# **PowerTrust System Guide**

# HP Model A3589A

5.5 kVA Rack-Mounted UPS



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1.	Overview	
_•	Introduction	1-2
	About this book.	
	Terms Used in this Manual	1-5
	Power Failure Operation	
	Electronics Unit and Bypass Operations	
	Timed Power-Off/Power-On	
	Control Panel Switches and Indicators.	
	Rear Panel Connectors, Switches, and Indicators (North American Version)	
	Rear Panel Connectors, Switches, and Indicators (Worldwide Version)	
	Battery Box	1-21
	Service Bypass Unit	1-22
	Specifications	1-24
	Voltage and Frequency	1-28
	Voltage	1-28
	Frequency.	1-31
	UPS Modes	1-32
	On-line Mode	1-32
	On-battery Mode	1-32
	Automatic Bypass Mode	1-32
	Service Bypass Mode.	1-33
	Sleep Mode	1-35
	UPS Safety Preparedness	1-36
	Safety Information	1-36
	Handling Emergencies	1-36
	Hazardous Product Information	1-37
	Suggested Hazardous Product Procedures	1-37
	Support Information	1-39
	Support Strategy	1-39
	Training	1-39
	Battery Type	1-39
2.	Unpacking and Inspecting	
	Receiving the PowerTrust UPS	2-2
	Physical Inventory	2-2
	Unpacking the UPS	2-3
	Cutting the Shipping Straps	2-4
	Unpacking the Service Bypass Unit	2-4
	Unpacking the Battery Box	2-6
	Removing Battery Packs from Battery Box	2-7
	Unpacking the Electronics Unit	2-9
	Claims Procedures	
	Repacking	
	Returning PowerTrust Battery Packs	2-11
	Shipping and Storage Requirements	2-12
•		
3.	Installing the UPS	0.0
	Sizing the Load	3-2

Rackmounting Procedures	3-3
Installing the Battery Box	3-3
Installing the Battery Box in the Rack	3-3
Installing the Electronics Unit in the Rack	3-6
Installing the Service Bypass Unit	3-8
Attaching Front Bezel	3-9
Power Distribution Unit (PDU)	. 3-10
Installing Switchless Power Distribution Unit (PDU)	. 3-10
Connecting the Battery Box Cable to the Electronics Unit	. 3-11
Input and Output Connections	. 3-14
Wire Gauge Requirements	. 3-14
Torque Specifications	. 3-15
Removing the Access Panels	. 3-15
Worldwide Version Input Wiring	. 3-16
Worldwide Version Output Wiring	. 3-16
Cabling Connections	. 3-17
Connecting Equipment to the PowerTrust UPS (with 30A Service Bypass Unit Only)	. 3-17
Connecting the Communications Link	. 3-17
Examples of PowerTrust Connections in a System	. 3-19
Example 1: Single Expansion Cabinet System (Field-Integrated)	. 3-20
Example 2: Single Expansion Cabinet System (Factory-Integrated)	. 3-22
Example 3: Dual Expansion Cabinet System (Field-Integrated)	. 3-24
Example 4: Dual Expansion Cabinet System (Factory-Integrated)	. 3-26

#### 4. Power-On/Power-Off Procedures

Power-On Procedures	 . 4-2
Initial Power-On or Power-On After Shutdown	 . 4-2
Powering On the UPS After Being Powered Off for a Short Time	 4-2
Power-Off Procedures	 . 4-4
Powering-Off the UPS for an Extended Time	 . 4-4
Powering Off the UPS for a Short Time	 . 4-4
Service Bypass	 . 4-5
Placing the UPS in Service Bypass Mode	 . 4-5
Taking the UPS Out of Service Bypass Mode	 . 4-6
Emergency Power Off (EPO) Connections	 . 4-7
Charging the Batteries	 . 4-8

#### 5. Verification Procedures

oad Testing
-------------

#### 6. Troubleshooting

	~	~
Iroubleshooting Aids	. 6	-2
Console Messages	. 6	-2
Operating System Assistance	. 6	-2
Without Operating System Assistance	. 6	-2
RS-232 UPS Port Does Not Respond	. 6	-3
Checking the Voltage of a Battery Box or a Battery Pack	. 6	-4
Overtemperature Considerations	. 6	-5

	Alarm Indicators	6-6
	Front Danal Visible Indicators (I EDs)	0-0
	Poor Donal Visible Indicators (LEDS)	0-0
	Dear Danal Enable I ED	
	Contion I ED	
	Cauuon LED	0-0
		0-7
		0-7
	Shence Alarm/ lest.	
	Indicator Cases	
	Normal LED and Alarm Condition	0-10
	Case I (Normal) — UPS Running on AC Power	6-10
	UPS Running on AC Power with Audible Alarm	6-11
	Case 2 (Abnormal) — Battery Operation Problem	6-11
	Case 3 (Abnormal) — Overtemperature Condition	6-11
	Case 4 (Normal or Abnormal) — Bypass Mode	6-12
	Case 5 (Normal) — Overload Warning On-Line	6-13
	UPS Running on Battery Power with Audible Alarm	6-15
	Case 6 (Normal) — Battery Power	6-15
	Case 7 (Normal) — Low Battery	6-16
	Case 8 (Normal) — Overload Warning on Battery	6-17
	UPS Halted (Has No AC Output)	6-18
	Case 9 (Abnormal) — Failure Shutdown	6-18
	Case 10 (Normal or Abnormal) — Overload or EPO Shutdown	6-18
	Case 11 (Normal, Abnormal) — Overtemperature Shutdown	6-20
	Case 12 (Normal or Abnormal) — Output Disabled	6-20
	Case 13 (Normal or Abnormal) — Deeply Discharged Batteries or Non-Fatal UPS F	ailure .
	6-21	
	Case 14 (Abnormal) — Battery Precharge Failure	6-22
	Case 15 (Normal or Abnormal) — UPS Off or Asleep	6-23
	Case 16 (Normal or Abnormal) — Bypass Sleep Mode	6-24
7	Cleaning and Maintenance	
1.	Cleaning	7-9
	Pacammandad Dariadic Tasting	
	Evolution Petronic Ferring	7-3
	Determining the Age of a Pottery Deek	
	Even a provide the second static product of the second state of th	
		7-5
A.	HP-UX UPS Monitor Error Messages	
	Introduction	A-2
	Normal Operation Messages	A-3
	Timer Controlled Power On/Off Messages	A-5
	Exit ups mond Daemon Messages	A-8
	shutdown(1M) Messages	A-12
	reboot(2) Messages	A-14
	Log-Only Messages.	A-20

	IntroductionB-2Power Status MessagesB-3Alarm Status MessagesB-6Alarm Status Cleared MessagesB-13Log-Only Status MessagesB-18
<b>C</b> .	Configuring the OS for the PowerTrust UPS
	Introduction
	Configuring HP-UX for the PowerTrust UPSC-3
	Configuring MPE/iX for the PowerTrust UPSC-5
	Power Failing the UPSC-7
D.	Field Replaceable Units
	Replaceable Parts Lists
	Replaceable Parts for the PowerTrust UPS         D-2
	Removal and Replacement ProceduresD-4
	Removing and Replacing UPS Electronics UnitD-4
	Removing and Replacing Battery PacksD-6
	Removing and Replacing the Battery BoxD-9
	Removing and Replacing the Service Bypass Unit.
	Removing and Replacing Hardwire Conversion Kit (30A Service Bypass Unit Only)D-13
	Removing and Replacing North American Conversion Kit
	Removing and Replacing Control Panel and Label KitD-19
	Removing and Replacing the Electronics Unit Fan AssemblyD-24
E.	40A Service Bynass Unit: Specifications and Procedures
	40A Service Bypass Unit F-2
	Unnacking the Service Bypass Unit E-4
	Connecting the SPU to the UPS (40A Service Bypass Unit Only) E-6
	Connecting the Communications Cable to the V-Class System E-8
	Connecting the Test Station F-8
	Examples of PowerTrust Connections on V-Class Systems
	Renlacement Parts F.8

# Figures

Figure 1-1 . Rack-mounted PowerTrust 5.5 kVA UPS
Figure 1-2 . PowerTrust UPS Control Panel 1-9
Figure 1-3 . Rear Panel Connectors, Switches, and Indicators (North American Version) 1-11
Figure 1-4 . Rear Panel Connectors, Switches, and Indicators (Worldwide Version) 1-16
Figure 1-5 . PowerTrust UPS Battery Box 1-21
Figure 1-6 . PowerTrust UPS Service Bypass Unit (30A) (North American Version) 1-22
Figure 1-7 . PowerTrust UPS Service Bypass Unit (30A) (Worldwide Version) 1-23
Figure 1-8 . UPS Input Voltage Transfer Points 1-30
Figure 1-9. UPS Frequency Transfer Points 1-31
Figure 1-10 . Simplified UPS 5.5 kVA UPS Block Diagram
Figure 2-1 . A3589A PowerTrust UPS Packaging
Figure 2-2. Unpacking the PowerTrust Service Bypass Unit
Figure 2-3. Unpacking the PowerTrust Battery Box
Figure 2-4. Battery Box
Figure 2-5. Removing a Battery Pack from the Battery Box Removing a Battery Pack from the Battery Box
Figure 2-6 . Unpacking the PowerTrust Electronics Unit
Figure 2-7. Battery Pack Shelf-Life vs Storage Temperature
Figure 2-8. Battery Pack Shelf-Life Storage Time vs Temperature
Figure 3-1. Rail Locations for the Battery Box
Figure 3-2. Battery Box Corner Mounting Locations
Figure 3-3. Inserting a Battery Pack into the Battery Box
Figure 3-4. Rail and Clip-Nut Locations for Rackmounting the Electronics Unit
Figure 3-5. Clip-Nut Locations for Rackmounting the Service Bypass Unit
Figure 3-6 . Attaching the Front Bezel to the Electronics Unit
Figure 3-7 . PDU Ground Connection
Figure 3-8. Battery Precharge Shorting Plate
Figure 3-9. Reattaching Battery Precharge Shorting Plate
Figure 3-10 . A3589A Terminal Block
Figure 3-11 . Example 1: 99x/T-Class SPU with One Field-Integrated Expansion Cabinet 3-21
Figure 3-12. Example 2: 99x/T-Class SPU with One Factory-Integrated Expansion Cabinet . 3-23
Figure 3-13. Example 3: 99x/T-Class SPU Two Field-Integrated Expansion Cabinets 3-25
Figure 3-14. Example 4: 99x/T-Class SPU with Two Factory-Integrated Expansion Cabinets 3-27
Figure 6-1 . Alarm Indications
Figure 7-1 . Battery Pack Serial Number Location
Figure D-1. Battery Pack
Figure D-2. Terminal Block
Figure D-3. North American Conversion Kit
Figure D-4. Control Panel Assembly
Figure D-5. Control Panel Header
Figure D-6. Attaching the Front Bezel to the Electronics Unit
Figure D-7 . Fan Assembly
Figure E-1. 40A Service Bypass Unit E-2
Figure E-2. Unpacking the 40A PowerTrust Service Bypass Unit
Figure E-3. Power and Communication Line Connections E-7

# Figures

# Tables

Table 1-1. Operator and Service Information	
Table 1-2. A3589A Specifications	
Table 3-1. Example of Determining Load	
Table 6-1. Troubleshooting Cases	6-8
Table 7-1. Manufacturing Month Codes	
Table D-1. Replaceable Parts List	D-2
Table D-2. UPS Serial Communications Cables	D-3

# Tables

# **Printing History**

The manual printing date and part number indicate its current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. the manual part number will change when extensive changes are made.

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# **Safety and Regulatory Information**

#### IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.

For your protection, this product has been tested to various national and international regulations and standards. The scope of this regulatory testing includes electrical/mechanical safety, radio frequency interference, ergonomic, acoustic, and hazardous materials. Where required, approvals obtained from third-party test agencies are shown on the product label. In addition, various regulatory bodies require some of the information under the following headings.

# **Safety Considerations**

This product and related documentation must be reviewed for familiarization with safety markings and instructions before operation. The following figure shows some of the safety symbols used on the product to indicate various safety considerations.

WARNING	The WARNING sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.
CAUTION	The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not done correctly or adhered to, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

Please read all safety considerations carefully. You should understand all **WARNINGS** and **CAUTIONS** before using your PowerTrust UPS.

## **Physical Safety Considerations**

- Each PowerTrust UPS consists of an Electronics Unit weighing about 78kg (171 lbs) unpacked.
- The PowerTrust UPS also includes a Battery Box weighing about 180kg (396 lbs) unpacked with batteries and 30kg (66 lbs) unpacked without batteries. Included in the Battery Box are ten field replaceable packs, each weighing about 33 pounds.

#### WARNING Be very careful when lifting or moving either the Electronics unit or the Battery box. Follow the unpacking (Chapter 2) and installation (Chapter 3) instructions carefully.

• Each PowerTrust UPS contains powerful batteries and large capacitors. Therefore, the unit may contain hazardous voltages, even when it is disconnected from the input AC source receptacle, or when the AC power has failed.

WARNING Batteries can present a risk of electrical shock and/or burn from high short circuit current. Observe proper precautions. Do not stack battery trays on top of each other. Do not allow anything to touch the battery terminals. Do not pierce battery pack wiring insulation. Do not allow conductive tools or jewelry to touch battery packs or battery terminals.

### **Electrical Safety Considerations**

- DO NOT use an extension cord or multiple outlet power strips to provide electrical power to the unit, or any other computer equipment.
- DO NOT install the unit next to open windows or where uncontrolled environmental conditions could affect it.

WARNING	To reduce the risk of fire, connect the A3589A PowerTrust UPS North American unit only to a circuit provided with 50 amperes maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.				
	The hardwire (worldwide) version may be connected to a circuit provided with 63 amperes maximum branch circuit overcurrent protection in accordance with local codes.				
CAUTION					
	<ul> <li>Do not place magnetic media on the UPS.</li> </ul>				
	• Avoid plugging the unit into a wall outlet controlled by a switch. If the outlet is controlled by a switch, cover or protect the switch from being turned off accidentally. The switch will not turn off the PowerTrust UPS; instead, the PowerTrust UPS will go to battery mode, allowing electrical current to continue to flow to its outputs until the batteries are discharged.				
	• During power failure conditions, the PowerTrust output will be nominal 230 volts.				
CAUTION					

- The PowerTrust UPS should NOT be operated from line stabilizers, ferro-resonant transformers, or other types of line conditions. AC waveform distortion caused by these devices may cause unexpected transfer from line operation to UPS battery operation.
- These units should NOT be operated from non-sinusoidal AC voltage sources. AC input waveforms having distortion caused by large phase controlled devices, poor utility power, or poor site power may cause unexpected transfer from line operation to UPS battery operation.

# FCC Statement (USA only)

FCC rules part 15, subpart A, class A devices.

**Information to User (section 15.105)** 

NOTE This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

# **EMI Statement (Canada Only)**

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

## **Japanese Radio Frequency Interference**

#### 注意

この装置は、情報処理装置等電波障害自主規制協議会(VCCI)の基準 に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨 害を引き起こすことがあります。この場合には使用者が適切な対策を講ずる よう要求されることがあります。

upsg008

#### Japanese VCCI Radio Frequency Notice

## **EMI Statement (European Union)**

**Warning:** This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

# **Acoustics (Germany)**

Laermangabe (Schalldruckpegel  $L_pA$ ) gemessen an Arbeitsplatz bei normalem Betrieb nach DIN 45635, Teil 19: Acoustic Noise (A-weighted Sound Pressure Level  $L_pA$ ) measured at operator's position, normal operation, to ISO 7779.

A3589A: On-line = 56 dBA

On-battery = 57 dBA

## **EMI (Australia and New Zealand)**

UPS model A3589A meets the applicable requirements of the Australia and New Zealand EMC Framework.



## **Product Warnings**

#### WARNING

- Serious injury can occur if the unit enclosure is opened by unqualified personnel. There is a risk of electric shock and/or burn. Hazardous live parts inside the unit are energized from the battery supply even when the input power is disconnected. Do not remove the cover; there are no user-serviceable parts inside. Refer repair to qualified service personnel.
- The PowerTrust unit is capable of supplying AC voltage even if there is no input power present. Although the output enable switch on the front of the unit is protected from accidental actuation, do not allow the unit to become enabled without the operator's knowledge.
- A battery can present a risk of electrical shock and/or burn from high short-circuit current. Observe proper precautions.
- Both the Mains and Bypass circuit breakers are the Mains disconnect when the Service Bypass switch is in the NORMAL position. The facility branch circuit is the Mains disconnect when the Service Bypass switch is in the BYPASS position.

Both the UP/Battery switch and the battery cable are the battery disconnect devices.

- To disconnect AC Mains and battery power or to put the UPS into Service Bypass mode prior to servicing, refer to Chapter 4.
- DO NOT touch uninsulated battery terminals.

### **Battery Notices**

The products described in this manual contain sealed, lead acid batteries. Replace batteries only with the same type and part number.

When recycling used batteries, adhere to local codes or follow the return instructions included with the replacement battery pack.

WARNING	Fire, exp	losion, and	severe	burn	hazard!
---------	-----------	-------------	--------	------	---------

DO NOT crush, disassemble, heat, incinerate, or expose the battery to water.

DO NOT puncture or subject batteries to mechanical shock.

# **United Kingdom General Approval**

UPS Model A3589A is approved under Approval No. NS/G/1234/100003 for indirect connection to public telecommunication systems within the United Kingdom.

### **IT Power System**

WARNING	This product has not been evaluated for connection to an IT power system (an AC distribution system having no direct
	connection to earth according to IEC 950/EN50091-1).

### Leakage Current

WARNING	To reduce the risk of electric shock, never operate this product
	with the input or output ground conductors disconnected. An
	earth connection is essential before connecting the supply. Due
	to the types of products that can be connected to this product,
	there is a risk of high leakage current (>3.5mA). Reliable
	ground circuit continuity is vital for safe operation of this
	product.

Symbol Definitions		
Symbol	Description	
Â	ATTENTION or CONSULT ACCOMPANYING DOCUMENTS	
Ŕ	Dangerous voltage	
	On (power: connection to the mains) or Output Enabled	
	Off (power: disconnection from mains) or Output Disabled	
Ċ	Stand-by	
$\sim$	Alternating current	
	Direct current	
N	Connection for the neutral conductor on PERMANENTLY INSTALLED EQUIPMENT	
<u> </u>	Earth (ground)	
	Protective earth (ground)	
	Noiseless (clean) earth (ground)	
	Battery Check	
	Output Receptacle	
ß	Silence Alarm	
- +	Battery Power	
-¥-	Flashing LED	

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## Preface

This edition of the *Power Trust System Guide (5.5 kVA Rack-Mounted UPS)* contains technical information about the HP Model A3589A 5.5 kVA rack-mounted Uninterruptible Power Supply (UPS).

WARNING Some of the procedures described in this manual present the risk of serious physical injury and/or damage to the PowerTrust UPS. They should be performed by trained service personnel only. See Table 1-1.

### **Other Reference Documents**

- HP 3000 Configuring Systems for Terminals, Printers, and other Serial Devices
- HP-UX System Administration Task Manual

DECLARATION OF CONFORMITY according to ISO/IEC Guide 22 and EN 45014			
Manufacturer's Name:		Hewlett-Packard	
Manufacturer's Address:		8000 Foothills Boulevard Roseville, CA, 95747, U.S.A	
declares, that the l	product		
Product Name: Model Number(s): Product Options:		HP PowerTrust 5.5 kVA Uninterruptible Power System A3589A All	
conforms to the f	ollowing P	roduct Specifications:	
Safety:	EN 500 IEC 950	91-1:1993 ):1991 +A1+A2+A3 / EN 60950:1992 +A1+A2+A3	
EMC:	EN 500 CISI IEC IEC IEC IEC	91-2:1995 PR 22:1993 / EN 55022:1994 - Class A 1) 801-2:1991 6 kV CD, 8 kV AD 801-3:1984 3 V/m 801-4:1988 0.5 kV Signal Lines, 1 kV Power Line 801-5:1995 1 kV DM, 2 kV CM	
Supplementary Information:			
The product herewith complies with the requirements of the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC and carries the CE marking accordingly.			
1) The product was tested under typical load conditions with Hewlett-Packard Information Technology Equipment.			
Roseville, CA <u>N</u>	March 31, 19	097 Dan Blount	
European Contact: Your local Europe, Herrenberger Strasse	Hewiett-Packard S 130, D-71034 Böt	ales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE / Standards blingen (FAX:+49-7031-143143)	

# **1** Overview

This chapter contains:

- An introduction to the 5.5 kVA UPS
- Information about this book
- Terms used in this manual
- Power failure operation
- Electronics Unit and Bypass operations
- Control Panel switches and indicators
- PowerTrust UPS rear panel
- Battery Box
- Service Bypass Unit
- Specifications
- UPS safety preparedness
- Support information

# Introduction

The HP PowerTrust UPS is a battery backup device that switches to battery power when input AC power fails or when it falls below or goes above a specified utility voltage level. This allows your computer system to function through brief power failures, or allows for an orderly system shutdown during extended power failures.

There are three basic components of the UPS: **Electronics Unit, Battery Box,** and **Service Bypass Unit.** See Figure 1-1.

The PowerTrust also provides internal overtemperature sensing to either warn of potential internal damage to the UPS, or to shut off the UPS to avoid equipment damage.

Each PowerTrust UPS can be ordered in a factory-integrated expansion cabinet as part of a supported HP 3000 or HP 9000 computer system order, or as a field-installable upgrade to an existing HP 3000 or HP 9000 system. The entire unit is designed to be installed at the bottom of the Hewlett-Packard A1883A, A1884A, A1896A, or A1897A expansion cabinet (19-inch rack) for any supported system.

A UPS-compatible **Power Distribution Unit** (PDU or "power strip") must be installed within the expansion cabinet containing receptacles for the device(s) to be protected by the UPS. Both the factory-integrated and field-integrated versions of the PowerTrust UPS must be used with a UPS-compatible PDU.

Refer to HP 3000 and HP 9000 Configuration Guides for descriptions of supported systems and peripherals.

Figure 1-1 shows the 5.5 kVA UPS installed in an expansion cabinet.





This UPS provides 5.5 kVA of power protection for approximately 15 minutes.

# About this book

This manual describes the rack mounted, 5.5 kVA UPS. The following table shows which information in the manual is operator information and which is meant for qualified service-trained personnel.

Description	Operator Information	Service Information
Chapter 1: Overview	X	X
Chapter 2: Unpacking and Inspecting		X
Chapter 3: Installing the UPS		X
Chapter 4: Power-On/Power-Off Procedures	X	X
Chapter 5: Verification Procedures		X
Chapter 6: Troubleshooting	X	X
Chapter 7: Cleaning and Maintenance		X
Appendix A: HP-UX UPS Monitor Error Messages	X	Х
Appendix B: MPE/iX UPS Monitor Error Messages	X	Х
Appendix C: Configuring the OS for the PowerTrust UPS		Х
Appendix D: Field Replaceable Units		X
Appendix E: 40A Service Bypass Unit: Specifications and Procedures		Х

 Table 1-1
 Operator and Service Information

#### WARNING Service Information is meant for qualified, service-trained personnel only. Untrained personnel risk serious injury and/or damage to the equipment if they attempt to perform some of the operations described in this manual.

# **Terms Used in this Manual**

This section contains definitions of words and phrases that are used throughout this manual.

automatic bypass	Internal circuitry that detects a failure in the UPS's internal AC power path and bypasses the faulty circuitry so that AC input continues to supply power to the connected equipment.
Automatic Bypass mode	The condition the UPS is in after it detects a problem with its own circuitry. For more detailed information about this mode, refer to "UPS Modes".
Battery Box	A rack-mounted unit containing ten <i>battery packs</i> . The Battery Box is connected to the <i>Electronics Unit</i> with a cable integrated into the Battery Box.
battery pack	A sealed removable unit containing a rechargeable battery.
Bypass Unit	See Service Bypass Unit.
control panel	The front panel of the <i>Electronics Unit</i> . Also called the <i>front panel</i> . See Figure 1-2.
Electronics Unit	A rack-mounted unit containing the electronic components of the PowerTrust UPS.
front panel	The front panel of the <i>Electronics Unit</i> . Also called the <i>control panel</i> .
hold-up time	The amount of time that the UPS will maintain AC power to the connected equipment after the external AC power has failed or been removed. This is about 15 minutes when the batteries within the UPS are fully charged and the unit is powering its rated load. If the UPS is powering less than its rated load, the unit's hold-up time is longer.
On-battery mode	The state of the UPS when it is supplying AC power from its batteries to the connected equipment. For a more complete description of this mode, refer to "UPS Modes".
On-line mode	The state of the UPS when normal voltage to the system load is supplied through the <i>Electronics Unit</i> by the AC input power source. For more information, see "UPS Modes".
overtemperature	A high temperature condition, sensed within the UPS.
Power Distribution Unit (PDU)	A power strip within the expansion cabinet containing receptacles for the device(s) to be protected by the UPS. Both the factory-integrated and field-integrated versions of the PowerTrust UPS must be used with a UPS-compatible PDU.

Overview Terms Used in this Manual

rear panel	The rear panel of the Electronics Unit and Service Bypass Unit. See Figure 1-3. The term "rear panel" <i>never</i> refers to the back of the <i>Battery Box.</i>
Service Bypass Unit	A unit located behind the Electronics Unit that can, when set properly, isolate the AC input source from the Electronics Unit and the batteries so that those components can be serviced without disrupting power to the load.
Service Bypass mode	The condition the UPS is in when AC input power flows directly to output receptacles and is cut off to the UPS's Electronics Unit and batteries. The UPS must be in Service Bypass mode (by switching the Service Bypass switch to BYPASS) when its Electronics Unit or Battery Box needs to be serviced or replaced. Loss of input power while the UPS is in this mode results in a complete loss of power to the connected equipment. For more information, refer to "UPS Modes".
Sleep mode	The state of the UPS after prolonged disruptions in AC input power or after it has detected a problem with its internal circuitry. The UPS may also enter Sleep mode after it has been in Automatic or Service Bypass mode for more than 30 minutes. In this state, the UPS uses a minimum of battery power. For more information, about this mode, refer to "UPS Modes".
transfer time	The very short time it takes the UPS to go to the <i>on battery</i> state after the external AC power fails or is removed.

# **Power Failure Operation**

When utility power fails, the UPS supplies internally generated AC voltage from its batteries for approximately **fifteen (15) minutes at full load**. As soon as the UPS detects a utility power failure, it generates an **audible alarm**. The alarm will sound approximately once **every 10 seconds**. When the UPS's battery charge level is within approximately three (3) minutes of full battery discharge, the UPS initiates a different audible warning: a repeating pattern of **three beeps** followed by approximately ten seconds of silence. When this happens, you should *immediately prepare for loss of battery power by powering down your protected equipment*. After any power failure, the battery hold-up time is reduced until the batteries are again fully charged.

The UPS automatically switches to battery operation when the following abnormal conditions exist:

- A complete AC power failure.
- AC power falls below a predefined voltage.
- AC power rises above a predefined voltage.

The following actions should be taken after the UPS detects an AC power failure and sounds an alarm:

- 1. Shut down the operating system.
- 2. Power down the protected equipment.
- 3. Switch the UPS Output On/Output Off switch to Output Off. Refer to Figure 1-3.
- 4. If the power will be off for an extended time, perform the following steps; otherwise, proceed to step 5.
  - a. Power off the UPS by following the steps outlined in "Powering-Off the UPS for an Extended Time" in Chapter 4.
  - b. When AC power returns, follow the steps outlined in "Initial Power-On or Power-On After Shutdown" in Chapter 4.
- 5. Once the AC power returns, switch the UPS Output On/Output Off switch to Output On.
- 6. Power up the protected equipment.
- 7. Restart the operating system.

When the AC power is restored, the UPS will automatically recharge its batteries as long as the UPS/BATTERY switch is set to ENABLE and the MAIN INPUT circuit breaker is in the ON position.

Recharging the batteries can take up to 14.5 hours at 25° C ambient operating temperature for a 90% recharge. The recharge time may be considerably less if the batteries are not fully discharged.

# **Electronics Unit and Bypass Operations**

Under normal operating conditions the Electronics Unit provides AC power through the AC power input cable of the Service Bypass Unit. This operating mode is called *On-line mode*. If the Electronics Unit malfunctions, however, the Electronics Unit still redirects the AC input power to the output receptacles in order to maintain AC power to the system load. This feature is called *Automatic Bypass mode*. Another operating mode, *Service Bypass mode*, allows the Electronics Unit and Battery Box to be serviced without disrupting power to the connected equipment. To enter Service Bypass mode, the red Bypass button must be pressed and the Service Bypass switch must be manually set to BYPASS. In Service Bypass mode, the AC input bypasses the Electronics Unit and is sent directly to the output receptacles.

WARNING The Electronics Unit must be serviced only while the UPS is in Service Bypass mode. Replacement of the Electronics Unit with the UPS in Automatic Bypass mode will result in loss of power to the connected equipment.

## **Timed Power-Off/Power-On**

PowerTrust UPS units installed on HP-UX systems also support a timed power-off/power-on facility. This allows you to power down the HP-UX system and have the PowerTrust UPS restore power to the system at a predetermined time. See the power\_onoff(1M) man page for more information.

Currently, MPE/iX does not support the timed power-off/power-on facility.

# **Control Panel Switches and Indicators**

The PowerTrust Electronics Unit has a user-accessible control panel on its front, as shown in Figure 1-2. Descriptions of the switches and indicators on the control panel follow the illustration.





upin004b

1 AC Output	A green light indicates that AC power is being supplied to the output receptacles.
2 Battery Power	A yellow light indicates that the unit is supplying power from its batteries.
3 Attention	A yellow light indicates that the unit needs attention. This indicator (in conjunction with the audible alarm) has multiple meanings, as defined in Chapter 6, "Troubleshooting."
4 Silence Alarm/Test	A pushbutton switch. Pressing this switch silences the alarm if the audible alarm is active. The Attention and/or Battery Power lights remain lit, however. Pressing this switch again reactivates the audible alarm.
	If the audible alarm is not active and the UPS Electronics Unit has not failed, pushing this button causes the UPS to switch to battery operation for 10 to 20 seconds. This tests the On-battery mode of the UPS and the Battery Power LED will light. If you press the button when the batteries are low, the test will not be performed and the Battery Power LED will not light.
5 Output On/Output Off switch	A two-position switch that controls the AC output of the UPS. Some conditions — after the UPS switches into Automatic Bypass mode, for example — may be reset by turning the switch off for a second of so, then back on. The North American and worldwide versions of the PowerTrust UPS have a slightly different rear panel. These differences are illustrated and described in the following sections.

# **Rear Panel Connectors, Switches, and Indicators (North American Version)**

The connectors, switches, and indicators on the rear panel of the Electronics Unit and the Service Bypass Unit are shown for the North American version in Figure 1-3. The connectors, switches, and indicators on the rear panel of the Electronics Unit and the Service Bypass Unit for the Worldwide version are shown in Figure 1-4. Descriptions follow each illustration.



# Figure 1-3 Rear Panel Connectors, Switches, and Indicators (North American Version)

**1 AC Power Input** A line cord with NEMA 6-50P plug attached. Used to connect the North American version of the UPS to an AC source or wall outlet. Figure 1-3 shows the AC power input for the 30A Service Bypass Unit. For information on the 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures.". 2 IEC Output Three IEC320 C19 output receptacles are available on both North Receptacles American and worldwide versions of the PowerTrust UPS. Up to three expansion cabinet Power Distribution Units (PDUs) can be plugged in here. **3 NEMA Output** One NEMA L6-30R output receptacle (North American version only). An SPU, peripheral, or PDU in an adjacent expansion cabinet plugs in here. Figure 1-3 shows the NEMA output for the 30A Service Bypass Unit. For information on the 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures."

4 Access Plate		This plate provides access to the terminal block where hardwired connections can be made.			
5 EPO Terminals		A pair of screw terminals is provided for connection to an Emergency Power Off (EPO) system. For normal operation, these terminals must be connected by a jumper or by the EPO system. Removing the connection causes the UPS AC output to shut down. The output remains shut off until the terminals are connected again, and the Output On/Output Off switch on the control panel is cycled (Output Off, then Output On). If the Service Bypass switch is set to BYPASS, the EPO has no effect on the PowerTrust AC output.			
6 UPS Port		A 9-pir Throug by an e	n D-type connector, used for connection to a computer system. If this connection the UPS reports its status and can be controlled external device.		
NOTE A specia appears pinout.		al cable is required to connect to the UPS Port. Although the UPS Port is to be a standard 9-pin RS-232 connector, it has a non-standard Use one of these RS-232 cables:			
	5061-257	75	9-pin male/9-pin female (2.5 meter)		
	5061-256	<b>39</b>	9-pin male/25-pin male (2.5 meter)		
	5053-535	52	9-pin male/25-pin male (4 meter)		
If the wr manual, "HP-UX Monitor		ong ca but th UPS N Error	ble is used, the UPS will still function as stated in this e error messages and status logging described in Appendix A, fonitor Error Messages." and Appendix B, "MPE/iX UPS Messages." will not be supported.		

7 Battery Connector	The Battery Box is connected to the Electronics Unit using a battery cable. The cable from the Battery Box is plugged into a connector at the bottom of the Electronics Unit. For information on how to connect the Electronics Unit to the Battery Box, refer to "Connecting the Battery Box Cable to the Electronics Unit" in Chapter 3.
8 Output Circuit Breakers	When an Output circuit breaker activates, it shuts off the AC voltage to the corresponding output receptacle.
	There are four output circuit breakers that protect the UPS from overcurrent conditions.
	The first three output circuit breakers (marked <i>OUTLET 1, OUTLET 2</i> and <i>OUTLET 3</i> ) provide overcurrent protection for the IEC320 C19 outlets (see 2 in Figure 1-3). The circuit breaker marked <i>OUTLET 4</i> provides overcurrent protection for the output receptacle (see 1 in Figure 1-3).
	The AC coming out of the corresponding output receptacle remains off until the cause of the overcurrent is corrected, the circuit breaker is reset, and, depending on the severity of the problem, the UPS/BATTERY switch is cycled (turned off then back on). This restores the UPS to normal operation.
	Figure 1-3 shows the AC power input for the 30A Service Bypass Unit. For information on the 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures."
9 Input Circuit Breakers	The input circuit breaker marked <i>BYPASS</i> shuts off the AC input to the Service Bypass Unit, Electronics Unit, and the system load in the event of an overload (overcurrent condition). If the UPS is in Automatic or Service Bypass mode when the overload occurs, this breaker will trip and all AC power to the attached equipment is lost.
	The input circuit breaker marked <i>MAIN</i> protects the UPS and the protected equipment from overcurrent conditions when the UPS is operating normally from the AC line; that is, when the UPS is neither in Bypass mode nor on battery.
	The UPS remains in this condition until the cause of the overcurrent is corrected, the circuit breaker is reset, and, depending on the severity of the problem, the UPS/BATTERY switch is cycled (turned off then back on). This restores the UPS to normal operation.

#### WARNING Turning off the MAIN INPUT circuit breaker does NOT turn off the PowerTrust UPS! Instead, the UPS goes to the "on-battery" state of operation. See Chapter 4, "Power-On/Power-Off Procedures.".

10 Bypass Activation	Switch n Button	This red button must be pressed to change the Service Bypass switch setting from NORMAL to BYPASS. (The button does not have to be pressed to change the setting from BYPASS to NORMAL.) Pressing this button will put the UPS into Automatic Bypass mode. To avoid loosing AC power to the protected equipment, you should always check that the BYPASS INPUT circuit breaker is ON before pressing this button.		
CAUTION	Do not pu the conne	ash the red button while the UPS is operating on battery. Damage to ected equipment can occur.		
11 Service Switch	Bypass	This rotary switch allows you to isolate and disconnect the AC input from the Electronics Unit and batteries so that these components can be serviced without disrupting power to the connected equipment. This switch is also used to manually override automatic bypass.		
		The bypass switch can be set to two positions, NORMAL and BYPASS.		
		<b>Normal Mode</b> . When the switch is set to NORMAL, the AC power source provides power to the Electronics Unit. Should the AC power fail while the Service Bypass switch is set to NORMAL, the UPS automatically switches to On-battery mode. When input power is restored, the Electronics Unit returns to On-line mode.		
		<b>Bypass Mode</b> . When the switch is set to <b>BYPASS</b> , the AC power source bypasses the Electronics Unit but continues to supply power to the load.		
		The <b>BYPASS</b> setting is used to service the Electronics Unit or Battery Box. The UPS cannot switch to battery power if AC input power is lost when the Service Bypass switch is set to <b>BYPASS</b> .		
CAUTION	Should th of the cor	Should the AC power fail while the Service Bypass switch is set to bypass, all of the connected equipment will lose power immediately.		
	The Powe breaker v breaker. instructe	erTrust UPS output is <i>not</i> protected by the MAIN INPUT circuit when in Bypass mode; instead, it is protected by the BYPASS INPUT The Bypass switch should always be in the NORMAL position, unless d otherwise by a Hewlett-Packard service representative.		
#### 12 UPS/BATTERY This slide switch enables or disables operation of the UPS. In the Switch **ENABLE** position (switch to the right), the UPS functions normally. Depending on other conditions, there may be voltage present at the AC output, and the UPS may be charging or discharging its batteries. Unless the UPS is in Bypass mode, it is completely disabled when this switch is in the **DISABLE** position (switch to the left); there is no voltage present at the AC output, and the UPS is neither charging nor discharging its batteries. The switch should be left in the DISABLE position if the UPS is disconnected from AC input power or the system is shut down for an extended period of time. Cycling this switch — moving the switch to the **DISABLE** position and then back to the ENABLE position — resets all UPS conditions except an Emergency Power Off (EPO) shutdown and an automatic bypass condition.

#### WARNING If the Service Bypass switch is in the BYPASS position, voltage may still be present at the output! This is true regardless of the UPS/BATTERY switch setting.

13 Enable Light	This green light indicates that the UPS is enabled and operating. The Enable light is normally on if the UPS/BATTERY switch is set to ENABLE. However, there are two exceptions:	
	1. If the UPS/BATTERY switch is set to the ENABLE position while the AC input power is off, the Enable light flashes, and then remains off until AC input power returns.	
	2. If the batteries discharge while AC input power is off and the Output On/Output Off switch is set to Output On, the Enable light turns off. It remains off until AC input power returns.	
14 Output Receptacle Cover	The cover that prevents the connectors in the output receptacles from being accidentally unplugged.	
15 Precharge Failure LED	When flashing, this red LED indicates that the voltage on the main inverter has not precharged properly and that the Battery Precharge Shorting Plate must not be installed.	
16 Battery Precharge Shorting Plate	This plate is used to prevent the battery from being directly connected to an unenergized inverter assembly. It must be removed to attach the battery cable and, when reinstalled, provides a low resistance, direct current path from the battery to the main inverter.	
17 Caution Light	This light warns that the UPS should not be switched into or out of Bypass mode.	

# **Rear Panel Connectors, Switches, and Indicators (Worldwide Version)**

Figure 1-4 Rear Panel Connectors, Switches, and Indicators (Worldwide Version)



upsgs04c

Connectors and switches on the worldwide version are shown in Figure 1-4 and described below.

1 Hardwired Output	For the worldwide version, a hole with a strain relief is provided in the right access panel for making a hardwired output connection in a manner appropriate to local electrical codes.
	Hardwired output is not available with 40A Service Bypass Units.
2 IEC Output Receptacles	Three IEC320 C19 output receptacles are available on both North American and worldwide versions of the PowerTrust UPS. Up to three expansion cabinet Power Distribution Units (PDUs) can be plugged in here.
3 AC Power Input	For the worldwide (hardwired) version of the PowerTrust UPS, a hole with a strain relief is provided in the right access panel for making a hardwired input connection to an AC power source.

4 Access Plate 5 EPO Terminals 6 UPS Port		This plate provides access to the terminal block where hardwired connections can be made. For information about the Access Plate on the 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures.". A pair of screw terminals is provided for connection to an Emergency Power Off (EPO) system. For normal operation, these terminals must be connected by a jumper or by the EPO system. Removing the connection causes the UPS AC output to shut down. The output remains shut off until the terminals are connected again, and the Output On/Output Off switch on the control panel is cycled (Output Off, then Output On). If the Service Bypass switch is set to BYPASS, the EPO has no effect on the PowerTrust AC output. A 9-pin D-type connector, used for connection to a computer system. Through this connection the UPS reports its status and can be controlled by an external device.				
				NOTE A special cabl appears to be pinout. Use o		is required to connect to the UPS Port. Although the UPS Port a standard 9-pin RS-232 connector, it has a non-standard e of these RS-232 cables:
					5061-2575	9-pin male/9-pin female (2.5 meter)
	5061-2569	9-pin male/25-pin male (2.5 meter)				
	5053-5352	9-pin male/25-pin male (4 meter)				
	If the wrong ca manual, but th "HP-UX UPS M Monitor Error	able is used, the UPS will still function as stated in this be error messages and status logging described in Appendix A, Monitor Error Messages." and Appendix B, "MPE/iX UPS Messages." will not be supported.				

7 Battery Connector	The Battery Box is connected to the Electronics Unit using a battery cable. The cable from the Battery Box is plugged into a connector at the bottom of the Electronics Unit. For information on how to connect the Electronics Unit to the Battery Box, refer to "Connecting the Battery Box Cable to the Electronics Unit" in Chapter 3.
8 Output Circuit Breakers	When an Output circuit breaker activates, it shuts off the AC voltage to the corresponding output receptacle.
	There are four output circuit breakers that protect the UPS from overcurrent conditions.
	The first three output circuit breakers (marked <i>OUTLET 1</i> , <i>OUTLET 2</i> and <i>OUTLET 3</i> ) provide overcurrent protection for the IEC320 C19 outlets (see <b>2</b> in Figure 1-4). The circuit breaker marked <i>OUTLET 4</i> provides overcurrent protection for the NEMA L6-30R output receptacle (see <b>3</b> in Figure 1-4).
	The AC coming out of the corresponding output receptacle remains off until the cause of the overcurrent is corrected, the circuit breaker is reset, and, depending on the severity of the problem, the UPS/BATTERY switch is cycled (turned off then back on). This restores the UPS to normal operation. For information on the 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures.".
9 Input Circuit Breakers	The input circuit breaker marked <i>BYPASS</i> shuts off the AC input to the Service Bypass Unit, Electronics Unit, and the system load in the event of an overload (overcurrent condition). If the UPS is in Automatic or Service Bypass mode when the overload occurs, this breaker will trip and all AC power to the attached equipment is lost.
	The input circuit breaker marked <i>MAIN</i> protects the UPS and the protected equipment from overcurrent conditions when the UPS is operating normally from the AC line; that is, when the UPS is neither in Bypass mode nor on battery.
	The UPS remains in this condition until the cause of the overcurrent is corrected, the circuit breaker is reset, and, depending on the severity of the problem, the UPS/BATTERY switch is cycled (turned off then back on). This restores the UPS to normal operation.
WARNING Turning o PowerTru operation Chapter 4	off the MAIN INPUT circuit breaker does NOT turn off the ast UPS! Instead, the UPS goes to the "On-battery" state of a. See "Powering-Off the UPS for an Extended Time" in a.

10 Bypass Switch	This red button must be pressed to change the Service Bypass
Activation Button	switch setting from NORMAL to BYPASS. (The button does not have to
	be pressed to change the setting from BYPASS to NORMAL.) Pressing
	this button will put the UPS into Automatic Bypass mode. To avoid
	loosing AC power to the protected equipment, you should always
	check that the BYPASS INPUT circuit breaker is ON before
	pressing this button.

# CAUTION Do not push the red button while the UPS is operating on battery. Damage to the connected equipment can occur.

11 Service Bypass Switch		This rotary switch allows you to isolate and disconnect the AC input from the Electronics Unit and batteries so that these components can be serviced without disrupting power to the connected equipment. This switch is also used to manually override automatic bypass.
		The bypass switch can be set to two positions, NORMAL and BYPASS.
		<b>Normal Mode</b> . When the switch is set to NORMAL, the AC power source provides power to the Electronics Unit. Should the AC power fail while the Service Bypass switch is set to NORMAL, the UPS automatically switches to On-battery mode. When input power is restored, the Electronics Unit returns to On-line mode.
		<b>Bypass Mode</b> . When the switch is set to <b>BYPASS</b> , the AC power source bypasses the Electronics Unit but continues to supply power to the load.
		The BYPASS setting is used to service the Electronics Unit or Battery Box. The UPS cannot switch to battery power if AC input power is lost when the Service Bypass switch is set to BYPASS.
CAUTION	Should the A of the connec	C power fail while the Service Bypass switch is set to вуразя, all ted equipment will lose power immediately.
The PowerTrust UPS output is <i>not</i> protected by the MAIN INPUT circ breaker when in Bypass mode; instead, it is protected by the BYPASS I breaker. The Bypass switch should always be in the NORMAL position, un instructed otherwise by a Hewlett-Packard service representative.		ust UPS output is <i>not</i> protected by the MAIN INPUT circuit n in Bypass mode; instead, it is protected by the BYPASS INPUT Bypass switch should always be in the NORMAL position, unless herwise by a Hewlett-Packard service representative.

12 UPS/BATTERY Switch	This slide switch enables or disables operation of the UPS. In the <b>ENABLE</b> position (switch to the right), the UPS functions normally. Depending on other conditions, there may be voltage present at the AC output, and the UPS may be charging or discharging its batteries.
	Unless the UPS is in Bypass Mode, it is completely disabled when this switch is in the DISABLE position (switch to the left); there is no voltage present at the AC output, and the UPS is neither charging nor discharging its batteries. The switch should be left in the DISABLE position if the UPS is disconnected from AC input power or the system is shut down for an extended period of time.
	Cycling this switch — moving the switch to the <b>DISABLE</b> position and then back to the <b>ENABLE</b> position — resets all UPS conditions except an Emergency Power Off (EPO) shutdown and an automatic bypass condition.

#### WARNING If the Service Bypass switch is in the BYPASS position, voltage may still be present at the output! This is true regardless of the UPS/BATTERY switch setting.

13 Enable Light	This green light indicates that the UPS is enabled and operating. The Enable light is normally on if the UPS/BATTERY switch is set to ENABLE. However, there are two exceptions:	
	1. If the UPS/BATTERY switch is set to the ENABLE position while the AC input power is off, the Enable light flashes, and then remains off until AC input power returns.	
	2. If the batteries discharge while AC input power is off and the Output On/Output Off switch is set to Output On, the Enable light turns off. It remains off until AC input power returns.	
14 Output Receptacle Cover	The cover that prevents the connectors in the output receptacles from being accidentally unplugged.	
15 Precharge Failure LED	When flashing, this red LED indicates that the voltage on the main inverter has not precharged properly and that the Battery Precharge Shorting Plate must not be installed.	
16 Battery Precharge Shorting Plate	This plate is used to prevent the battery from being directly connected to an unenergized inverter assembly. It must be removed to attach the battery cable and, when reinstalled, provides a low resistance, direct current path from the battery to the main inverter.	
17 Caution Light	This light warns that the UPS should not be switched into or out of Bypass mode.	

## **Battery Box**

Each UPS includes a Battery Box that contains ten replaceable battery packs.





## **Service Bypass Unit**

The Service Bypass Unit provides AC power distribution to and from the UPS. Figure 1-6 and Figure 1-7 shows the North American and Worldwide versions of the Service Bypass Unit, respectively.

Figure 1-6 shows the 30A Service Bypass Unit. The 40A Service Bypass Unit has some differences. For information on the 40A unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures."

Figure 1-6 PowerTrust UPS Service Bypass Unit (30A) (North American Version)



upsgs06



Figure 1-7 PowerTrust UPS Service Bypass Unit (30A) (Worldwide Version)

upsgs09

## **Specifications**

This section contains the specifications for the 5.5 kVA PowerTrust UPS, Model A3589A.

#### Table 1-2A3589A Specifications

Description	Specification
Electrical Specifications	I
AC Line Input:	
Rated Voltage	200-240 VAC @ 50/60 Hz
Rated Current <sup>1</sup>	28A
Normal Operating Frequency Range	50 ±3 Hz or 60 ± Hz $^2$
Normal Operating Voltage Range	180-256 VAC
AC Line Input Transfer Points:	
On-line to On-battery:	
Normal to Overvoltage	262-272 VAC
Normal to Undervoltage	162-168 VAC
Normal to Underfrequency:	
For 50 Hz operation	below 46.5 Hz
For 60 Hz operation	below 56.5 Hz
Normal to Overfrequency:	
For 50 Hz operation	below 53.5 Hz
For 60 Hz operation	below 63.5 Hz
On-battery to On-line:	
Overvoltage to Normal	256-266 VAC
Undervoltage to Normal	174-180 VAC
Underfrequency to Normal:	
For 50 Hz operation	above 47.0 Hz
For 60 Hz operation	below 57.0 Hz
On-line to On-battery: Normal to Overvoltage Normal to Undervoltage Normal to Underfrequency: For 50 Hz operation For 60 Hz operation Normal to Overfrequency: For 50 Hz operation For 60 Hz operation On-battery to On-line: Overvoltage to Normal Undervoltage to Normal Underfrequency to Normal: For 50 Hz operation For 60 Hz operation	262-272 VAC 162-168 VAC below 46.5 Hz below 56.5 Hz below 53.5 Hz below 63.5 Hz 256-266 VAC 174-180 VAC above 47.0 Hz below 57.0 Hz

Description	Specification
Overfrequency to Normal:	
For 50 Hz operation	below 53.0 Hz
For 60 Hz operation	below 63.0 Hz
AC Output:	
Output Voltage (and tolerance):	
On-line	230 VAC (+6%/-13%)
On-battery	230 VAC (±3%)
Auto or Service Bypass	Same as the AC line input
Output Frequency (and tolerance):	
On line	Tracks input frequency <sup>3</sup>
On battery	50 ±3 Hz or 60 ±3 Hz $^4$
Auto or Service Bypass	Same as the AC line input
Rated Output volt-amperes (VA):	
On-line <sup>5</sup>	5500 VA, continuous
On battery <sup>5</sup>	5500 VA, until fully discharged
Auto or Service Bypass <sup>6</sup>	5500 VA, continuous
Rated Power:	
On Line <sup>7</sup>	5500 W, continuous
On battery <sup>7</sup>	5500 W, until fully discharged
Auto or Service Bypass <sup>6</sup>	5500 VA, continuous
Output Waveshape:	
On line	Matches the input waveshape
On battery	Sine wave (with $\leq$ 5% THD) <sup>8</sup>
Auto or Service Bypass	Matches the input waveshape

Description	Specification
Overload Protection:	
On-line or On-battery:	
Firmware protection:	
For >110% load	Shuts down after a delay <sup>9</sup>
Input Breaker protection:	Main UPS circuit breaker (50A)
Auto or Service Bypass:	Bypass circuit breaker (40A)
Output Overload Protection:	
At Output #1	Output circuit breaker #1 (16A)
At Output #2	Output circuit breaker #2 (16A)
At Output #3	Output circuit breaker #3 (16A)
At Output #4	Output circuit breaker #4 (Two versions available, 30A or 40A)
Battery	
Туре	Maintenance-free sealed lead acid
Nominal voltage	48 VDC
Runtime (@ +25°C or above)	15 min. over battery lifetime
Runtime (new battery)	15 min. (+5°C to +40°C; at 0-3000 m)
Charging Time (@ +25°C)	≤14.5 hours
Lifetime	Approximately 4 years
Environmental Specifications	
Operating Limits:	
Temperature <sup>10</sup>	$5^\circ$ to $40^\circ \mathrm{C}^{10}$ —up to maximum operating altitude
Recommended Temperature <sup>10</sup>	20° to 25°C <sup>10</sup>
Humidity	15% to 80% Relative Humidity, non-condensing at 40°C
Altitude	0 to 3,000 meters (10,000 feet)
Non-Operating Limits:	–40°C to 70°C –15°C to 25°C for maximum battery life
Relative Humidity (noncondensing)	5% to 90% at 65° C
Altitude	0 - 4572 m (15,000 feet)

Description	Specification	
Acoustic Noise:	7.5 Bels A-weighted sound power from any surface	
Physical Specifications - Electronics Uni	it	
Dimensions packaged	Height - 43.82cm (17.25in) Width - 59.69cm (23.50in) Length - 95.25cm (37.50in) Weight - 77.73kg (171.0 lbs)	
Dimensions unpackaged	Height - 34.4cm (13.54in) - 8 EIA units Width - 48.16cm (18.96in) Length - 80.74cm (30.79in) Weight - 68.19kg (150.0 lbs)	
Physical Specifications - Battery Box		
Dimensions packaged	Height - 41.91cm (16.50in) Width - 55.25cm (21.75in) Length - 83.82cm (33.0in) Weight (with batteries) - 187.27kg (412 lbs)	
Dimensions unpackaged	Height - 30.84cm (12.14in) - 7 EIA units Width - 44.88cm (17.67in) Length - 70.15cm (27.62in) Weight (with batteries) - 180kg (396 lbs) Weight (without batteries) - 30kg (66 lbs)	
Physical Specifications - Battery Pack		
Dimensions packaged	Height - 39.37cm (15.50in) Width - 23.18cm (9.13in) Length - 50.80cm (20.00in) Weight - 18.18kg (40 lbs)	
Dimensions unpackaged	Height - 25.88cm (10.19in) Width - 8.0cm (3.15in) Length - 37.47cm (14.75in) Weight - 15kg (33 lbs)	
Physical Specifications - Service Bypass Unit (30A)		
Dimensions packaged	Height - 33.02 cm (13.00 in) Width - 40.64 cm (16.00 in) Length - 55.88 cm (22 in) Weight - 13.63 kg (30.0 lbs)	
Dimensions unpackaged	Height - 27.86cm (10.97in) Width - 22.1cm (8.70in) Length - 47.14cm (18.56in) Weight - 10.45kg (23 lbs)	
Physical Specifications - Service Bypass Unit (40A)		
Dimensions packaged	Height - 32.9 cm (12.9 in) Width - 18.1 cm (17.1 in) Length - 49.7 cm (19.6 in) Weight - 18.6 kg (41.0 lbs)	
Dimensions unpackaged	Height - 25.4 cm (10.0 in) Width - 15.5 cm (6.1 in) Length - 42.5 cm (16.7 in) Weight - 14.5 kg (32 lbs)	

Description	Specification	
Minimum Required Service Access		
Service access space	Rear - 76.0cm (30.0in) Side - 0.0cm (0.0in) Front - 91.0cm (36.0in)	
Communication Specifications		
RS-232 port pinouts	pin 1: Receive Data pin 2: Transmit Data pins 3-8: Reserved (Do not use) pin 9: Signal Ground	
Communication protocol	8 data bits, 1 stop bit, no parity, 1200 baud	

- 1. 50A max branch circuit overcurrent protection.
- 2. Outside these ranges the A3589A UPS may not turn on, or it may switch to on-battery operation if it is already on. Frequency range, specified above.
- 3. For input frequencies within the range specified in "Normal Operating Frequency Range."
- 4. The first number applies when the UPS operates within  $50 \pm 3$  Hz before the input power fails (or violates the operating limits). The second number applies when the UPS operates within  $60 \pm 3$  Hz before the input power fails (or violates the operating limits).
- 5. For loads with crest factors of 3.0 or less.
- 6. For loads with power factors of 1.0 (resistive or PFC).
- 7. Independent of load power factor or crest factor.
- 8. For purely resistive load.
- 9. Shutdown delay is implemented by PFC firmware. Delay decreases in inverse relation to the degree of output overload. In addition, UPS Outputs 1 through 4 are protected by corresponding Output circuit breakers 1 through 4.
- 10.Battery life is severely shortened if temperature exceeds 25°C (77°F) for extended periods of time.
- NOTE During AC line failure conditions, the PowerTrust UPS should **not** be operated from small portable generators, small portable motor generators, or other poorly regulated or distorted AC voltage sources. Use only high quality AC sources to supply input power to the UPS to ensure continued protection of your equipment.

## **Voltage and Frequency**

#### Voltage

When the AC input voltage drops below or rises above a specific value, the UPS automatically provides power to the connected equipment from its batteries. These voltage values are called transfer points. The UPS input voltage and frequency transfer points for the UPS are documented in Table 1-2 and shown in Figure 1-8 and Figure 1-9.

At power-on, the auto-ranging feature of the UPS measures the incoming AC voltage level and frequency to determine the correct operational mode.

When the UPS becomes operational, it directs AC line voltage to the output connectors until the AC input falls out of range. When the AC input is out of range, the UPS internally generates regulated AC power for up to 15 minutes at rated load and sends it to the connected equipment through the output connectors.

The UPS should power-on only when the input AC is between 175 V and 264 V, 50/60 Hz. Other voltage information is shown in the following table.

Operating Mode	Output Voltage
On-line	230 +6/-13%
On-battery	230 ±3%
Automatic Bypass	Tracks Input Voltage
Service Bypass	Tracks Input Voltage

While running on-line, the output voltage can be from 200 VAC to 244 VAC. While on battery, the output voltage must be 230 VAC with the output voltage regulated to within  $\pm$ 3%. Thus, the on-battery output voltage is always in the range of 234 VAC and 223 VAC.



Figure 1-8 UPS Input Voltage Transfer Points

upsg010



Figure 1-9 UPS Frequency Transfer Points

upsg011

#### Frequency

The UPS is designed to operate from nominal 50 Hz or 60 Hz power systems. Selection between 50 Hz and 60 Hz operation is performed automatically by the UPS at initial power on. If the input AC line frequency is below the minimum operating frequency, or above the maximum operating frequency, for either 50 Hz or 60 Hz operation when the UPS is first turned on, power will not be applied to the AC output. The minimum and maximum frequency ranges (in Hz) are specified in Table 1-2.

Other key points regarding frequency:

- The UPS has no switches or jumpers to set input or output frequency.
- The unit is **auto-ranging**; that is, it configures itself to the frequency of the AC input source.
- The UPS has a wide input range and automatic frequency selection.

## **UPS Modes**

The UPS has four modes of operation: *On-line, On-battery, Automatic Bypass,* and *Service Bypass.* 

## **On-line Mode**

When the UPS is operating normally, it is in On-line mode. In this mode, it is monitoring the AC input line and providing AC power to the output receptacles.

AC input power enters the Electronics Unit through the MAIN circuit breaker in the Service Bypass Unit (SBU). Power is directed to the Electronics Unit where it is monitored and returned to the SBU. See Figure 1-10. AC power then passes through the Service Bypass switch, which is in the NORMAL position, to the Output Breakers, and on to the output receptacles.

In this mode, AC input power to the Electronics Unit is also used to charge the batteries, if required.

## **On-battery Mode**

If AC input power is interrupted when the UPS is operating normally, the UPS switches to On-battery mode. In this mode, the batteries supply DC power to the DC-AC inverter. Output power flows to the Service Bypass Unit through the Service Bypass switch, which is set to NORMAL, and on to the output receptacles. This mode is used to allow time to safely shutdown the SPU or other loads. Fully charged batteries can sustain power to the SPU and other connected equipment for up to 15 minutes.

CAUTION Do not push the red button while the UPS is operating on battery. Damage to the connected equipment can occur.

## **Automatic Bypass Mode**

When the Electronics Unit detects an internal fault, it bypasses faulty or failing AC circuitry so that AC input power continues to flow to the connected equipment. While in *Automatic Bypass mode*, the UPS remains surge protected. Loss of input power while the UPS is in this mode, however, results in a complete loss of power to the connected equipment.

In this mode, AC input power flows through the Bypass breaker (see Figure 1-10) into the Electronics Unit where it is routed directly to the Automatic Electronic Bypass switch, which is closed, through the Service Bypass switch, which is set to NORMAL, and on to the output breakers and receptacles.

Because the Electronics Unit has detected an internal fault, battery power to the connected equipment is not available. If AC input power is interrupted while the UPS is in this mode, output power will also be interrupted.

## **Service Bypass Mode**

This mode allows the Electronics Unit, Battery Box, Control Panel, and Fan to be serviced while still providing AC input power to the connected equipment.

In contrast to Automatic Bypass mode, which is triggered on automatically by the UPS, Service Bypass mode occurs when the Service Bypass switch is *manually* turned to BYPASS. In Service Bypass mode, AC input power passes through the Bypass breaker, through the Service Bypass switch, which is set to BYPASS, and on to the output breakers and receptacles.

Because the Electronics Unit and Battery Box are isolated from the AC input and the output, there is no power failure protection while in this mode. Connected equipment is protected from surges, however, by the Bypass circuit breaker.





## **Sleep Mode**

To protect its internal circuitry and to prevent deep battery discharge after prolonged disruptions in AC input power, the UPS includes a feature called *Sleep Mode*. In Sleep Mode the UPS uses a minimum of battery power. Sleep Mode is normally initiated by the operating system (HP-UX) sending a shutdown ("S") command to the UPS to conserve Battery power. (This is the case when AC input fails, or its magnitude, frequency or waveshape are out-of-spec, for a prolonged period of time).

The following conditions also cause the UPS to go into Sleep Mode:

- Deeply discharged batteries while running On-Battery during an abnormal AC input situation (more likely to happen for operating systems other than HP-UX).
- Overload shutdown.
- Overtemperature shutdown.
- Improperly installed UPS (Battery Box cable not properly connected or Battery Precharge Shorting Plate not properly installed).
- Certain internal UPS faults.

In addition, the UPS also goes into Sleep Mode after it has been in Automatic or Service Bypass for more than 30 minutes (both of these cases are called *Bypass Sleep Mode*, to distinguish them from all the other cases). In either Automatic or Service Bypass Sleep Mode, power to the load is still maintained, in the absence of any power fail or out-of-spec power events, even though most of the internal UPS circuits are dormant and do not consume any battery power.

Bypass Sleep Mode can be distinguished from normal Sleep Mode by the state of the LED Indicators and Sound Alarm. (See "Case 15 (Normal or Abnormal) — UPS Off or Asleep" in Chapter 6 and "Case 16 (Normal or Abnormal) — Bypass Sleep Mode" in Chapter 6 for more detailed information regarding both types of Sleep Mode, including recommended diagnostic and recovery procedures).

## **UPS Safety Preparedness**

The purpose of this section is to reinforce the importance of preparedness when handling or servicing UPS products. UPS products must go through rigorous testing to ensure their safety, the same as all of HP's computer-related products. UPS products are proven to be safe under normal and most abnormal conditions. However, failed or stressed components within the UPS may present safety hazards in the form of:

- Caustic chemicals leaking from batteries damaged during shipping or from overcharging.
- Batteries exploding when overcharged or overheated.
- Dangerous voltage and current levels backfeeding through the AC input conductors for short periods after the AC power is turned off.
- Internal flame or smoke momentarily emitting from the UPS.

## **Safety Information**

Safety information you should know to avoid hazards:

- Obtain proper training before servicing any UPS product.
- Remember, unless properly shut down, all UPS outlet receptacles remain live even after the UPS is unplugged.
- Follow the published service procedures exactly; deviations may stress components.
- Refer to the handbook, *Electrical Safety &Lockout/Tagout*, for safe work practices.
- Learn how to:
  - Avoid back injuries from handling UPS components.
  - Shut down the UPS safely and power-fail the UPS without pulling the power plug.
  - Extinguish electrical fires without using water or other conductive fire retardants.
  - Wash acid from eyes or skin.
  - Wipe up acid spills.
  - Neutralize leaking batteries.
  - Discharge and dispose of old batteries at approved recycling centers.

#### Handling Emergencies

Be prepared before an emergency occurs. Suggested actions during an emergency:

- DO:
  - Call for assistance.
  - Report emergencies.

- Stay focused on the problem.
- DO NOT:
  - Put yourself or others in danger.
  - Work alone.

Where to find help:

- Refer to your site's emergency response procedures.
- Refer to the handbook, *Electrical Safety &Lockout/Tagout*.
- Call the HP Response Center, if you are uncertain about how to proceed.

#### **Hazardous Product Information**

Hazardous Components:	Percent:
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	10-20%
	Concentration of $H_2SO_4$ exists depending on state of discharge.
Lead (Pb)	30-60%
Lead Dioxide (PbO <sub>2</sub> )	5-25%
Lead Sulfate (PbSO <sub>4</sub> )	1-25%
	Pb exists either in the form of Pb, $PbO_2$ , or $PbSO_4$ depending on state of discharge.

## **Suggested Hazardous Product Procedures**

Situation:	Procedure:
Extinguishing fire:	Use fog, foam, $CO_2$ , dry chemical, or dry sand to extinguish fire. <i>DO NOT use water</i> .

Situation:	Procedure:
Handling released or spilled material:	If a battery is accidentally broken and electrolyte (sulfuric acid) leaks out, put on waterproof gloves and wipe it up with a cloth. Neutralize the acid with some alkaline substance such as ammonia solution or baking soda (sodium bicarbonate).
Contacting battery acid:	Wash eyes and skin with water immediately after any contact with battery acid.
Disposing of batteries:	Return discharged batteries to your vendor for disposal, or dispose locally following local regulations. Recycle batteries when possible.

#### WARNING

- DO NOT short the battery terminals. A battery can present a risk of electrical shock and/or burn from high short-circuit current. Observe proper precautions.
- DO NOT touch un-insulated battery terminals.
- DO NOT crush, disassemble, heat, incinerate, or expose battery to water.
- DO NOT puncture or subject batteries to mechanical shock.

## **Support Information**

## **Support Strategy**

The UPS has a 1-year warranty. All UPS assemblies are field-replaceable and do not have serviceable components inside. The UPS requires site preparation and installation by trained service personnel. Two CEs are required to install or replace the heavy electronics assemblies.

## Training

UPS training is self-paced with optional lab exercises — CE42-PWRTRUST55, HP P/N A3589-60101.

## **Battery Type**

The battery type is rechargeable, maintenance free, and sealed lead-acid.

The batteries should be recharged periodically when they are stored. The frequency of the recharge depends on the storage temperature. See "Shipping and Storage Requirements" in Chapter 2. Even when kept charged, a battery pack's hold-up time will decrease over the life of the pack. Each battery pack must be replaced every 3 to 5 years to maintain the 15-minute run time. If the UPS is exposed to environmental extremes or frequent discharges, replacement may need to be more often.

CAUTIONStoring battery packs for long periods without recharging them will cause<br/>damage to the battery packs, resulting in reduced run time.Protect the PowerTrust UPS from environmental extremes that can cause<br/>condensation within the unit.

Overview
Support Information

# **2** Unpacking and Inspecting

This chapter describes:

- Receiving the PowerTrust UPS
- Unpacking the UPS
- Claims procedures
- Shipping and storage requirements

#### WARNING The following procedures, as well as all other service, cleaning, and maintenance of the UPS, should be performed only by qualified service-trained Hewlett-Packard personnel.

You should understand all WARNINGs and CAUTIONs located in the front matter before proceeding with the installation and operation of the PowerTrust UPS.

## **Receiving the PowerTrust UPS**

First, check that the order is complete as specified in the carrier's Bill of Lading. Sometimes several orders are combined into one shipment. Inspect each container for evidence of mishandling during transit. Request that the carrier's agent be present when any damaged containers are opened.

Inspect the exterior of the shipping container before unpacking the unit, and carefully inspect all equipment as it is removed from the container. If you observe any damage, refer to "Claims Procedures" later in this chapter.

## **Physical Inventory**

Open the shipping container and find the packing list that lists the equipment supplied. Compare the product and option numbers on the packing list with the purchase order to verify that the shipment is correct. If any of the equipment is damaged or missing, refer to "Claims Procedures" later in this chapter.

Use the instructions on the following pages for unpacking the UPS. As you unpack the equipment, check that the model and serial numbers are identical to those specified in the packing list. The model and/or serial numbers are printed on the front of the UPS's Electronics Unit and the back of the Service Bypass Unit and Battery Box.

## **Unpacking the UPS**

Each PowerTrust Electronics Unit, Battery Box, and Service Bypass Unit is shipped in a separate carton; the cartons are stacked and banded together on a shipping pallet.

The bottom carton contains the Electronics Unit, the middle carton contains the Battery Box, and the top carton contains the Service Bypass Unit. See Figure 2-1. The shipment will also include a separate carton containing the Power Distribution Unit (PDU), if one was ordered.





upsg004

The shipping carton for the Battery Box and Electronics Unit consists of an inverted half-carton, which covers the top of the unit, and a tray-like bottom on which the unit sits. Figure 2-3 and Figure 2-6 illustrate the packaging for these components. The shipping carton for the Service Bypass Unit is a regular four-sided box. See Figure 2-2.

To unpack the PowerTrust UPS, you must cut the straps that secure the UPS to the pallet and unpack the shipping containers from the top down. The following subsections contain step-by-step procedures for unpacking the UPS.

## **Cutting the Shipping Straps**

WARNING The straps that secure the cartons to the pallet are under tension. Be careful when cutting the shipping straps to prevent personal injury.

Carefully cut and remove the straps that secure the cartons to the shipping pallet.

## **Unpacking the Service Bypass Unit**

Use the following procedure to unpack the Service Bypass Unit:

- 1. Remove the carton containing the Service Bypass Unit (top box).
- 2. Open the carton and remove the AC power cord. Figure 2-2 shows how the 30A Service Bypass Unit is packed. Refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures." for 40A Service Bypass Unit unpacking information.



#### Figure 2-2Unpacking the PowerTrust Service Bypass Unit

upsg005

- 3. Remove any additional material, such as manuals or cords, from the top of the unit and set them aside.
- 4. Remove the packing material on which the power cord was resting.
- 5. Remove the L-shaped corrugated-cardboard pads from the top of the Service Bypass Unit.
- 6. Check the packing material for signs of damage, which could indicate rough handling during transit. Refer to "Claims Procedures" later in this chapter if you discover any damage.
- 7. Carefully remove the Service Bypass Unit.

## **Unpacking the Battery Box**



#### Figure 2-3 Unpacking the PowerTrust Battery Box

upsg006

To unpack the Battery Box and battery packs:

- 1. While the carton containing the Battery Box is still on the shipping pallet, open it.
- 2. Remove the packing material from the top and sides of the Battery Box. See Figure 2-3.
- 3. Check the packing material for signs of damage. Refer to "Claims Procedures" later in this chapter if you discover any damage.
- 4. Remove the top half-carton (item 1) from the tray-like bottom of the shipping carton.
- 5. Before lifting the Battery Box out of its shipping carton, follow the step-by-step instructions for removing the battery packs, which follows.

# WARNING With the batteries installed, each Battery Box weighs about 180 kg (396 lbs.) Do not attempt to lift the Battery Box out of the shipping carton. Use the procedure in "Removing Battery Packs from Battery Box".

#### **Removing Battery Packs from Battery Box**

The following procedure should be performed by qualified service personnel only.

## WARNING Batteries can present a risk of electrical shock and/or burn from high short circuit current. Observe proper precautions.

- Do not stack batteries on top of each other.
- Do not allow anything to touch the battery terminals.
- Do not pierce battery pack wiring insulation.
- Do not allow conductive tools or jewelry to touch battery packs or battery terminals.
- 1. Loosen the thumbscrew at the bottom of each battery. See Figure 2-4.





2. Using the handhold at the top of the left-most battery, carefully pull the battery pack out of the battery box 8-10 inches.

- 3. Position your free hand under the battery pack for support. See Figure 2-5.
- 4. Carefully pull the battery pack all the way out of the slot and set it aside in a safe place.

WARNING Each battery pack weighs approximately 14.5 kg (33 lbs). Exercise appropriate caution to avoid personal injury when removing the battery packs.

Battery packs contain hazardous voltages. Do not short connectors together.

Do not stack battery packs on top of each other; doing so may damage them or cause physical injury.





upsgs08

- 5. Repeat steps 2 through 4 until all of the batteries have been removed from one side.
- 6. Repeat steps 1 through 4 for the batteries on the other side of the Battery Box.

When you have finished, you should have removed ten battery packs.

7. Along with one other person, lift the Battery Box off of the box containing the Electronics Unit and set it aside; then remove the bottom portion of the Battery Box carton.



Figure 2-6 Unpacking the PowerTrust Electronics Unit

upsg007

## **Unpacking the Electronics Unit**

# WARNING The Electronics Unit weighs about 68 kg (150 lbs.) unpacked. At least two people are required to lift it.

Refer to Figure 2-6 while removing the Electronics Unit from its shipping carton:

- 1. Remove the piece of plywood located on the top of the carton containing the Electronics Unit.
- 2. Open the carton containing the Electronics Unit.
- 3. Remove the packing material from around the Electronics Unit.
- 4. Remove the top half-carton (item 1) from the tray-like bottom of the shipping carton.
- 5. Remove any additional material, such as manuals or cords, from the top of the unit and set them aside.

- 6. Check the packing material for signs of damage, which could indicate rough handling during transit. Also look for damage such as broken controls and connectors, dented corners, scratches, bent panels, and loose components. Refer to "Claims Procedures" later in this chapter if you discover any damage.
- 7. Along with one other person, get a firm grip on all four lifting straps and lift the Electronics Unit straight up and out of the shipping carton and set it aside.
# **Claims Procedures**

If the PowerTrust UPS is damaged, follow the procedures outlined in this section.

Notify the nearest Hewlett-Packard Sales and Service Office if the shipment is incomplete, damaged, or fails to meet specifications. If damage occurred in transit, also notify the carrier. Hewlett-Packard will arrange for replacement or repair without waiting for settlement of claims against the carrier. In the event of damage in transit, retain the packing container and packing materials for inspection.

## Repacking

If the PowerTrust UPS must be reshipped, use the original shipping and packing materials, if available and undamaged. If unavailable, contact the local Hewlett-Packard Sales and Service Office for repacking information and materials. *Do not reuse damaged packing material or return the unit without the proper packaging materials.* 

## **Returning PowerTrust Battery Packs**

Defective, damaged, or depleted PowerTrust battery packs must be returned or recycled locally. Refer to "Shipping and Storage Requirements". The return location is in a flyer that accompanies the replacement battery packs. For more information about where to return battery packs, contact the nearest Hewlett-Packard Sales and Service Office.

# **Shipping and Storage Requirements**

The PowerTrust UPS can be shipped or stored under the following (non-operating) conditions and environmental limits:

- The UPS/BATTERY switch must be in the DISABLE position.
- Temperature limits:
  - Electronics Unit, Service Bypass Unit, and Battery Box:  $-40^\circ$  to  $70^\circ C~(-104^\circ$  to  $158^\circ F)$
  - **Battery Pack:** The shelf life of a battery pack depends on the temperature of the storage area. The charge on a battery should not be allowed to drop below 50%. Figure 2-7 shows how long a battery pack takes to reach a 50% charge at 40°C (104°F), 30°C (88°F), and 25°C (77°F). Figure 2-8 shows the time for the battery capacity to decrease to 50% over temperatures ranging from 18°C (64°) to about 54°C (129°F). For example, if a battery pack has been stored at 20°C (68°F), it should be recharged after about 800 days or about 27 months. If it has been stored at 50°C (122°F), it should be recharged after about 60 days or 2 months.





upsg012



Figure 2-8 Battery Pack Shelf-Life Storage Time vs Temperature

- Recommended temperature: 20° to 25°C
- Humidity: 5% to 90% non-condensing at 65°C
- Altitude: 4,572 meters (15,000 feet)
- The batteries must be recharged periodically depending on the storage temperature.

CAUTIONStoring battery packs without recharging periodically will cause damage to<br/>the battery packs, resulting in reduced run time.The PowerTrust UPS should be protected from environmental extremes that<br/>can cause condensation within the unit.

This chapter contains information about:

- Sizing the load
- Rackmounting procedures
- Hardwired connections
- Cabling connections
- Examples of PowerTrust connections in a system

#### WARNING The following procedures, as well as all other service, cleaning, and maintenance of the UPS, should be performed only by qualified service-trained Hewlett-Packard personnel.

# **Sizing the Load**

The equipment to be attached to the PowerTrust UPS is rated in Volt Amps (VA). This represents the rated voltage multiplied by the rated current (or amperage) used by the equipment.

**CAUTION** Be sure to perform the test in "Load Testing" in Chapter 5 after the installation is complete.

To size the load for the PowerTrust UPS:

- 1. Determine the power required for each component. Hewlett-Packard Configuration Guides give a "Power Required" value (in Volt-Amperes) for many HP products. When racking a component with no Power Required value available, follow these rules:
  - a. If a wattage number is given on the component, and it is labeled "Power Factor Corrected," use that number.
  - b. If a wattage number is given that is not labeled "Power Factor Corrected," multiply that number by 1.4.
  - c. If no wattage number is given on the component, multiply the volts by the amperage of the component.
- 2. Sum all of the Volt-Amperes (VA) of all the components to ensure that the total power required is less than or equal to the Volt-Ampere (VA) rating of the UPS. If more than the UPS VA rating is consumed in the cabinet, additional PowerTrust UPS units will be required to provide power protection for all components.

In most cases, equipment is rated high so that the sum of the values for all of the equipment is equal to or less than the actual load. Note that power load values listed for HP devices in the HP3000 and HP9000 Configuration Guides are *not* "worst case"; they represent realistic loading values.

Acceptable power ranges for the PowerTrust UPS:

- 5500 VA
- 5500 W

For example:

Table 3-1 Example of Determining Load

Equipment	Rating	Volts	VA
Computer	6A	240 V	1440 VA
Terminal	1A	240 V	240 VA
Total VA			1680 VA

In this example, the load has a total of 1680 VA, which is well within the range of the A3589A (5.5 kVA) unit.

# **Rackmounting Procedures**

The PowerTrust UPS is designed to be installed at the bottom of the Hewlett-Packard A1883A, A1884A, A1896A, or A1897A expansion cabinet (19-inch rack).

Before you begin, check that the following switch settings have been made:

- 1. The Output On/Output Off switch on the front panel of the Electronics Unit is set to Output Off.
- 2. The UPS/BATTERY switch on the Service Bypass Unit is set to the DISABLE position.
- 3. All circuit breakers located on the Service Bypass Unit are set to OFF.
- 4. The Service Bypass switch on the Service Bypass Unit is set to NORMAL.

When installing the PowerTrust, work from the bottom up:

- 1. Install the Battery Box.
- 2. Install the Electronics Unit.
- 3. Install the Service Bypass Unit.
- 4. Connect the Battery Box to the Electronics Unit.
- 5. Install the switchless Power Distribution Unit (PDU), if it has not already been installed by the factory. (Factory installation is optional.)
- 6. Connect the UPS to AC input power.

The details of these installation procedures are described in the sections that follow.

## **Installing the Battery Box**

The Battery Box contains ten battery packs. For purposes of shipping, the battery packs are included in the Battery Box. When fully loaded, a Battery Box weighs about 180 kg (396 lb) and each battery pack weighs about 15 kg (33 lbs).

# WARNING To prevent personal injury, remove the battery packs before installing the Battery Box into the expansion cabinet.

The battery packs should have been removed when the Battery Box was unpacked. Refer to "Removing Battery Packs from Battery Box" in Chapter 2 for step-by-step instructions if the battery packs are still in the Battery Box.

#### **Installing the Battery Box in the Rack**

NOTE The Battery Box is installed from the rear of the expansion cabinet. In the following procedures, the end of the Battery Box containing the access plate should be positioned so that it will be at the rear of the expansion cabinet (next to the access door).

1. Open the rear door of the expansion cabinet.

2. Install two rails at the bottom-most position in the expansion cabinet. Four clip-nuts are needed and should be placed in the 3rd hole up from the bottom on each cabinet side frame rail. (Refer to Figure 3-1.)

Do not install rail stops. If rail stops have been installed on the rails, they should be removed.

3. Eight clip-nuts are needed to secure the Battery Box. Two clip-nuts should be placed on each cabinet side rail, one in the 6th hole and one in the 13th hole up from the bottom of the cabinet side rail.



#### **Figure 3-1 Rail Locations for the Battery Box**

- 4. With the help of one other person, slide the Battery Box onto the rackmount rails from the rear of the expansion cabinet so that the opening containing the battery cable is at the back of the cabinet. The battery cable is located behind the plastic cover marked "REMOVE FOR ASSEMBLY." See Figure 3-8.
- 5. Using a Torx driver, attach two screws at each corner of the Battery Box. See Figure 3-2.



Figure 3-2 Battery Box Corner Mounting Locations

6. Install all ten battery packs into the Battery Box. Install the battery packs one at a time, moving from left to right.

a. Slip the guide at the bottom of the new battery pack between the tracks at the bottom of the Battery Box and push the battery completely into the Battery Box slot. See Figure 3-3.

You may need to rock the battery pack up and down slightly to get it to slide on the track.

b. Fasten the thumbscrew at the bottom of the battery pack.



Figure 3-3 Inserting a Battery Pack into the Battery Box

## **Installing the Electronics Unit in the Rack**

- 1. Install two rails just above the Battery Box. Four clip-nuts are needed and should be placed in the 24th hole up from the bottom of each cabinet side frame rail.
- 2. Four clip-nuts are needed to secure the Electronics Unit. From the front of the cabinet, place two clip-nuts in each front cabinet rail one in the 32nd hole and one in the 41st hole up from the bottom of the rail. See Figure 3-4.



Figure 3-4 Rail and Clip-Nut Locations for Rackmounting the Electronics Unit

3. With the help of one other person, grasp the strap handles, lift the Electronics Unit, and slide it into the rackmount position from the front of the expansion cabinet, just above the Battery Box. As you slide the Electronics Unit into the cabinet, fold the second set of

straps over the top of the Electronics Unit and out of the way.

#### WARNING The Electronics Unit weighs about 68 kg (150 lbs). It requires two people to move it. Use all four lifting straps to lift the Electronics Unit.

4. Secure the Electronics Unit to the front cabinet frame with four screws.

## **Installing the Service Bypass Unit**

- 1. At the rear of the cabinet, place four clip-nuts (two per side) onto holes at the following positions:
  - a. Two clip-nuts (one per side) at the 32nd hole up from the bottom of the cabinet frame rail. See Figure 3-5.
  - b. Two clip-nuts (one per side) at the 41st hole up from the bottom of the frame rail. There should be eight empty holes between each set of clip-nuts.

Figure 3-5 Clip-Nut Locations for Rackmounting the Service Bypass Unit



2. Make sure the Service Bypass switch is set to NORMAL and that the circuit breakers are ON.

- 3. Slide the Service Bypass Unit onto the *shelf* of the Electronics Unit until the connector at the back of the Electronics Unit is aligned with the connector on the Service Bypass Unit.
- 4. Carefully push the Service Bypass Unit into the cabinet until the connector is fully engaged.
- 5. Secure the Service Bypass Unit to the rear cabinet frame with four screws.
- 6. Set the output receptacle cover (that came in the box with the Service Bypass Unit) aside. You will attach it after you plug in the output receptacles.

## **Attaching Front Bezel**

- 1. Attach one bracket to each of the four front corners of the Electronics Unit and secure it with a single M4-.7 Torx screw. The alignment pins on each bracket must line up with small holes in the front panel. (See Figure 3-6).
- 2. Position the front bezel onto the brackets so that the pins behind the front of the bezel line up with the four brackets on the face of the Electronics Unit.
- 3. Gently push the bezel in until the bezel pins snap into the bracket clips.
- 4. Install nine filler panels onto the front of the cabinet rack below the Electronics Unit to cover the Battery Box.





upins10d

## **Power Distribution Unit (PDU)**

Both the factory-integrated and field-integrated versions of the PowerTrust UPS require the use of a UPS-compatible Power Distribution Unit (PDU or "power strip") on the expansion cabinet containing the device(s) to be protected by the UPS.

#### **Installing Switchless Power Distribution Unit (PDU)**

For field upgrades, a switchless Power Distribution Unit (PDU) should have been ordered along with the UPS. It should be installed next to the existing PDU in the expansion cabinet.

Tools required for installing the PDU:

- #25 Torx driver
- 1. Loosen and remove the two screws that secure the existing PDU to the brackets attached to the cabinet frame.
- 2. Loosen and remove the two screws that secure the brackets to the cabinet frame and remove the brackets.
- 3. Insert the new PDU into the space beside the existing PDU.
- 4. Re-install the brackets and secure them with two screws each.

- 5. Insert and tighten two screws at each bracket to secure both PDUs to each bracket.
- 6. Attach a ground wire from the new PDU to the chassis (see Figure 3-7). This ground wire is required for safe operation of the unit.

Figure 3-7 PDU Ground Connection



upsg001

## **Connecting the Battery Box Cable to the Electronics Unit**

Use the following procedure to connect the cable from the Battery Box to the Electronics Unit.

- 1. Before you begin, make sure the UPS/BATTERY switch is set to DISABLE.
- 2. Locate the Battery Precharge Shorting Plate that covers the battery cable connector. See Figure 3-8.



Figure 3-8 Battery Precharge Shorting Plate

- 3. Use a screwdriver to loosen the screw at the center of each thumbscrew, then unscrew the thumbscrews on either side of the plate and remove it.
- 4. From the Battery Box, remove the plastic cover marked "REMOVE FOR ASSEMBLY" and dispose of it.
- 5. Remove the Battery Box cable.
- 6. Attach the Battery Box cable connector to the connector on the Electronics Unit.

After you attach the cable, the capacitors will precharge.

7. Check the Precharge Failure LED (see Figure 1-3).

If the LED is off, continue.

#### WARNING If the Precharge Failure LED is blinking, do not reinstall the Battery Precharge Shorting Plate. Severe product damage can result. Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

8. Orient the plate so that the notch on the plate is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

Attaching the plate is not trivial. You may need to rock the plate back and forth as you push it in.



#### **Figure 3-9 Reattaching Battery Precharge Shorting Plate**

jd039

9. Tighten the two thumbscrews at the sides of the plate.

# **Input and Output Connections**

WARNING	Only a qualified electrician should make the hardwired connections.		
NOTE	<b>5.5 kVA, 30A PowerTrust UPS products</b> that are sold in Europe are shipped without a line cord. It is the responsibility of the customer to get the correct power cord for the particular country and electrical code, and to have the power cord wired to the UPS input terminals.		
	<b>5.5 kVA, 40A PowerTrust UPS products</b> are equipped with two cords, one with an IEC 309 receptacle for output power and one with an IEC 309 plug for AC input power.		

This section describes the hardwired input and output connections to the PowerTrust UPS. In the worldwide version, the connections are made to the terminal block located behind the access panels at the rear of the Service Bypass Unit (see Figure 3-10). The Worldwide version is shipped without a line cord and without the L6-30R output receptacle; input and output wiring connections must be hardwired. The North American version is prewired at the factory with an input line cord terminated with an 6-50P plug and an L6-30R output receptacle; no hardwiring is required.

CAUTION It is recommended that you do not place intervening power conditioning equipment between the PowerTrust UPS and the AC mains power source. Such power conditioning equipment might interact with the PowerTrust UPS or the connected load, causing faulty operation. If you must use power conditioning equipment between the PowerTrust UPS and the AC mains power source, the output of the nonferro-resonant power conditioning equipment should be capable of supporting 3% voltage regulation for an additional dynamic input current surge to the PowerTrust UPS of four times the PowerTrust's operating input current rating. When in doubt, consult a qualified site-preparation expert.

### Wire Gauge Requirements

Always use the following wire gauge guidelines when making input or output connections to the mains input and output terminal blocks.

• Input Wiring:

Input: (L1 IN, L2/N IN): minimum 8 AWG (6 mm<sup>2</sup>) stranded copper wire

Ground: minimum 8 AWG (6 mm<sup>2</sup>) stranded copper wire

• Output Wiring:

The output terminals can accommodate stranded copper wire with a range of 14 AWG to 4 AWG ( $2.5 \text{ mm}^2 - 16 \text{ mm}^2$ ).

Output wiring should be sized based on input current requirements of the load equipment, in accordance with local codes.



#### Figure 3-10 A3589A Terminal Block

jd035a

## **Torque Specifications**

Use a flat-bladed screwdriver to secure the screws to the terminal block. The following torque specifications are required:

For Line and Ground Terminals: 10.6 - 12.3 in-lb (1.2 - 1.4 Nm)

## **Removing the Access Panels**

- 1. Turn off the AC input at the power source.
- 2. Make certain that the UPS/BATTERY switch is set to **DISABLE**.
- 3. Make certain that the Service Bypass switch is in the NORMAL position.
- 4. Loosen and remove the four screws that secure each access panel to the rear panel of the Service Bypass Unit. Remove the access panels.
- 5. Feed the AC input and output wires through the right access panel to the left access panel for connection to the terminal block.

## **Worldwide Version Input Wiring**

For 200-240V, 50 or 60Hz:

- Line (or Line 1): Connect wire to the L1 IN terminal.
- Neutral (or Line 2) Connect wire to the L2/N IN terminal.
- **Protective Earth Ground:** Connect the GREEN or GREEN/YELLOW wire to the protective earth terminal marked with the following symbol:



NOTE This model requires single-phase input power (in contrast to 3-phase). Single-phase power may be obtained in one of the following ways:

- 1. **Line-to-neutral**: 200-240V across a phase wire (hot wire) and a neutral wire.
- 2. Line-to-line: 200-240V across two different phase wires (hot wires).

In some countries, the UPS must be supplied line-to-line in order to obtain 200-240 V; other countries require line-to-neutral to obtain 200-240 V. In no case should the input voltage rating of 200-240 Volts be exceeded.

## **Worldwide Version Output Wiring**

Line (or Line 1): Connect wire to the L1 terminal

Neutral (or Line 2): Connect wire to the L2/N terminal

**Earth Ground:** Connect the GREEN or GREEN/YELLOW wire to the terminal marked with the following symbol:



# **Cabling Connections**

# **Connecting Equipment to the PowerTrust UPS (with 30A Service Bypass Unit Only)**

This section describes how to connect equipment to a UPS with a 30A Service Bypass Unit. For information on how to connect equipment to a UPS with a 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures."

The UPS has four output receptacles. Typically, the SPU is connected to output receptacle 4 and one or more PDU(s) are connected to output receptacles 1, 2, and 3. If an SPU is not being protected by the UPS, a PDU may also be connected to receptacle 4.

- 1. Position the expansion cabinet containing the PowerTrust UPS close to the AC input source.
- 2. Make sure that the power switches of any equipment or PDU(s) being connected to the UPS are in the OFF position.
- 3. Remove the cover mounted over the output receptacles by removing the two screws at the top of the cover. See Figure 1-3, 14.
- 4. Connect the line cord(s) from the PDU(s) to the IEC 320 C19 output receptacle(s).
- 5. Connect the SPU or PDU to the UPS:
  - North American version—Plug the SPU or PDU line cord into the NEMA L6-30R receptacle.
  - Worldwide version—Hardwire the SPU or PDU line cord to the UPS. Refer to "Input and Output Connections" earlier in this chapter for detailed hardwiring information.
- 6. Install the cover over the output receptacles.
- 7. Connect the UPS to the AC power source:
  - North American version—Plug the UPS power cord into the source outlet (NEMA 6-50P).
  - Worldwide version—Hardwire a connection from the AC input source to the UPS. Refer to "Input and Output Connections" earlier in this chapter for detailed hardwiring information.
- 8. Connect the equipment power cords to the UPS-protected PDU receptacles.
- 9. Perform the steps in "Initial Power-On or Power-On After Shutdown" in Chapter 4.

### **Connecting the Communications Link**

1. Connect the RS-232 cable to the UPS Port connector (see 6 in Figure 1-3) on the rear panel of the Service Bypass Unit. Secure the RS-232 cable to the connector by tightening the small mounting screws on each side of the connector with a small blade screw driver.

- 2. Attach the other end of the RS-232 cable to the appropriate RS-232 connector on the computer equipment as listed:
  - For HP 3000 computers, the RS-232 connection is made at a 25-pin modem-type port on a DTC that is configured to the computer.
  - For HP 9000 computers, the RS-232 connection is made at any available DB25 or DB9 direct connect or modem type port (except remote or maintenance port). The connector location varies with each specific computer model. The default RS-232 cable has a DB25 connector. A DB9-style cable is available as an option to the PowerTrust UPS. Refer to the HP9000 Configuration Guide and the computer system's documentation for connector styles (RS-232 and DB9) locations and default address assignments for the first UPS.
  - For connection to V-Class computers, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures.".
  - For connection to other computers, refer to that particular computer documentation for RS-232 connection instructions.

## **Examples of PowerTrust Connections in a System**

The following figures show examples of how to connect the PowerTrust UPS with a 30A Service Bypass Unit in an expansion cabinet. For examples of how to connect a UPS with a 40A Service Bypass Unit, refer to Appendix E, "40A Service Bypass Unit: Specifications and Procedures." For examples of other configurations, see the HP3000 or HP9000 Configuration Guide.

## **Example 1: Single Expansion Cabinet System** (Field-Integrated)

Figure 3-11 shows a field-integrated system with one expansion cabinet. Note these features:

- A second (switchless) PDU (identified as the UPS PDU) has been installed. This PDU receives its power from the IEC320 C19 connector on the PowerTrust UPS.
- For this example, all peripherals in the cabinet are being powered via the UPS PDU. If either the UPS or PDU ratings are insufficient to power all of the peripherals, the switched PDU is still available for powering the additional peripherals, but they will not be protected by the UPS.
- The system console is being powered from the UPS PDU.
- The system SPU is being powered from the 30A output of the PowerTrust UPS.
- The expansion cabinet fan is powered from the UPS PDU to ensure that the cabinet is cooled in the event of power failure.



Figure 3-11 Example 1: 99x/T-Class SPU with One Field-Integrated Expansion Cabinet

## **Example 2: Single Expansion Cabinet System** (Factory-Integrated)

Figure 3-12 shows a factory-integrated system with one expansion cabinet. Note these features:

- One switchless Power Distribution Unit (PDU) is installed. This PDU receives its power from the IEC320 C19 connector on the PowerTrust UPS.
- All peripherals in the cabinet and the expansion cabinet fan are being powered via the UPS PDU. Note that powering all expansion cabinet peripherals in this manner may not be possible in every case due to power loading restrictions.
- The system console is being powered from the UPS PDU.
- The expansion cabinet fan is powered from the UPS PDU, to ensure that the cabinet is cooled in the event of power failure.
- The system SPU is being powered from the 30A output of the PowerTrust UPS.



Figure 3-12 Example 2: 99x/T-Class SPU with One Factory-Integrated Expansion Cabinet

## **Example 3: Dual Expansion Cabinet System (Field-Integrated)**

Figure 3-13 shows a field-integrated system with two expansion cabinets. Note these features:

- A second (switchless) PDU (identified as the UPS PDU) has been installed in each expansion cabinet. The UPS PDU in the left-hand expansion cabinet receives its power from the 30A connector on the PowerTrust UPS located in the right-hand cabinet. The UPS PDU in the right-hand cabinet receives its power from the IEC320 connector on the same PowerTrust UPS.
- Peripherals in the expansion cabinet should be powered via the UPS PDU whenever possible. If either the UPS or PDU ratings are insufficient to power all of the peripherals, the switched PDU is still available for powering the additional peripherals, but they will not be protected by the UPS.
- The system console is being powered from the switched PDU, not the UPS PDU; it is *not* protected by the PowerTrust UPS. It is recommended that the console be protected by the UPS.
- The system SPU is being powered from the 30A output of the PowerTrust UPS in the left-hand expansion cabinet.
- The expansion cabinet fan is powered from the UPS PDU, to ensure that the cabinet is cooled in the event of power failure.



Figure 3-13 Example 3: 99x/T-Class SPU Two Field-Integrated Expansion Cabinets

upin003b

## **Example 4: Dual Expansion Cabinet System** (Factory-Integrated)

Figure 3-14 shows a factory-integrated system with two expansion cabinets. Note these features:

- Only one PDU is installed in each expansion cabinet. Both PDUs receive their power from the PowerTrust UPS located in the right-hand expansion cabinet. (The 30A connector supplies the PDU in the left-hand cabinet, and the IEC320 connector supplies the PDU in the right-hand expansion cabinet.)
- All peripherals and fans in both expansion cabinets are being powered via the single PDU located within the right-hand cabinet. Powering all expansion cabinet peripherals in this manner may not be possible in every case due to power loading restrictions.
- The system console is being powered from the single PDU in the left-hand expansion cabinet.
- The system SPU is being powered from the 30A output of the UPS in the left-hand cabinet.



Figure 3-14 Example 4: 99x/T-Class SPU with Two Factory-Integrated Expansion Cabinets

upin003c

Installing the UPS Examples of PowerTrust Connections in a System

# **4** Power-On/Power-Off Procedures

This chapter contains the procedures for:

- Initial power-on
- Powering-on and powering-off during normal operation
- Switching into and out of Service Bypass mode
- Powering-off for an extended time

This chapter also discusses the Emergency Power Off (EPO) connection, and battery charging.

WARNING Only qualified service personnel should service the unit, change batteries, or power up the UPS after it is installed or serviced.

# **Power-On Procedures**

## **Initial Power-On or Power-On After Shutdown**

Use the following procedure to power-on the UPS for the first time after it is installed or after the UPS has been shutdown for an extended of time (see "Powering-Off the UPS for an Extended Time"). Allow time for the temperature of the equipment to stabilize before applying input AC power.

- 1. Set the BYPASS switch to the NORMAL position.
- 2. Check that AC input power is being provided to the UPS.
- 3. Set the MAIN and BYPASS INPUT breakers to the ON position.
- 4. Set the UPS/BATTERY switch to ENABLE.
- 5. Set the Output On/Output Off switch to Output On.
- 6. Confirm that the UPS powered on properly by checking the following indicators:
  - AC Output LED: on
  - Battery LED: off
  - Attention LED: off
  - Audible Alarm: none
  - Enable LED: on
  - Caution LED: off

If any of the indicators differ from the above, the UPS did not power up correctly. Refer to Chapter 6, "Troubleshooting." to identify the problem.

7. Set the OUTPUT breakers appropriate for your system to the On position. Output breakers 1, 2, and 3 control Output Receptacles (IEC 320 C19) 1, 2, and 3, respectively. Output breaker 4 controls Output Receptacle 4, which is either a NEMA L6-30P receptacle or a hardwired output.

The UPS is now in Normal mode and is providing AC power and power failure protection to the equipment connected to the UPS.

## Powering On the UPS After Being Powered Off for a Short Time

Use the following procedure to power-up the UPS if it has been shutdown for a short time (following a short duration power off procedure). See "Powering Off the UPS for a Short Time".

- 1. Check that AC input power is being provided to the UPS.
- 2. Set the Output On/Output Off switch to Output On.
- 3. Confirm that the UPS powered on properly by checking the following indicators:

- AC Output LED: on
- Battery LED: off
- Attention LED: off
- Audible Alarm: none
- Enable LED: on
- Caution LED: off

If any of indicators differ from the above, the UPS did not power up correctly. Refer to Chapter 6, "Troubleshooting." to identify the problem.

The UPS is now in Normal mode and is providing AC power and power failure protection to the equipment connected to the UPS.

# **Power-Off Procedures**

### **Powering-Off the UPS for an Extended Time**

You should follow the procedure for powering off the UPS for an extended time when:

• A power failure has occurred or input AC power will be off for an extended time (more than 24 hours).

Should input AC power fail, the UPS, if in Normal mode, will supply battery generated AC output to the connected equipment for up to 15 minutes. During extended power failures, the unit will warn you approximately three minutes before battery power is depleted. The three-minute warning consists of a repeating sequence of three audible beeps followed by approximately ten seconds of silence. If you hear the warning, you should immediately prepare for a loss of AC power to the connected equipment. See "Power Failure Operation" in Chapter 1.

When the input AC power is restored, the UPS will automatically recharge its batteries as long as the UPS/BATTERY switch is in the ENABLE position, and the MAIN INPUT breaker is in the ON position.

The recharge can take up to 14.5 hours for a 90% recharge. The recharge time may be considerably less if the batteries are not fully discharged.

• The UPS will be stored, shipped or otherwise be out of service.

**NOTE** The UPS batteries should be recharged periodically to maintain battery life. Refer to "Shipping and Storage Requirements" in Chapter 2.

Use the following procedure to power off the UPS for an extended time:

- 1. Power down the equipment connected to the UPS.
- 2. Set the Output On/Output Off switch to Output Off.
- 3. Set the UPS/BATTERY switch to DISABLE.
- 4. Set the MAIN and BYPASS INPUT breakers to the OFF position.
- 5. Set the Output breakers to the OFF position.
- 6. If the unit is to be stored or shipped, disconnect the battery cable.

### **Powering Off the UPS for a Short Time**

If input AC power will be interrupted for a short time (less than 24 hours), you can use the following procedure to power off the UPS to save the batteries from undue discharge, which would result in a reduction in battery life and longer recharge times.

- 1. Power down the equipment connected to the UPS.
- 2. Set the Output On/Output Off switch to Output Off.
### **Service Bypass**

Service Bypass mode allows the Electronics Unit and Battery Box to be serviced without disrupting AC output.

CAUTION Do not push the red button while the UPS is operating on battery. Damage to the connected equipment can occur.

#### Placing the UPS in Service Bypass Mode

The UPS should be placed in Service Bypass mode only by qualified service personnel or under their direction.

The correct procedure for placing the UPS in Service Bypass mode is as follows:

- 1. Determine whether the UPS is already in Automatic Bypass mode by checking that the following indicators are as shown:
  - AC Output LED: on
  - Battery LED: off
  - Attention LED: on
  - Audible Alarm: solid tone (The alarm may have been silenced by pressing the Silence Alarm/Test button. Press it again to re-enable the alarm.)
- NOTE If the UPS has been in Automatic Bypass mode for more than 30 minutes, it will probably be in Automatic Bypass Sleep mode. In Automatic Bypass Sleep mode the Alarm/Test button will not reactivate the alarm. See "Case 16 (Normal or Abnormal) — Bypass Sleep Mode" in Chapter 6.
- 2. If all of the indicators above are in the specified state, then the UPS is already in Automatic Bypass mode and you can skip to step 7, otherwise continue with step 3.
- 3. Make sure that the BYPASS INPUT breaker is ON, the Caution LED is out, and the unit is not running from its batteries. If any of these conditions are present, loss of AC power to the connected equipment will result when the UPS is placed in either Service or Automatic Bypass mode.

# CAUTIONIf the Caution LED is flashing, STOP! You may interrupt AC input to the<br/>connected equipment if you attempt to place the UPS in Service Bypass mode.<br/>Perform an orderly shutdown of the system before proceeding.

4. Press and release the red Bypass Switch Activation button.

This puts the UPS in Automatic Bypass mode.

- 5. Confirm that the UPS is in Automatic Bypass mode by checking the following indicators:
  - AC Output LED: on

- Battery LED: off
- Attention LED: on
- Audible Alarm: solid tone (The alarm may be silenced by pressing the Silence Alarm/Test switch.)

CAUTION	If the Caution LED is flashing, <b>STOP!</b> You may interrupt AC input to the
	connected equipment if you attempt to place the UPS in Service Bypass mode.
	Perform an orderly shutdown of the system before proceeding.

6. Press and hold the red Bypass button while turning the Bypass switch to BYPASS, then release the red Bypass button.

The UPS is now in Service Bypass mode.

#### Taking the UPS Out of Service Bypass Mode

The UPS should be taken out off Service Bypass mode only by qualified service personnel or under their direction.

- 1. Check that the UPS is ready to be returned to Normal mode. If the UPS was serviced, ensure that all components are installed and properly connected.
- 2. Set the Output On/Output Off switch to Output ON.
- 3. Set the MAIN INPUT breaker to ON.
- 4. Set the UPS/BATTERY switch to ENABLE.
- 5. Confirm that the UPS has powered on properly and is ready to be returned to Normal mode by checking the following indicators:
  - AC Output LED: on
  - Battery LED: off
  - Attention LED: on
  - Enable LED: on
  - Caution LED: off
  - Audible Alarm: solid (The alarm may be silenced by pressing the Silence Alarm/Test switch.)
- 6. If the indicators are as specified above, continue. If any of the indicators differ from these **STOP!** The UPS should not be taken out of Service Bypass mode. You may interrupt AC output to the connected equipment if you attempt to do so. Refer to Chapter 6, "Troubleshooting," to identify the problem.
- 7. Turn the Bypass switch to NORMAL. This places the UPS in Automatic Bypass mode.
- 8. Turn the Output On/Output Off switch to Output Off for about one second, then switch it back to Output On. This step returns the UPS to Normal mode and clears the audible alarm.

## **Emergency Power Off (EPO) Connections**

A pair of terminals is provided for connection to an EPO system. For normal operation, the terminals must be connected by a jumper or connected to a normally closed EPO switch.

If the terminals are not connected together, or the EPO switch has been activated (opened), the UPS will shutdown AC output power to the output receptacles in On-line mode, On-battery mode, or Automatic Bypass mode. The AC output will remain shut off until the terminals are connected together again or the EPO switch is closed and the Output On/Output Off switch is cycled OFF and then ON.

In Service Bypass mode, input AC power is routed directly to the output receptacles, bypassing the Electronics Unit, and the EPO connection will have no effect on the output power from the UPS. Output power will be present at the receptacles whenever input power is provided to the UPS.

## **Charging the Batteries**

The 5.5 kVA PowerTrust UPS's batteries must be charged before the UPS can provide battery generated output AC power in the event of an input power failure. For the batteries to charge, input AC power must be present, the UPS/BATTERY switch must be in the ENABLE position, and the MAIN INPUT breaker must be ON.

Charging the batteries can take up to 14.5 hours for a 90% recharge. The recharge time may be considerably less if the batteries are not fully discharged.

This chapter contains information on how to verify that the UPS is installed correctly after initial installation or service, and that it is not overloaded.

## WARNING The following procedures should be performed only by qualified service-trained Hewlett-Packard personnel.

## **Load Testing**

Load testing is required to verify that the PowerTrust UPS is correctly installed, and that the equipment attached to the PowerTrust UPS does not put the unit in an overload condition.

Except when it is in Bypass mode (Service or Automatic), the UPS continuously monitors load current, automatically, without operator intervention. It automatically performs the following test whenever it is powered on, but you may perform the test manually.

CAUTION	Before doing the load test, ensure that:				
	All software and data are backed up.				
	• All critical functions or processes on the connected computer equipment are stopped. It should not be performing any critical functions or processes such as booting, ISL, or making disk access.				
	Batteries are fully charged.				

To perform the load test, follow these steps:

- 1. Verify that:
  - a. the Output On/Output Off switch is set to Output On.
  - b. the UPS/BATTERY switch is set to ENABLE.
  - c. the INPUT and OUTPUT circuit breakers are set to the ON position.
  - d. the Service Bypass switch is set to NORMAL.
  - e. the connected equipment is ON and fully running (not in start mode).
  - f. the Attention LED is OFF.
  - g. the AC Output LED is ON.
  - h. the Battery Power LED is OFF.
  - i. the Caution LED is ON.

If any of these switches and indicators are not as shown, refer to Chapter 6, "Troubleshooting.".

- 2. Press the Silence Alarm/Test switch:
  - a. Battery Power LED should come ON. The unit will run on battery power for the next 30 seconds.
  - b. Unit should beep once every ten seconds.
  - c. Attention light should *not* come on or flash.
  - d. The connected equipment should remain in its current operating state.

- 3. Take action based on one of these conditions:
  - a. If the indications in step 2 occur, the equipment attached to the UPS is within the accepted load range of the UPS. Proceed to step 4.
  - b. If the Attention light flashes, the PowerTrust UPS is overloaded. Either obtain a UPS with more capacity or reduce the load to the unit by switching off, then removing, some of the connected equipment. Repeat the load test until you are successful. Refer to Chapter 3, "Installing the UPS.".
  - c. If the unit shuts OFF the attached equipment (removes power from the Output receptacles) and the Attention LED is ON continuously, there is an overload shutdown condition. Refer to "Case 10 (Normal or Abnormal) Overload or EPO Shutdown" in Chapter 6. This may be caused by a heavy overload. You must resize the attached load (refer to "Sizing the Load" in Chapter 3), then repeat the load test until your are successful.

A fault in the load can also cause an overload shutdown.

- 4. Check that all connected equipment is functioning normally and that there is no disturbance to the connected equipment. This verifies that the UPS transfer time (the very brief time between power loss and battery start-up) did not disturb the connected equipment. If so, the UPS passed the Load Test.
- 5. Repeat these tests a few times under various operating conditions to ensure that the PowerTrust UPS can properly power the load under all conditions.

If the Load Test is successful, the equipment will be protected by the PowerTrust UPS.

**NOTE** You must repeat the load test whenever you add new equipment or change the equipment that is plugged into the UPS unit.

Verification Procedures Load Testing This chapter provides some information to assist you in troubleshooting the UPS. Using it will help you determine the urgency of the condition and possible actions to take. These are the topics in this chapter.

- Troubleshooting aids
- RS-232 UPS port does not respond
- Overtemperature considerations
- Alarm indicators
- Normal and abnormal UPS conditions

Figure 6-1 shows the different combinations of indicator lights and warning alarms that can occur on a UPS as well as the conditions (cases) under which these lights and alarms activate. The discussion of each case provides a meaning, a cause, and suggested actions.

WARNING If there is any action or procedure you do not understand, or are not qualified to perform, do not attempt to perform it.

## **Troubleshooting Aids**

#### **Console Messages**

The UPS sends error messages and warnings via its RS-232 port to the computer system. To receive these messages, your computer system needs HP-UX version 9.04 (or later) or MPE/iX version 5.0 (or later).

The operating system attempts to display a message on the system console and in a diagnostic log. Under some alarm conditions, however, it may not be able to. The message may be delayed until AC input power has been restored. In other cases, the message may be lost. For a complete listing of diagnostic messages and warnings, refer to Appendix A, "HP-UX UPS Monitor Error Messages," or Chapter B, "MPE/iX UPS Monitor Error Messages are also listed in the index to help you find a specific message.

#### **Operating System Assistance**

If your computer system is HP-UX version 9.04 (or later), the operating system provides assistance in troubleshooting the UPS equipment. In addition to displaying error and warning messages from the UPS, the operating system can automatically shut down the equipment.

When AC power fails, and the UPS switches to battery power, the HP-UX operating system receives a message from the UPS. After one minute on battery power, the operating system automatically sends a shut down message to the UPS and shuts itself down in five minutes. When AC power returns, the operating system automatically restarts itself. No operator intervention is required to shut down and restart the equipment, unless some of the switches are incorrectly set. The default number of minutes for shutdown delay and shutdown timeout can be changed for your specific needs. For information on setting the shutdown parameters, refer to Chapter C, "Configuring the OS for the PowerTrust UPS.".

#### Without Operating System Assistance

If your computer system is an MPE/iX system or a version of HP-UX earlier than 9.04, then it cannot provide assistance in a power fail situation. During an AC power failure, operator intervention is required to shut down the protected equipment and the UPS before the battery power is depleted.

In cases described in this chapter, suggested actions are provided with and without operating system assistance.

### **RS-232 UPS Port Does Not Respond**

The following are possible causes for the RS-232 port not responding on an MPE/iX or HP-UX system:

- The version of the operating system is required to support UPS is not valid: HP-UX 9.04 (or later) or MPE/iX 5.0 (or later).
- The port is not configured correctly on the computer. It must be configured as a valid serial port. Refer to these sections of this manual: "Connecting the Communications Link" in Chapter 3, "Configuring HP-UX for the PowerTrust UPS" in Appendix C, and "Configuring MPE/iX for the PowerTrust UPS" in Appendix C.
- The UPS port may not be in computer mode. This may require a patch in 9.04 (PHC0\_3692).
- Although it appears to be a standard RS-232 cable, the wrong cable may be connecting the UPS to the computer. It requires one of these special RS-232 cables:
  - 5061-2575 DB9 9-pin male/DB9 9-pin female (2.5 meter)
  - 5061-2569 DB9 9-pin male/DB25 25-pin male (2.5 meter)
  - 5063-5352 DB9 9-pin male/DB25 25-pin male (4 meter)

## Checking the Voltage of a Battery Box or a Battery Pack

WARNING The following procedure should be performed by qualified service personnel only.

The battery packs in the Battery Box are connected in series-parallel; that is, the five packs at the front and the five packs at the back are in parallel, and each of the two groups of five battery packs is connected in series with the other group of five. Thus, while the voltage of a single battery pack is nominally 27 V, the total voltage at the output connector of the UPS Battery Box is nominally 54 V. A battery can lose its charge however, and when it does, UPS problems can develop.

Some of the troubleshooting procedures listed in this chapter recommend that the batteries be tested to determine if they are serviceable. There are two batteries in a battery pack. While you cannot check the voltage of a single battery, you can check the voltage of a battery pack. You can also check the voltage of the Battery Box at the cable connector of the Battery Box. Use the following table to determine what action to take after you check the voltage of a battery pack or the Battery Box. Refer to column one if you check the total voltage of the UPS Battery Box, or column two if you check a single battery pack.

Battery Box Voltage	Battery Pack Voltage	Battery Condition and Action Required			
below 39V	below 19.5V	The battery is faulty and should be replaced.			
above 48V <sup>1</sup>	above 24V	The battery is charged and should not be replaced.			
39V - 48V	19.5V - 24V	The battery may be faulty. To determine if it needs to be replaced:			
		1. Restart the UPS and let it charge the batteries for at least 14.5 hours.			
		2. Recheck the battery voltage.			

1. The voltage from the Battery Box could measure 48V even with several defective battery packs. The result could be a lower than expected hold-up time. If you suspect a battery problem, it is recommended that each battery pack be checked for the correct voltage and/or a blown fuse.

### **Overtemperature Considerations**

Overtemperature sensing is done inside the Electronics Unit for the protection of the internal components of the UPS. Refer to the temperature specifications for your system in Table 1-2. Overtemperature can occur under a variety of conditions, but is most often the result of rising ambient temperatures, blocked airflow of the cooling fan, or blocked outlet holes. The key to preventing overtemperature warnings or shutdowns is to keep the immediate area around the UPS clear for air flow and heat dissipation purposes.

If the installation site is kept within the operating temperature specifications, there should be no overtemperature problems with the UPS. If the installation site conditioning equipment (air or humidity conditioners) fail, closely monitor all electronic equipment at the site for temperature warnings. Have the conditioning equipment repaired and returned to service as soon as possible.

Two possible scenarios may cause an overtemperature condition:

- 1. If the UPS is supplying output power using normal AC line voltage when an overtemperature condition occurs:
  - a. Attention light flashes twice quickly every 10 seconds.
  - b. Audible alarm beeps three times every 10 seconds.
  - c. The UPS continues to supply AC output.
  - d. The UPS may enter Automatic Bypass mode or shutdown depending on the load and line conditions.
  - e. Refer to Case 3 (Abnormal) Overtemperature Condition for actions.
- 2. If the UPS is supplying output power from batteries when the overtemperature condition occurs:
  - a. Attention light flashes twice quickly every 10 seconds.
  - b. The UPS sends a message to the console warning of the high temperature condition.
  - c. Audible alarm beeps three times every 10 seconds.
  - d. If the temperature is above 40°C, the UPS may shutdown.
  - e. Refer to "Case 11 (Normal, Abnormal) Overtemperature Shutdown" for actions.

## **Alarm Indicators**

Interpreting indicators and audible alarms and suggested actions are included in the case descriptions. Figure 6-1 shows the possible indicator light combinations and relates each to a case number.

#### Front Panel Visible Indicators (LEDs)

The following three indicator lights (LEDs) are located on the front control panel of the Electronics Unit as shown in Figure 1-2.

AC Output	A <i>green light</i> indica receptacles of the S	A <i>green light</i> indicates that power is being supplied to the output receptacles of the Service Bypass Unit.				
Battery Power	A <i>yellow light</i> indicates that the unit is supplying power from its battery. It may also light momentarily when the UPS is adjusting to a change in input voltage. <b>Caution:</b> Do not push the red button while the UPS is operating on battery. Damage to the connected equipment can occur.					
Attention	A <i>yellow light</i> indication one or two flashes o conjunction with the	ates that the unit needs attention. It may flash with r remain on continuously. This indicator, in e audible alarm, has multiple meanings.				
	One flash	a flash every second indicates an <i>overload</i> condition.				
	Two flashes	two quick flashes every 10 seconds along with the 3-beep audible alarm indicates an <i>overtemperature</i> condition.				
	Light on continuously	indicates a condition that needs your attention, such as a system failure.				

#### **Rear Panel Visible Indicators (LEDs)**

#### **Rear Panel Enable LED**

The Enable LED is on the rear panel of the UPS (see item 13 in Figure 1-3). This green light indicates that the UPS is enabled and operating (sensing the input AC power). The Enable light is normally on if the UPS/BATTERY switch is on ENABLE. However, there is one exception: If the batteries discharge while AC input power is off, and the AC Output On/Output Off switch is set to Output On, the Enable light turns off. It remains off until AC input power returns.

#### **Caution LED**

The UPS has a Caution LED on the rear panel (see item 17 in Figure 1-3). This amber light indicates whether it is safe to change the position of the Bypass switch—from Bypass to Normal or from Normal to Bypass—without affecting the AC output to the load. If the

Caution LED is flashing, changing the position of the Service Bypass switch may interrupt AC output to the load. Therefore, *do not* change the position of the Service Bypass switch when the Caution LED is blinking unless there is no load or the load is not running.

The following table lists the possible reasons for caution LED to be blinking.

Cause	Action
The Output On/Output Off switch is set to Output Off.	Set the switch to Output On.
The AC input voltage or frequency is outside the UPS specifications.	Resolve the AC line problem.
The batteries are discharged.	Charge the batteries (~14 hours).
The UPS was turned off by the operating system (OS).	Have the OS turn the UPS on.
The Electronics Unit is defective.	Replace the Electronics Unit.

If the light is not blinking, it is safe to use the Service Bypass switch.

#### **Precharge Failure LED**

When flashing continuously, this red LED indicates that the voltage on the main inverter has not precharged properly and that the Battery Precharge Shorting Plate must not be installed.

#### **Audible Alarm**

The audible alarm is located inside the unit and is used in conjunction with the Attention light and the Silence Alarm/Test switch. A variety of conditions activate the audible alarm as explained in the cases on the following pages. Refer to the cases for meaning, cause, and possible actions.

The audible alarm has four different patterns of increasing urgency:

Isolated beep	a single beep sounds each time the Silence Alarm/Test switch is pushed. (See "Silence Alarm/Test" for more information.)
One-Beep alarm	one beep every 10 seconds. This means the battery is supplying power.
Three-Beep alarm	three beeps every 10 seconds. The actions associated with this alarm may include preparing for shut down of the protected equipment. (The three-beep alarm takes precedence over a one-beep alarm.)

**Continuous tone alarm** A continuous tone indicates that the UPS has switched to Automatic Bypass mode.

#### **Silence Alarm/Test**

The Silence Alarm/Test switch is a push-button switch on the front panel. Pressing this switch silences the alarm if the audible alarm is active. This only cancels the audible alarm, it does not correct the condition that caused the alarm. The Attention and/or Battery Power light remains lit. Any additional alarm conditions will reactivate the audible alarm.

If the audible alarm is not active, pushing this button causes the PowerTrust UPS to switch to battery operation for 10 to 20 seconds. This tests the On-battery mode of the UPS.

CAUTION Pushing the Silence Alarm/Test switch as a test may cause the AC power at the UPS output to fail if batteries are depleted or if there is a problem in the Electronics Unit. Before performing this test, make certain that the batteries are fully charged, and that the connected equipment is not in a critical performance state.

#### **Indicator Cases**

Figure 6-1 summarizes the troubleshooting cases presented in this chapter. After you determine the case that matches the alarm indicators on the UPS, use Table 6-1 to find the page number where the case is discussed in more detail.

Case	Symptom	Page #
1	UPS Running on AC Power	6-10
2	Battery Operation Problem	6-10
3	Overtemperature Condition	6-11
4	Bypass Mode	6-11
5	Overload Warning On-Line	6-12
6	Battery Power	6-13
7	Low Battery	6-14
8	Overload Warning on Battery	6-15
9	Failure Shutdown	6-16
10	Overload or EPO Shutdown	6-16
11	Overtemperature Shutdown	6-17
12	Output Disabled	6-18
13	Deeply Discharged Batteries or Non-fatal UPS Failure	6-19

 Table 6-1
 Troubleshooting Cases

Case	Symptom	Page #
14	Battery Precharge Failure	6-19
15	UPS Off or Asleep	6-20
16	Bypass Sleep Mode	6-22

#### Figure 6-1 Alarm Indications

Case 1		Case 2	Case 3	Case 4	Case 5	
AC Output	•					
Battery Power	0	0	0	0	0	
Attention	0				*	
Caution	0	May or may not May or may not O		0	*	
Enable	•					
Precharge	0	0	0	0	0	
Audible Alarm	None	3–Beeps 3–E		Continuous	1–Beep	
Condition	Normal	Abnormal	Abnormal	Normal; Abnormal	Normal	

	Case 6	Case 7	Case 8	Case 9	Case 10
AC Output	•			0	0
Battery Power	•	•	•	0	0
Attention	0	•	*		•
Caution	0	0	0	May or may not	<b>★</b>
Enable	•	•	•		
Precharge	0	0	0	0	0
AudibleAlarm	1–Beep	3–Beeps	1–Beep	May or may not	1–Beep
Condition	Normal;Abnormal	Normal; Abnormal	nal;Abnormal Normal Abnormal		Normal;Abnormal

	Case 11	Case 12	Case 13	Case 14	Case 15	
AC Output	0	0	•	0	0	
Battery Power	0	0	0	0	0	
Attention	**	0	•	0	0	
Caution	•	*	0	0	0	
Enable	•	•	•	0	0	
Precharge	0	0	0	*	0	
AudibleAlarm	3–Beeps	None	1–Beep	None	None	
Condition	Normal; Abnormal	Normal; Abnormal	Normal; Abnormal	Abnormal	Normal; Abnormal	

	Case 16							
AC Output	•							
Battery Power	0							
Attention	•							
Caution	0							
Enable	0							
Precharge	0							
AudibleAlarm	Continuous							
Condition	Normal;Abnormal							
upsa39c	Legend: O	OFF; ●	Solid On	; ¥	Continuous	s Flashing ;	*	🗲 Two Flashes

## **Normal LED and Alarm Condition**

#### Case 1 (Normal) — UPS Running on AC Power

The unit is functioning normally.

Indicators:	AC Output lit
	Battery Power not lit
	Attention not lit
	Caution LED not lit
	Enable lit
	Audible alarm: none
Meaning:	The output to the protected equipment is enabled and the UPS is supplying AC power from the AC line.
Cause:	Normal condition.
Action:	None.

## **UPS Running on AC Power with Audible Alarm**

#### **Case 2 (Abnormal)** — **Battery Operation Problem**

Indicators:	AC Output lit
	Battery Power not lit
	Attention lit
	Caution LED may or may not be lit
	Enable lit
	Audible alarm: 3-beeps every 10 seconds
Meaning:	The output to the protected equipment is enabled and supplying AC power, but there is an internal problem with the UPS battery or electronic circuits. The UPS may not be able to switch to battery power if the AC power fails.
Cause:	Either the battery charger failed or the inverter logic is out of phase with the AC input; that is, the UPS Electronics Unit needs to be replaced.
Action:	1. Make sure the BYPASS and MAIN INPUT circuit breakers are ON.
CAUTION	If the yellow caution light is flashing, do not proceed. Call HP Service. If the yellow caution light is not flashing, continue.
	2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

3. Call HP Service.

#### **Case 3 (Abnormal) — Overtemperature Condition**

Indicators:	AC Output lit
	Battery Power not lit
	Attention two quick flashes every 10 seconds
	Caution LED may or may not be lit
	Enable lit
	Audible alarm: 3-beeps every 10 seconds
Meaning:	Refer to "Overtemperature Considerations".

Cause:	The unit senses an overtemperature condition when the UPS reaches $40^{\circ}$ C or higher. The overheating may be caused by the unit itself or the environment.
Action:	For Systems without automatic shutdown procedure:
	1. Prepare to power-off the protected equipment and the UPS.
	2. Check if there is a problem with the environment, and if so, take actions to correct the problem.
	3. If the problem is with the unit, power-off the UPS, and call HP Service. See "Power-Off Procedures" in Chapter 4.
	For Systems with automatic shutdown procedure:
	1. The HP-UX operating system will power-off the UPS automatically.
	2. Check whether there is a problem with the environment, and if so, take actions to correct the problem.
	3. If the problem is with the unit, call HP Service.

## **Case 4 (Normal or Abnormal) — Bypass Mode**

Indicators:	AC Output lit
	Battery Power not lit
	Attention lit
	Caution LED not lit
	Enable lit
	Audible Alarm: continuous
Meaning:	The UPS is in Automatic or Service Bypass mode. In either of these modes, the UPS maintains power to the load, as long as AC input power is present. If input power is lost, however, the power to the load will also be lost. In addition, in either mode, the load is not protected from brownouts, surges or excessive input frequency deviations. (The UPS is protected from overload by the BYPASS and OUTPUT circuit breakers).
NOTE	This case is transitory. After 30 minutes of operation in Automatic or Service Bypass mode, the UPS will switch to Bypass Sleep mode. See "Case 16 (Normal or Abnormal) — Bypass Sleep Mode".
Cause:	<ul> <li>Normal causes of this case are:</li> <li>The UPS has been placed in Automatic Bypass with the red Bypass Switch Activation Button.</li> </ul>

• The UPS has been placed in Service Bypass (see "Service Bypass" in Chapter 4).

Abnormal causes of this case are:

- The UPS microprocessor detected a UPS internal failure and placed the unit in Automatic Bypass mode.
- The Battery Box cable is not connected to the UPS Electronics Unit.
- The Battery Precharge Shorting Plate is not properly installed onto the corresponding connector blades of the Electronics Unit.
- Deeply discharged (or dead) UPS batteries.
- Action: 1. Verify whether the Service Bypass switch is in the BYPASS position; if so, use the procedure in "Taking the UPS Out of Service Bypass Mode" in Chapter 4 to recover the UPS from Service Bypass.
  - 2. If the Service Bypass switch is in the NORMAL position, the UPS must be in Automatic Bypass. To determine if it got to this state because of an internal UPS fault or by the normal depression of the red Bypass Switch Activation Button, turn the Output On/Output Off switch to Output Off for one second, and then turn it back to Output On.

If the UPS returns to normal (UPS Running on AC Power), then it is either OK (and must have gotten into Automatic Bypass by normal depression of the red Bypass Switch Activation Button) or else it has an intermittent fault that occasionally puts it in Automatic Bypass and then clears itself.

If the UPS remains in the condition described in this case (with the Service Bypass switch in the NORMAL position and after toggling the Output On/Output Off switch), it must be defective.

#### Case 5 (Normal) — Overload Warning On-Line

Indicators:	AC Output lit
	Battery Power not lit
	Attention flashes once per second
	Caution LED not lit
	Enable lit
	Audible Alarm: 1 beep every 10 seconds
Meaning:	Indicates an overload condition while the UPS is running On-line. (The loads attached to the UPS output require more power than the UPS can support while running On-line).
Cause:	Excessive UPS load.

NOTE	This case is transitory. If the overload condition persists indefinitely, it is
	always followed by an overload shutdown (see "Case 10 (Normal or Abnormal)
	— Overload or EPO Shutdown") and then, if the AC input is gone or
	out-of-spec for a sufficient time, the UPS switches to Sleep mode (see "Case 15
	(Normal or Abnormal) — UPS Off or Asleep"). The duration of the overload
	warning is inversely related to the degree of overload: the greater the
	overload, the shorter the duration of the warning, and vice versa.
Action	1. Power-off the protected equipment, one-by-one, until the UPS returns to normal operation.
	2. Move the input connections of the equipment that was powered-off in step 1 to another power source.
NOTE	For information on adjusting the load size, refer to "Sizing the Load". Call HP
	Service if you need assistance in resizing the load.

## **UPS Running on Battery Power with Audible Alarm**

#### **Case 6 (Normal)** — **Battery Power**

Indicators:	AC Output lit
	Battery Power lit
	Attention not lit
	Caution LED not lit
	Enable lit
	Audible alarm: 1-beep every 10 seconds
Meaning:	The output is enabled, but the battery is supplying the output power. If the power outage exceeds the battery run-time, all protected equipment must be shut down.
Cause:	1. Loss of AC power. The UPS is supplying output power from the battery without input AC to recharge the battery.
	2. The UPS may be operating from a line stabilizer, ferro-resonant transformer, or other types of line conditioners that are causing AC waveform distortion.
	3. The UPS may be operating from distorted AC input waveforms caused by large phase controlled devices, poor utility power, or poor site power.
	4. The UPS may be operating from poor site wiring. Examples include excessive wire length or improper wire gauge.
	5. The UPS may be operating from AC input whose frequency has drifted outside specified operating frequency limits.
Action:	1. Cause 1 - Verify that the MAIN INPUT circuit breaker is ON and that the UPS is plugged into a source of AC input power.
	<ul> <li>For systems without automatic shutdown procedure:</li> </ul>
	a. Shut down the operating system.
	b. Power-off the protected equipment until AC power returns.
	c. When AC power returns, power on the protected equipment.
	For systems with automatic shutdown procedure:
	a. No action is required. The HP-UX system will power-down the UPS automatically.
	b. The system will power-up automatically when AC power returns.

- 2. Cause 2 Connect UPS to standard wall outlets or remove line stabilizers, ferro-resonant transformer, or line conditioner from AC source to UPS.
- 3. Cause 3 or 4 Connect UPS to alternate AC outlets. If problem persists, contact a qualified electrician to investigate your power line quality.
- 4. Cause 5 Check the frequency of the AC input power.

CAUTION	Do not push the red button while the UPS is operating on battery. Damage to
	the connected equipment can occur.

#### **Case 7 (Normal)** — Low Battery

Indicators:	AC Output lit
	Battery Power lit
	Attention lit
	Caution LED not lit
	Enable lit
	Audible alarm: 3-beeps every 10 seconds
Meaning:	Low battery voltage warning.
Cause:	During an AC input power failure or brownout, the UPS determined that the battery voltage is incapable of supporting the load for more than three minutes.
Action:	<ul> <li>Verify that the MAIN INPUT circuit breaker is ON and that the UPS is plugged into AC output.</li> </ul>
	<ul> <li>For systems without automatic shutdown procedure:</li> </ul>
	1. Power-off the protected equipment until AC power returns.
	2. When AC power returns, power on the protected equipment.
	<ul> <li>For systems with automatic shutdown procedure:</li> </ul>
	1. No action is required. The HP-UX system will power-down the UPS automatically.
	2. The system will power-up automatically when AC power returns.
CAUTION	Do not push the red button while the UPS is operating on battery. Damage to the connected equipment can occur.

## Case 8 (Normal) — Overload Warning on Battery

Indicators:	AC Output lit
	Battery Power lit
	Attention flashes once per second
	Caution LED not lit
	Enable lit
	Audible Alarm: 1 beep every 10 seconds
Meaning:	Indicates an overload condition while the UPS is running on battery; that is, while the AC input is not present or is out-of-spec, but the UPS is still powering the load. (The load attached to the UPS output require more power than the UPS can support while running on battery).
Cause:	Excessive UPS load.
NOTE	This case is transitory. If the overload condition persists indefinitely, it is always followed by an overload shutdown (see "Case 10 (Normal or Abnormal) — Overload or EPO Shutdown") and then, if the AC input is gone or out-of-spec for a sufficient time, the UPS switches to Sleep mode (see "Case 15 (Normal or Abnormal) — UPS Off or Asleep"). The duration of the overload warning is inversely related to the degree of overload: the greater the overload, the shorter the duration of the warning, and vice versa.
Action	<ol> <li>Power-off the protected equipment, one-by-one, until the UPS returns to normal operation.</li> <li>Move the input connections of the equipment that was powered-off in step 1 to another power source.</li> </ol>
NOTE	For information on adjusting the load size, refer to "Sizing the Load" in Chapter 3 and "Load Testing" in Chapter 5. Call HP Service if you need assistance in resizing the load.
CAUTION	Do not push the red Bypass Switch Activation button while the UPS is operating on Battery. Damage to the connected equipment can occur.

## **UPS Halted (Has No AC Output)**

#### **Case 9 (Abnormal) — Failure Shutdown**

Indicators:	AC Output not lit
	Battery Power not lit
	Attention lit
	Caution LED may or may not flash periodically
	Enable lit
	Audible Alarm: may or may not beep periodically
Meaning:	The UPS has failed, and its output has been shut down.
Cause:	The UPS fault monitoring circuits have detected a fatal internal UPS fault that caused the UPS output to shut down.
Action:	1. Call HP Service.
	2. At this point, it may be possible to restore the operation of the equipment powered by the UPS (but without UPS power fail protection) by placing the UPS in Service Bypass mode until an HP Service person arrives. (See "Placing the UPS in Service Bypass Mode" in Chapter 4.)

#### **Case 10 (Normal or Abnormal) — Overload or EPO Shutdown**

Indicators:	• AC Output not lit
	Battery Power not lit
	Attention lit
	Caution LED flashing
	Enable lit
	Audible Alarm: 1 beep every 10 seconds
Meaning:	The UPS has shut down its output due to EPO activation or because of an overload condition — the loads attached to the UPS output require more power than the UPS can continuously support; alternatively, an internal short-circuit or failed component may exist at the output circuits of the UPS.
Cause:	Normal causes of this case are:
	• The EPO has been activated or is not properly wired.

• There is an excessive UPS load or a short-circuit at the UPS output.

Abnormal causes of this case are:

- Internal EPO circuits of the UPS are defective.
- An internal short-circuit or failed component may exist at the output circuits of the UPS.

NOTE This case is transitory; that is, after some time it is followed by the UPS switching to Sleep mode. The length of time that the UPS stays in an overload condition depends on whether or not the AC input is present (and in-spec) during the time:

- Otherwise, it is about 30 seconds.
- With the AC input in-spec, it is about 30 minutes.

Action: For EPO-related shutdowns:

- 1. Verify whether the EPO switch/button of the computer has been activated. (If so, correct the cause of the EPO activation, and reset the EPO).
- 2. Check the EPO wiring (correct if needed).

For overload shutdowns:

- 1. If the shutdown was not EPO-related, power-off the protected equipment.
- 2. Set the Output On/Output Off switch of the UPS to Output Off.
- 3. Set the UPS/Battery switch to DISABLE.
- 4. Remove enough equipment from the output of the UPS to allow it to power the remaining equipment. For information on adjusting and testing the load size, refer to "Sizing the Load" in Chapter 3 and "Load Testing" in Chapter 5.
- 5. Connect the equipment that was removed from the output of the UPS to another power source.
- 6. Set the UPS/Battery switch to ENABLE.
- 7. Set the Output On/Output Off switch of the UPS to Output On.

If the problem persists, that is, if the UPS gets into this case even without EPO activation and without any loads connected to its outputs, it is defective.

#### **Case 11 (Normal, Abnormal) — Overtemperature Shutdown**

Indicators:	AC Output not lit
	Battery Power not lit
	Attention two quick flashes every 10 seconds
	Caution LED lit
	Enable lit
	Audible alarm: 3-beeps every 10 seconds
Meaning:	This indicates an overtemperature condition. The unit has shutdown and is not supplying output power.
Cause:	The system is behaving normally if the environment is overheated. It is abnormal for the unit to overheat if the environment is not overheated.
Action:	1. When the environment is overheated, see "Case 3 (Abnormal) — Overtemperature Condition".
	2. If the UPS (not the environment) is overheated, take these actions:
	• Prior to powering-down the UPS, check the cooling fan to determine if it is on or off.
	Power-down the UPS.
	• Put the UPS in Bypass mode by switching the Service Bypass switch to BYPASS.
	• Call HP Service and report on the status of the fan when the UPS shut down.

## **Case 12 (Normal or Abnormal) — Output Disabled**

Indicators:	AC Output not lit
	Battery Power not lit
	Attention not lit
	Caution LED flashing
	Enable lit
	Audible Alarm: none
Meaning:	Indicates that the UPS output has been disabled.
Cause:	Normal causes of this case are:

- The UPS output has been turned off with the Output On/Output Off switch. For this cause, use Action 1 below to recover.
- The UPS output has been turned off by a command from the host computer system and has not been commanded to turn back on. For this cause, use Actions 2 and 3 below to recover.

Abnormal causes of this case are:

- Faulty UPS Output On/Output Off switch and related internal UPS components. For this cause, use Actions 2 and 3 below to recover.
- Action: 1. Verify that the Output On/Output Off switch is in the Output off position. If it is, set it to Output On. This should cause the UPS to return to normal operation if all other conditions, such as, AC input voltage, load, and UPS temperature, are normal.
  - 2. If the Output On/Output Off switch is in the Output On position, the following steps should be performed to recover the UPS output:
    - a. Set the UPS/Battery switch to DISABLE for one second, and then set it back to ENABLE.
    - b. Set the Output On/Output Off switch to Output Off for one second, and then set it back to Output On.

If the UPS returns to normal operation, that is, with the UPS running on AC power, then it is either OK and must have entered Automatic Bypass because the Bypass Switch Activation button was pressed, or the UPS has an intermittent fault that occasionally puts it in Automatic Bypass and then clears itself.

If the UPS stays in this condition—with the Service Bypass switch in the NORMAL position and after toggling the Output On/Output Off switch—it is defective.

3. If none of the steps above causes the UPS output to recover, the UPS is defective.

#### **Case 13 (Normal or Abnormal) — Deeply Discharged Batteries** or Non-Fatal UPS Failure

Indicators: AC Output lit

Battery Power not lit Attention lit Caution LED not lit Enable lit Audible Alarm: 1 beep every 10 seconds

Meaning:	The UPS detected deeply discharged batteries while trying to operate during a power fail or in the event of abnormal AC input power. This may be a recoverable condition, unless the batteries are too old or defective.
	Alternatively, an internal UPS failure has been detected that does not require immediate shutdown of the UPS output, for example, a fan failure. Continuous operation under these conditions could cause a UPS output shutdown at a later time.
Cause:	The UPS fault monitoring circuits have detected a non-fatal internal UPS fault.
Action:	1. To determine if this is a recoverable condition, use the following procedure:
	a. Verify that normal AC input power is present.
	b. If so, place the UPS in Service Bypass Mode (see "Placing the UPS in Service Bypass Mode" in Chapter 4).
	c. Set the UPS/Battery switch to DISABLE.
	d. Set the UPS/Battery switch back to ENABLE.
	e. Set the Bypass switch back to NORMAL.
	f. Set the Output On/Output Off switch to Output Off for one second, and then set it back to Output On.
	2. If the UPS does not recover, that is, it does not return to normal

## operation, call HP Service.

### **Case 14 (Abnormal) — Battery Precharge Failure**

Indicators:	AC Output not lit
	Battery Power not lit
	Attention not lit
	Alarm - none
	Precharge Failure LED (red) - lit or flashing
Meaning:	The polarity of the batteries is reversed and it is not safe to continue.
Cause:	1. An improperly wired Battery Box or Electronics Unit.
	2. A faulty battery cable.
Actions:	1. Make sure the BYPASS and MAIN INPUT circuit breakers are ON.
CAUTION	If the yellow caution light is flashing, do not proceed. Call HP Service. If the yellow caution light is not flashing, continue.

- 2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.
- 3. Disconnect the battery cable.
- 4. Reattach the Battery Precharge Shorting Plate.
- 5. Call HP Service.

#### **Case 15 (Normal or Abnormal) – UPS Off or Asleep**

Indicators:	AC Output not lit
	Battery Power not lit
	Attention not lit
	Caution LED not lit
	Enable not lit
	Audible Alarm: none
Meaning:	Indicates that the UPS has not turned on. Alternatively, the UPS internal circuits have become dormant after encountering a normal or abnormal condition that prevents charging the UPS batteries. The UPS enters this dormant state to minimize the rate of discharge of its batteries while the condition that prevents battery recharge is present.
Cause:	Normal causes of this case are:
	• The UPS/Battery switch is not set to ENABLE.
	Prolonged absence of AC input.
	• Prolonged period during which the MAIN and BYPASS INPUT circuit breakers are OFF.
	• Prolonged period during which the AC input voltage is not within spec.
	<ul> <li>Prolonged period during which the AC input frequency is not within spec.</li> </ul>
	• For UPSs attached to a HP-UX host system, the system commanded the UPS to go to sleep some time after it was informed by the UPS that it had to go to battery operation (after detecting one of the causes above).
	<ul> <li>Prolonged period during which the UPS load is excessive.</li> </ul>
	<ul> <li>Prolonged period during which the UPS internal temperature is excessive.</li> </ul>
	Abnormal causes of this case are:
	• The Battery Box cable is not connected to the UPS Electronics Unit.

- The Battery Precharge Shorting Plate is not properly installed onto the corresponding connector blades of the Electronics Unit.
- Deeply discharged (or dead) UPS batteries.
- Internal failure at the UPS input circuits or auxiliary power sources.
- Internal short-circuit or failed component at the output circuits of the UPS.
- Action 1. Verify that the UPS/Battery switch is set to ENABLE and verify that the UPS indicators return to one of the other cases in this chapter.
  - 2. Verify that the Battery Box cable is properly plugged into the corresponding UPS Electronics Unit connector.
  - 3. Verify that the Battery voltage is normal (see "Checking the Voltage of a Battery Box or a Battery Pack").
  - 4. Verify whether the AC input voltage and frequency are within spec. Correct these if needed. (See Table 1-2 and Figure 1-8 and Figure 1-9.)
  - 5. Once the AC input voltage and frequency return to normal operating range, or if they were already within normal operating range when checked, turn-off the MAIN and BYPASS INPUT circuit breakers for a couple of seconds, and then turn them on. This should awaken the UPS, causing its visual and audible status indicators to reflect the present UPS operational status:
    - If everything is now OK, the UPS should be operating normally.
    - If the AC input voltage or frequency is still not within normal range, the UPS will be on battery power (see "Case 6 (Normal) — Battery Power") or the UPS has a low battery charge (see "Case 7 (Normal) — Low Battery").
    - If the load is still excessive and the AC input is out-of-spec or absent, the UPS will warn of an overload on the battery (see "Case 8 (Normal) Overload Warning on Battery").
    - If the load is still excessive and AC input is in-spec, the UPS will be in overload shutdown mode (see "Case 10 (Normal or Abnormal) — Overload or EPO Shutdown").
    - If the UPS internal temperature is still excessive, the unit will be in an overtemperature condition (see "Case 3 (Abnormal) Overtemperature Condition").

#### **Case 16 (Normal or Abnormal) — Bypass Sleep Mode**

Indicators: AC Output lit

Battery Power not lit

	Attention lit
	Caution LED not lit
	Enable not lit
	Audible Alarm: continuous
Meaning:	This case indicates that the UPS internal circuits have become dormant after 30 minutes of operation in Automatic or Service Bypass mode (see "Case 4 (Normal or Abnormal) — Bypass Mode"). The UPS enters this state to minimize the rate of discharge of its batteries, since its battery charging circuits are not functional while in Bypass mode.
Cause:	Normal causes of this case are:
	• The UPS has been placed in Service Bypass for more than 30 minutes.
	• The red Bypass Switch Activation Button of the UPS was depressed (manually forcing the UPS in Automatic Bypass mode) at least 30 minutes earlier.
	Abnormal causes of this case are:
	• The UPS microprocessor detected a UPS internal failure and placed the unit in Automatic Bypass mode. 30 minutes later, the UPS entered this case.
	• The Battery Box cable is not connected to the UPS Electronics Unit.
	• The Battery Precharge Shorting Plate is not properly installed onto the corresponding connector blades of the Electronics Unit.
	The UPS batteries are deeply discharged or dead.
Action:	1. Verify whether the Service Bypass switch is in the Bypass position. If so, use the procedure in "Placing the UPS in Service Bypass Mode" in Chapter 4 to recover the UPS from Service Bypass mode.
	2. If the Service Bypass switch is in the NORMAL position, the UPS is in Automatic Bypass Sleep mode. To determine if the UPS is in this condition because of an internal UPS fault or because the red Bypass Switch Activation Button was pressed, follow this procedure:
	a. Place the UPS in Service Bypass mode using the procedure outlined "Placing the UPS in Service Bypass Mode" in Chapter 4. This action prevents dropping the UPS output voltage during the rest of this procedure.
	b. Set the UPS/Battery switch to DISABLE for one second, and then set it back to ENABLE.
	c. Set the Output On/Output Off switch to Output Off for one second, and then set it back to Output On.

If the UPS returns to normal operation, that is, with the UPS running on AC power, then it is either OK and must have entered Automatic Bypass because the Bypass Switch Activation button was pressed, or the UPS has an intermittent fault that occasionally puts it in Automatic Bypass and then clears itself.

If the UPS stays in this condition—with the Service Bypass switch in the NORMAL position and after toggling the Output On/Output Off switch—it is defective.

## **7** Cleaning and Maintenance

This chapter describes simple cleaning and maintenance procedures for the PowerTrust UPS.

The PowerTrust UPS requires little or no maintenance. Occasionally, the input and output connections should be inspected for signs of damage.

WARNING The following procedures should be performed only by qualified service-trained Hewlett-Packard personnel.

## Cleaning

- 1. Shut down the operating system.
- 2. Set the front panel Output On/Output Off switch to Output Off.
- 3. Set the INPUT circuit breakers (MAIN and BYPASS) to the OFF position.
- 4. Set the rear panel UPS/BATTERY switch to the **DISABLE** position.

The rear panel Enable LED should go off after a few seconds. This checks for AC loss.

- 5. Turn off branch circuit protection for the installation.
- 6. Remove the bezel assembly from the front of the Electronics Unit.
- 7. Carefully vacuum any dust from the cooling vent.
- 8. Clean the external surfaces of the unit by using a cloth dampened (not soaked) with water only.
- 9. Allow the unit to completely dry before returning it to service.
- 10.Attach the bezel assembly to the front of the Electronics Unit.
- 11.Turn on branch circuit protection for the installation.
- 12.Restart the operating system.
- 13.Set the INPUT circuit breakers (MAIN and BYPASS) on the rear panel to the ON position.
- 14.Set the UPS/BATTERY switch on the rear panel to the ENABLE position.
- 15.Set the Output On/Output Off switch to Output On.
- 16. Make certain that the Service Bypass switch is in the NORMAL position.
### **Recommended Periodic Testing**

Hewlett-Packard recommends periodic testing of the PowerTrust unit to determine if it is capable of providing the specified functionality.

- 1. Notify users of the computer system that power testing of the computer equipment will be performed.
- 2. Back up the computer system.
- 3. Halt all active applications.
- 4. Perform the load test using the procedures in the section, "Load Testing" of Chapter 5, "Verification Procedures."

If problems occur as a result of the PowerTrust unit test, refer to Chapter 6, "Troubleshooting," for problem solving suggestions.

#### **Exchanging Batteries/Fan**

## WARNING Only qualified service-trained HP personnel should replace or service the batteries or fan.

The unit comes equipped with sealed, maintenance free, lead-acid batteries. Battery lifetime is impossible to predict accurately because of the many variables of load, cycling, and ambient temperature involved. Experience has shown that batteries can be expected to last three and one-half to five years under normal computer room conditions.

Exchange the batteries in the PowerTrust unit every 3-1/2 to 5 years, in order to maintain the full 15 minutes of reserve time. All 10 batteries should be exchanged at the same time.

If the unit is exposed to environmental extremes or frequent discharges, the battery packs should be replaced more frequently.

Storing battery packs without recharging them periodically may cause damage to the battery packs, resulting in reduced run time. See "Shipping and Storage Requirements" in Chapter 2.

#### **Determining the Age of a Battery Pack**

You use the serial number to determine the age of the battery pack. Figure 7-1 shows where the serial number is located on the battery pack.

Figure 7-1 Battery Pack Serial Number Location



The serial number is a 10-digit code. The first four digits represent the date the battery pack was manufactured.

For example, in the serial number:

#### L97FB00143

 $\uparrow\uparrow\uparrow\uparrow\uparrow$ 

The first four digits (L97F) specify the UPS part and manufacturing date.

The 1st digit specifies the UPS part. For a 24V HP battery pack this designation is always "L."

The 2nd and 3rd digits specify the year the battery pack was manufactured. In the example, the year is 19**97**.

The 4th digit specifies the month the battery pack was manufactured. See Table 7-1. In the example, the month is, June.

Month	Designator	Month	Designator	Month	Designator
January	А	May	E	September	Ι
February	В	June	F	October	J
March	С	July	G	November	К
April	D	August	Н	December	L

Table 7-1 Manufacturing Month Codes

#### **Exchanging the Fan**

It is recommended that the fan inside the Electronics Unit be replaced when the batteries are replaced.

For procedures on replacing battery packs, refer to the section, "Removing and Replacing Battery Packs" in Appendix D, "Field Replaceable Units."

Cleaning and Maintenance Exchanging Batteries/Fan

# **A** HP-UX UPS Monitor Error Messages

This appendix lists all UPS-related error message for the HP-UX operating system. The messages are generated by the UPS Monitor daemon to report PowerTrust hardware status conditions that may require corrective action. To receive these messages, your computer system needs HP-UX version 9.04 (or later).

- Normal Operation Messages
- Timer Controlled Power On/Off Messages
- Exit ups\_mond Daemon Messages
- shutdown(1M) Messages
- reboot(2) Messages
- Log-Only Messages

NOTE The term **UPS** (Uninterruptible Power System) is used in all error messages to refer to the PowerTrust unit. The term **UPS Monitor** refers to the software utility (ups\_mond) that monitors PowerTrust operation. The UPS Monitor daemon is not designed to used with any UPS other than an HP PowerTrust.

All messages are indexed by their exact text. Look up the message text in the index to find the page where the definition occurs.

They are organized in the following categories:

## Introduction

The UPS sends error messages and warnings via its RS-232 port to the computer system. This appendix lists the messages that may be displayed by the UPS Monitor daemon (ups\_mond) to indicate PowerTrust status or error conditions. The UPS Monitor daemon monitors the conditions of all PowerTrust units in an HP-UX system. It notifies the system operator of any PowerTrust alarm conditions and of system power failures via console messages and syslog. Under some alarm conditions, it might not be able to. The message may be delayed until AC input power has been restored. In other cases, the message may be lost. If your computer system is HP-UX version 9.04 (or later), the operating system also provides automatic shut down of the equipment.

### **Normal Operation Messages**

The messages in this section may appear during normal operation.

MESSAGE	ups_mond: UPS Monitor daemon starting; using configuration file <filename></filename>
SEVERITY	Information. Startup processing program message.
MEANING	UPS Monitor process creation and activation daemon has successfully begun execution.
CAUSE	ups_mond has launched the UPS Monitor process successfully, using the data contained in the PowerTrust configuration file.
ACTION	None.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> OK: AC Power back on.</tty>
MESSAGE SEVERITY	ups_mond: UPS <tty file="" name="" special=""> OK: AC Power back on. Information. A previous critical, error, or warning condition related to AC input power has been corrected.</tty>
MESSAGE SEVERITY MEANING	<pre>ups_mond: UPS <tty file="" name="" special=""> OK: AC Power back on. Information. A previous critical, error, or warning condition related to AC input power has been corrected. The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that its input AC power has returned to normal following a power failure. The PowerTrust unit is now supplying normal power, not battery reserve power.</tty></tty></pre>
MESSAGE SEVERITY MEANING CAUSE	<pre>ups_mond: UPS <tty file="" name="" special=""> OK: AC Power back on. Information. A previous critical, error, or warning condition related to AC input power has been corrected. The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that its input AC power has returned to normal following a power failure. The PowerTrust unit is now supplying normal power, not battery reserve power. Corrective action succeeded, and normal power has been restored.</tty></tty></pre>

MESSAGE	ups_mond: AC Power to all recognized, system critical UPSs OK! System will not shutdown.
SEVERITY	Information. A previous critical or warning condition related to AC input power has been corrected.
MEANING	Following an AC power failure affecting one or more critical PowerTrust units on the system, normal AC power has been restored to all critical PowerTrust units before either exhaustion of the battery reserve power, or a graceful shutdown, occurred. The system has recovered from the power failure.
CAUSE	The system has recovered from an AC power failure that was short enough not to exhaust the PowerTrust unit's battery reserve, or cause a graceful shutdown.
ACTION	None.

### **Timer Controlled Power On/Off Messages**

The following messages relate to the <code>Timer Controlled Power On/Off utility. See power\_onoff(1M)</code> for more information about the utility.

MESSAGE	ups_mond: Timer Controlled On/Off information invalid; ignored
SEVERITY	Error. Request to turn off the system (with a later turn on) is ignored.
MEANING	The power_onoff utility sent an invalid turn-on time to ups_mond.
CAUSE	Internal error in power_onoff.
ACTION	Ensure that the requested turn-on date and time are valid, and within range of the PowerTrust unit's capability.
MESSAGE	<pre>ups_mond: mknod error: <error number=""> for Timed On/Off fifo file /timed_off; continuing without</error></pre>
SEVERITY	Error.
MEANING	Could not create fifo (also known as a "pipe") for communication between power_onoff and ups_mond.
CAUSE	File system problem.
ACTION	Refer to mkfifo(3C) for more information on the error.

MESSAGE	ups_mond: open error: <error number=""> for Timed On/Off fifo file /timed_off; continuing without</error>
SEVERITY	Error.
MEANING	Could not open fifo (also known as a "pipe") for reading request from the power_onoff utility.
CAUSE	File system problem.
ACTION	Refer to mkfifo(3C) for more information on the error.

MESSAGE	ups_mond: Timer Controlled On value exceeds UPS <tty special<br="">file name&gt; maximum. The maximum value of <value> will be used for this UPS.</value></tty>
SEVERITY	Warning. Turn-on date and time will be earlier than requested.
MEANING	The PowerTrust hardware does not support the requested length of time for delay.
CAUSE	The entered Timer Controller On value was outside the range of the PowerTrust unit's capability.
ACTION	Ensure that the requested turn-on date and time are within the range of the PowerTrust unit's capability.
MESSAGE	ups_mond: Power Off request active; performing graceful shutdown.
SEVERITY	Warning.
MEANING	The PowerTrust unit has begun a graceful shutdown of the system.
CAUSE	An entered Timer Controller date and time setting for powering off the PowerTrust unit has been reached, and the PowerTrust unit has begun to gracefully shutdown the system.
ACTION	None.

#### **Exit ups\_mond Daemon Messages**

The messages in this section precede the exiting of the <code>ups\_mond</code> daemon. After the appearance of one of these messages, the UPS Monitor will not be running, thus the affected PowerTrust unit(s) will not be monitored.

MESSAGE	usage: ups_mond [-f configfile] [-s]
SEVERITY	Error.
MEANING	Incorrect parameter when invoking ups_mond.
CAUSE	An incorrect parameter was used when invoking ups_mond.
ACTION	Correct the parameter according to the syntax shown in the usage message above. If ups_mond was invoked from /etc/inittab, edit that file to correct the parameter.
MESSAGE	ups_mond: cannot exec ups_mond -f <filename> -e ups_monchild due to <error number=""></error></filename>
SEVERITY	Error.
MEANING	Cannot execute ups_mond's child process.
CAUSE	Specific cause denoted by <error number=""> in the message.</error>
ACTION	Ensure that ups_mond exists in the /usr/bin directory, and is executable.

MESSAGE	ups_mond: permission denied; must be super user
SEVERITY	Error.
MEANING	Must be super user to execute ups_mond.
CAUSE	An attempt was made to start ups_mond without super user capability.
ACTION	ups_mond is designed to be started from /etc/inittab by init, which has super user capability.
MESSAGE	ups_mond: exiting; unable to lock process in memory: <error number=""></error>
SEVERITY	Error.
MEANING	An attempt to execute a plock failed.
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>

MESSAGE	ups_mond: aborted, configfile <filename> open received error: <error number=""></error></filename>
SEVERITY	Error.
MEANING	Could not open the ups_mond configuration file.
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that the configuration file named in the message exists, and is readable.
MESSAGE	<pre>ups_mond: aborted, configfile <filename> fseek error: <error number=""></error></filename></pre>
SEVERITY	Error.
MEANING	ups_mond could not "seek" through the configuration file due to the cause denoted by the <error number=""> in the messages.</error>
CAUSE	File system problem.
ACTION	Refer to fseek(3S) for more information on the error.

MESSAGE	ups_mond: terminated by signal <decimal value=""></decimal>
SEVERITY	Information.
MEANING	The signal received by ups_mond caused termination.
CAUSE	The signal denoted by <decimal value=""> in the message was received. The most common cause is a kill of the ups_mond process.</decimal>
ACTION	None, if done on purpose.
MESSAGE	ups_mond: aborted, malloc error: <error number=""></error>
SEVERITY	Information.
MEANING	A memory allocation error caused termination.
MEANING CAUSE	A memory allocation error caused termination. The memory allocation error denoted by <error number=""> in the message caused the ups_mond process to terminate.</error>

#### shutdown(1M) Messages

The messages in this section may precede a shutdown(1M) attempt, depending on the particular PowerTrust configuration in the system.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> AC POWER FAILURE - running on UPS battery</tty>
SEVERITY	Warning. AC power failure. The PowerTrust unit is supplying battery reserve power for up to a maximum of 15 minutes, or the configured shutdown delay. After this, those UPSs configured as critical PowerTrust units will cause a graceful shutdown of the system.
MEANING	The PowerTrust device configured as <tty filename="" special=""> informed the UPS Monitor that its AC input power has failed. The PowerTrust unit is now supplying reserve power from its battery. Depending on the battery's state of charge, there are from 0 to 15 minutes of full-load reserve power available before the AC output from the PowerTrust unit shuts off.</tty>
CAUSE	AC source power failure, detected by a PowerTrust unit.
ACTION	Locate the AC power source for the PowerTrust unit reporting the power failure, and try to restore power before the PowerTrust battery becomes exhausted. If this is an isolated, brief power transient failure, no action is needed; the system will recover automatically when AC power returns to normal.

MESSAGE	If power is not returned within previously configured time period, your system will automatically go to graceful shutdown.
SEVERITY	Warning. Critical (not MSG-ONLY) PowerTrust units have lost AC power.
MEANING	One or more critical PowerTrust units are supplying reserve power from their batteries. If power has not been restored (after the delay specified in the configuration file), a graceful shutdown of the system will occur.
CAUSE	Loss of AC power to one or more critical PowerTrust units.
ACTION	Restore AC power source for PowerTrust units reporting power failure. Otherwise, allow shutdown of system to occur.

#### reboot(2) Messages

The messages in this section may precede a reboot(2), depending on the particular PowerTrust configuration in the system.

NOTE	All of the <b>reboot(2)</b> messages will be followed by:
	ups_mond: reboot -halt invoked due to UPS error cited in previous syslog message.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> battery low&lt;</tty>
SEVERITY	Critical. The system is operating on insufficient reserve power.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that while it was operating on its battery to supply reserve power, the battery drained down to a state of low charge. The PowerTrust unit has only about two minutes of battery power remaining, after which the PowerTrust output power will fail. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.</tty>
CAUSE	The PowerTrust unit detected a loss of AC power and switched over to its battery reserve power to supply power to the system. The battery then drained down to the point at which a "low charge" condition was detected, or the battery had already been depleted by a previous AC power failure, and had not had enough time to recharge.
ACTION	Locate the AC power loss problem, and restore that power to the system before the battery becomes exhausted.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> no output - either switch setting wrong on UPS or bad UPS</tty>
SEVERITY	Critical. No power output from the PowerTrust device configured as <tty file="" name="" special="">.</tty>
MEANING	No output voltage from PowerTrust unit. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.
CAUSE	<ol> <li>The cause may be one of the following:</li> <li>The Output On/Output Off switch setting on the PowerTrust unit is incorrect.</li> <li>The PowerTrust unit has been turned off programmatically.</li> <li>The PowerTrust unit is faulty.</li> </ol>
ACTION	Toggle the Output On/Output Off switch on the suspect PowerTrust unit. If the output voltage is not restored by toggling the switch, replace the PowerTrust unit.

MESSAGE	ups_mond:	UPS	<tty< th=""><th>special</th><th>file</th><th>name&gt;</th><th>failed</th><th>-</th><th>requires</th><th></th></tty<>	special	file	name>	failed	-	requires	
	repair									

- **SEVERITY** Critical. PowerTrust hardware has failed, and PowerTrust output power has been lost. Some system component(s) now without power.
- **MEANING** The PowerTrust device configured as <tty special file name> is faulty. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.
- **CAUSE** The PowerTrust unit is faulty.
- **ACTION** Call HP Service.
- **MESSAGE** ups\_mond: UPS <tty special file name> current overload; UPS turned itself off either UPS bad or too many devices connected
- **SEVERITY** Critical. PowerTrust hardware has failed, and PowerTrust output power has been lost. Some system component(s) now without power.
- **MEANING** The PowerTrust device configured as <tty special file name> informed the UPS Monitor that it detected an excessive demand for output power from its AC power outlet (greater than 100% of allowable output power), and has consequently shut off its output.
- **CAUSE** Improper system installation has put too much load on the PowerTrust unit, or a hardware malfunction in the system equipment being powered by the PowerTrust unit has increased the power demand to the point of overload. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.

#### **ACTION** Call HP Service.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> ambient temperature too high; UPS turned itself off - reduce heat in area</tty>
SEVERITY	Critical. PowerTrust hardware has failed, and PowerTrust output power has been lost. Some system component(s) now without power.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it detected an excessive ambient temperature that makes further operation of the PowerTrust unit inadvisable, and has consequently shut off its output. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.</tty>
CAUSE	The computer room became so hot that the operating temperature limit of the PowerTrust unit was exceeded.
ACTION	Reduce the temperature in the computer room.

**MESSAGE** ups\_mond: UPS <tty special file name> output voltage too high; UPS turned itself off - requires repair

- **SEVERITY** Critical. PowerTrust hardware has failed, and PowerTrust output power has been lost. Some system component(s) now without power.
- **MEANING** The PowerTrust device configured as <tty special file name> informed the UPS Monitor that its output voltage is too high, making further operation of the PowerTrust unit inadvisable, and has consequently shut off its output. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.
- **CAUSE** The PowerTrust unit is faulty.
- **ACTION** Call HP Service.
- **MESSAGE** ups\_mond: UPS <tty special file name> output voltage too low; UPS turned itself off - requires repair
- **SEVERITY** Critical. The PowerTrust has detected multiple UPS internal failures, and PowerTrust output power has been lost. Some system component(s) now without power.
- **MEANING** The PowerTrust device configured as <tty special file name> informed the UPS Monitor that its output voltage is too low for correct system operation, and has consequently shut off its output. If the specified PowerTrust unit is a critical PowerTrust unit, then the system will reboot.
- **CAUSE** The PowerTrust unit is faulty.
- **ACTION** Call HP Service.

MESSAGE	ups_mond: cannot reboot due to <error number=""> returned by exec().</error>
SEVERITY	Error.
MEANING	A reboot system call failed.
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Refer to $exec(2)$ for more information on the error.
MESSAGE	ups_mond: cannot exec shutdown due to <error number=""> returned by exec().</error>
SEVERITY	Error.
MEANING	Cannot execute shutdown process.
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that shutdown exists in the /sbin directory, and that it is executable.

### **Log-Only Messages**

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The messages in this section are not displayed, but instead are logged in the **syslog** file. See the syslog(3C) man page for more information.

MESSAGE	ups_mond: warning - no upstty: UPS's found in configfile <filename>; daemon running for no purpose</filename>
SEVERITY	Warning. May indicate an incorrect system configuration. PowerTrust units that are supposed to be monitored are NOT being monitored.
MEANING	The UPS Monitor successfully started execution and acquired system resources, but then could not find any PowerTrust hardware units configured. Although the UPS Monitor has no PowerTrust units to monitor, it will continue running to inhibit excessive respawns out of /etc/inittab.
CAUSE	If PowerTrust units are supposed to be on the system, either the PowerTrust configuration is incorrect, or the PowerTrust cabling is not connected.
ACTION	1. If PowerTrust units are supposed to be on the system, correct the PowerTrust configuration file.
	2. Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.
	3. Check the PowerTrust hardware for correct cable connections, power-on/off condition, and front panel conditions.

- **MESSAGE** ups\_mond: UPS <tty special file name> interrupted, but read of ups status failed possible UPS hardware problem
- **SEVERITY** Warning.
- **MEANING** The PowerTrust device configured as <tty special file name> experienced a state change, but no status information was communicated to the UPS Monitor.
  - **CAUSE** Faulty RS-232 communication.
  - **ACTION** 1. Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.
    - 2. Check the PowerTrust hardware for correct cable connections, power-on/off condition, and front panel conditions.

MESSAGE	<pre>ups_mond: upstty <tty file="" name="" special=""> failed open: <error number&gt;; ignoring that tty and continuing</error </tty></pre>
SEVERITY	Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> could not establish communication with the UPS Monitor.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that the correct <tty file="" name="" special=""> is being used for the RS-232 port to the PowerTrust unit.</tty>
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> ioctl(TCGETA) failed: <error number="">; ignoring that UPS</error></tty>
SEVERITY	Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> could not establish communication with the UPS Monitor.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that the correct <tty file="" name="" special=""> is being used for the RS-232 port to the PowerTrust unit.</tty>

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MESSAGE	ups_mond: UPS <tty file="" name="" special=""> ioctl(TCSETAF) failed: <error number="">; ignoring that UPS</error></tty>
SEVERITY	Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> could not establish communication with the UPS Monitor.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that the correct <tty file="" name="" special=""> is being used for the RS-232 port to the PowerTrust unit.</tty>

- **MESSAGE** ups\_mond: UPS <tty special file name> line too noisy; ignoring that UPS
- **SEVERITY** Warning. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
- **MEANING** The communication link to the PowerTrust device configured as <tty special file name> has too much noise; the UPS Monitor has stopped monitoring the specified PowerTrust unit.
- **CAUSE** The RS-232 cable to the PowerTrust device configured as <tty special file name> is faulty, or the PowerTrust unit itself is faulty.
- ACTION 1. Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.
  - 2. Check the PowerTrust hardware for correct cable connections, power-on/off condition, and front panel conditions.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> could not enable; ignoring that UPS</tty>
SEVERITY	Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty>
CAUSE	These are possible causes:
	1. Incorrect PowerTrust unit configuration.
	2. Incorrect PowerTrust unit type.
	3. Incorrect RS-232 cable connection.
ACTION	1. Ensure that the PowerTrust unit configuration is correct.
	2. Ensure that you are using a supported PowerTrust unit type.
	3. Ensure that the RS-232 cable is correctly connected.
	3. Ensure that the RS-232 cable is correctly connected.
MESSAGE	3. Ensure that the RS-232 cable is correctly connected. ups_mond: UPS <tty file="" name="" special=""> read after enable failed: common numbers i immening that UDS</tty>
MESSAGE	<pre>3. Ensure that the RS-232 cable is correctly connected. ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS</error></tty></pre>
MESSAGE	<pre>3. Ensure that the RS-232 cable is correctly connected. ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.</error></tty></pre>
MESSAGE SEVERITY MEANING	<pre>3. Ensure that the RS-232 cable is correctly connected. ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED. The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty></error></tty></pre>
MESSAGE SEVERITY MEANING CAUSE	<pre>3. Ensure that the RS-232 cable is correctly connected. ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED. The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication. The specific cause is denoted by the <error number=""> in the message.</error></tty></error></tty></pre>
MESSAGE SEVERITY MEANING CAUSE ACTION	<ul> <li>3. Ensure that the RS-232 cable is correctly connected.</li> <li>ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS</error></tty></li> <li>Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.</li> <li>The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty></li> <li>The specific cause is denoted by the <error number=""> in the message.</error></li> <li>1. Ensure that the PowerTrust unit configuration is correct.</li> </ul>
MESSAGE SEVERITY MEANING CAUSE ACTION	<ul> <li>3. Ensure that the RS-232 cable is correctly connected.</li> <li>ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS</error></tty></li> <li>Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.</li> <li>The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty></li> <li>The specific cause is denoted by the <error number=""> in the message.</error></li> <li>1. Ensure that the PowerTrust unit configuration is correct.</li> <li>2. Ensure that you are using a supported PowerTrust unit type.</li> </ul>
MESSAGE SEVERITY MEANING CAUSE ACTION	<ul> <li>3. Ensure that the RS-232 cable is correctly connected.</li> <li>ups_mond: UPS <tty file="" name="" special=""> read after enable failed; <error number="">; ignoring that UPS</error></tty></li> <li>Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.</li> <li>The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty></li> <li>The specific cause is denoted by the <error number=""> in the message.</error></li> <li>1. Ensure that the PowerTrust unit configuration is correct.</li> <li>2. Ensure that you are using a supported PowerTrust unit type.</li> <li>3. Ensure that the RS-232 cable is correctly connected.</li> </ul>

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> write failed: <error number&gt;; ignoring that UPS</error </tty>
SEVERITY	Warning/Error. System hardware powered by the specified PowerTrust unit is UNPROTECTED.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> does not behave as expected when ups_mond attempts communication.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	1. Ensure that the PowerTrust unit configuration is correct.
	2. Ensure that you are using a supported PowerTrust unit type.
	3. Ensure that the RS-232 cable is correctly connected.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> read of status received ILLEGAL CMD or NOISY LINE</tty>
MESSAGE	<pre>ups_mond: UPS <tty file="" name="" special=""> read of status received ILLEGAL CMD or NOISY LINE Warning. The UPS Monitor is continuing to monitor the specified PowerTrust unit.</tty></pre>
MESSAGE SEVERITY MEANING	<pre>ups_mond: UPS <tty file="" name="" special=""> read of status received ILLEGAL CMD or NOISY LINE Warning. The UPS Monitor is continuing to monitor the specified PowerTrust unit.</tty></pre> The PowerTrust device configured as <tty file="" name="" special=""> returned one of the two error conditions listed in the message.</tty>
MESSAGE SEVERITY MEANING CAUSE	<pre>ups_mond: UPS <tty file="" name="" special=""> read of status received ILLEGAL CMD or NOISY LINE</tty></pre> Warning. The UPS Monitor is continuing to monitor the specified PowerTrust unit. The PowerTrust device configured as <tty file="" name="" special=""> returned one of the two error conditions listed in the message. The RS-232 cable between the host and the specified PowerTrust unit is noisy.</tty>

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> read of status received <number> bytes of unexpected data: (octal:<octal number=""> <string></string></octal></number></tty>
SEVERITY	Warning. The UPS Monitor is continuing to monitor the PowerTrust unit.
MEANING	The status information returned by the PowerTrust device configured as <tty file="" name="" special=""> was not in the form expected.</tty>
CAUSE	The RS-232 cable between the host and the specified PowerTrust unit is noisy.
ACTION	Replace the RS-232 cable that is connected to the specified PowerTrust unit.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> read of status failed: <error number=""></error></tty>
SEVERITY	Warning. The UPS Monitor is continuing to monitor the PowerTrust unit.
MEANING	The UPS Monitor attempted to read the status of the PowerTrust device configured as <tty file="" name="" special="">, however, the read of status information failed.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	Ensure that the RS-232 cable to the specified PowerTrust unit is correctly connected.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> write failed: <error number&gt;</error </tty>
MESSAGE SEVERITY	ups_mond: UPS <tty file="" name="" special=""> write failed: <error number&gt; Warning. The UPS Monitor is continuing to monitor the PowerTrust unit.</error </tty>
MESSAGE SEVERITY MEANING	<pre>ups_mond: UPS <tty file="" name="" special=""> write failed: <error number=""> Warning. The UPS Monitor is continuing to monitor the PowerTrust unit. A write by the UPS Monitor to the PowerTrust device configured as <tty file="" name="" special=""> failed.</tty></error></tty></pre>
MESSAGE SEVERITY MEANING CAUSE	<pre>ups_mond: UPS <tty file="" name="" special=""> write failed: <error number=""> Warning. The UPS Monitor is continuing to monitor the PowerTrust unit. A write by the UPS Monitor to the PowerTrust device configured as <tty file="" name="" special=""> failed. The specific cause is denoted by the <error number=""> in the message.</error></tty></error></tty></pre>
MESSAGE SEVERITY MEANING CAUSE ACTION	<pre>ups_mond: UPS <tty file="" name="" special=""> write failed: <error number=""> Warning. The UPS Monitor is continuing to monitor the PowerTrust unit. A write by the UPS Monitor to the PowerTrust device configured as <tty file="" name="" special=""> failed. The specific cause is denoted by the <error number=""> in the message. 1. Ensure that the PowerTrust unit configuration is correct. 2. Ensure that the PS 2020 all is a statement of the second second</error></tty></error></tty></pre>

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Failure Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to PowerTrust unit System Fail has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared an internal system failure error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust unit System Fail condition.
ACTION	Continue to monitor the specified PowerTrust unit.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Inverter Failure Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to PowerTrust unit Inverter Fail has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared an Inverter Fail error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust Inverter Fail condition.
ACTION	Continue to monitor the specified PowerTrust unit.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Battery Charger Fault Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to a Charger Fault has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a Charger Fault error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust Charger Fault condition.
ACTION	None.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Current Overload Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to a Current Overload has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a Current Overload error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust Current Overload condition.
ACTION	None.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off High Ambient Temperature Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to High Ambient Temperature has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a High Ambient Temperature error condition. The temperature in the PowerTrust unit area is now within acceptable limits.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust internal High Ambient Temperature condition. Room temperature has fallen low enough to remove the overtemperature condition.
ACTION	None.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Battery Failure Alarm</tty>
MESSAGE	<pre>ups_mond: UPS <tty file="" name="" special=""> turned-off Battery Failure Alarm Information. A previous critical or warning condition related to a Battery Failure has been corrected.</tty></pre>
MESSAGE SEVERITY MEANING	<pre>ups_mond: UPS <tty file="" name="" special=""> turned-off Battery Failure Alarm Information. A previous critical or warning condition related to a Battery Failure has been corrected. The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a Battery Failure error condition.</tty></tty></pre>
MESSAGE SEVERITY MEANING CAUSE	<pre>ups_mond: UPS <tty file="" name="" special=""> turned-off Battery Failure Alarm Information. A previous critical or warning condition related to a Battery Failure has been corrected. The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a Battery Failure error condition. The PowerTrust unit has recovered from a previous PowerTrust Battery Failure condition.</tty></tty></pre>

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off High Battery Voltage Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to High Battery Voltage has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a High Battery Voltage error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust High Battery Voltage condition.
ACTION	None.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Low Battery Voltage Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to Low Battery Voltage has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that a previous low charge condition of its battery has been corrected, and the battery has recharged to a level above the "low charge" threshold. The PowerTrust unit has something more than two minutes of battery reserve power available.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust Low Battery Voltage condition.
ACTION	None.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off High Output Voltage Alarm</tty>
SEVERITY	Information. A previous critical or warning condition related to High Output Voltage has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a previous High Output Voltage error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust High Output Voltage condition.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> turned-off Low Output Voltage Alarm</tty>
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SEVERITY	Information. A previous critical or warning condition related to Low Output Voltage has been corrected.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it has cleared a previous Low Output Voltage error condition.</tty>
CAUSE	The PowerTrust unit has recovered from a previous PowerTrust Low Output Voltage condition.
ACTION	None.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> Inverter Failure requires repair</tty>
SEVERITY	Critical. PowerTrust hardware has failed. PowerTrust power output is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it experienced an internal failure of its DC-to-AC power inverter.</tty>
CAUSE	The PowerTrust unit detected a failure condition in its power inverter.
ACTION	Call HP Service.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> Battery Charger Fault - requires repair</tty>
SEVERITY	Critical. PowerTrust hardware has failed. PowerTrust output power is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that it detected a failure of its battery charger, and consequently, the battery is no longer being charged.</tty>
CAUSE	Hardware failure of the PowerTrust unit battery charger.

**MESSAGE** ups\_mond: UPS <tty special file name> Current Overload either UPS bad or too many devices connected

- **SEVERITY** Warning. PowerTrust hardware has not failed, but has a condition that puts the system in jeopardy of going down if the condition is not corrected.
- **MEANING** The PowerTrust device configured as <tty special file name> informed the UPS Monitor that it detected an abnormally high demand for output power from its AC outlet (approximately 100% of allowable output power). The PowerTrust unit is still operational, but if the power demand goes higher, the overload could increase to a level that causes the PowerTrust unit to turn itself off (refer to the Current Overload; UPS turned itself off message in the **reboot(2) Messages** section of this appendix).
- **CAUSE** Improper system hardware installation has put too much load on the PowerTrust unit, or a hardware malfunction in the system equipment being powered by the PowerTrust unit has increased the power demand to the point of overload.
- **ACTION** Call HP Service.

**MESSAGE** ups\_mond: UPS <tty special file name> High Ambient Temperature - reduce area temperature

- **SEVERITY** Warning. PowerTrust hardware has not failed, but has a condition that puts the system in jeopardy of going down if the condition is not corrected.
- **MEANING** The PowerTrust device configured as <tty special file name> informed the UPS Monitor that it detected an abnormally high ambient temperature, indicating insufficient cooling of the equipment area. The PowerTrust unit is still operational, but could progress to a High Ambient Temperature condition if the room temperature goes higher.
- **CAUSE** The temperature in the computer room is getting too hot.
- **ACTION** Reduce the temperature in the computer room.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> Battery Failure - requires repair</tty>
SEVERITY	Critical. PowerTrust hardware has failed. PowerTrust power output is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that its battery has failed the battery test operation. The PowerTrust unit can no longer be relied upon to supply battery reserve power in the event of an AC power failure.</tty>
CAUSE	A hardware problem in the battery or battery charger circuitry, or elsewhere in the PowerTrust unit, has caused the battery to fail to perform normally.
ACTION	Call HP Service.
MESSAGE	ups_mond: UPS <tty file="" name="" special=""> High Battery Voltage - requires repair</tty>
SEVERITY	Critical. PowerTrust hardware has failed. PowerTrust power output is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that the voltage output of its battery is too high. The PowerTrust unit can no longer be relied upon to supply battery reserve power in the event of an AC power failure.</tty>
CAUSE	A hardware problem in the battery or battery charger circuitry, or elsewhere in the PowerTrust unit, has caused the battery to fail to perform normally.
ACTION	Call HP Service.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> Low Battery Voltage - requires repair</tty>
SEVERITY	Critical. PowerTrust hardware has failed. PowerTrust power output is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> informed the UPS Monitor that the voltage output of its battery is too low. The PowerTrust unit can no longer be relied upon to supply battery reserve power in the event of an AC power failure.</tty>
CAUSE	A hardware problem in the battery or battery charger circuitry, or elsewhere in the PowerTrust unit, has caused the battery to fail to perform normally.
ACTION	Call HP Service.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> UNKNOWN status/alarm <hex number=""> - may require repair</hex></tty>
SEVERITY	Warning.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> returned unexpected information to the UPS Monitor.</tty>
CAUSE	Incomplete or unexpected status information was received by the UPS Monitor.
ACTION	If this message re-occurs, the PowerTrust unit may be faulty; it should be replaced.
MESSAGE	ups_mond: write to UPS <tty file="" name="" special=""> Failed: <error number=""> of command <command string=""/></error></tty>
SEVERITY	Warning/Error. A command was not sent to the PowerTrust unit.
MEANING	A command to the PowerTrust device configured as <tty file="" name="" special=""> was not sent due to a write error to that tty.</tty>
CAUCE	
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	<ol> <li>Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.</li> </ol>

MESSAGE	ups_mond: read from UPS <tty file="" name="" special=""> after sending command <command string=""/> to it failed: <error number=""></error></tty>
SEVERITY	Warning/Error. It is unknown if a command to the PowerTrust unit was successful.
MEANING	After a command was sent to the PowerTrust device configured as <tty file="" name="" special="">, a read of the status of that command failed.</tty>
CAUSE	The specific cause is denoted by the <error number=""> in the message.</error>
ACTION	1. Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.
	2. Check the PowerTrust hardware for correct cable connections, power-on/off condition, and front panel conditions.

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> could not execute command <command string=""/>; returned <string> - possible bad signal cable</string></tty>
SEVERITY	Warning/Error. A command sent to the PowerTrust unit had unpredictable results.
MEANING	After a command was sent to the PowerTrust device configured as <tty file="" name="" special="">, the status returned was not as expected for either success or failure conditions.</tty>
CAUSE	Either the RS-232 communication link between the host and the PowerTrust unit is intermittent, or the PowerTrust unit is faulty.
ACTION	1. Check the I/O hardware components that comprise the communications link from the SPU to the PowerTrust unit.
	2. Check the PowerTrust hardware for correct cable connections, power-on/off condition, and front panel conditions.
	3. If neither of the first two action steps above corrects the problem, the PowerTrust unit is probably faulty and should be replaced.
MESSAGE	3. If neither of the first two action steps above corrects the problem, the PowerTrust unit is probably faulty and should be replaced. ups_mond: warning - shutdown delay or shutdown timer parameter in configfile <configfilename> missing or not greater than zero; using default</configfilename>
MESSAGE	<pre>3. If neither of the first two action steps above corrects the problem, the PowerTrust unit is probably faulty and should be replaced. ups_mond: warning - shutdown delay or shutdown timer parameter in configfile <configfilename> missing or not greater than zero; using default Warning/Error.</configfilename></pre>
MESSAGE SEVERITY MEANING	<pre>3. If neither of the first two action steps above corrects the problem, the PowerTrust unit is probably faulty and should be replaced.  ups_mond: warning - shutdown delay or shutdown timer parameter in configfile <configfilename> missing or not greater than zero; using default  Warning/Error.  A value in the PowerTrust configuration file for setting the amount of delay time before graceful shutdown is missing or has not been set. The default value will be used instead.</configfilename></pre>
MESSAGE SEVERITY MEANING CAUSE	<pre>3. If neither of the first two action steps above corrects the problem, the PowerTrust unit is probably faulty and should be replaced. ups_mond: warning - shutdown delay or shutdown timer parameter in configfile <configfilename> missing or not greater than zero; using default Warning/Error. A value in the PowerTrust configuration file for setting the amount of delay time before graceful shutdown is missing or has not been set. The default value will be used instead. The shutdown delay value in the PowerTrust configuration file is missing or has not been set.</configfilename></pre>

MESSAGE	ups_mond: UPS <tty file="" name="" special=""> in bypass-mode; no AC Power-loss protection.</tty>
SEVERITY	Warning/Error. PowerTrust power output is still on, but the PowerTrust unit will not be able to protect the system against an AC power failure, if one occurs.
MEANING	The PowerTrust device configured as <tty file="" name="" special=""> is in bypass mode, thus cannot provide protection to the system in the event of an AC power failure.</tty>
CAUSE	The PowerTrust unit has been set to bypass mode, or is faulty.
ACTION	Call HP Service.

HP-UX UPS Monitor Error Messages Log-Only Messages

# **B** MPE/iX UPS Monitor Error Messages

This appendix lists all UPS-related error message for the MPE/iX operating system. The messages are generated by the UPS Monitor to report PowerTrust hardware status conditions that may require corrective action. To receive these messages, your computer system needs MPE/iX version 5.0 (or later). They are organized in the following categories:

- Power Status Messages
- Alarm Status Messages
- Alarm Status Cleared Messages
- Log-Only Status Messages

NOTE The term **UPS** (Uninterruptible Power System) is used in all error messages to refer to the PowerTrust unit. The term **UPS Monitor** refers to the software that monitors PowerTrust operation.

All messages are indexed by their exact text. Look up the message text in the index to find the page where the definition occurs.

## Introduction

The UPS sends error messages and warnings via its RS-232 port to the computer system. The UPS Monitor subsystem monitors the conditions of all PowerTrust units on an MPE/iX system and notifies the system operator via console messages of any PowerTrust alarm conditions and of system power failures. Under some alarm conditions, it might not be able to. The message may be delayed until AC input power has been restored. In other cases, the message may be lost.

#### **Power Status Messages**

The following messages are displayed on the system console to report PowerTrust power status conditions.

MESSAGE	UPS LDEV <nnn> reports loss of AC input power. (UPSERR 0033)</nnn>
CAUSE	The specified PowerTrust unit reported that it detected an input power failure; there has been an AC power failure somewhere in the power path leading into the unit. The PowerTrust unit has switched to its battery pack to supply reserve power.
ACTION	If the power failure is brief (not long enough to exhaust the PowerTrust battery), no action is needed. Otherwise, determine what is causing the power loss and restore the power before the PowerTrust battery becomes exhausted.
MESSAGE	UPS LDEV <nnn> reports AC input power "Bypass Mode". (UPSWRN 0035)</nnn>
CAUSE	The specified PowerTrust unit has been placed into its "AC Power Bypass Mode" of operation. This should only occur when the PowerTrust unit is being serviced, and the unit is intended to be put into "Bypass Mode". If this message occurs during normal system operation, there is probably a hardware problem in the PowerTrust unit.
ACTION	No action is needed if this message occurs during servicing of the PowerTrust unit. If this message occurs during normal system operation, replace the faulty PowerTrust unit.

MESSAGE	UPS LDEV <nnn> reports AC input power restored. (UPSWRN 0036)</nnn>
CAUSE	The specified PowerTrust unit had lost its AC input power in the past, and now the AC input power has been restored. If the PowerTrust unit is operating correctly, it will now switch from battery operation back to normal AC power operation.
ACTION	No action is needed. The system automatically returns to normal operation when all PowerTrust units (there may be one or several units in a system) detect that normal AC input power is present following a power loss at any PowerTrust unit.
MESSAGE	UPS LDEV <nnn> reports "Low Battery Charge" condition. (UPSWRN 0037)</nnn>
CAUSE	The specified PowerTrust unit had lost its AC input power some time ago and has been supplying reserve power from its battery. AC input power has not been restored yet, causing the battery to be drained down to a "low charge" power level.
ACTION	Locate and correct the cause of the AC power failure. If AC power is not restored within the next two minutes, the PowerTrust battery will be exhausted, and output AC power from the PowerTrust unit will fail, causing power loss to the computer equipment.

MESSAGE UPS LDEV <nnn> reports AC output power turned off. (UPSERR 0041)

- **CAUSE** The specified PowerTrust unit has turned off its AC output power. Someone may have mistakenly turned off the PowerTrust unit's power switch, or the PowerTrust unit may have malfunctioned. Whatever equipment was receiving power from the PowerTrust unit has now lost power.
- ACTION Investigate and correct the problem at the PowerTrust unit. Turn on all power control switches on the PowerTrust unit. If the computer (SPU) lost power, you will have to reboot the system after restoring the PowerTrust unit power.

#### **Alarm Status Messages**

The following messages are displayed on the system console to report PowerTrust alarm status conditions.

MESSAGE	UPS LDEV <nnn> reports UPS "System Fail" condition. (UPSERR 0192)</nnn>
CAUSE	The specified PowerTrust unit reported a PowerTrust "System Failure" condition. This is a hardware malfunction condition within the PowerTrust unit.
ACTION	Call HP Service.
MESSAGE	UPS LDEV <nnn> reports UPS "Inverter Fail" condition. (UPSERR 0193)</nnn>
CAUSE	The specified PowerTrust unit reported an "Inverter Fail" condition. This is a hardware malfunction condition within the PowerTrust unit. The DC-to-AC power inverter within the PowerTrust unit has malfunctioned.
ACTION	Call HP Service.
MESSAGE	UPS LDEV <nnn> reports UPS "Charger Fault" condition. (UPSERR 0195)</nnn>
CAUSE	The specified PowerTrust unit reported a "Charger Fault" condition. This is a hardware malfunction condition within the PowerTrust unit. The PowerTrust unit's internal battery charger circuitry has malfunctioned.

MESSAGE	UPS LDEV <nnn> reports UPS "Overload Shutdown" condition. (UPSERR 0196)</nnn>
CAUSE	The specified PowerTrust unit reported an "Overload Shutdown" condition. Too much power was being drawn from the PowerTrust unit AC output by the computer equipment being powered from this PowerTrust unit. An improper system installation has put too much load on the PowerTrust unit, or the computer equipment being powered may be malfunctioning.
ACTION	1. Reduce the load on the PowerTrust unit by powering off some non-critical system component.
	2. Check for an improper system hardware installation. Correct the system installation to reduce the loading on the PowerTrust unit.
	3. If the system installation is not the problem, find and replace the faulty system hardware component that is overloading the PowerTrust unit.
MESSAGE	UPS LDEV <nnn> reports UPS "High Ambient Temperature Shutdown" condition. (UPSERR 0197)</nnn>
CAUSE	The specified PowerTrust unit reported a "High Ambient Temperature Shutdown" condition. The temperature of the PowerTrust unit hardware became too high to permit safe operation, and the PowerTrust unit turned itself off to prevent equipment damage. The computer room temperature is too high, or there may be a hardware malfunction in the PowerTrust unit.
ACTION	If the computer room has become too warm, take steps to cool the room. If

**ACTION** If the computer room has become too warm, take steps to cool the room. If room temperature is not the problem, then replace the faulty PowerTrust unit.

MESSAGE	UPS LDEV <nnn> reports UPS "Overload" condition. (UPSERR 0198)</nnn>
CAUSE	The specified PowerTrust unit reported an "Overload" condition. The equipment being powered by the PowerTrust unit is drawing too much power from the PowerTrust unit AC output. If the excessive power draw continues, the PowerTrust unit may reach an "Overload Shutdown" condition.
ACTION	1. Reduce the load on the PowerTrust unit by powering off some non-critical system component.
	2. Check for an improper system hardware installation. Correct the system installation to reduce the loading on the PowerTrust unit.
	3. If the system installation is not the problem, find and replace the faulty system hardware component that is overloading the PowerTrust unit.

MESSAGE	UPS LDEV <nnn> reports UPS "High Ambient Temperature" condition. (UPSERR 0199)</nnn>
CAUSE	The specified PowerTrust unit reported a "High Ambient Temperature" condition. The PowerTrust unit has detected an abnormally high temperature in the PowerTrust unit hardware. If the temperature rises further, the PowerTrust unit may reach a "High Ambient Temperature Shutdown" condition. The computer room temperature is too high, or there may be a hardware malfunction in the PowerTrust unit.
ACTION	If the computer room has become too warm, take steps to cool the room. If room temperature is not the problem, then replace the faulty PowerTrust unit.
MESSAGE	UPS LDEV <nnn> reports UPS "Battery Test Fail" condition. (UPSERR 0200)</nnn>
CAUSE	The specified PowerTrust unit reported a "Battery Test Fail" condition. This is a hardware malfunction within the PowerTrust unit hardware. The PowerTrust unit logic perceives that the PowerTrust unit battery is not working properly.
ACTION	Call HP Service.
MESSAGE	UPS LDEV <nnn> reports UPS "High Battery Voltage" condition. (UPSERR 0201)</nnn>
CAUSE	The specified PowerTrust unit reported a "High Battery Voltage" condition. This is a hardware malfunction within the PowerTrust unit hardware. The PowerTrust unit logic perceives that the PowerTrust unit battery is not working properly.
ACTION	Call HP Service.

MESSAGE	UPS LDEV <nnn> reports UPS "Low Battery Voltage" condition. (UPSERR 0202)</nnn>
CAUSE	The specified PowerTrust unit reported a "Low Battery Voltage" condition. This is a hardware malfunction within the PowerTrust unit hardware. The PowerTrust unit logic perceives that the PowerTrust unit battery is not working properly.
ACTION	Call HP Service.

MESSAGE UPS LDEV <nnn> reports UPS "High Output Voltage Shutdown" condition. (UPSERR 0203)

**CAUSE** The specified PowerTrust unit reported a "High Output Voltage Shutdown" condition. This is a hardware malfunction within the PowerTrust unit hardware or possibly in the equipment being powered from the PowerTrust unit. The PowerTrust unit has shut itself off.

**ACTION** Call HP Service.

**MESSAGE** UPS LDEV <nnn> reports UPS "Low Output Voltage Shutdown" condition. (UPSERR 0204)

**CAUSE** The specified PowerTrust unit reported a "Low Output Voltage Shutdown" condition. This is a hardware malfunction within the PowerTrust unit hardware or possibly in the equipment being powered from the PowerTrust unit. The PowerTrust unit has shut itself off.

**ACTION** Call HP Service.

**MESSAGE** UPS Monitor UPS error: Lost communications with UPS LDEV <nnn>. That UPS is no longer being monitored. (UPSERR 0512)

**CAUSE** The UPS Monitor had been monitoring the specified PowerTrust unit LDEV successfully, then for some reason lost I/O communications with that PowerTrust unit. The I/O interface cable or I/O interface hardware may have failed, or the PowerTrust unit itself may have failed.

- **ACTION** 1. Check the specified PowerTrust unit's I/O interface cable and I/O interface connection at the computer.
  - 2. Check the PowerTrust unit hardware for power connections and front panel indicators.

NOTE: Even after correcting cable or connection problems, the system must be rebooted before the software will attempt to resume monitoring the UPS.

MESSAGE	UPS Monitor UPS error: Unable to start monitoring on UPS Ldev <nnn> due to File System error in finding or opening the device. (UPSWRN 0587)</nnn>
CAUSE	This is a software-detected error condition that indicates an error in the UPS Monitor software or in some other system software, or a system memory error.
ACTION	Call the Response Center.

## **Alarm Status Cleared Messages**

The following messages are displayed on the system console to report that an alarm status condition has been cleared, and the PowerTrust (UPS) has returned to normal operation.

MESSAGE	UPS LDEV <nnn> reports UPS "System Fail" condition cleared. (UPSWRN 0128)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "System Failure" condition. Now, the "System Failure" condition within the PowerTrust unit device has been corrected, and the PowerTrust unit is reporting that it has returned to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "Inverter Fail" condition cleared. (UPSWRN 0129)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Inverter Failure" condition. Now, the "Inverter Failure" condition within the PowerTrust unit has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "Charger Fault" condition cleared. (UPSWRN 0131)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Charger Fault" condition. Now, the "Charger Fault" condition within the PowerTrust unit has been corrected, and the PowerTrust unit is reporting that it has returned to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.

MESSAGE	UPS LDEV <nnn> reports UPS "Overload Shutdown" condition cleared. (UPSWRN 0132)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported an "Overload Shutdown" condition. Now, the "Overload Shutdown" condition within the PowerTrust unit has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "High Ambient Temperature Shutdown" condition cleared. (UPSWRN 0133)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "UPS High Ambient Temperature Shutdown" condition. Now, the "High Ambient Temperature Shutdown" condition has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "Overload" condition cleared. (UPSWRN 0134)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Overload" condition. Now, the PowerTrust unit "Overload" condition has been corrected, and the PowerTrust unit is reporting that it has returned to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.

MESSAGE	UPS LDEV	<nnn></nnn>	repor	ts UP	S "H	igh	Ambient	Temperature"
	condition	n clear	ced. (	UPSWR	N 01	35)		

- **CAUSE** Some time ago, the specified PowerTrust unit had reported a "High Ambient Temperature" condition. Now, the "High Ambient Temperature" condition has been corrected, and the PowerTrust unit is reporting that it has returned to normal operation.
- **ACTION** No action is needed. This message merely confirms that a previously reported problem has been corrected.

MESSAGE	UPS LDEV <nnn> reports UPS "Battery Test Fail" condition cleared. (UPSWRN 0136)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Battery Test Fail" condition. Now, the "Battery Test Fail" condition within the PowerTrust unit has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "High Battery Voltage" condition cleared. (UPSWRN 0137)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "High Battery Voltage" condition. Now, the "High Battery Voltage" condition in the PowerTrust unit has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "Low Battery Voltage" condition cleared. (UPSWRN 0138)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Low Battery Voltage" condition. Now, the "Low Battery Voltage" condition in the PowerTrust unit has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.

MESSAGE	UPS LDEV <nnn> reports UPS "High Output Voltage Shutdown" condition cleared. (UPSWRN 0139)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "High Output Voltage Shutdown" condition. Now, the "High Output Voltage Shutdown" condition has been cleared, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.
MESSAGE	UPS LDEV <nnn> reports UPS "Low Output Voltage Shutdown" condition cleared. (UPSWRN 0140)</nnn>
CAUSE	Some time ago, the specified PowerTrust unit had reported a "Low Output Voltage Shutdown" condition. Now, the "Low Output Voltage Shutdown" condition has been corrected, and the PowerTrust unit is reporting a return to normal operation.
ACTION	No action is needed. This message merely confirms that a previously reported problem has been corrected.

#### **Log-Only Status Messages**

The following messages are not displayed on the system console; instead, they are recorded in the system log file. Log-only status messages indicate error conditions affecting the UPS Monitor's ability to monitor the PowerTrust units(s).

These messages are a subset of all the log-only status messages, and are listed here only if the required **ACTION** involves a hardware check to be performed by qualified, service-trained personnel.

MESSAGE	UPS LDEV <nnn> I/O Operation error: UPS device failed to complete a Read I/O request in allotted time. The Read request timed out. (UPSERR 0536)</nnn>
CAUSE	This is a software-detected error condition that indicates an error in the I/O software subsystems that the UPS Monitor uses to communicate with PowerTrust units. It could indicate a disconnected I/O cable or a PowerTrust unit hardware malfunction.
ACTION	1. Check for proper connection of the PowerTrust unit I/O interface cable at both ends.
	2. Ensure that the PowerTrust unit is powered on.
	NOTE: Even after correcting cable or connection problems, the system must be rebooted before the software will attempt to resume monitoring the UPS.
MESSAGE	UPS LDEV <nnn> I/O Operation error: The actual Read data transfer length in a UPS Read I/O operation was too short, less than the minimum required Read transfer length. (UPSERR 0563)</nnn>
CAUSE	This is a software-detected error condition that indicates an error in the I/O software subsystems that the UPS Monitor uses to communicate with PowerTrust units. It could also indicate a hardware problem in the I/O interface, or a PowerTrust unit.
ACTION	1. Check for proper connection of the PowerTrust unit I/O interface cable at both ends.
	2. If no I/O connection problem is found, call the Response Center.
	NOTE: Even after correcting cable or connection problems, the system must be rebooted before the software will attempt to resume monitoring the UPS.

MESSAGE	UPS LDEV <nnn> initialization error: After trying several times, the UPS Monitor has been unable to complete the initialization sequence of I/O operations for this UPS device. (UPSERR 0573)</nnn>
CAUSE	Something is preventing the HP 3000 system from communicating with the PowerTrust unit. The fault is possibly a bad I/O interface cable, or bad I/O interface hardware at the system or at the PowerTrust unit. A PowerTrust unit hardware malfunction may also be the cause.
ACTION	1. Check the I/O interface cable for correct attachment.
	2. Check that the PowerTrust unit is powered on.
	3. Check that the system I/O configuration is correct.
	NOTE: Even after correcting cable or connection problems, the system must be rebooted before the software will attempt to resume monitoring the UPS.
MESSAGE	UPS Monitor warning: Too many UPS devices have been configured in the system I/O configuration files. The UPS Monitor cannot monitor all of them; it will monitor as many as it can. (UPSWRN 0577)
CAUSE	Incorrect system I/O configuration. The system I/O configuration, generated by SYSGEN and NMMGR configurators, contains more than 128 PowerTrust units, which is the maximum number that the UPS monitor can handle simultaneously.
ACTION	Review and correct the system $I/O$ configuration, reducing the number of

**ACTION** Review and correct the system I/O configuration, reducing the number of PowerTrust units specified in the configuration to an acceptable number.

MESSAGE	UPS Monitor warning: UPS Monitor finds no UPS devices configured in the system I/O configuration files. UPS Monitor is terminating itself. (UPSWRN 0591)
CAUSE	No PowerTrust units have been configured in the system's I/O configuration files. This is an error if this system is supposed to have PowerTrust units on it. This is not an error if this system is not supposed to have PowerTrust units on it.
ACTION	If this system is supposed to have PowerTrust units on it, review and correct the system I/O configuration, then restart the system. If this system is not supposed to have PowerTrust units on it, then no action is needed.

# **C** Configuring the OS for the PowerTrust UPS

This appendix gives an overview of how to configure your HP-UX or MPE/iX system for the PowerTrust UPS. For specific instructions about configuring the PowerTrust UPS into your system, refer to the *System Administration Task Manual* for HP-UX servers, or to *Configuring Systems for Terminals, Printers, and Other Serial Devices* for MPE/iX systems. Instructions for how to power fail a system are in the last section of this appendix.

# Introduction

Software running on the protected system can monitor the status of the PowerTrust UPS if the following conditions are met:

- 1. The UPS is connected to the protected system via an RS-232 connection.
- 2. The operating system is HP-UX version 9.04 (or higher) or MPE/iX 4.7 (or higher).
- 3. The operating system configuration is modified to recognize the UPS.

If the PowerTrust UPS is not added to the computer's configuration table, the UPS will still perform power conditioning and supply battery backup, but there are two limitations:

- 1. The error message information in Appendix A, "HP-UX UPS Monitor Error Messages," and Appendix B, "MPE/iX UPS Monitor Error Messages," will not display on the system console and logfile.
- 2. The computer system will not be able to respond to impending power failures.

#### **Configuring HP-UX for the PowerTrust UPS**

On HP-UX 9.04 and later releases, PowerTrust UPS messages are displayed on the system console and logged to **syslog**; this functionality is not supported on HP-UX 9.0 PCO. The UPS always communicates with the operator by means of auditory alarms and indicators on its front panel.

This applies to HP-UX 9.04 and later releases only. In order for HP-UX to display UPS messages and log UPS events to the system log, you must perform several configuration tasks:

1. Connect the supplied RS-232 cable from the UPS to a serial port configured to the system for each UPS in the system. The port should be a direct connect or modem type port (except remote or maintenance type port).

If the supplied cable is not long enough, use a straight-through 25-wire RS-232-C extender cable (3062C, 25 feet long) from the MDP port to the DB-25 connector end of the cable supplied with the UPS, and then the UPS cable to the UPS's DB-9 connector.

- 2. Use SAM (Peripheral Devices) to configure the PowerTrust UPS when HP-UX is running. For how to log on and other detailed information, refer to the *ups\_mond(1M)* and *ups\_conf(4)* man pages. Specify these options and parameters:
  - a. The port used for the UPS. Configure the port at 1200 baud rate.
  - b. Activate or deactivate the automatic shutdown feature.
  - c. The *shutdown\_delay\_mins* parameter (default=1 minute). This parameter specifies the number of minutes the UPS Monitor program will wait before initiating a "shutdown -h" following notification that AC power to the UPS is lost. This interval allows the computer to continue operation through brief electrical fluctuations.

To take full advantage of the UPS, this value should be large enough to account for transient power fluctuations expected at the site. Shut down is undesirable if power will return shortly. Consider the effects of frequent short power losses. Too long a delay will cause earlier battery depletion.

- d. The *shutdown\_timeout\_mins* parameter (default=5 minutes). This parameter specifies the number of minutes the UPS Monitor program will monitor the "shutdown -h" operation before initiating a reboot with the halt option. In this way, a reboot is executed even if the shutdown process hangs. This value must be longer than the longest time that shutdown may take on the system, but should not exceed the battery capacity.
- 3. Verify that HP-UX is properly configured for the UPS by checking that UPS messages are displayed on the console. Also check for UPS messages in /**usr/adm/syslog**. Messages appear whenever **ups\_mond** starts, and whenever the PowerTrust detects some reportable condition.
- 4. Power fail the UPS to check the system and generate messages. See "Power Failing the UPS" later in this chapter.
- 5. Check the following if UPS messages are not displayed on the console:

- a. Verify that the RS-232 cable is properly connected to the UPS and to an appropriate port on the HP9000 system. An UPS port may be any available DB25 or DB 9 direct connect or modem type port (except remote or maintenance port).
- b. Verify that the RS-232 cable is the correct cable. Although the UPS Port appears to be a standard 9-pin RS-232 connector, it has a non-standard pin out. You must use one of these RS-232 cables:

5061-2575	DB9 9-pin male/DB9 9-pin female (2.5 meter)
5061-2569	DB9 9-pin male/DB25 25-pin male (2.5 meter)
5063-5352	DB9 9-pin male/DB25 25-pin male (4 meter)

- c. Check that the port is configured at 1200 baud rate.
- d. Verify that the configured port value corresponds to the physical port used for the UPS connection.
- e. Reboot the system after correcting cable or connection problems before the software will attempt to resume monitoring the UPS.
- f. Call the HP Response Center if the above checks have not resolved the problem.

#### **Configuring MPE/iX for the PowerTrust UPS**

In order for MPE/iX 5.0 and later releases to display PowerTrust UPS messages on the system console and to log UPS events to the system log, you must perform the following configuration tasks:

1. Connect the supplied RS-232 cable from the UPS to a 25-wire modem port on a DTC for each PowerTrust UPS in the system. Any DTC used for this purpose should itself be protected by a UPS; if the DTC is not protected, UPS messages will not be displayed when AC input power fails.

If the supplied cable is not long enough, use a straight-through 25-wire RS-232-C extender cable (3062C, 25 feet long) from the DTC port to the DB-25 connector end of the cable supplied with the UPS, and then the UPS cable to the UPS DB-9 connector.

2. Choose an available LDEV number if you are adding a UPS to an existing 990/992 System. The configuration groups supplied for 991/995 Systems leave LDEV 22 undefined and suitable for use for the first UPS on the system.

Any LDEV used by a UPS *should not* already be defined as being used for other devices for the system. For log on instructions and information on using SYSGEN to view and modify the configuration, see Chapter 2 of the *CS 99x/T-Class Installation Guide*.

- 3. Use NMMGR to configure the DTC port for each UPS. A port connected to a UPS is configured similar to a terminal. Use a profile with the following parameters:
  - a. Set the field Allow :HELLO logon? to N.
  - b. Set the first device class name field to HPUPSDEV.
  - c. Set the baud rate to 1200.
  - d. Set all other fields the same as those used for a terminal.

The sample configuration file NMSAMP1.PUB.SYS contains the profile UP10D12 that is configured with these parameters. Enter this profile in the Profile Name field on the Async Card Configuration screen for the desired DTC port.

On a system configured for PC-based management, configure the correct baud rate using the Open View DTC Manager workstation.

- 4. *Make certain that the system is not performing critical work.* Shut down the system.
- 5. Cycle power to the DTCs, then reboot the system with the new NMMGR configuration.
- 6. Verify that MPE/iX is properly configured for the UPS by checking that UPS messages are displayed on the console. Use LOGTOOL to check for UPS messages in the system log.
- 7. Check the following if UPS messages are not being displayed on the console:
  - a. Verify that the RS-232 cable is properly connected to the UPS and to an appropriate modem port on a DTC. An appropriate port is a 25-pin modem-type port on a DTC configured to the computer.

b. Verify that the RS-232 cable is the correct cable. Although the UPS Port appears to be a standard 9-pin RS-232 connector, it has a non-standard pin out. You must use one of these RS-232 cables:

5061-2575 DB9 9-pin male/DB9 9-pin female (2.5 meter)

5061-2569 DB9 9-pin male/DB25 25-pin male (2.5 meter)

- c. Verify that the value entered in NMMGR for the port corresponds to the physical port used on the DTC.
- d. Verify these UPS terminal profile parameters:
  - Baud rate 1200.
  - No parity.
  - Terminal type 10.
  - First (and only) device class name HPUPSDEV.
- e. Power-cycle the DTC to force the DCC (Data Comm Configurator) to download the DTC as the system finishes booting. This is needed to get the baud rate changed from its DTC-firmware default of 9600 baud to the NMMGR configured 1200 baud value.
- f. Call the HP Response Center if none of the above resolves the problem.
#### **Power Failing the UPS**

Before forcing an AC input power failure to test the UPS and its communication with the system, wait for the system to establish communication and initialize the UPS.

On a MPE/iX system, it takes the system about 30 seconds from the time it finishes downloading the DTCs with their firmware to be ready to respond to UPS events. As the system is finishing its boot up process, watch the system console for the message:

nmev #`00@234 dtmc c0000303 code download completed for DTC address 080009281E05.

Wait 30 seconds after that message appears, and then perform the power fail test.

For either HP-UX or MPE/iX systems, use this procedure to power fail a system:

- 1. Check that the system is not performing critical processes.
- 2. Use the wall breaker to cut the power for the circuit that is supplying power to the UPS. **Do NOT use the rear panel circuit breaker to power fail the system.**
- 3. Wait one (1) full minute.
- 4. Verify that messages are displayed on the console.
- 5. Verify that the indicators are normal for battery power:

AC Output lit Battery Power lit Attention not lit Alarm 1 beep

6. Use the wall breaker to return power to the UPS AC input circuit.

#### CAUTION

Do *NOT* pull the power cord. This would compromise the electrical fault protection because it provides grounding.

Configuring the OS for the PowerTrust UPS **Power Failing the UPS** 

# **D** Field Replaceable Units

This appendix documents:

- The Field Replaceable Units (FRUs) for the UPS
- Removal and replacement procedures for all FRUs

#### **Replaceable Parts Lists**

Table D-1 lists the replaceable parts for the rackmounted UPS.

**NOTE** Rackmounted PowerTrust UPS products that are sold in Europe are shipped without a line cord or an L6-30R output receptacle. It is the responsibility of the customer to supply the correct cord and output receptacle for the particular country and electrical code.

#### **Replaceable Parts for the PowerTrust UPS**

HP Part No.	Description
0950-3128	5.5 kVA UPS Electronics Unit
0950-3131	Service Bypass Unit (30A, North American power)
0950-3129	Service Bypass Unit (30A, hardwired power)
0950-3291	Service Bypass Unit (40A, North American power)
0950-3292	Service Bypass Unit (40A, European power)
0957-0269	5.5 kVA UPS Electronics Unit (exchange)
0957-0270	Service Bypass Unit, 30A (hardwired power, exchange)
0957-0271	Service Bypass Unit, 30A (North American power, exchange)
0957-0268	Conversion Kit (Worldwide to North American, 30A)
0957-0274	Conversion Kit (North American to Worldwide, 30A— includes two strain reliefs)
0957-0285	Conversion Kit (European to North American, 40A)
0957-0286	Conversion Kit (North American to European, 40A)
0957-0272	Battery Box (exchange, without battery packs)
0957-0273	Battery Box (new exchange, without battery packs)
0957-0267	Replacement Battery Packs (24V, 17AH)
0957-0275	Replacement Fan Assembly
0957-0283	Replacement Control Panel and Label Kit
5061-2575	RS-232 Cable, DB9 male - DB9 female (2.5m)
5061-2569	RS-232 Cable, DB9 male - DB25 female (2.5m)
5063-5352	RS-232 Cable, DB9 male - DB25 male (4m)

#### Table D-1Replaceable Parts List

HP Part No.	Description
8120-1575	PDU Output Convenience Cable, male C14 to female C13, 30in)
8120-1625	PDU Output Convenience Cable, male C14 to female C13, 8ft)
8120-6366	PDU Output Convenience Cable, male C14 to female C13, 5m)

#### Table D-2 UPS Serial Communications Cables

5061-25	69 Pin	out
DB-9		DB-25
Male		Male
UPS		Host
1 RX	<	3 TX
2 TX	>	2 RX
9 GND	<	7 GND
5061-25	75 Pin	out
DB-9		DB-9
Male		Femal
		e
UPS		Host
1 RX	<	3 TX
2 TX	>	2 RX
9 GND	<	5 GND
5063-53	52 Pin	out
DB-25		DB-9
Male		Male
Male UPS		Male <b>Host</b>
Male <b>UPS</b> 1 RX	<	Male <b>Host</b> 2 TX
Male UPS 1 RX 2 TX	< >	Male Host 2 TX 3 RX

#### **Removal and Replacement Procedures**

The following subsections describe the field replacement procedures for the following units:

- UPS Electronics Unit
- Battery Pack
- Battery Box
- Service Bypass Unit
- Hardwire Conversion Kit
- North American Conversion Kit
- Control Panel and Label Kit
- Fan Assembly

With the exception of the replacement of the Service Bypass Unit and the installation of the North American Conversion Kit, these procedures discussed in this chapter can be performed on-line by putting the UPS in Bypass mode.

WARNING The following procedures should be performed by qualified service personnel only.

#### **Removing and Replacing UPS Electronics Unit**

Tools required:

- #25 Torx driver
- Flathead screwdriver

To replace the Electronics Unit:

1. Make sure the BYPASS and MAIN INPUT breakers are ON.

CAUTIONIf the yellow caution light is flashing, do not proceed. Switching the UPS into<br/>Bypass mode when the caution light is flashing may disrupt power to the<br/>load. Call HP Service. If the yellow caution light is not flashing, continue.

2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

A continuous alarm will sound indicating that the UPS is in Bypass mode.

- 3. Set the rear panel UPS/BATTERY switch to DISABLE. The alarm will turn off.
- 4. Use a screwdriver to loosen the screw at the center of each captive thumbscrew on the Battery Precharge Shorting Plate, then unscrew the thumbscrews and remove the plate. See Figure 3-8.

- 5. Disconnect the Battery Box cable from the Electronics Unit.
- 6. Remove the bezel assembly and the four Torx screws that secure the Electronics Unit to the rack.
- 7. Slide the old Electronics Unit out of the rack. This will disconnect it from the Service Bypass Unit.

### WARNING The Electronics Unit weighs about 68 kg (150 lbs). Two people are required to remove and replace it.

- 8. Check that the Output On/Output Off switch on the replacement unit is set to Output Off.
- 9. Check that the UPS/BATTERY switch on the replacement unit is set to DISABLE.
- 10. With the help of another person, slide the replacement Electronics Unit back into the rack.
- 11.Carefully push the Electronics Unit until it connects completely with the Service Bypass Unit.
- 12. Reattach the four Torx screws that secure the Electronics Unit to the rack.
- 13.At the back of the replacement Electronics Unit, unscrew the thumbscrews on either side of the Battery Precharge Shorting Plate and remove it. You may have to use a screwdriver to loosen the screw at the center of each captive thumbscrew.
- 14.Connect the battery cable to the connector on the Electronics Unit.
- 15. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

16.Orient the plate so that the notch is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

You may need to rock the plate back and forth as you push it in.

**CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

- 17. Tighten the thumbscrews on either side of the Battery Precharge Shorting Plate.
- **18**.Switch the UPS/BATTERY switch to ENABLE. Wait for the green Enable LED to come on. The UPS will beep continuously. You can silence the beeping by pressing the Silence Alarm/Test switch on the control panel.
- 19. Switch the Output On/Output Off switch to Output On.

The Caution LED should flash for about five seconds then go out.

20.When the Caution LED stops flashing, go to step 21.

If the Caution LED continues to flash, the Electronics Unit is defective and you need to perform the following steps:

- a. Set the UPS/BATTERY switch to disable.
- b. Set the Output On/Output Off switch to Output Off.
- c. Get a new replacement Electronics Unit.
- d. Return to step 4.
- 21.Switch the Bypass switch to Normal.
- 22.To clear the alarm (if you have not already done so) and return to normal operation from Bypass mode, turn the control panel Output On/Output Off switch to Output Off for about one second, then return it to the Output On position.

CAUTION	Do not leave the Output On/Output Off switch in the Output Off position for
	more than 5 seconds. Doing so will turn off AC output to the receptacles and
	power down the load.

23.Position the front bezel onto the brackets so that the pins behind the front of the bezel line up with the four brackets on the face of the Electronics Unit. (See Figure D-6.)

24.Push the bezel in until the bezel pins snap into the bracket clips.

NOTE After installing the Electronics Unit, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.

Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### **Removing and Replacing Battery Packs**

A battery pack is shown in Figure D-1.





upsgs05

**Tools required:** 

• Flathead screwdriver

To remove and replace a battery pack, use the following procedure:

CAUTION	Battery packs should be replaced one at a time. Failure to do so could cause
	the battery fuse to fail. Begin replacing batteries by starting with the
	left-most battery pack and working to the right. After you have finished
	replacing the battery packs on one side, replace the battery packs on the
	other side—one at a time.

1. Make sure the BYPASS and MAIN INPUT breakers are ON.

CAUTION	If the yellow caution light is flashing, do not proceed. Switching the UPS into
	Bypass mode when the caution light is flashing may disrupt power to the
	load. Call HP Service. If the yellow caution light is not flashing, continue.

2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

A continuous alarm will sound indicating that the UPS is in Bypass mode.

3. Set the rear panel UPS/BATTERY switch to DISABLE. The alarm will turn off.

- 4. Use a screwdriver to loosen the screw at the center of each captive thumbscrew on the Battery Precharge Shorting Plate, then unscrew the thumbscrews and remove the plate. See Figure 3-8.
- 5. Disconnect the Battery Box cable from the Electronics Unit.
- 6. Remove the filler panels in front of the battery box.
- 7. Loosen the thumbscrew at the bottom of a battery pack. See Figure 2-4.
- 8. Grasping the handhold at the top of the battery with one hand and supporting the bottom of the battery with the other, carefully pull the battery from its slot and set it aside in a safe place. See Figure 2-5.

# WARNING Each battery pack weighs approximately 15 kg (33 lbs). Exercise appropriate caution to avoid personal injury when removing the battery packs.

- 9. Remove the new battery pack from its shipping container. Do not destroy or dispose of the container; you will use it to repack the old battery pack.
- 10.Slip the guide at the bottom of the new battery pack between the tracks at the bottom of the Battery Box and push the battery completely into the Battery Box slot. See Figure 3-3.

You may need to rock the battery slightly if the battery binds on the tracks.

- 11.Fasten the thumbscrew at the bottom of the battery pack.
- 12.Put the old battery pack in the shipping container from which you took the new battery pack and follow the return and disposal procedures that were shipped with the replacement battery pack.
- 13.Repeat steps 7 through 12 for the remaining battery packs on one side of the Battery Box. When you finish replacing the battery packs on one side, replace the battery packs on the other side, one at a time. Begin with the left-most battery pack.
- 14.Connect the battery cable to the connector on the Electronics Unit.
- 15. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

16.Orient the plate so that the notch is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

**CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

17. Tighten the thumbscrews on either side of the Battery Precharge Shorting Plate.

- **18**.Switch the UPS/BATTERY switch to ENABLE. Wait for the green Enable LED to come on. The UPS will beep continuously. You an silence the beeping by pressing the Silence Alarm/Test switch on the control panel.
- 19. Switch the Output On/Output Off switch to Output On.

The Caution LED should flash for about five seconds then go out.

20. When the Caution LED stops flashing, go to step 21.

If it continues to blink, refer to "Caution LED" in Chapter 6 for possible causes and actions.

- 21. Turn the Bypass switch to Normal.
- 22. To clear the alarm (if you have not already done so) and return to normal operation from Bypass mode, turn the control panel Output On/Output Off switch to Output Off for about one second, then return it to the Output On position.
- **CAUTION** Do *not* leave the Output On/Output Off switch in the Output Off position for more than 5 seconds. Doing so will turn off AC output to the receptacles and power down the load.

23.Replace the filler panels.

NOTE After replacing the battery packs, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.

Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### **Removing and Replacing the Battery Box**

Tools required:

- #25 Torx driver
- Flathead screwdriver

To remove and replace the Battery Box:

1. Make sure the BYPASS and MAIN INPUT breakers are ON.

CAUTION If the yellow caution light is flashing, do not proceed. Switching the UPS into Bypass mode when the caution light is flashing may disrupt power to the load. Call HP Service. If the yellow caution light is not flashing, continue.

2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

A continuous alarm will sound indicating that the UPS is in Bypass mode.

3. Set the rear panel UPS/BATTERY switch to DISABLE. The alarm will turn off.

- 4. Use a screwdriver to loosen the screw at the center of each captive thumbscrew on the Battery Precharge Shorting Plate, then unscrew the thumbscrews and remove the plate. See Figure 3-8.
- 5. Disconnect the Battery Box cable from the Electronics Unit.
- 6. Remove the filler panels from in front of the battery box.
- 7. Using the procedure outlined in "Removing Battery Packs from Battery Box" in Chapter 2, remove the battery packs from the Battery Box.
- 8. Remove the two screws at each corner of the Battery Box (eight total) from the cabinet frame. See Figure 3-8.
- 9. With the help of another person, slide the old Battery Box out of the rack.
- 10.Slide the new Battery Box into the rack.
- 11.Reattach the two screws at each corner of the Battery Box (eight total) to the cabinet frame.
- 12.Install all ten battery packs:
  - Replace batteries on one side one a a time moving from left to right.
  - Replace the batteries on the other side one at a time moving from left to right.
  - Make sure to tighten the thumbscrew at the bottom of each battery pack.

13. Reattach the Battery Box cable to the Electronics Unit.

After you attach the cable, the capacitors will precharge.

14. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

15.Orient the plate so that the notch on the plate is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

You may need to rock the plate back and forth as you push it in.

### **CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

16.Fasten the thumbscrew at the bottom of the battery pack.

- 17.Put the old battery pack in the shipping container from which you took the new battery pack and follow the return and disposal procedures that were shipped with the replacement battery pack.
- 18.Repeat steps 7 through 12 for the remaining battery packs on one side of the Battery Box. When you finish replacing the battery packs on one side, replace the battery packs on the other side, one at a time. Begin with the left-most battery pack.

19.Connect the battery cable to the connector on the Electronics Unit.

20. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

21.Orient the plate so that the notch is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

**CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

- 22. Tighten the thumbscrews on either side of the Battery Precharge Shorting Plate.
- 23.Switch the UPS/BATTERY switch to ENABLE. Wait for the green Enable LED to come on. The UPS will beep continuously. You an silence the beeping by pressing the Silence Alarm/Test switch on the control panel.
- 24. Switch the Output On/Output Off switch to Output On.

The Caution LED should flash for about five seconds then go out.

25. When the Caution LED stops flashing, go to step 26.

If it continues to blink, refer to "Caution LED" in Chapter 6 for possible causes and actions.

- 26.Turn the Bypass switch to Normal.
- 27.To clear the alarm (if you have not already done so) and return to normal operation from Bypass mode, turn the control panel Output On/Output Off switch to Output Off for about one second, then return it to the Output On position.
- **CAUTION** Do *not* leave the Output On/Output Off switch in the Output Off position for more than 5 seconds. Doing so will turn off AC output to the receptacles and power down the load.

28.Replace the filler panels.

**NOTE** After replacing the Battery Box, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.

Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### **Removing and Replacing the Service Bypass Unit**

Tools required:

• #25 Torx driver

To remove and replace the Service Bypass Unit:

- 1. Power-down the load.
- 2. Shut down the UPS:
  - a. Turn the Output On/Output Off switch to Output Off.
    - The yellow Caution Light will blink.
  - b. Set the UPS/BATTERY switch to DISABLE.
  - c. Disconnect the unit from AC power.
- 3. Remove the Output Receptacle Cover (see 14 in Figure 1-3) from the output receptacles and unplug any attached cables.
- 4. Disconnect the RS-232 cable from the serial port.
- 5. Remove the four screws that hold the Service Bypass Unit to the rack.

#### WARNING The Service Bypass Unit sits on the Electronics Unit. If you have removed the Electronics Unit, however, be sure to hold the Service Bypass Unit in place as you remove the screws that hold it to the rack. Unsupported, the Service Bypass Unit will fall when the last screw is removed.

- 6. Carefully, but firmly, pull on the Service Bypass Unit to disconnect it from the Electronics Unit and remove it from the rack.
- 7. Check that the Service Bypass switch on the new UPS is set to NORMAL and that the breakers are all off.
- 8. Slide the Service Bypass Unit onto the *shelf* of the Electronics Unit until the connector at the back of the Electronics Unit is aligned with the connector on the Service Bypass Unit.
- 9. Carefully push the Service Bypass Unit into the cabinet until the connectors are fully engaged.
- 10. Secure the Service Bypass Unit to the rear cabinet frame with four screws.
- 11.Reconnect the cables to the output receptacles and reattach the Output Receptacle Cover.
- 12. Reconnect the RS-232 cable to the serial port.
- 13.Reconnect AC power.
- 14. Turn on all circuit breakers.
- 15.Switch the UPS/BATTERY switch to ENABLE.

Wait for the green Enable LED to come on and the Caution LED should flash for about five seconds then go out.

16. When the Caution LED stops flashing, go to step 17.

If it is blinking, refer to "Power Failing the UPS" in Appendix C for possible causes and actions.

17. Turn the control panel Output On/Output Off switch to Output On.

18. Power on the load.

NOTE	After installing the Service Bypass Unit, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.
	Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

### **Removing and Replacing Hardwire Conversion Kit (30A Service Bypass Unit Only)**

WARNING The following procedure applies to the 30A Service Bypass Unit only and should be performed by a qualified electrician.

The Hardwire Conversion Kit contains the following items:

- 1- Metal plate preassembled with 2 plastic strain reliefs
- 4- Torx screws (#25 10-32 x 1/2')
- 2- Labels

Tools required:

- #25 Torx driver
- Flathead screwdriver
- Wire cutter, wire stripper

#### Removing the existing conversion plate (if any):

- 1. If the UPS is operating, shut it down using the following procedure:
  - a. Turn the Output On/Output Off switch to Output Off.
  - b. Turn the UPS/BATTERY switch to DISABLE.
  - c. Turn OFF the MAIN INPUT circuit breaker.

#### d. DISCONNECT THE LINE CORD FROM THE AC SOURCE.

- 2. At the rear of the Service Bypass Unit, remove the four Torx screws holding the left Access Panel and remove it. See 4 in Figure 1-3.
- 3. Disconnect the input and output wires by loosening the screws on the terminal block. See Figure D-2.
- 4. Remove the four Torx screws holding the conversion plate on the right and remove it.





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#### Installing the Hardwire Conversion Kit:

#### A. If the wiring is done at another location:

- 1. Attach the conversion plate to the rear panel using four Torx screws. Make certain that the plate is positioned over the right opening in the rear panel.
- 2. Reinstall the left Access Panel on the rear panel using the four Torx screws that were removed earlier.
- 3. Apply the Hardwire Conversion Kit labels to the shipping container and pack the unit. Contact the local Hewlett-Packard Sales and Service Office for repacking information and materials.

#### B. If the wiring is done on site:

1. Wire gauge requirements for new hardwired installations:

#### a. Input Wiring:

Input: (L1 IN, L2/N IN): minimum 8 AWG (6 mm<sup>2</sup>) stranded copper wire Ground: minimum 8 AWG (6 mm<sup>2</sup>) stranded copper wire

#### b. Output Wiring:

The output terminals can accommodate stranded copper wire with a range of 14 AWG to 4 AWG ( $2.5 \text{ mm}^2 - 16 \text{ mm}^2$ ).

Output wiring should be sized based on input current requirements of the load equipment, in accordance with local codes.

2. This UPS may be wired with either cords or conduit.

#### **Installing cords:**

- a. The strain relief can accept 18.0 mm (0.709 in) to 25.4 mm (1.00 in) diameter cords.
- b. If not already done, strip the outer cord covering 15.2cm (6 in) and strip the wires 12.7mm (.50 in).
- c. Insert each cord into the strain relief bodies that are attached to the conversion plate. The cords should enter from the side of the plate that has printing on it. The input cord goes into the strain relief on the left (under the printing). The output cord goes into the strain relief on the right.
- d. Position each cord so that the outer covering of the cords protrudes 2.54 cm (1.0 in) past the inside end of the strain relief bodies. Hand tighten both bushings to secure the cords.

#### Installing conduit connectors:

The plate has 1 23/64' holes that can accommodate conduit connectors in place of strain reliefs. Remove the strain reliefs and replace them with suitable conduit connectors. Attach the conduits to the connectors and insert the connecting wires into the conduits with the wires protruding through the conversion plate.

- 3. Attach the conversion plate to the rear panel using the four Torx screws supplied in the kit. Make certain that the conversion plate is positioned over the opening in the rear panel.
- 4. Connect the wires as follows:

#### Input wiring for worldwide (hardwired) version (200-240V/50 or 60 Hz):

Line (or Line 1): Connect wire to the L1 IN terminal

Neutral (or Line 2) Connect wire to the L2/N IN terminal

**Protective Earth Ground:** Connect the GREEN or GREEN/YELLOW wire to the protective earth terminal marked with the following symbol:

NOTE The UPS requires single-phase input power (in contrast to 3-phase). Single-phase power may be obtained in one of the following ways:

- a. **Line-to-neutral**: 200-240V across a phase wire (hot wire) and a neutral wire.
- b. Line-to-line: 200-240V across two different phase wires (hot wires).

In some countries, the UPS must be supplied line-to-line in order to obtain 200-240V. Other countries require line-to-neutral to obtain 200-240V. In no case should the input voltage exceed the rating of 200-240V.

#### Output wiring for worldwide (hardwired) version:

Line (or Line 1): Connect wire to the L1 terminal

Neutral (or Line 2): Connect wire to the L2/N terminal

**Earth Ground:** Connect the GREEN or GREEN/YELLOW wire to the terminal marked with the following symbol:



Tighten the terminal block screws to the following torque specifications:

For Line and Ground Terminals: 1.2 - 1.4 Nm (10.6 - 12.3 lb-in)

- 5. If all repairs to the UPS have been completed, or if the UPS is being converted on site, it can be powered on and returned to service. Follow these steps:
  - a. Make certain that the Bypass switch is in the NORMAL position.
  - b. Connect the AC line cord to the AC source.
  - c. Turn ON the MAIN INPUT circuit breaker.
  - d. Turn the UPS/BATTERY switch to ENABLE.

Wait for the green Enable LED to come on.

e. Check that the Caution LED is off.

If it is on, refer to "Caution LED" in Chapter 6.

f. Turn the Output On/Output Off switch to Output On.

# **NOTE** After installing the Hardwire Conversion Kit, power-on the load, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.

Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### **Removing and Replacing North American Conversion Kit**

### WARNING The following procedure should be performed by a qualified electrician only.

The North American Conversion Kit contains the following items:

- 1- Metal plate preassembled with a 3-pin L6-30 twist-lock receptacle and a line cord
- 4- Torx screws (#25 10-32 x 1/2')
- 2- Labels

**Tools required:** 

- #25 Torx driver
- Flat blade screwdriver

#### **Removing the existing conversion plate (if any):**

- 1. If the UPS is operating, shut it down using the following procedure:
  - a. Turn the Output On/Output Off switch to Output Off.
  - b. Turn the UPS/BATTERY switch to DISABLE.
  - c. Turn OFF the MAIN INPUT circuit breaker.

#### d. DISCONNECT THE LINE CORD FROM THE AC SOURCE.

- 2. Remove the four Torx screws holding the left Access Panel (see 4 in Figure 1-3) on the rear panel and remove the panel.
- 3. Disconnect the input and output wires by loosening the screws on the terminal block. See Figure D-2.
- 4. Remove the four Torx screws holding the conversion plate on the right and remove it.



Figure D-3 North American Conversion Kit Installing the North American conversion kit:

upsgs11

- 1. Attach the plate to the rear panel using the four Torx screws supplied with the kit. Make certain that the conversion plate is positioned over the right opening in the rear panel.
- 2. Connect the wires as follows:

**Input Wiring** (line cord):

Connect the BLACK (30A) or BROWN (40A) wire to the L1 terminal.

Connect the WHITE (30A) or BLUE (40A) wire to the L2/N terminal.

Connect the GREEN or GREEN/YELLOW wire to the input ground terminal marked with the following symbol:



#### **Output Wiring** (receptacle):

- Connect the BROWN (30A) or BLACK (40A) wire to the L1 terminal.
- Connect the BLUE (30A) or WHITE (40A) wire to the L2/N terminal.
- Connect the GREEN or GREEN/YELLOW wire to the output ground terminal marked with the following symbol:



Tighten the terminal block screws to the following torque specifications:

For Line and Ground Terminals: 1.2 - 1.4 Nm (10.6 - 12.3 lb-in)

- **3**. Replace the left Access Panel on the rear panel using the four Torx screws removed earlier.
- 4. If all repairs to the UPS have been completed, or if the UPS is being converted on site, it can be powered up and returned to service as follows:
  - a. Connect the AC line cord to the source.
  - b. Turn ON the main circuit breaker.
  - c. Turn the UPS/BATTERY switch to ENABLE.

Wait for the green Enable LED to come on.

d. Check that the Caution LED is off.

If it is on, refer to "Caution LED" in Chapter 6.

- e. Turn the Output On/Output Off switch to Output On.
- 5. If the UPS is being converted for use elsewhere, apply the North American Conversion Kit labels to the shipping container and pack the unit. Contact the local Hewlett-Packard Sales and Service Office for repacking information and materials.
- NOTEAfter installing the North American Conversion Kit, power-on the load, check<br/>that the computer is not performing critical processes, then repeat the load<br/>test. For procedures, refer to "Load Testing" in Chapter 5.Also, after installing replacement UPS equipment, test it by power failing the

UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### **Removing and Replacing Control Panel and Label Kit**

WARNING The following procedure should be performed by qualified service personnel only.

The Control Panel and Label Kit contains the following items:

- 1- Control panel assembly (metal housing with a label affixed to the outside and a circuit board inside). See Figure D-5.
- 4- Torx screws (#25 10-32 x 1/2')

Tools required:

- #25 Torx driver
- 1/4 inch hex nut driver (for control panels with underside cable connector only)
- Phillips head screwdriver

#### Figure D-4 Control Panel Assembly



To remove and replace the Control Panel and Label Kit:

1. Make sure the BYPASS and MAIN INPUT breakers are ON.

#### CAUTION If the yellow caution light is flashing, do not proceed. Switching the UPS into Bypass mode when the caution light is flashing may disrupt power to the load. Call HP Service. If the yellow caution light is not flashing, continue.

2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

A continuous alarm will sound indicating that the UPS is in Bypass mode.

- 3. Set the rear panel UPS/BATTERY switch to DISABLE. The alarm will turn off.
- 4. Use a screwdriver to loosen the screw at the center of each captive thumbscrew on the Battery Precharge Shorting Plate, then unscrew the thumbscrews and remove the plate. See Figure 3-8.
- 5. Disconnect the Battery Box cable from the Electronics Unit.
- 6. Remove the bezel assembly and the four Torx screws that secure the Electronics Unit to the rack.
- 7. Remove the old panel assembly by removing the four Torx screws that hold it to the front of the Electronics Unit.
- 8. Disconnect the cable from the circuit board by grasping the red connector and gently pulling it out from the 10-pin right-angle header on the side of the circuit board.
- 9. Install the replacement control panel.
  - a. Connect the cable to the circuit board. Refer to Figure D-6.

The number on the connector must match the number on the board.

Connect the cable to the circuit board by plugging the cable connector into the 10-pin right-angle header on the side of the circuit board.

Be careful not to bend or break any of the header pins.

- b. Attach the control panel to the front panel.
  - i. Align the holes in the housing flanges with the holes in the front panel of the UPS. Secure with the four screws provided in the kit.
  - ii. Remove the protective clear plastic film that covers the label.

Figure D-5 Control Panel Header



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- 10.Connect the battery cable to the connector on the Electronics Unit.
- 11. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6.

12.Orient the plate so that the notch is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

**CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

13. Tighten the thumbscrews on either side of the Battery Precharge Shorting Plate.

14.Switch the UPS/BATTERY switch to ENABLE. Wait for the green Enable LED to come on. The UPS will beep continuously. You an silence the beeping by pressing the Silence Alarm/Test switch on the control panel.

15. Switch the Output On/Output Off switch to Output On.

The Caution LED should flash for about five seconds then go out.

16. When the Caution LED stops flashing, go to step 17.

If it is blinking, refer to "Caution LED" in Chapter 6 for possible causes and actions.

- 17. Turn the Bypass switch to Normal.
- 18.To clear the alarm (if you have not already done so) and return to normal operation from Bypass mode, turn the control panel Output On/Output Off switch to Output Off for about one second, then return it to the Output On position.
- **CAUTION** Do *not* leave the Output On/Output Off switch in the Output off position for more than 5 seconds. Doing so will turn off AC output to the receptacles and power down the load.
- 19.Position the front bezel onto the brackets so that the pins behind the front of the bezel line up with the four brackets on the face of the Electronics Unit. (See Figure D-7.)
- 20.Push the bezel in until the bezel pins snap into the bracket clips.
- **NOTE** After replacing the Control Panel and Label Kit, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.

Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

#### Figure D-6 Attaching the Front Bezel to the Electronics Unit



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#### **Removing and Replacing the Electronics Unit Fan Assembly**

#### WARNING The following procedure should be performed by qualified service personnel only.

The fan assembly kit contains the following items:

- 1- Fan assembly. See <Undefined Cross-Reference>.
- 6- Torx screws (#25 10-32 x 1/2')

**Tools required:** 

- #25 Torx driver
- Flathead screwdriver •

#### **Figure D-7 Fan Assembly**



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NOTE

The fan assembly must be replaced as a module. Do not disassemble it.

To remove and replace the fan assembly:

1. Make sure the BYPASS and the MAIN INPUT breakers are ON.

CAUTIONIf the yellow caution light is flashing, do not proceed. Switching the UPS into<br/>Bypass mode when the caution light is flashing may disrupt power to the<br/>load. Call HP Service. If the yellow caution light is not flashing, continue.

2. While depressing the red button on the Service Bypass Unit, set the Service Bypass switch to Bypass.

A continuous alarm will sound indicating that the UPS is in Bypass mode.

- 3. Set the rear panel UPS/BATTERY switch to DISABLE. The alarm will turn off.
- 4. Use a screwdriver to loosen the screw at the center of each captive thumbscrew on the Battery Precharge Shorting Plate, then unscrew the thumbscrews and remove the plate. See Figure 3-8.
- 5. Disconnect the Battery Box cable from the Electronics Unit.
- 6. Remove the bezel assembly.
- 7. Set the MAIN INPUT breaker to OFF.
- 8. Set the UPS/BATTERY switch to ENABLE.

The green enable LED will turn on until the capacitors are discharged.

- 9. When the green LED turns off, set the switch to DISABLE.
- 10. Remove the fan.
  - a. Remove the four Torx screws that hold the fan assembly to the front of the UPS.
  - b. Carefully remove the fan assembly from the UPS front panel. While removing it, unplug the wire connector from the board.
  - c. Plug the wire connector on the replacement fan to the board.

CAUTION	Make sure the fan wire is positioned below the fan housing; otherwise, the
	wire can catch in the fan.

- d. Carefully position the replacement fan assembly into the UPS front panel and secure it with the four Torx screws you removed earlier.
- 11.Turn on the MAIN INPUT circuit breaker.
- 12.Connect the battery cable to the connector on the Electronics Unit.
- 13. Check the Battery Precharge Failure LED (see 15 in Figure 1-3).

If the LED is off, continue.

If the LED is on, **do not reinstall the Battery Precharge Shorting Plate.** Refer to "Case 14 (Abnormal) — Battery Precharge Failure" in Chapter 6. 14.Orient the plate so that the notch is positioned over the Battery Box cable connector, then reattach the plate making sure that the prongs on the plate are pressed firmly into the clips in the Electronics Unit. See Figure 3-9.

**CAUTION** Operating the UPS without the Battery Precharge Shorting Plate is not supported and may result in loss of UPS AC output.

- 15. Tighten the thumbscrews on either side of the Battery Precharge Shorting Plate.
- 16.Switch the UPS/BATTERY switch to ENABLE. Wait for the green Enable LED to come on. The UPS will beep continuously. You an silence the beeping by pressing the Silence Alarm/Test switch on the control panel.
- 17. Switch the Output On/Output Off switch to Output On.

The Caution LED should flash for about five seconds then go out.

18. When the Caution LED stops flashing, go to step 19.

If it is blinking, refer to "Caution LED" in Chapter 6 for possible causes and actions.

- 19. Turn the Bypass switch to Normal.
- 20.To clear the alarm (if you have not already done so) and return to normal operation from Bypass mode, turn the control panel Output On/Output Off switch to Output Off for about one second, then return it to the Output On position.
- CAUTION Do *not* leave the Output On/Output Off switch in the Output Off position for more than 5 seconds. Doing so will turn off AC output to the receptacles and power down the load.
- 21.Position the front bezel onto the brackets so that the pins behind the front of the bezel line up with the four brackets on the face of the Electronics Unit. (See Figure D-6.)
- 22.Push the bezel in until the bezel pins snap into the bracket clips.
- NOTE After replacing the fan assembly, check that the computer is not performing critical processes, then repeat the load test. For procedures, refer to "Load Testing" in Chapter 5.
   Also, after installing replacement UPS equipment, test it by power failing the UPS. For procedures, refer to "Power Failing the UPS" in Appendix C.

# **E** 40A Service Bypass Unit: Specifications and Procedures

This appendix gives an overview of the 40A Service Bypass Unit. In general, the specification and procedures described in the body of this manual are the same for both the 30A and 40A Service Bypass Units. However, there are minor differences between them and those differences are explained in this appendix.

#### **40A Service Bypass Unit**

The primary differences between the 30A and the 40A Service Bypass Units are shown in Figure E-1.

Figure E-1 40A Service Bypass Unit



upsgs10

1 AC Power Input	A line cord with an IEC 309 363P6 plug attached. Used to connect the North American version of the UPS to an AC source or wall outlet.
2 AC Output	One line cord with IEC 309 363C6 receptacle attached. An SPU is connected to this receptacle.

3 Access Plate	This plate provides access to the terminal block where cord connections are made.
4 Output Circuit Breakers	When an Output circuit breaker activates, it shuts off the AC voltage to the corresponding output receptacle.
	There are four output circuit breakers that protect the UPS from overcurrent conditions.
	The first three output circuit breakers (marked <i>OUTLET 1</i> , <i>OUTLET 2</i> , and <i>OUTLET 3</i> ) provide overcurrent protection for the IEC320 C19 outlets (see 2 in Figure 1-3). The circuit breaker marked <i>OUTLET 4</i> provides overcurrent protection for the IEC 309 363C6 output (cord-mounted) receptacle (see 2 Figure E-1 in).
5 IEC Output Receptacles	Three IEC320 C19 output receptacles are available on both North American and worldwide versions of the PowerTrust UPS. Only one Power Distribution Unit (PDU) can be plugged in to one of these three receptacles.

#### **Unpacking the Service Bypass Unit**

Use the following procedure to unpack the Service Bypass Unit:

- 1. Remove the carton containing the Service Bypass Unit (top box).
- 2. Open the carton.
- 3. Remove materials such as manuals from the top of the box and set them aside.
- 4. Lift both cords, then remove the packaging that supports the cords by letting the cords pass through the opening in the cardboard. See Figure E-2.

#### Figure E-2 Unpacking the 40A PowerTrust Service Bypass Unit



upsg005a

5. Remove the L-shaped corrugated cardboard pads from the top of the Service Bypass Unit.

- 6. Check the packing material for signs of damage, which could indicate rough handling during transit. Refer to "Claims Procedures" in Chapter 2 if you discover any damage.
- 7. Carefully remove the Service Bypass Unit.

# **Connecting the SPU to the UPS (40A Service Bypass Unit Only)**

This section describes how to connect the SPU and test station to a UPS with a 40A Service Bypass Unit.

Three EC320 C19 output receptacles are located on the lower left of the Service Bypass Unit and one cord-mounted IEC 309 363C6 receptacle is attached to the right access plate on the Service Bypass Unit (see 2 in Figure E-1). The SPU is connected to the cord-mounted receptacle.

To connect the SPU:

- 1. Position the expansion cabinet containing the PowerTrust UPS close to the AC input source.
- 2. Make sure that the power switches of the SPU and test station are OFF.
- 3. Connect the UPS input power cord (IEC 309 363P6 plug, 1 in Figure E-1) to the AC power source.
- 4. Plug the SPU power cord into the IEC 309 363C6 (cord-mounted) receptacle.
- 5. Connect the Mux port module power cord to the PDU in the expansion cabinet containing the UPS. Refer to Figure E-3.
- 6. Connect the PDU cable to an IEC 320 C19 output receptacle in the UPS. See 5 in Figure E-1.
- 7. If other equipment is being protected by a second UPS, follow the instructions in the manual that came with that UPS to connect the equipment.
- 8. Perform the steps in "Initial Power-On or Power-On After Shutdown" in Chapter 4.



**Figure E-3 Power and Communication Line Connections** 



upsgs12

#### **Connecting the Communications Cable to the V-Class System**

- 1. Use the instructions that came with the component interface multiplexer (PCI Mux) card to install the card into the SPU.
- 2. Attach the RS-232 cable to the UPS Port connector on the rear panel of the Service Bypass Unit. Secure the cable to the connector by tightening the small mounting screws on each side of the connector with a small blade screw driver.
- 3. Attach the other end of the RS-232 cable to a RS-232 connector on the Mux port module. Refer to Figure E-3.

#### **Connecting the Test Station**

It is recommended that the test station for the V-Class SPU be connected to another UPS. It is further recommended that the communications cable for the test station UPS not be connected to the Mux port module but rather directly to the test station. Figure E-3 shows how to connect the test station power and communications cables.

#### **Examples of PowerTrust Connections on V-Class Systems**

For examples of configurations for the V-Class Systems, see the HP3000 or HP9000 Configuration Guide.

#### **Replacement Parts**

For a list of replacement parts for the 5.5 kVA 40A UPS, refer to Table D-1.
# Index

#### A

A1883A expansion cabinet, 1-2 A1884A expansion cabinet, 1-2 A1896A expansion cabinet, 1-2 A1897A expansion cabinet, 1-2 AC output, E-2 AC Output light, 6-6 AC power input, 1-12, 1-16 access panels, removing, 3-15 access plates, 1-12, 1-16, E-2 acid leaks, 1-37 alarm, 1-7, 6-8 audible, 6-7 continuous tone, 6-7 indications, 6-6 one beep, 6-7 three beeps, 6-7 alarm indicators, 6-6, 6-8 attention light, 6-6 audible alarm, 6-7, 6-8 automatic bypass defined, 1-6 automatic bypass condition, 1-6 automatic bypass mode, 1-8, 1-32 defined, 1-6 automatic bypass sleep mode, 1 - 35

## B

batteries charging, 4-8 exchanging, 7-4 expected lifetime, 7-4 recharging, 1-7 battery acid, 1-37 connections, 1-13, 1-17 disposal, 1-37 Battery Box unpacking, 2-6 battery box, 1-2, 1-21 rackmounting procedures, 3-3 removing and replacing, D-9 battery pack date code, 7-4 removing and replacing, 2-7, D-6 returning, 2-11 battery power light, 6-6 battery power loss, 4-4 battery precharge failure, 6-22 battery precharge shorting plate, 1-15, 1-20, 3-11

baud rate HP-UX, C-4 MPE/iX, C-5 bezel, attaching, 3-9 block diagram, 1-33 buttons Silence Alarm/Test, 6-8 Test, 6-8 bypass mode, 1-14, 1-19, 4-5 bypass modes, 1-8 bypass sleep mode, 1-35 bypass switch, 1-14, 1-18 normal mode, 1-14, 1-19

## С

cable connector, battery, 3-11 cable for UPS Port, 1-13, 1-17, C-4, C-6 cabling connections, 3-17 Caution LED, 6-6 caution light, 1-15, 1-20 charging batteries, 4-8 chemicals, 1-37 circuit breakers, 1-13, 1-18 claims procedures shipping, 2-11 cleaning the PowerTrust, 7-1 communications cable connecting, E-8 communications link connecting, 3-17 communications port, 1-12, 1-17 configuration examples, 3-19, E-8 frequency, 1-31 voltage, 1-31 configuring the PowerTrust for HP-UX, C-1 for MPE/iX, C-5 for MPE/iX with NMMGR, C-5 connecting communications cable, E-8 communications link, 3-17 equipment to PowerTrust, 3-17, E-6 test station, E-8 UPS, 3-17 connecting battery cable, 3-11 connections, input and output, 3 - 14console messages, 6-2 HP-UX, A-1, A-41, C-3 MPE/iX, B-1, B-20 control panel indicators, 6-6 switches and indicators, 1-9, 1 - 20

control panel and label kit, D-19 control panel assembly, D-20

#### D

disposing of battery, 1-37

## Е

**Electronics Unit** fan, D-24 unpacking, 2-9 electronics unit, 1-2 rackmounting procedures, 3-6 emergency information, 1-36 Emergency Power Off (EPO), 1-12 Connections, 4-7 emergency power off (EPO), 1-17 Enable light, 1-15, 1-20 equipment connecting test station, E-8 connecting to PowerTrust, 3-17, E-6 error messages, 6-2 HP-UX, A-1, A-41 MPE/iX, B-1, B-20 European power cord, 3-14 example PowerTrust configurations, 3-19, E-8 exchanging batteries, 7-4 expansion cabinets supported, 1-2 extended power failure, 1-7

# F

fan Electronics Unit, D-24 exchanging, 7-5 field replaceable unit (FRU), D-2 fire extinguishing, 1-37 flashing light, 6-6 frequency, 1-31 frequency configuration, 1-31 front bezel installing, 3-9 front control panel, 1-9 front control panel lights, 6-6 front panel defined, 1-5 FRU, D-1

# G

glossary, 1-5 ground connection PDU, 3-11

## Н

hardwired connections, 3-14

hardwired output, 1-16 hazardous components, 1-37 HPUPSDEV, C-5 HP-UX configuration, C-1 error messages, A-1, A-41 HP-UX error messages If power is not returned within previously configured time period, your system will automatically go to graceful shutdown., Å-13 ups\_mond Timer Controlled On/Off information invalid, A-5 ups\_mond: aborted, configfile <filename> fseek error : <error number>, A-10 ups\_mond: aborted, configfile <filename> open received error: <error number>, A-10 ups\_mond: aborted, malloc error: <error number>, A-11 ups\_mond: AC Power to all recognized, system critical UPSs OK! System will not shutdown., A-4 ups\_mond: cannot exec shutdown due to <error number> returned by exec()., A-19 ups\_mond: cannot exec ups\_mond -f <filename> -e ups\_monchild due to <error number>, A-8 ups\_mond: cannot reboot due to <error number> returned by exec()., A-19 ups\_mond: exiting; unable to lock process in memory: <error number>, A-9 ups\_mond: mknod error: <error number> for Timed On/Off fifo file /timed\_off; continuing without, A-5 ups\_mond: open error: <error number> for Timed On/Off fifo file /timed\_off; continuing without, A-6 ups\_mond: permission denied; must be super user, A-9 ups\_mond: Power Off request active; performing graceful shutdown., A-7 ups\_mond: read from UPS <tty special file name> after sending command

<command string> to it failed: <error number>, A-39

- ups\_mond: terminated by signal <decimal value>, A-11
- ups\_mond: Timer Controlled On value exceeds UPS <tty special file name> maximum. The maximum value of <value> will be used for this UPS., A-7
- ups\_mond: UPS <tty special file name> AC POWER FAILURE - running on UPS battery, A-12
- ups\_mond: UPS <tty special file name> ambient temperature too high; UPS turned itself off - reduce heat in area, A-17
- ups\_mond: UPS <tty special file name> Battery Charger Fault - requires repair, A-34
- ups\_mond: UPS <tty special file name> Battery Failure requires repair, A-36
- ups\_mond: UPS <tty special file name> battery low, A-14
- ups\_mond: UPS <tty special file name> could not enable; ignoring that UPS, A-24
- ups\_mond: UPS <tty special file name> could not execute command <command string>; returned <string> possible bad signal cable, A-40
- ups\_mond: UPS <tty special file name> current overload, A-16
- ups\_mond: UPS <tty special file name> Current Overload either UPS bad or too many devices connected, A-35
- ups\_mond: UPS <tty special file name> failed - requires repair, A-16
- ups\_mond: UPS <tty special file name> High Ambient Temperature - reduce area temperature, A-35
- ups\_mond: UPS <tty special file name> High Battery Voltage - requires repair, A-36

- ups\_mond: UPS <tty special file name> in bypass-mode; no AC Power-loss protection., A-41
- ups\_mond: UPS <tty special file name> interrupted, but read of ups status failed possible UPS hardware problem, A-21
- ups\_mond: UPS <tty special file name> Inverter Failure requires repair, A-34
- ups\_mond: UPS <tty special file name> ioctl(TCGETA) failed: <error number>; ignoring that UPS, A-22
- ups\_mond: UPS <tty special file name> ioctl(TCSETAF) failed: <error number>; ignoring that UPS, A-23
- ups\_mond: UPS <tty special file name> line too noisy ; ignoring that UPS, A-23
- ups\_mond: UPS <tty special file name> Low Battery Voltage - requires repair, A-37
- ups\_mond: UPS <tty special file name> no output - either switch setting wrong on UPS or bad UPS, A-15
- ups\_mond: UPS <tty special file name> OK, AC Power back on., A-3
- ups\_mond: UPS <tty special file name> output voltage too high; UPS turned itself off requires repair, A-18
- ups\_mond: UPS <tty special file name> output voltage too low; UPS turned itself off requires repair, A-18
- ups\_mond: UP\$ <tty special file name> read after enable failed; <error number>; ignoring that UPS, A-24
- ups\_mond: UPS <tty special file name> read of status failed: <error number>, A-27
- ups\_mond: UPS <tty special file name> read of status received <number> bytes of unexpected data: (octal:<octal number> <string>, A-26

ups\_mond: UPS <tty special file name> read of status received ILLEGAL CMD or NOISY LINE, A-25 ups\_mond: UPS <tty special file name> turned-off Battery Charger Fault Alarm, A-29 ups\_mond: UPS <tty special file name> turned-off Battery Failure Alarm, A-30 ups\_mond: UPS <tty special file name> turned-off Cur rent **Overload Alarm. A-29** ups mond: UPS <tty special file name> turned-off Failure Alarm, A-28 ups\_mond: UPS <tty special file name> turned-off High **Ambient Temperature** Alarm, A-30 ups\_mond: UPS <tty special file name> turned-off High Battery Voltage Alarm, A-31 ups\_mond: UPS <tty special file name> turned-off High Output Voltage Alarm, A-32 ups\_mond: UPS <tty special file name> turned-off Inverter Failure Alarm, A-28 ups\_mond: UPS <tty special file name> turned-off Low Battery Voltage Alarm, A-32 ups\_mond: UPS <tty special file name> turned-off Low Output Voltage Alarm, A-33 ups\_mond: UPS <tty special file name> UNKNOWN status /alarm <hex number> - may require repair, A-38 ups\_mond: UPS <tty special file name> write failed: <error number>, A-27 ups\_mond: UPS <tty special file name> write failed: <error number>; ignoring that **UPS**, A-25 ups\_mond: UPS Monitor daemon starting; using configuration, A-3 ups\_mond: upstty <tty special file name> failed open : <error number>; ignoring that tty and continuing, A-22

ups\_mond: warning - no upstty: UPSs found in configfile <filename>; daemon running for no purpose, A-20

ups\_mond: warning - shutdown delay or shutdown timer parameter in configfile <configfilename> missing or not greater than zero; using default, A-40

ups\_mond: write to UPS <tty special file name> Failed: <error number> of command <command string>, A-38

usage ups\_mond [-f configfile] [-s], A-8

# Ι

IEC output receptacles, 1-12, 1-16, E-2 ignored, A-5 indicators, 6-6 input and output connections, 3-14 input wiring North American version, 3-14 worldwide version, 3-16, D-15 inventorying the PowerTrust shipment, 2-2

# L

lights AC Output, 6-6 Attention, 6-6 Battery Power, 6-6 Caution, 1-15, 1-20, 6-6 enable, 1-15, 1-20 indicators, 6-6 precharge failure LED, 1-15, 1 - 20rear panel, 6-6 load sizing, 3-2 testing, 5-2 LOGTOOL and MPE/iX configuration, C-5 low battery voltage warning, 6-16

# М

maintaining the PowerTrust, 7-1 man page configuring UPS, C-3 timed power-off/power-on, 1-8 messages console, C-3 HP-UX error, A-1, A-41 MPE/iX error, B-1, B-20 syslog, C-3 MPE/iX configuration, C-5 error messages, B-1, B-20 MPE/iX error messages UPS LDEV <nnn> I/O **Operation error: The actual** Read data transfer length in a UPS Read I/O operation was too short, less than the minimum required Read transfer length. (UPSERR 0563), B-18 UPS LDEV <nnn> I/O **Operation error: UPS device** failed to complete a Read I/O request in allotted time. The Read request timed out. (UPSERR 0536), B-18 UPS LDEV <nnn> initialization error After trying several times, the UPS Monitor has been unable to complete the initialization sequence of I/O operations for this UPS device. (UPSERR 0573), B-19 UPS LDEV <nnn> reports "Low Battery Charge" condition. (UPSWRN 0037), B-4 UPS LDEV <nnn> reports AC input power "Bypass Mode". (UPSWRN 0035), B-3 UPS LDEV <nnn> reports AC input power restored. (UPSWRN 0036), B-4 UPS LDEV <nnn> reports AC output power turned off. (UPSERR 0041), B-5 UPS LDEV <nnn> reports loss of AC input power. (UPSERR 0033), B-3 UPS LDEV <nnn> reports UPS

"Battery Test Fail" condition cleared. (UPSWRN 0136), B-16 UPS LDEV <nnn> reports UPS "Battery Test Fail" condition. (UPSERR 0200), B-9

- UPS LDEV <nnn> reports UPS "Charger Fault" condition cleared. (UPSWRN 0131), B-13
- UPS LDEV <nnn> reports UPS "Charger Fault" condition. (UPSERR 0195), B-6
- UPS LDEV <nnn> reports UPS "High Ambient Temperature Shutdown" condition cleared.
- (UPSWRN 0133), B-14 UPS LDEV <nnn> reports UPS "High Ambient Temperature Shutdown" condition. (UPSERR 0197), B-7, B-8
- UPS LDEV <nnn> reports UPS "High Ambient Temperature" condition cleared. (UPSWRN 0135), B-15
- UPS LDEV <nnn> reports UPS "High Ambient Temperature" condition.
- (UPSERR 0199), B-9 UPS LDEV <nnn> reports UPS "High Battery Voltage" condition cleared. (UPSWRN 0137), B-16
- UPS LDEV <nnn> reports UPS "High Battery Voltage" condition. (UPSERR 0201), B-9
- UPS LDEV <nnn> reports UPS "High Output Voltage Shutdown" condition cleared. (UPSWRN 0139), B-17
- UPS LDEV <nnn> reports UPS "High Output Voltage Shutdown" condition. (UPSERR 0203), B-11
- UPS LDEV <nnn> reports UPS "Inverter Fail" condition cleared. (UPSWRN 0129), B-13
- UPS LDEV <nnn> reports UPS "Inverter Fail" condition. (UPSERR 0193), B-6
- UPS LDEV <nnn> reports UPS "Low Battery Voltage" condition cleared. (UPSWRN 0138), B-16

- UPS LDEV <nnn> reports UPS "Low Battery Voltage" condition. (UPSERR 0202), B-10
- UPS LDEV <nnn> reports UPS "Low Output Voltage Shutdown" condition cleared. (UPSWRN 0140), B-17
- UPS LDEV <nnn> reports UPS "Low Output Voltage Shutdown" condition. (UPSERR 0204), B-11
- UPS LDEV <nnn> reports UPS "Overload Shutdown" condition cleared. (UPSWRN 0132), B-14
- UPS LDEV <nnn> reports UPS "Overload Shutdown" condition. (UPSERR 0196), B-7
- UPS LDEV <nnn> reports UPS "Overload" condition cleared. (UPSWRN 0134), B-14
- UPS LDEV <nnn> reports UPS "System Fail" condition cleared. (UPSWRN 0128), B-13
- UPS LDEV <nnn> reports UPS "System Fail" condition. (UPSERR 0192), B-6
- UPS Monitor UPS error: Lost communications with UPS LDEV <nnn>. That UPS is no longer being monitored. (UPSERR 0512), B-11
- UPS Monitor warning: Too many UPS devices have been configured in the system I/O configuration files. The UPS Monitor cannot monitor all of them; it will monitor as many as it can. (UPSWRN 0577), B-19
- UPS Monitor warning: UPS Monitor finds no UPS devices configured in the system I/O configuration files. UPS Monitor is terminating itself. (UPSWRN 0591), B-20

## Ν

NEMA output, 1-12 NMSAMP.12.PUB.SYS sample configuration file, C-5 normal mode, 1-14, 1-19 North American Conversion Kit, D-17 North American version input wiring, 3-14 output wiring, 3-14

#### 0

on-battery mode, 1-32 on-battery sleep mode, 1-35 on-line mode, 1-8, 1-32 operating system requirements, C-2 operation power failure, 1-7 output receptacle cover, 1-15, 1-20 output wiring North American version, 3-14 worldwide version, 3-16, D-16 overtemperature conditions, 6-5 sensing, 1-2

## Р

pallet, 2-4 part numbers, D-2 parts list, D-2 PDU, 1-2, 3-10 ground connection, 3-11 rackmounting procedures, 3-10 periodic testing, 7-3 power failure operation, 1-7 power loss battery, 4-4 power requirements protected component, 3-2 power\_off/on utility, 1-8 power-off, 4-4 long duration, 4-4 procedure, 4-4 short duration, 4-4 power-on, 4-2 after short duration power-off, 4-2 initial, 4-2 procedure, 4-2 PowerTrust UPS defined, 1-2 precharge failure LED, 1-15, 1-20, 6-7 precharge shorting plate, 1-15, 1 - 20preparedness, safety, 1-36 procedures installing Hardwire Conversion Kit, D-14

# Index

installing North American conversion kit, D-18 installing replacement control panel, D-19 power-off, 4-4 power-on, 4-2 remove and replace fan assembly, D-24 removing existing conversion plate, D-13, D-17 removing original battery pack, D-8 removing original control panel, D-20 replacing Electronics Unit fan, D-24 verification, 5-1 protected component power requirements, 3-2

#### R

rackmounting procedures Battery Box, 3-3 Electronics Unit, 3-6 front bezel, 3-9 general, 3-3 PDU, 3-10 Service Bypass Unit, 3-8 rear panel Caution LED, 6-6 LED, 6-6 rear panel connectors, 1-10, 1-16, 1-20 30A, 1-10 40A, E-2 rear panel switches and indicators, 1-10, 1-20 receiving the PowerTrust, 2-2 recharging batteries, 1-7 red LED, 6-7 remove and replace procedures Battery Box, D-9 battery pack, D-6 control panel and label kit, D-19 **Electronics Unit**, D-4 Electronics Unit fan assembly, D-24 hardwire conversion kit, D-13 North American conversion kit, D-17 Service Bypass Unit, D-11 repacking the PowerTrust, 2-11 replaceable parts, D-2 returning battery packs, 2-11 RS-232 cable, 3-17, E-8 RS-232 cable for UPS Port, 1-13, 1-17, C-4, C-6

RS-232 port, 1-13, 1-17

#### S

safety information, 1-36 SBU, 1-32 self-paced training, 1-39 serial cables, D-2 serial number, battery pack, 7-4 Service Bypass mode, 1-8, 1-14 service bypass mode, 1-19, 1-33, 4-5 service bypass switch, 1-14, 1-19 Service Bypass Unit unpacking, E-4 service bypass unit, 1-21 40A, E-1 installing, 3-8 removing and replacing, D-11 unpacking, 2-4 shipping claims procedures, 2-11 shipping pallet, 2-4 breaking, 2-4 shipping requirements, 2-12 shutdown\_delay\_mins parameter, C-3 shutdown\_timeout\_mins parameter, C-3 shutdowns, 6-18, 6-20 Silence Alarm/Test button, 6-8 sizing the load, 3-2 sleep mode, 1-35 specifications, 1-24 storage requirements, 2-12 support information, 1-39 switches and indicators, 1-9, 1-20 syslog messages, C-3

## Т

temperature, overtemperature, 6-5 terminal block, 3-15 terms, 1-5 Test button, 6-8 test station, E-8 testing, periodic, 7-3 timed power-off/power-on facility, 1-8 torque specifications, 3-15 training, 1-39 troubleshooting, 6-1 battery precharge failure, 6-22 case summary, 6-8

#### U

unconfigured PowerTrust behavior, C-2 unpacking Battery Box, 2-6 Electronics Unit, 2-9 Service Bypass Unit, 2-4, E-4 unpacking the UPS, 2-3 UPS port, 1-13, 1-17 UPS turned itself off - either UPS bad or too many devices connected, A-16 UPS/Battery switch, 1-14, 1-19 ups\_conf configuration file, C-3 ups\_mond monitor daemon, C-3

## V

verification procedures, 5-1 voltage, 1-28, 1-31

## W

warning low battery voltage, 6-16 waste disposal, 1-37 wire gauge requirements, 3-14, D-14 worldwide version input wiring, 3-16, D-15 output wiring, 3-16, D-16 worldwide version connectors, 1-16