*Answer:*

The Compaq High to Low Voltage Transformer comes equipped with a Circuit Breaker feature that prevents damage to attached external equipment in the case of incoming electrical surges.

*Question:*

What is a Power Distribution Unit?

*Answer:*

A Power Distribution Unit, or PDU, is a device that distributes energy to external devices in increments to suit individual power requirements.

*Question:*

How can I extend the backup time for the Compaq R6000?

*Answer:*

Install a Compaq Extended Run Module (ERM) to the R6000.

*Question:*

I would like to install several Compaq Extended Run Modules. How many can be simultaneously supported?

*Answer:*

Up to two Compaq Extended Run Modules may be used to prolong the runtime of each R6000 UPS.

*Question:*

How long can the Extended Run Module provide back-up support for my Compaq R6000 UPS?

*Answer:*

An Extended Run Module can extend battery back-up time on the R6000 up to three hours. For more detailed information, please refer to Table 1 "Compaq R6000 Battery Back-up Time".

*Question:*

Do the batteries for the Compaq R6000 require service?

*Answer:*

No. The batteries used in the Compaq R6000 are composed of sealed, lead-acid cells with an immobilized electrolyte that require no maintenance.

*Question:*

Is it safe to have an additional battery back-up supply, such as an Extended Run Module when using a Compaq R6000 UPS?

*Answer:*

Yes. The DC bus is well protected with an internal circuit breaker, a one-way connector, and reverse polarity protection to ensure safe operation.