

# Preliminary Information

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## Features of MasterSwitch Plus(AP9225 and AP9225EXP)

American Power Conversion's MasterSwitch Plus is a power control unit that provides many features for managing power to your servers and peripherals. Some of these features are:

- Sequential power-up to limit inrush current during system startup.
- Automatic shutdown of your loads when the UPS enters an on-battery state, and restarting when utility power returns.
- On-demand outlet control, including:
  - On
  - Delayed On
  - Off
  - Reboot
  - Graceful Shutdown
  - Graceful Reboot
- Seven basic signaling ports and one port that can be used for basic signaling or for advanced PowerChute Plus signaling.
- Eight individually manageable outlets. Daisy chaining up to three additional MasterSwitch Plus Expansion Units provides outlet management for up to 32 connected devices.
- Integration with Measure-UPS II to initiate graceful shutdowns of connected servers or to toggle power to connected devices when Measure-UPS II generates an alarm.
- Brackets for mounting in an APC NetShelter<sup>®</sup> or other 19-inch rack, and rubber feet for placing on a desk.

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## Preliminary Information *continued*

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### Features of MasterSwitch Plus (AP9225 only)

- Built-in Web interface for remote configuration and control.
- Password-protected Outlet User accounts that restrict users to a specific group of outlets.
- Password-protected Administrator and Device Manager accounts for configuration and control.
- A fully featured and easy-to-use console interface.
- MD5 authentication for enhanced Web security.
- Environmental SNMP traps from APC's PowerChute Plus.
- Configuration Wizard (Windows 95/NT 4.0) with mass configuration support (included on CD-ROM).

*Note: These features are also available on expansion units (AP9225EXP) that are daisy-chained to an AP9225.*

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### Inventory

The inventory of MasterSwitch Plus includes:

- MasterSwitch Plus Expansion Unit (APC part number AP9225EXP)
- Web/SNMP Management Card (APC part number AP9696)<sup>†</sup>
- CD-ROM containing product documentation and the Management Card Wizard.
- Daisy-chain cable (APC part number 940-1000)
- Smart-signaling cable (APC part number 940-0024)
- Rack-mount brackets and screws (APC part number 870-8062)
- Installation and Quick Start Manual (APC part number 990-6011)
- Warranty registration card

<sup>†</sup> The AP9225EXP model does not include the Web/SNMP Management Card.

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## Preliminary Information *continued*

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**Product names** In this manual, the term MasterSwitch Plus refers to both the AP9225 and AP9225EXP models unless otherwise noted. Please see the *MasterSwitch Plus User Guide*, included on the CD-ROM, for detailed information on configuration and operation of MasterSwitch Plus.

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**Please recycle** The shipping materials for MasterSwitch Plus are recyclable. Please save them for later reuse or dispose of them appropriately.

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# Installing MasterSwitch Plus

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## Overview of setup procedure

To set up MasterSwitch Plus to work correctly in your environment, perform the following steps in the order given.

- 1 Place MasterSwitch Plus on a flat surface or mount it in a rack. See Mounting in a NetShelter enclosure.
  - 2 Connect MasterSwitch Plus. See Connecting MasterSwitch Plus.
  - 3 Configure MasterSwitch Plus according to the connection procedure you have used.
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## Mounting in a NetShelter enclosure

MasterSwitch Plus comes with brackets for mounting in an APC NetShelter enclosure or other standard (EIA3100) 19-inch rack. To mount in a NetShelter enclosure, perform the following steps, as numbered in Figure 1 and Figure 2.

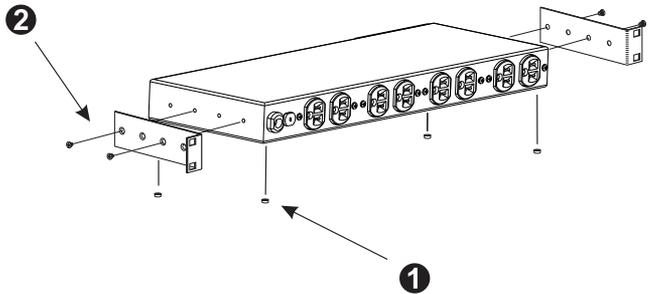


Figure 1: Remove feet and attach mounting brackets.

- 1 Remove the rubber feet from the bottom of the unit.
  - 2 Attach the mounting brackets to the unit as shown, using two self-tapping Phillips screws provided for each bracket.
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# Installing MasterSwitch Plus *continued*

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## Mounting in a NetShelter enclosure, *continued*

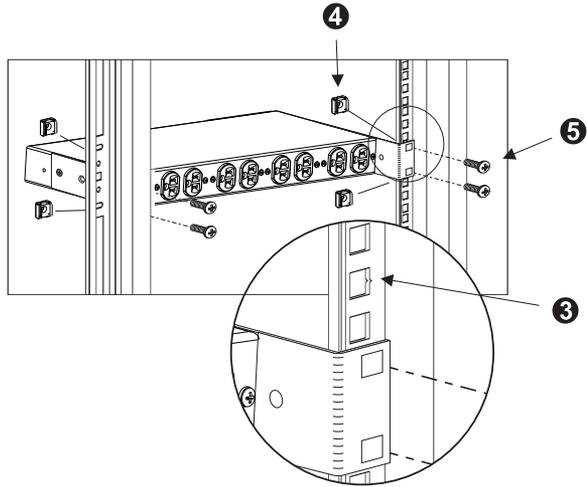


Figure 2: Mount assembly to vertical rails.

- 3 Choose a location for the brackets. A notched hole on the vertical rail denotes the middle of a U.
  - 4 Install a caged nut (provided with the enclosure) as shown, above and below a notched mounting hole on both vertical mounting rails.
  - 5 Align the mounting holes of the brackets with the installed caged nuts. Insert screws and tighten.
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# Connecting MasterSwitch Plus

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## Configurations that do not use AP9225

If you are connecting one or more MasterSwitch Plus Expansion Units (AP9225EXP) and the configuration does not include MasterSwitch Plus (AP9225), see Setup of the MasterSwitch Plus Expansion Unit. The connection and quick start instructions in this section are for configurations that use at least one MasterSwitch Plus (AP9225) unit.

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## Overview of setup for configurations that use AP9225

MasterSwitch Plus can be connected in a number of different configurations depending on your needs.

IF you want to use...	...THEN see...
only the on-demand features	Connecting for On-Demand-Only Use
the unattended shutdown features	Connecting for Unattended Shutdown
a configuration that uses a server with redundant power cords	Connecting with Redundantly Powered Servers

*Table 1: Choosing a Configuration*

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# Connecting MasterSwitch Plus *continued*

## Choosing additional cables

Table 2 lists some of the simple-signaling cables for use with the systems supported by MasterSwitch Plus. For a complete listing of available cables, visit the APC Web site at <http://www.apcc.com> and enter keyword **cables** in the search box. See the document entitled *UPS Accessories—Cable Interface Kits—Product Information*.

IF you want to connect a Basic port to a(n)...	...THEN order...	APC part number
Windows or NetWare server	UPS LAN Manager Cable	940-0020
UNIX server	UNIX Basic Signaling Cable	AP9823
IBM AS/400	AS/400 Cable Model 9402/9404	940-0006
15-foot extension cable	UPS Interface Extension	AP9815 <sup>†</sup>
50-ft extension cable	Isolated Extension Cable	AP9825 <sup>†</sup>

Table 2: Additional Cables Offered by APC

<sup>†</sup> Requires the use of a cable for the operating system being used.

## Safety warning



If your configuration will involve communication with a UPS, use MasterSwitch Plus only with an APC UPS.

Use only APC communications cables suitable for your operating system.

Connections using a an incorrect APC cable or a cable made by any other manufacturer may cause damage or improper operation of MasterSwitch Plus, the UPS, or the connected equipment.

# Connecting for On-Demand-Only Use

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## Overview

Use a connection procedure in this section if you want only to control outlets by using the On, Off, Shutdown and Reboot commands. To connect a single unit see Connecting a single unit (on-demand). To connect multiple units see Procedure for connecting multiple units (on-demand).

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## Connecting a single unit (on-demand)

To connect a single MasterSwitch Plus unit for on-demand-only use, perform the following steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of MasterSwitch Plus.
  - 2 *If you plan to use the graceful shutdown and graceful reboot features of MasterSwitch Plus:*
    - a Check to make sure that the connected server is running PowerChute Plus or other shutdown software.
    - b Connect the simple-signaling cable (not supplied) of each server to the corresponding Basic port on the front panel of the MasterSwitch Plus unit. For example, a server plugged into outlet #3 must be connected to Basic port #3. Table 2 lists the signaling cables supported by MasterSwitch Plus.
  - 3 Connect your 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus.
  - 4 Connect the power cord of the MasterSwitch Plus unit into a single-phase, 120-VAC, 15-amp outlet.

*Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.*
  - 5 Continue with Quick Configuration.
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# Connecting for On-Demand-Only Use *continued*

**Typical cascaded configuration (on demand)**

Figure 3 shows an example of a cascading setup for an on-demand-only configuration. See Procedure for connecting multiple units (on-demand) for more information.

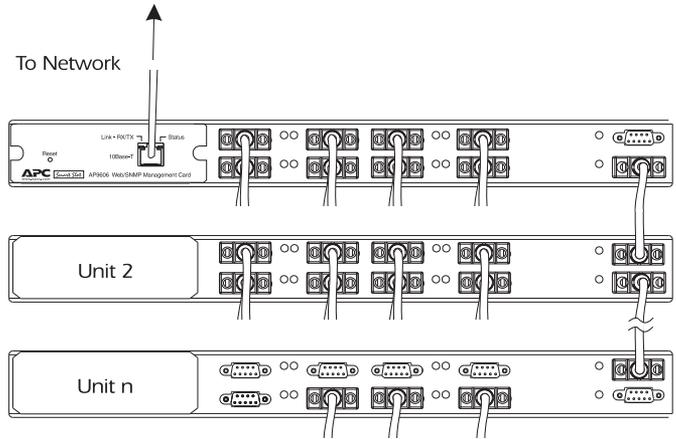


Figure 3: Example of a Cascading Setup for On-Demand-Only Operation

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## Connecting for On-Demand-Only Use *continued*

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### Procedure for connecting multiple units (on-demand)

To connect multiple MasterSwitch Plus units in an on-demand-only configuration, follow these steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of MasterSwitch Plus.
- 2 *If you plan to use the Graceful Shutdown and Graceful Reboot features of MasterSwitch Plus:*
  - a Check to make sure that each connected server is running PowerChute Plus or other shutdown software.
  - b Connect the simple-signaling cable (not supplied) of each server to the corresponding Basic port on the front panel of MasterSwitch Plus. For example, a server plugged into outlet #3 must be connected to Basic port #3. Table 2: Additional Cables Offered by APC lists the signaling cables supported by MasterSwitch Plus.
- 3 Using the supplied daisy-chain cables (APC part number 940-1000), connect the To UPS port of each MasterSwitch Plus unit to the Advanced port of the succeeding unit, as shown in Example of a Cascading Setup for On-Demand-Only Operation.
- 4 Connect your 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus.
- 5 Connect the power cord of the MasterSwitch Plus unit into a single-phase, 120-VAC, 15-amp outlet.

*Note: The AP9225 address must be set to Unit 1.  
Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.*

- 6 Continue with Quick Configuration.
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# Connecting for Unattended Shutdown

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## Overview

Use this connection procedure if you want to be able to shut down servers or other peripherals automatically because of UPS events or Measure-UPS II alarms. You will also be able to exercise on-demand control. To connect a single unit see Connecting a single unit (unattended shutdown). To connect multiple units see Connecting multiple units (unattended shutdown).

**Note:** *To use the unattended shutdown feature of MasterSwitch Plus, you must have both of the following:*

- PowerChute Plus shutdown software, installed and running on your servers.
  - An APC Smart-UPS<sup>®</sup>, Matrix-UPS<sup>™</sup>, or Symmetra<sup>™</sup> Power Array<sup>™</sup>.
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## Connecting a single unit (unattended shutdown)

To connect a single MasterSwitch Plus unit for unattended shutdown, perform the following steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of MasterSwitch Plus.
  - 2 Connect the signaling cable of each server to the corresponding port on the front panel of MasterSwitch Plus.
    - a *Simple signaling:* Use the simple-signaling cable associated with each server. (See Table 2: Additional Cables Offered by APC.) Connect these cables to the corresponding Basic ports of MasterSwitch Plus. For example, a server plugged into outlet #3 must be connected to Basic port #3.
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## Connecting for Unattended Shutdown *continued*

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### Connecting a single unit (unattended shutdown), continued

- b *Smart signaling (for advanced reporting features of PowerChute Plus):* Use the supplied smart-signaling cable (APC part number 940-0024). Connect one end of the cable to the Advanced port of MasterSwitch Plus and connect the other end to the server whose power cord is attached to outlet #1.

*Note: If you are using smart signaling, Basic port #1 must remain unused.*

- 3 Connect your 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus.
- 4 *If you are using a UPS (APC only):* Connect one end of the supplied daisy-chain cable (APC part number 940-1000) to the To UPS port on MasterSwitch Plus and connect the other end to the serial port on the UPS.
- 5 Connect the power cord of the MasterSwitch Plus unit according to your configuration:
  - a *If you are using a UPS:* Plug the power cord into an outlet on the UPS.
  - b *If you are not using a UPS:* Plug the power cord into a single-phase, 120-VAC, 15-amp outlet.

*Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.*

- 6 If you are using a Measure-UPS II environmental monitor, see Installing Measure-UPS II.
- 7 Continue with Quick Configuration.

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# Connecting for Unattended Shutdown *continued*

## Connecting multiple units (unattended shutdown)

By cascading as many as four MasterSwitch Plus units, you can manage power for up to 32 connected devices. To set up MasterSwitch Plus in a cascading configuration, refer to Figure 4 and see Procedure for connecting multiple units (unattended shutdown).

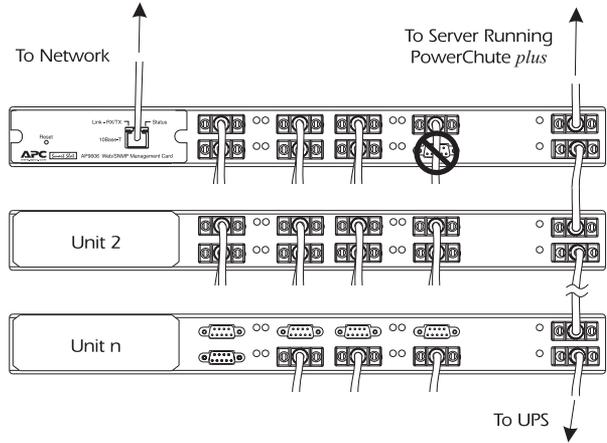


Figure 4: Example of a Cascading Setup for Unattended Shutdown

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## Connecting for Unattended Shutdown *continued*

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### Procedure for connecting multiple units (unattended shutdown)

To configure multiple MasterSwitch Plus units for unattended shutdown, perform the following steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of MasterSwitch Plus.
- 2 Connect the signaling cable of each server to the corresponding port on the front panel of MasterSwitch Plus.
  - a *Simple signaling*: Use the simple-signaling cable associated with the server. (See Table 2: Additional Cables Offered by APC.) These cables must be connected to the corresponding Basic ports of MasterSwitch Plus. For example, a server plugged into outlet #3 must be connected to Basic port #3.
  - b *Smart signaling (for advanced reporting features of PowerChute Plus)*: Use the smart-signaling cable (APC part number 940-0024). Connect one end of this cable to the Advanced port of MasterSwitch Plus and connect the other end to the server whose power cord is attached to outlet #1.

**Note:** *If you are using smart signaling, Basic port #1 of Unit 1 must remain unused.*

*Smart signaling is only available on Unit 1.*

*The remaining units must use simple signaling for outlet #1.*

- 3 Using the supplied daisy-chain cables (APC part number 940-1000), connect the To UPS port of each MasterSwitch Plus unit to the Advanced port of the succeeding unit, as directed in Figure 4: Example of a Cascading Setup for Unattended Shutdown.

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# Connecting for Unattended Shutdown *continued*

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**Procedure for  
connecting  
multiple units  
(unattended  
shutdown),  
continued**

*Note: The AP9225 address must be set to Unit 1.*

- 4 Connect your 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus.
- 5 *If you are using an APC UPS:* Connect one end of a daisy-chain cable (APC part number 940-1000) to the To UPS port on MasterSwitch Plus and connect the other end to the serial port of the UPS.
- 6 Connect the power cord of each MasterSwitch Plus unit according to your configuration:
  - a *If you are using a UPS:* Plug the power cord into an outlet on the UPS.
  - b *If you are not using a UPS:* Plug the power cord into a single-phase, 120-VAC, 15-amp outlet.

*Do not exceed the maximum  
voltage and current ratings  
listed on the label on the bottom  
panel of the unit.*

- 7 *If you are using a Measure-UPS II environmental monitor:* See Installing Measure-UPS II.
  - 8 Continue with Quick Configuration.
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# Connecting with Redundantly Powered Servers

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## Overview

Use the connection procedure on this page if you want to connect MasterSwitch Plus to servers that have redundant input power cords. This configuration provides additional protection by using a separate MasterSwitch Plus unit for each input power cord. One of the units must be an AP9225 model of MasterSwitch Plus.

**Note:** *With this configuration, the unattended shutdown features of MasterSwitch Plus are not available.*

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## Connection procedure (redundant power)

To connect MasterSwitch Plus to a server that has redundant power cords, follow these steps in the order given.

- 1 Connect each power cord of the server to an outlet on the back panel of a separate MasterSwitch Plus unit.

**Note:** *Connect only one of the server's power cords for each MasterSwitch Plus unit.*

- 2 Connect the To UPS port of each unit to the Advanced Port of the succeeding MasterSwitch Plus as directed in Figure 5, using the supplied daisy-chain cables (APC part number 940-1000).

**Note:** *The AP9225 unit address must be set to Unit 1.*

- 3 Connect the 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus.
- 4 Connect the power cord of each unit into a separate single-phase, 120-VAC, 15-amp outlet.

*Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.*

- 5 To complete the configuration, you must set up a User Account for controlling the outlets—used in Step 1—as a group. See the chapter entitled Security and Help Features for more information on User Accounts. See also Quick Configuration.
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# Installing Measure-UPS II

**Measure-UPS II environmental monitor**

APC offers SmartSlot Measure-UPS II, a management accessory that monitors the environmental conditions of your rack-mount equipment.

**Choosing a location for Measure-UPS II**

Some configurations using Measure-UPS II will require an additional SmartSlot housing, available in an external chassis. APC offers two models of external chassis—the Expansion Chassis (AP9600) and the Triple Chassis (AP9604). Choose a location for your Measure-UPS II environmental monitor by following the instructions in Table 3.

IF your configuration has ___ of each device listed below,			THEN install Measure-UPS II in...
AP9225	AP9225EXP	UPS	
0	1 or more	0	an external chassis
0	1 or more	1 <sup>†</sup>	the UPS
1	0	0	an external chassis
1	0	1 <sup>†</sup>	the UPS
1	1 or more	0	AP9225EXP
1	1 or more	1 <sup>†</sup>	the UPS or AP9225EXP

*Table 3: Installation Location for Measure-UPS II*

<sup>†</sup> If the SmartSlot housing of your UPS is already populated with another SmartSlot accessory, install Measure-UPS II in the UPS and use an external chassis (or AP9225EXP, if there is also an AP9225 present) for the other accessory. See the document entitled *Installation of Multiple SmartSlot Accessories* provided with Measure-UPS II or other accessory.

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## Installing Measure-UPS II *continued*

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### Installing Measure-UPS II in a UPS

To install Measure-UPS II in a UPS, see the Measure-UPS II user manual.

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### Powering an external chassis

When installing Measure-UPS II in an external chassis (AP9600 or AP9604), use an external 24 VDC adapter (AP9505) available from APC for use in connecting the chassis to a secondary source of 115 VAC power when:

- your configuration does not contain a UPS.
- the connection of the external chassis with the *UPS* does not provide enough power for Measure-UPS II.
- when it is appropriate to connect the external chassis to a backup source of AC power.

**Note:** *For more information on using a 24 VDC adapter, see the user manual provided with the Expansion Chassis or the Triple Chassis.*

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## Installing Measure-UPS II *continued*

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### **Installing Measure-UPS II in an external chassis**

To install Measure-UPS II in an APC Expansion Chassis (AP9600) or Triple Chassis (AP9604), follow these steps in the order given.

- 1 Disconnect power and serial connections for the external chassis.
  - 2 Remove the plate covering the SmartSlot housing and save the two screws.
  - 3 Insert Measure-UPS II into the SmartSlot housing by sliding the card along the guides.
  - 4 Use the screws saved in step 2 to secure Measure-UPS II in the external chassis.
  - 5 *If you are using a 24 VDC adapter:* Connect it to the chassis, and then plug the adapter into a single-phase, 120-VAC, 15-amp outlet.
  - 6 Connect one end of the supplied daisy-chain cable (APC part number 940-1000) to the To UPS port of MasterSwitch Plus and connect the other end to the Monitoring port on the external chassis.
  - 7 *If you are using an APC UPS and...*
    - a *you are using an Expansion Chassis (AP9600):* Connect the Expansion Chassis cable labeled “UPS” to the serial port of the UPS.
    - b *you are using a Triple Chassis (AP9604):* Connect the supplied daisy-chain cable (APC part number 940-1000) to the serial port of the UPS.
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# Quick Configuration

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## **Required configuration**

You must configure the network settings of the MasterSwitch Plus (AP9225) before it can function on a network. See Configuring TCP/IP settings for information on how to set up your MasterSwitch Plus for use on the network.

After you have configured the MasterSwitch Plus network settings, no further configuration is required. The remaining MasterSwitch Plus properties are pre-configured at the factory. However, these properties may not be correct for your application. See Introduction for details on configuring the MasterSwitch Plus for your application. Also see Managing MasterSwitch Plus for details on configuring the Management Card.

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## **Configuring TCP/IP settings**

The minimum configuration required is a valid IP address, subnet mask, and gateway for your TCP/IP network. Choose the configuration method that matches your environment:

- If you are using Windows 95, 98, or NT, see Through the Management Card Wizard.
  - If you are not using Windows or require direct serial configuration, see Serially through the Control Console.
  - If you are a network administrator using BOOTP, see Over the Network by BOOTP.
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## Quick Configuration *continued*

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**Configuring TCP/IP settings, continued**

**Through the Management Card Wizard.** The Management Card Wizard provides a quick way to configure all Management Card attributes, including TCP/IP settings. To install the Management Card Wizard, insert the CD-ROM supplied with the MasterSwitch Plus into the CD-ROM drive of your Windows 95, 98, or NT 4.0 workstation and follow the on-screen instructions.

**Serially through the Control Console.** If you are not using a Windows platform or require direct serial configuration, use the Serial Console port to configure the Management Card TCP/IP settings and perform the following steps in the order given.

- 1 Connect one end of the smart-signaling cable (APC part number 940-0024) to an available serial port on your server and connect the other end to the Advanced port on the front panel of MasterSwitch Plus.
- 2 Disable PowerChute Plus, UNIX Respond, or other service that may be using the serial port on the server.
- 3 Run a terminal emulator such as Windows HyperTerminal. Configure the appropriate serial port with settings: 2400 bps, no parity, 8 data bits, 1 stop bit, and no flow control.

***Note:** Some terminal emulators such as HyperTerminal require that you disconnect and reconnect in order for the new serial settings to take effect.*

- 4 From your server, press ENTER (RETURN on some keyboards), perhaps repeatedly, until the user name prompt appears.
- 5 Enter **apc**. The password prompt appears.
- 6 Enter **apc**. The Main menu appears.

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## Quick Configuration *continued*

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### **Configuring TCP/ IP settings, continued**

- 7 From the Main menu, choose Network.
- 8 From the Network menu, choose TCP/IP.
- 9 Within the TCP/IP menu:
  - a Disable BOOTP.
  - b Accept changes.
  - c Set a valid IP address, Subnet Mask and Gateway for your network.
  - d Accept changes.
  - e Press ESC until the Main menu appears.
  - f From the Main menu, choose Logout.

**Note:** *The new settings will not take effect until you enter the Logout command.*

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## Quick Configuration *continued*

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### Configuring TCP/ IP settings, continued

**Over the Network by BOOTP.** BOOTP is enabled by default. Use a BOOTP server to configure the MasterSwitch Plus TCP/IP settings and perform the following steps in the order shown.

- 1 Enter the MasterSwitch Plus MAC address, IP address, subnet mask, gateway and optional bootup file name. See Updating using a BOOTP bootup file-name for more information on creating a boot-up file. (A boot-up file is referenced in the BOOTPTAB file of an RFC951-compliant BOOTP server.

*Note:* The MAC address can be found on the Quality Assurance slip and is displayed on the TCP/IP menu from the control console. For details on how to access the TCP/IP menu, see *Serially through the Control Console*.

- 2 Connect the 10Base-T network cable to the RJ-45 connector on the front panel of MasterSwitch Plus. The BOOTP server will provide network settings to MasterSwitch Plus. If a boot-up file name was specified, MasterSwitch Plus will attempt to transfer that file from a TFTP or FTP server residing on the same computer as the BOOTP server. MasterSwitch Plus will assume all settings specified in the boot-up file. Otherwise, MasterSwitch Plus can be configured remotely using the Telnet or the Web interfaces.

*Note:* You must use the Management Card Configuration Wizard to create the boot-up file.

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## Quick Configuration *continued*

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### Accessing MasterSwitch Plus

You can access MasterSwitch Plus through the Worldwide Web, Telnet or SNMP interfaces. See the appropriate paragraph below for details on accessing MasterSwitch Plus through each interface.

**Through the Web interface.** Perform the following steps in the order shown.

- 1 From your Web browser, enter the System IP address or DNS name, if configured, of the MasterSwitch Plus unit. MasterSwitch Plus supports Internet Explorer version 3.01 or later, or Netscape version 3.0 or later.
- 2 Log on to MasterSwitch Plus. The default User Name is **apc** and the default Password is **apc** (both lowercase).

**Through the Telnet interface.** Perform the following steps in the order shown.

- 1 Start a Telnet session and enter the System IP address or DNS name, if configured, of MasterSwitch Plus.
- 2 Log on to MasterSwitch Plus. The default User Name is **apc** and the default Password is **apc** (both lowercase)

**Through the SNMP interface.** Accessing MasterSwitch Plus using SNMP requires a Network Management Station, such as HP OpenView. The default read-only community is named *public*. The default read/write community is named *private*.

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# Configuration Worksheet

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UNIT PROPERTIES						
Name:				Address:		
OUTLET PROPERTIES						
#	Name	Outlet Control Mode	Will Device Conf.	Low Battery Warning Control	UPS Low Batt. Mult.	Restart Delay
	Max 23 printable ASCII	Circle one	Circle one	Circle or give delay time(hh:mm:ss)	1-7	Circle or give delay time(hh:mm:ss)
1		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
2		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
3		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
4		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
5		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
6		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
7		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____
8		GS A	Y N	On Run Time Never Delay:_____		Remain Off  Delay:_____

# up of the MasterSwitch Plus Expansion Unit

## Introduction

This document provides installation and configuration instructions for the MasterSwitch Plus expansion unit (AP9225EXP) when you are using AP9225 model. Topics covered in this document are:

- connecting a single unit for on-demand-only use
- connecting multiple units for on-demand-only use
- connecting a single unit for unattended shutdown
- connecting multiple units for unattended shutdown
- setting the addresses of multiple units

After you have completed the steps in this document that are required for your needs, no further configuration of MasterSwitch Plus is required. The remaining MasterSwitch Plus properties are pre-configured at the factory. However, the properties may not be correct for your application. See Planning Your Configuration for details on configuring the MasterSwitch Plus for your application.

## Configuration options

The MasterSwitch Plus expansion unit can be connected in different configurations depending on your needs.

<b>IF you want to use...</b>	<b>...THEN see...</b>
only the on-demand features	Connecting for On-Demand-Only Use
the unattended shutdown features	Connecting for Unattended Shutdown

**Table 4: Choosing a Configuration**

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g additional

Table 5 lists some of the simple-signaling cables for use with the systems supported by MasterSwitch Plus. For a complete listing of available cables, APC Web site at <http://www.apcc.com> and enter keyword **cables** in box. See the document entitled UPS Accessories—Cable Interface Kits Information.

<b>IF you want to connect a Basic port to a(n)...</b>	<b>...THEN order...</b>	<b>APC number</b>
Windows or NetWare server	UPS LAN Manager Cable	940-0
UNIX server	UNIX Basic Signaling Cable	AP982
IBM AS/400	AS/400 Cable Model 9402/9404	940-0
15-foot extension cable	UPS Interface Extension	AP982
50-ft extension cable	Isolated Extension Cable	AP982

**Table 5: Additional Cables Offered by APC**

† Requires the use of a cable for the operating system being used

**Note:** Using the wrong cable will cause incorrect operation of MasterSwitch Plus and may damage components.

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Use a connection procedure in this section if you want only to control outlets using the On, Off, Shutdown and Reboot commands. To connect a single unit Procedure for connecting a single unit (on-demand). To connect multiple units Procedure for connecting multiple units (on-demand).

**Note:** This configuration requires DTE equipment (a data terminal equipment running terminal emulation software) for control and configuration of the MasterSwitch Plus unit.

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**Procedure for connecting a single unit (on-demand)**

To connect a single MasterSwitch Plus Expansion Unit for on-demand-only control, perform the following steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of the MasterSwitch Plus.
- 2 If you plan to use the graceful shutdown and graceful reboot commands on the MasterSwitch Plus:
  - a Check to make sure that the connected server is running PowerSecure Plus or other shutdown software.
  - b Connect the simple-signaling cable (not supplied) of each server to the corresponding Basic port on the front panel of the MasterSwitch Plus unit. For example, a server plugged into outlet #3 must be connected to Basic port #3. Table 5: Additional Cables Offered by APC lists some of the signaling cables supported by MasterSwitch Plus.
- 3 Connect one end of the supplied smart-signaling cable (APC part number 940-0024) to an available serial port on your DTE equipment and connect the other end of the cable to the Advanced port on MasterSwitch Plus. Set the communications parameters to 2400 bps, no parity, 1 stop bit, and hardware control.
- 4 Connect the power cord of the MasterSwitch Plus unit into a single 120-VAC, 15-amp outlet.

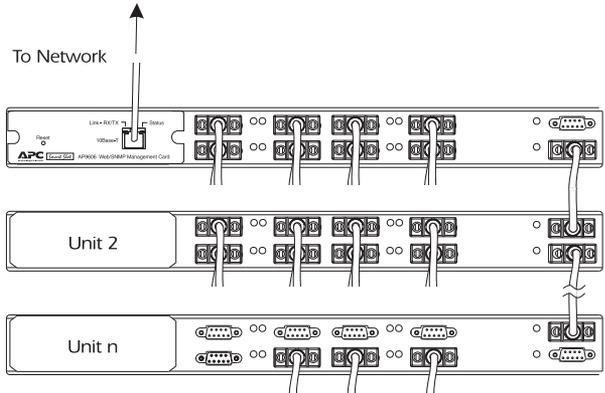
**Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.**

ing multiple units  
and)

By cascading as many as four MasterSwitch Plus Expansion Units, you can power for up to 32 connected devices. To set up MasterSwitch Plus in a cascading configuration, refer to Figure 5 and see Procedure for connecting multiple (on-demand).

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ation (on-

Figure 5 shows an example of a cascading setup for an on-demand-only configuration.



**Figure 5: Example of a Cascading Setup for On-Demand-Only Operation**

Continued on n

**e for connecting  
units (on-demand)**

To connect MasterSwitch Plus in an on-demand configuration, follow these steps in the order given.

- 1 Connect the power cord of each device to the outlets of MasterSwitch Plus.
- 2 If you plan to use the Graceful Shutdown and Graceful Restart features of MasterSwitch Plus:
  - a Check to make sure that the connected server is running the Graceful Shutdown Plus or other shutdown software.
  - b Connect the simple-signaling cable (not supplied) of each server to the corresponding Basic port on the front panel of MasterSwitch Plus. (For example, a server plugged into outlet #3 must be connected to Basic port #3.) Table 5: Additional Cables Offered by APC lists the part numbers of the signaling cables supported by MasterSwitch Plus.
- 3 Use the supplied daisy-chain cables (APC part number 940-0024) to connect the To UPS port of each MasterSwitch Plus to the Advanced port of the succeeding unit, as shown in Figure 5.
- 4 Connect one end of the supplied smart-signaling cable (APC part number 940-0024) to an available serial port on your DTE equipment and the other end of the cable to the Advanced port on the MasterSwitch Plus unit. Set the communications parameters to 2400 bps, no parity, 8 data bits, 1 stop bit, no flow control.
- 5 Connect the power cord of MasterSwitch Plus into a 120V, 15-amp outlet.

**Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of each unit.**

- 6 Continue with Configuring Addresses of MasterSwitch Plus

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Use this connection procedure if you want to be able to shut down servers and peripherals automatically because of UPS events or Measure-UPSII (you will also be able to exercise on-demand control of MasterSwitch Plus outlets to connect a single unit see Connecting a single unit (unattended shutdown), or to connect multiple units see Connecting multiple units (unattended shutdown)).

**Note:** To use the unattended shutdown feature of MasterSwitch Plus you must have both of the following:

- PowerChute Plus shutdown software installed and running on your servers.
- An APC Smart-UPS<sup>®</sup>, Matrix-UPS<sup>™</sup>, or Symmetra<sup>™</sup> PowerUPS.

### Connecting a single unit (unattended shutdown)

To connect a single MasterSwitch Plus unit for unattended shutdown, perform the following steps in the order given.

- 1 Connect the power cord of each device to the outlets on the back panel of MasterSwitch Plus.
- 2 Connect the signaling cable of each server to the corresponding port on the front panel of MasterSwitch Plus.

a Simple signaling: Use the simple-signaling cable as shown for each server. (See Table 5: Additional Cables Offered by APC.) Connect these cables to the corresponding Basic ports of MasterSwitch Plus. For example, a server plugged into outlet #3 must be connected to Basic port #3.

**Note:** The smart signaling feature is not available when you use the on-demand features. If you plan to use the on-demand features, skip Step 2b and proceed to Step 3.

b Smart signaling (for advanced reporting features of MasterSwitch Plus): Use the supplied smart-signaling cable (APC part # 0024). Connect one end of the cable to the Advanced Reporting Switch Plus and connect the other end to the server whose power cord is attached to outlet #1. Proceed to Step 4.

**Note:** If you are using smart signaling, Basic port #1 must be unused.

ng a single unit  
led shutdown),

- 
- 3 Connect one end of the supplied smart-signaling cable (APC part 940-0024) to an available serial port on your DTE equipment and the other end of the cable to the Advanced port on MasterSwitch Plus. Set the communications parameters to 2400 bps, no parity, 1 stop bit, and hardware control.
  - 4 Connect one end of the supplied daisy-chain cable (APC part 940-0024) to the To UPS port on the MasterSwitch Plus unit and the other end to the serial port on the UPS.
  - 5 Connect the power cord of the MasterSwitch Plus unit into an outlet on the UPS.

**Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.**

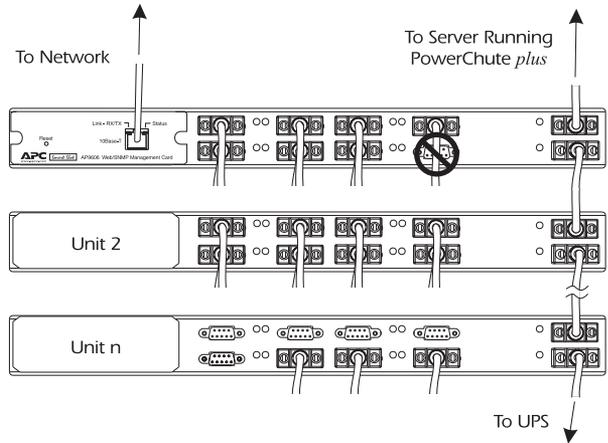
- 6 If you are using a Measure-UPS II environmental monitor, set the Measure-UPS II.

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Continued on n

ng multiple units  
ded shutdown)

By cascading as many as four MasterSwitch Plus units, you can manage po  
up to 32 connected devices. To set up MasterSwitch Plus in a cascading  
configuration, refer to Figure 6 and see Procedure for connecting multiple



**Figure 6: Example of a Cascading Setup for Unattended Shutdown**

re for connecting  
units

To configure multiple MasterSwitch Plus units for unattended shutdown, pe  
the following steps in the order given.

- 1 Connect the power cord of each device to the outlets  
MasterSwitch Plus.
- 2 Connect the signaling cable of each server to the co  
the front panel of MasterSwitch Plus.

a Simple signaling: Use the simple-signaling cable as  
server. (See Table 5: Additional Cables Offered by APC.) These  
must be connected to the corresponding Basic ports of Maste  
Plus. (For example, a server plugged into outlet #3 must be  
connected to Basic port #3.)

**Note:** The smart signaling feature is not available when you  
on-demand features. If you plan to use the on-dema  
tures, skip Step 2b and proceed to Step 3.

b Smart signaling (for advanced reporting features of  
Plus): Use the supplied smart-signaling cable (APC  
0024). Connect one end of the cable to the Adv  
Switch Plus and connect the other end to the server whose  
cord is attached to outlet #1.

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**Note:** Smart signaling is only available on Unit 1. The remaining must use simple signaling for outlet #1.

- 3 Connect one end of the supplied smart-signaling cable (APC part 940-0024) to an available serial port on your DTE equipment and the other end of the cable to the Advanced port on MasterSwitch Plus. Set the communications parameters to 2400 bps, no parity, 1 stop bit, and hardware control.
- 4 Using the supplied daisy-chain cables (APC part number 940-0024), connect the To UPS port of each MasterSwitch Plus unit to the Advanced port of the succeeding unit, as directed in Figure 6: Example of a Cascading Setup for Unattended Shutdown.
- 5 Connect one end of a daisy-chain cable (APC part number 940-0024) to the To UPS port on the MasterSwitch Plus and connect the other end to the serial port of the UPS.
- 6 Connect the power cord of each MasterSwitch Plus unit into an outlet on the UPS.

**Do not exceed the maximum voltage and current ratings listed on the label on the bottom panel of the unit.**

- 7 Continue with Configuring Addresses of MasterSwitch Plus
-

If you have multiple MasterSwitch Plus units connected in a cascading configuration, perform the following steps in the order given.

- 1 If your DTE equipment is a server: Disable PowerChute or any other service that may be using the serial port of the server.
- 2 Run a terminal emulator such as Window HyperTerminal. Configure the appropriate serial port with the following settings: 2400 bps, no parity, 8 data bits, 1 stop bit, and no flow control.

**Note:** Some terminal emulators such as HyperTerminal require you to disconnect and reconnect in order for the new serial settings to take effect.

- 3 From your server, press ENTER (RETURN on some keyboards). The Password prompt appears.

**Note:** All user input is terminated by ENTER.

- 4 Enter **apc**. The Main menu appears.
- 5 From the Main menu, select Unit Properties.
- 6 From the Unit Properties menu, select Address and set the value.

**Note:** The address of this first MasterSwitch Plus unit must be less than the MasterSwitch Plus units in your configuration. For example, if there are four units in your configuration, set the address of the first unit to 3.

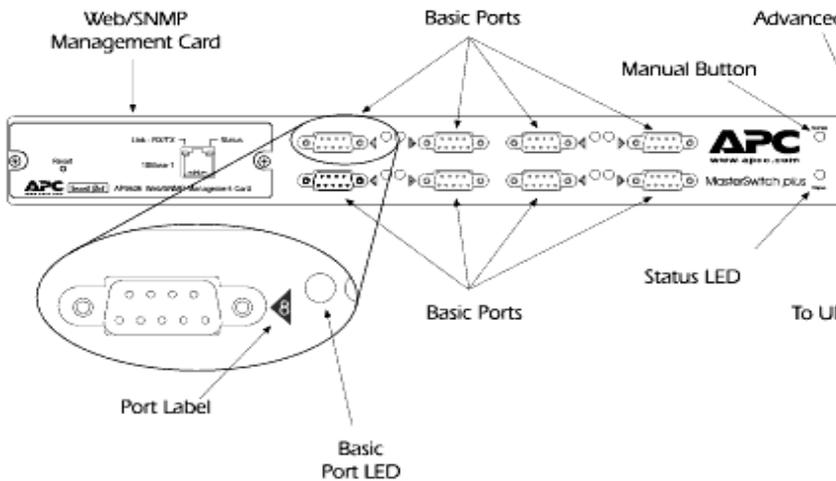
- 7 Return to the Main menu by pressing ESC.
- 8 Connect to the next MasterSwitch Plus unit by selecting Units from the Main menu.
- 9 From the Unit Properties menu, select Address and set the value to be less than the preceding MasterSwitch Plus unit. For example, if the address of the previous unit was set to 4, set the address of this unit to 3.

- 10 Return to the main menu by pressing ESC.
- 11 Repeat steps 9–11 for the remaining units.
- 12 Exit the current MasterSwitch Plus menu system by entering **Q** until you return to the Main menu. The Main menu on the preceding MasterSwitch Plus unit will appear. Continue entering **Q** until you have exited all MasterSwitch Plus units.

## Product Description

MasterSwitch Plus (AP9225) is a power control unit with a Web Management Card (AP9606) pre-installed. This combination allows you to manage a MasterSwitch Plus, up to three MasterSwitch Plus Expansion Units (AP9225) and a Measure-UPS II, using a Web browser, Telnet, or DTE terminal or a computer running terminal emulation software).

Figure 7 shows the front panel of MasterSwitch Plus. The parts in Figure 7 describe each of the labeled parts.



**Figure 7: Front Panel**

**Note:** AP9225EXP does not have a Web/SNMP Management Card or SmartSlot housing.

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The eight Basic ports connect MasterSwitch Plus to servers running PowerChute built-in UPS monitoring software. Each Basic port has its own specifications concerning the Basic ports, see Basic port pin assignments.

**Note:** Smart signaling allows you to use the advanced reporting features of PowerChute Plus. If you are using the Advanced port, Smart signaling is not available.

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d port

The Advanced port allows the connected server to communicate with a UPS operating in Smart Mode (Smart-UPS<sup>®</sup>, Matrix-UPS<sup>™</sup>, or Symmetra<sup>™</sup>PowerProtect). For information on Smart Mode, see the user manual supplied with your UPS. For specifications concerning the Advanced port, see Advanced port interface.

**Note:** The Advanced port may also be used for configuring MasterSwitch Plus. For instructions on configuring your unit through the Advanced port, see Managing the Expansion Unit.

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port

The To UPS port is used to connect MasterSwitch Plus to a second MasterSwitch Plus unit with the supplied daisy-chain cable (APC part number 940-1000).

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MP Management

MasterSwitch Plus is pre-installed with a Web/SNMP Management Card. Using a Web browser, Telnet, or DTE equipment, you can remotely manage connected devices and configure password-protected Administrator, Device Manager, and Outlet User accounts that ensure restricted access to system, device, and outlet attributes and services.

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ot accessory

The MasterSwitch Plus Expansion Unit provides housing for APC SmartSlot accessories on the front panel. SmartSlot accessories enhance your ability to monitor an APC UPS and to manage your system. For instructions on how to install and operate a SmartSlot accessory, refer to the user manual supplied with the accessory.

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EXP only)

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Refer to Table 6 for a description of the conditions related to LED status.

<b>LED</b>	<b>Status</b>	<b>Description</b>
Basic port	On	The Outlet is on.
	Off	The Outlet is off.
	Mostly off	The Outlet is scheduled to turn on.
	Mostly on	The Outlet is scheduled to turn off.
To UPS port	Flashing green	The UPS is in Sleep mode.
	Steady green	The UPS is operating Normally.
	Steady red	The UPS has experienced an AC Fail condition (is On Battery).
	Flashing red	The UPS has asserted a Low Battery indication.
	Flashing green and red	MasterSwitch Plus is unable to communicate with the UPS.
Status (AP9225 only)	Off	MasterSwitch Plus has no power.
	Solid green	MasterSwitch Plus has valid network settings.
	Flashing green	MasterSwitch Plus does not have valid network settings. See Remote Management Interface for more information.
	Flashing red slowly	MasterSwitch Plus is making a BOOTP request.
	Solid red	A hardware failure has been detected by MasterSwitch Plus.
Link-RX/TX (AP9225 only)	Off	The device(s) that connects MasterSwitch Plus to the network, whether a router, hub, or concentrator, is off or not operating correctly.
	Constant Green	MasterSwitch Plus is connected to a functioning network.
	Flashing Green	MasterSwitch Plus is receiving data packets from the network.

**Table 6: MasterSwitch Plus LED Indicator Descriptions**

Continued on next page

button

The Manual button is used to cancel two different commands. If this button is pressed for at least 1/2 second and then released, one of the following results will occur:

- if MasterSwitch Plus is waiting for the Master Power On Delay to expire, then MasterSwitch Plus will issue a cancel command. The sequence in Figure 8 illustrates the outlet's behavior when the Master Power On Delay is canceled.
- if the configuration contains a UPS and the UPS is operating on battery, then MasterSwitch Plus will issue a Battery Capacity Override command. The sequence in Figure 9 illustrates the outlet's behavior when the Battery Capacity Override command is issued.
- If neither of the above conditions are true, then pressing the Manual button will have no effect.

button

The reset button allows you to reset the MasterSwitch Plus network interface. The reset button is only available on AP9225 and has no effect on the status of the outlet.

panel

Figure 8 shows the rear panel of MasterSwitch Plus.

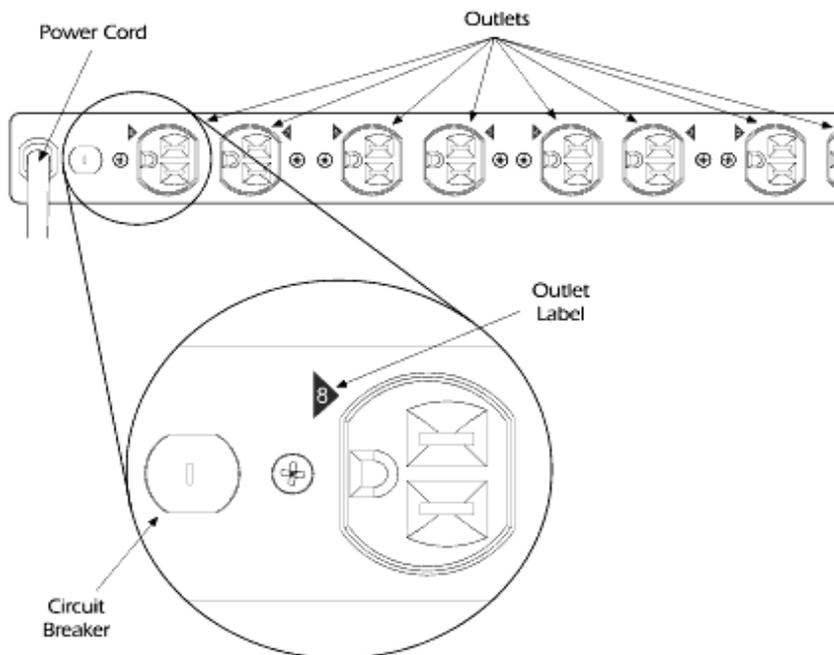


Figure 8: Rear Panel

There are two main categories of properties associated with MasterSwitch unit properties and outlet properties. Unit properties allow you to customize behavior of MasterSwitch Plus, and outlet properties allow you to customize behavior of individual outlets.

Table 7 lists the Unit properties and provides a description and the available settings for each property.

Property	Description	Available Settings
Device Name	A string of characters used to identify the MasterSwitch Plus unit.	A maximum of 23 printable characters <b>Default</b> = unnamed
Power On Time Delay	The time that MasterSwitch Plus will delay after AC power is applied before starting the outlet's power on sequence.	<b>Range:</b> 0–2:46:39 <b>Default:</b> 0
Manual Button	Governs whether or not the manual button functions. (This item is only available if you are using Telnet or DTE equipment.)	<b>Enabled:</b> the button function according to the description Manual button <b>Disabled:</b> no function <b>Default:</b> Enabled

**Table 7: Unit Properties**

**Note:** Unit properties retain their value even after power has been removed from MasterSwitch Plus.

Outlet properties are governed by two operating modes: Annunciator and Shutdown. (See Planning Your Configuration for more information on these modes.) Some outlet properties are common to both operating modes, while other properties are specific to each operating mode. The following three paragraphs describe the outlet properties with respect to the mode(s) they can operate in.

Continued on next page

Properties: both  
g modes

Table 8 describes the properties common to both operating modes and the available settings for each.

Property	Description	Available Settings
Outlet Control	Controls the operation of the outlet.	Graceful Shutdown mode and Annunciator mode
Name	Identifies the outlet being accessed.	A maximum of 23 printable ASCII characters
Measure-UPS II Alarm Masks	Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Enabled or disabled for any of the 12 Measure-UPS II alarms.

**Table 8: Common Outlet Properties**

**Note:** Outlet properties retain their value even after power has been removed from MasterSwitch Plus.

Properties:  
Shutdown mode

Table 9 describes the outlet properties that are specific to Graceful Shutdown mode and the available settings for each. See Table 11 for the default settings for each item.

Property	Description	Available Settings
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	<b>Range:</b> 0–999:59 Note: Time is rounded down by 6-minute intervals
Power On Time Delay	Determines the time interval between the triggering event and the outlet being turned on.	<b>Range:</b> 0–2:46:59
Power Off Time Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	<b>Range:</b> 0–2:46:59
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	<b>Range:</b> 0–2:46:59
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	<b>Range:</b> 0–100%

**Table 9: Outlet Properties for Graceful Shutdown Mode**

Continued on next page

Properties:

Shutdown mode,

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Property	Description	Available Settings
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	<b>Programmed Delay:</b> 0–16:39:54 <b>On Runtime Remaining:</b> When the UPS runtime remaining falls below the UPS Low Battery Signal Time. <b>Never</b>
UPS Low Battery Multiplier	Adjusts the UPS Low Battery Signal Time. This property allows each outlet to be programmed to generate a low battery signal at a different time. MasterSwitch Plus will assert the outlet's Low Battery signal when both of the following conditions apply: the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and the UPS is on battery and the UPS runtime remaining falls below the product of the UPS Low Battery signal time and the UPS Low Battery Multipliers.	<b>Range:</b> 1–7
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	<b>Yes</b> <b>No</b>

**Table 9: Outlet Properties for Graceful Shutdown Mode, continued**

Properties:

Annunciator mode

Table 10 describes the outlet properties that are specific to Annunciator mode and the available settings for each.

Property	Description	Available Settings
Initial State	Defines the initial state of the outlet.	<b>Off</b> <b>On</b>
Alarm Action Delay	The amount of time that a Measure-UPS II alarm must be asserted before the outlet is toggled.	<b>Range:</b> 0–

**Table 10: Outlet Properties for Annunciator Mode**

Continued on next page

for outlet

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Table 11 gives the default settings for the outlet properties of each outlet.

Property	Default setting for outlet #s_____							
	1	2	3	4	5	6	7	8
Outlet Control Mode	Graceful Shutdown Mode							
Name: Outlet #____	1	2	3	4	5	6	7	8
Power On Time Delay (seconds)	0	2	4	6	8	10	12	15
Battery Capacity Threshold	0%							
Low Battery Warning Control (minutes)	4.5							
Power Off Time Delay (seconds)	120							
UPS Low Battery Multiplier	1							
Will Device Confirm	No							
Restart Delay	Remain Off							
Reboot Duration (seconds)	5							
Initial State	Off							
Alarm Action Delay (seconds)	15							
Measure-UPS II Alarm Masks	Disabled (for each Measure-UPS II)							

**Table 11: Outlet Properties Default Settings**

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Configuration of MasterSwitch Plus is dependent upon your application. You can use only "on-demand" operations (On, Off, Shutdown, and Reboot) or you can couple on-demand operations with "unattended" shutdown features. If you use only on-demand operations, see "Configuring an outlet for on-demand operation" on this page. If you plan to use the "unattended" shutdown features, see MasterSwitch Plus in addition to the on-demand operations, see Configuring an outlet for unattended shutdown.

---

## Configuring an outlet for on-demand operation

Configuring an outlet for On-demand operation requires selecting values for the following properties:

- Unit Properties
  - # Power On Time Delay: See Outlet start-up sequence information about how this property affects the start-up sequence.
- Outlet Properties
  - # Outlet Control mode: All on-demand operations are available when this property is set to Graceful Shutdown. When it is set to Annunciate, Immediate On and Immediate Off operations are available.
  - # Reboot Duration: Used by the Reboot and Graceful Reboot operations.
  - # Will Device Confirm: Used by the Shutdown and Graceful Shutdown operations.
  - # Power Off Time Delay: Used by the Shutdown and Graceful Shutdown operations.
  - # Restart Delay: Used by the Shutdown operation.
  - # Power On Time Delay: Used by the Delayed On and Reboot operations.

See On-demand operation for detailed information about how these outlet properties affect outlet behavior.

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## Configuring an outlet for unattended shutdown

Configuring an outlet for unattended shutdown requires selecting values for the following properties:

- Unit Properties
  - # Power On Time Delay: See Outlet start-up sequence information about how this property affects the start up sequence.
- Outlet Properties
  - # Outlet Control Mode
    - Graceful Shutdown mode: Selecting this value requires selecting values for the following properties:
      - Low Battery Warning Control: Used by UPS shutdowns.
      - UPS Low Battery Multiplier: Used by UPS shutdowns.
      - Will Device Confirm: Used by UPS and Measure-UPS II shutdowns.
      - Power Off Time Delay: Used by UPS and Measure-UPS II shutdowns.See Graceful Shutdown sequence for detailed information about setting.
    - Annunciator mode: Selecting this value requires selecting values for the Alarm Action Delay property. (See Annunciator sequence information about Measure-UPS II alarms for detailed information about setting.)
  - # Measure-UPS II Alarm Masks: Used to specify the Measure-UPS II alarms that the outlet will react to.

**Note:** If your configuration contains an AP9225, you must enable the Traps On alarm property in order for the Measure-UPS II to generate an alarm. See Device Manager: Measure-UPS II for more information.

**Note:** All on-demand operations are available when the Outlet Control mode is set to Graceful Shutdown. When it is set to Annunciator, only Immediate On and Immediate Off operations are available.

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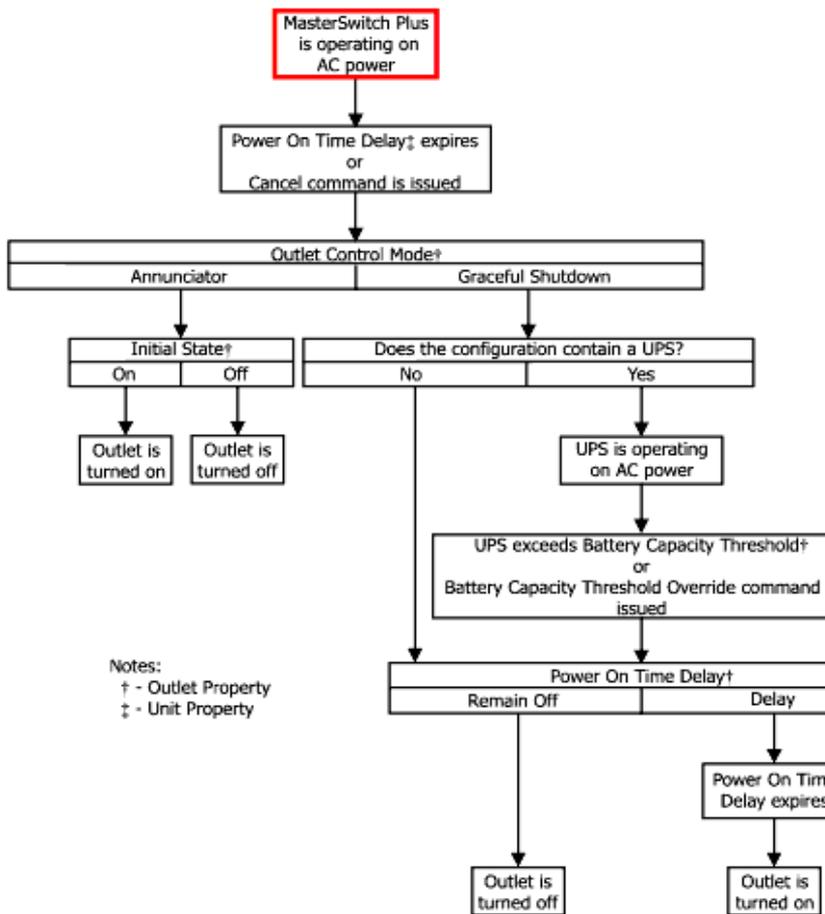


Figure 9: Outlet Start-up Sequence

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## Shutdown

When an outlet is set to Graceful Shutdown mode and MasterSwitch Plus is connected to an APC UPS or a Measure-UPS II environmental monitor, MasterSwitch Plus will automatically shut down outlets in response to a UPS On Battery or a Measure-UPS II alarm. Servers can be shut down gracefully using PowerChute Plus shutdown software and are connected to a serial communications port. The server can be automatically restarted once the main power is restored and Measure-UPS II alarms are cleared. By varying outlet programming, you can program servers and other peripherals to shut down at different times, which allows you to extend battery run-time for critical servers by shutting down less critical equipment. Figure 10 shows the Graceful Shutdown sequence of events.

## Shutdown for on-battery

Figure 11 shows what happens when an outlet has been configured for Graceful Shutdown and the UPS goes on battery.

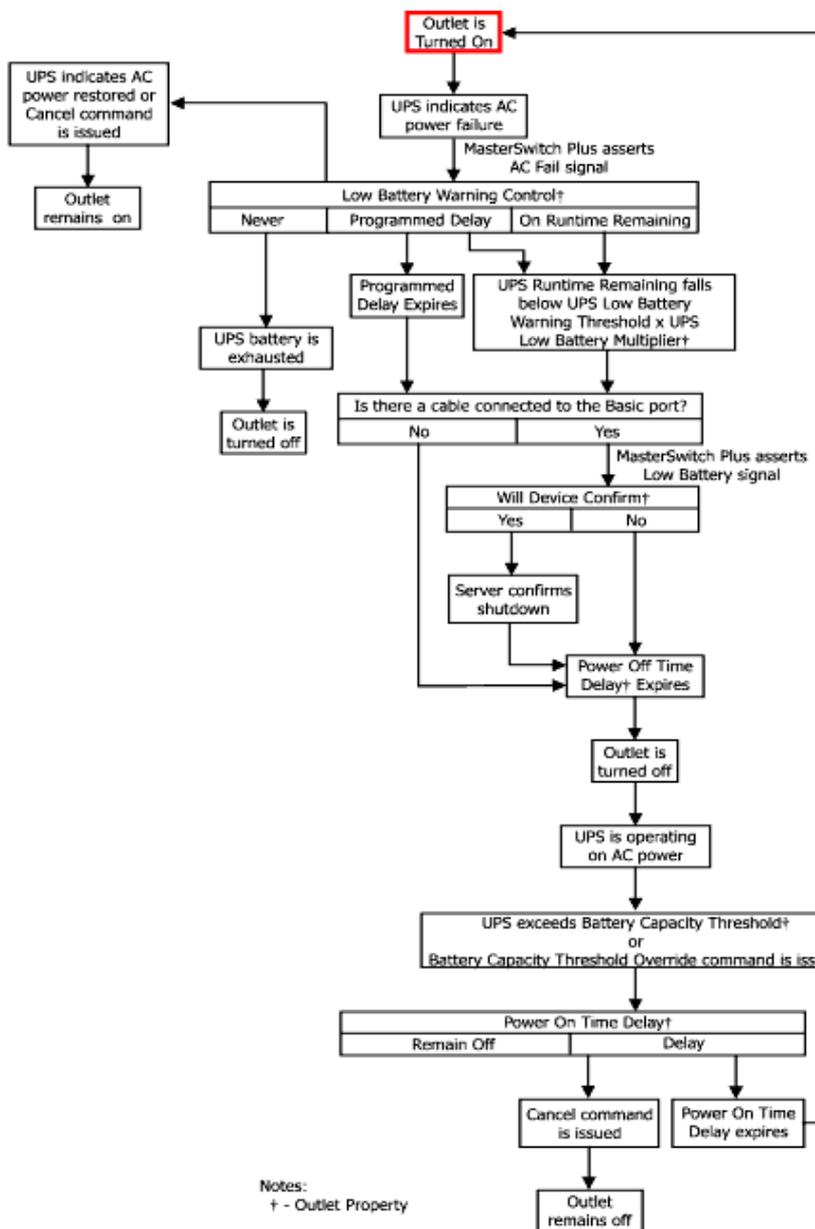
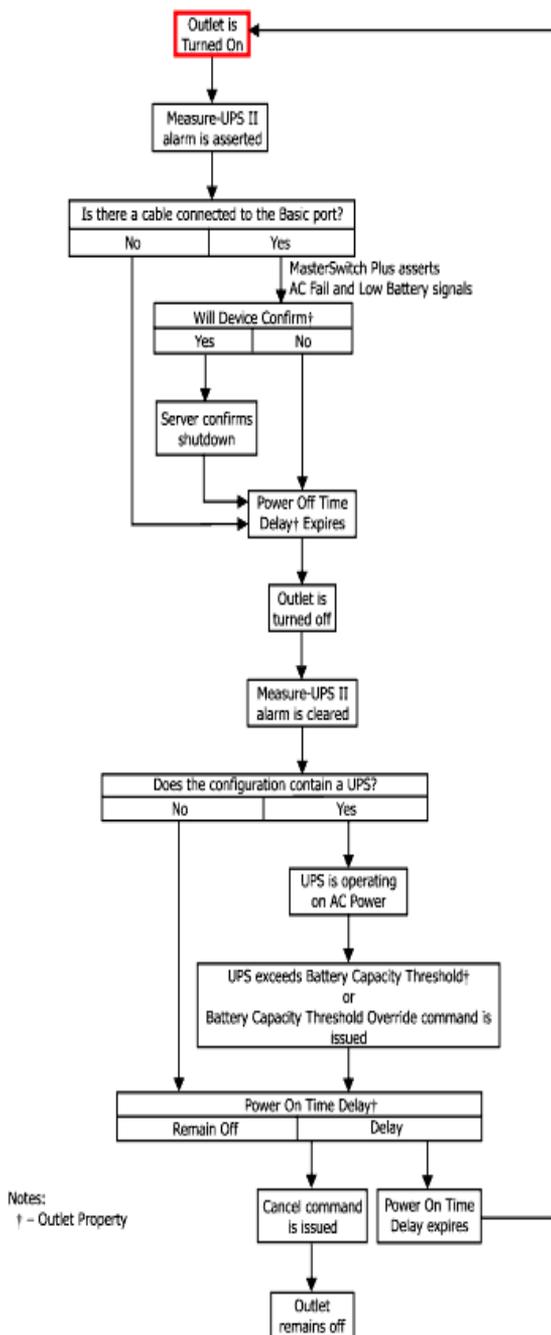


Figure 11: Graceful Shutdown Sequence for On-Battery Events

**Shutdown  
for Measure-UPS**

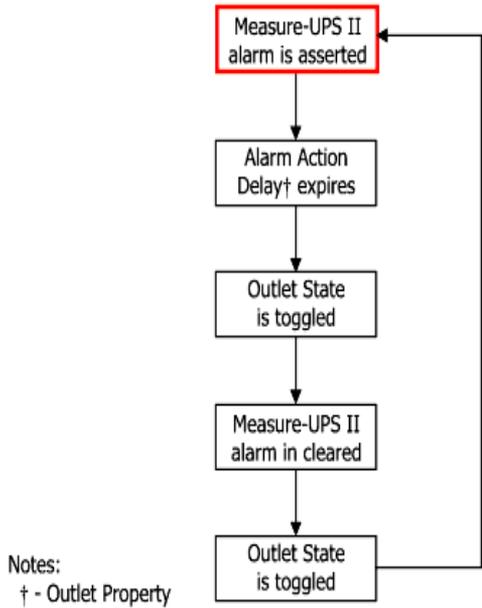
Figure 12 shows what happens when an outlet has been configured for Graceful Shutdown and a connected Measure-UPS II issues an alarm.



**Figure 12: Graceful Shutdown Sequence Triggered by Measure-UPS**

**Annunciator sequence for Measure-UPS II alarms**

An outlet can be configured to respond to any number of Measure-UPS II alarms. When an outlet is set to Annunciator mode and MasterSwitch Plus is connected to a Measure-UPS II environmental monitor, the outlet can be configured to change state based upon the presence of Measure-UPS II alarms. The sequence diagram in Figure 13 illustrates this behavior.



**Figure 13: Annunciator Mode Event Sequence**

**Measure-UPS II alarm**

The alarm signal for an outlet will be asserted if at least one of the enabled Measure-UPS II alarms occurs; the alarm signal will remain asserted until all enabled Measure-UPS II alarms are cleared. This applies for both Normal and Graceful Shutdown modes. See Outlet configuration for more information on enabling alarms for an outlet.

Continued on next page

Table 12 lists the available outlet control commands. These commands can be applied to a single outlet or to all outlets.

Command	Behavior
Immediate On	Immediately turns an outlet on. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Delayed On <sup>†</sup> ("Sequenced On" when applied to all outlets)	Turns an outlet on after the outlet's Turn On Delay expires. The sequence diagram in Figure 14 illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Immediate Off	Immediately turns an outlet off.
Immediate Reboot <sup>†</sup>	Immediately turns an outlet off and turns it back on after the Reboot Duration expires. The sequence diagram in Figure 15 illustrates the this command.
Shut Down <sup>†</sup>	Gracefully shuts down and optionally restarts an outlet. If the server is running shutdown software, such as PowerChuteplus, and is connected to MasterSwitchplus with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. You can prevent the outlet to restart automatically by specifying a Restart Delay. The Restart Delay can be set to as long as 999.9 hours. The sequence diagram in Figure 16 illustrates the this command.
Graceful Reboot <sup>†</sup>	Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChuteplus, and is connected to MasterSwitchplus with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. The outlet will be restarted after the Reboot Duration expires. The sequence diagram in Figure 17 illustrates the this command.  <b>Note:</b> If this command is applied to all outlets, then the Reboot Duration delay for an outlet will not begin until all the outlets have shut down.
Cancel <sup>†</sup>	Cancels a delayed startup or shutdown. The sequence diagrams in Figures 3–6 and Figures 8–11 illustrate the use of this command.
Batter Capacity Threshold Override <sup>†</sup>	Allows an outlet to restart when the UPS battery charge has exceeded the Battery Capacity Threshold. The sequence diagrams in Figure 9 and Figure 11 illustrate the use of this command.

**Table 12: Outlet Control Commands**

<sup>†</sup> Only available in Graceful Shutdown mode

Figure 14 shows what happens when MasterSwitch Plus executes the Delay sequence.

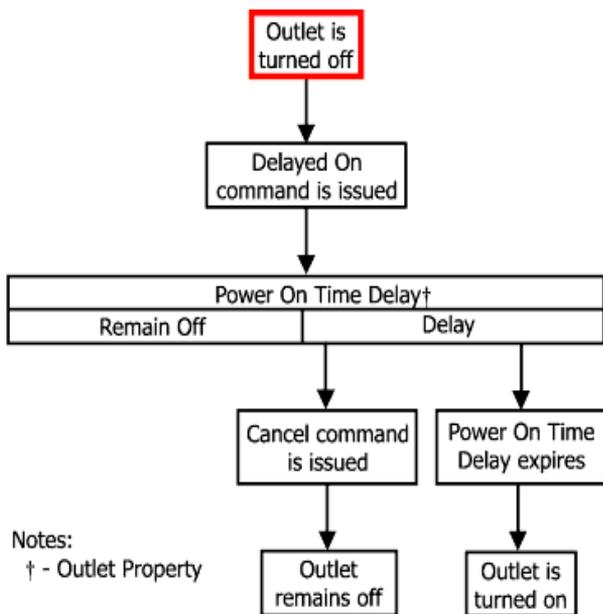


Figure 14: Delayed On Sequence

sequence

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Figure 15 shows what happens when MasterSwitch Plus executes the Reboot sequence.

**Figure 15: Reboot Sequence**

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Continued on n

Figure 16 shows what happens when MasterSwitch Plus executes the Shutdown sequence.

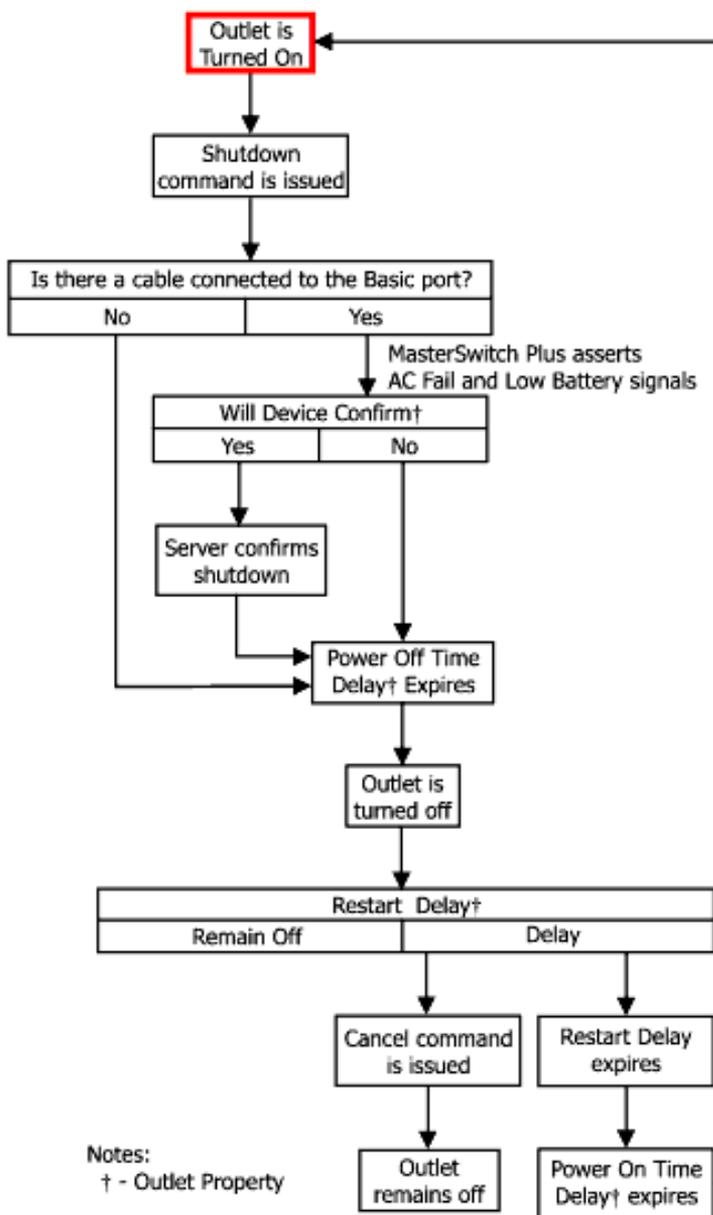


Figure 16: Shutdown Sequence

reboot sequence

Figure 17 shows what happens when MasterSwitch Plus executes the Graceful Reboot sequence.

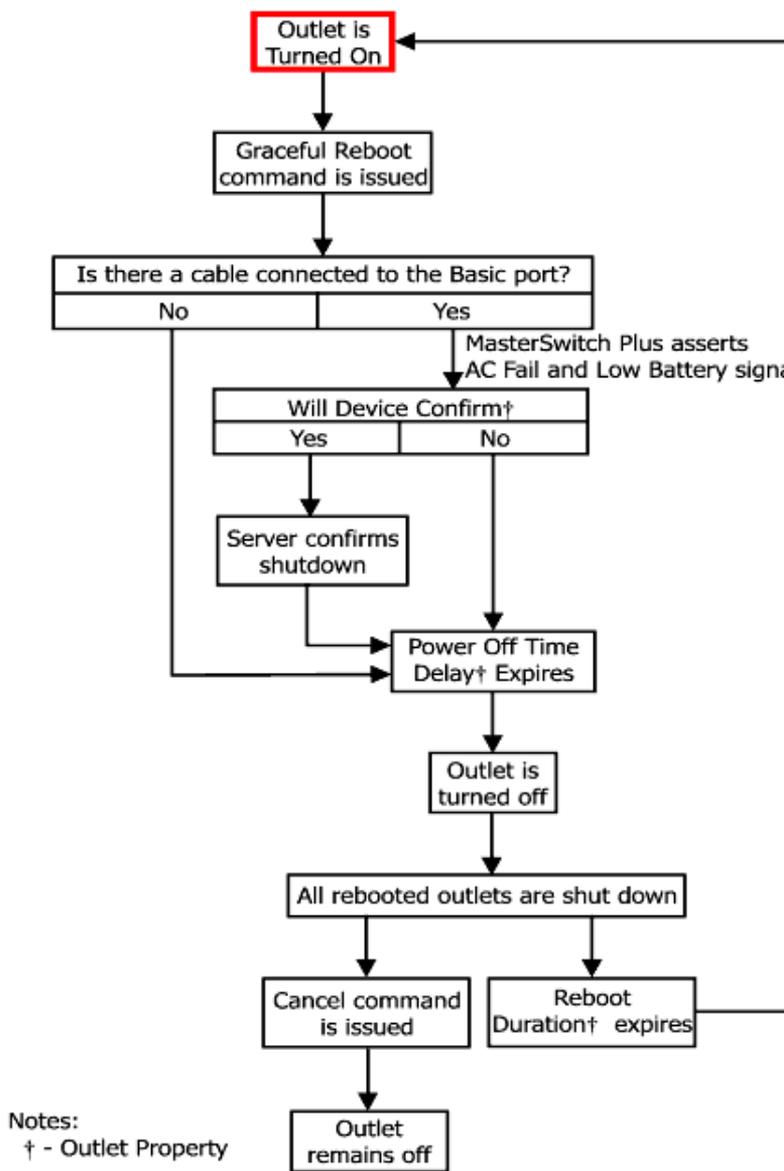


Figure 17: Graceful Reboot Sequence

## Introduction

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Using a Web browser, Telnet, or DTE equipment, you can manage your MasterSwitch Plus unit and outlet properties and configure password-protected Administrator, Device Manager, and Outlet User accounts. This chapter will familiarize you with the interfaces and accounts by covering the following topics:

- Remote management interfaces (Web and Control Console) used to manage MasterSwitch Plus and connected devices, and
  - Password-protected Administrator, Device Manager, and Outlet User accounts.
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Once MasterSwitch Plus has its proper network settings (see the MasterSwitch Plus Installation and Quick Configuration Manual for instructions), MasterSwitch Plus and Measure-UPS II can be managed remotely on Web and Console interfaces. The following sections describe each interface and provide instructions on how to access and log into each one.

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## Web interface

You can manage MasterSwitch Plus and Measure-UPS II by an easy-to-use Web interface. To access the Web interface, you will need one of the following supported Web browsers:

- Internet Explorer 3.0.2 and later
- Netscape 3.0 and later
- Other 3.0 Web browsers

Only one user at-a-time may access your MasterSwitch Plus unit. DTE users have precedence over Telnet users and Telnet users have precedence over Web interface users.

**Note:** Some Web interface features, including data verification, Assistant authentication, and MD5 authentication require that you enable JavaScript.

**Note:** The Web interface does not support all available MasterSwitch Plus properties. To access all MasterSwitch Plus properties, use the Console. (For more information on what properties each interface supports, see Differences in configurable items.)

---

## Web interface: accessing MasterSwitch Plus

Use any of the supported Web browsers to access the Web connection to MasterSwitch Plus. In the URL Location field, type in `http://` followed by the MasterSwitch Plus unit's IP address. Alternately, you can enter the unit's domain name (requires a DNS server entry for the Management Card). See the example below:

```
http://170.241.17.51
```

If the MasterSwitch Plus unit's Web Port is set to a value other than the default value of 80, enter the System IP address followed by a colon and the configuration Web Port value (in this example 8000). See the example below:

```
http://170.241.17.51:8000
```

---

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**Web interface: logging in**

After entering your MasterSwitch Plus unit's IP address, press ENTER to ask for your user name and password. For first time use, the default Administrator user name and password (or authentication phrase) is **apc**, all lower case.

**Note:** The user name, password, and time-out values can be changed in the Web interface in the System Menu (see System Menu for more information).

---

**Console interface**

In addition to using the Web, you can also manage MasterSwitch Plus and Measure-UPS II environmental monitor using Telnet for remote management or using DTE equipment (a dumb terminal or a computer terminal emulation software) for local management.

**Note:** Only one user at-a-time may access MasterSwitch Plus. DTE users have precedence over Telnet users and Telnet users have precedence over Web users.

---

**Console structure**

The Control Console provides comprehensive remote and local management for MasterSwitch Plus and Measure-UPS II. All menu items are listed by number. To enter an item:

- 1 Type the item number.
- 2 Press <ENTER>.
- 3 Follow any on-screen directions.

Menus that configure values have an Accept Changes menu item. If you want to save any changes that you made before you exit a menu, use the Accept Changes item. In addition to saving changes before exiting a menu, you can also:

- Press <ENTER> to refresh the menu.
  - Press <ESC> to go back to the previous menu.
  - Type <?> <ENTER> to access brief descriptions of menu items (help is available).
  - Use Ctrl-D to toggle between MasterSwitch Plus and Measure-UPS II.
  - Use Ctrl-C to return to the main menu (Control Console).
- 

Continued on next page

To access the Control Console through Telnet, start a Telnet session and follow the prompts. (See the Installation and Quick Configuration Manual for instructions on starting a Telnet session.) To use DTE equipment to access the Control Console, perform the following steps in the order given:

- 1 Use the supplied smart-signaling cable (APC part number 1000000000) to connect the terminal port to the Advanced Port on MasterSwitch 1.
- 2 Check the terminal port for the following communication settings:

Baud Rate	2400
Data Bits	8
Stop Bits	1
Parity	None
Handshaking	None
Local Echo	Off
Terminal Type	ANSI (VT100)

**Figure 18: Terminal Communication Settings**

**Note:** To change the communications settings using HyperTerminal, follow the steps below in the order given:

- a Make the needed changes.
  - b Select Disconnect in the Call menu.
  - c Select Connect in the Call menu.
- 3 Press <ENTER> and log into the Control Console. (See the Control Console.)

The procedure for logging into the Control Console is the same for both Telnet and DTE equipment. When prompted, follow the steps below:

- 1 Type your user name and press <ENTER>.
- 2 Type your password and press <ENTER>.

**Note:** The default values of both name and password for the Control Console are **apc**, all lowercase. For the procedure on how to change the password, see the Outlet User Manager.

MasterSwitch Plus provides three types of password-protected accounts that allow you to control access to MasterSwitch Plus and the devices it manages. Each type of account provides a different level of access to the MasterSwitch Plus menu. There is one Administrator account, one Device Manager Account and up to 10 Outlet User accounts. This section describes the different access levels, details each account, and lists the menus available to each account.

**Access to Main Menus**

Administrator and Device Manager accounts have access to all outlets. Outlet User accounts only have access to outlets assigned to their account. Users who have access to the Administrator account can configure and manage all other accounts. Table 13 lists each account and the access privileges each one carries. For more instructions on configuring Device Manager and Outlet User accounts, see the Device Manager and Outlet User Manager.

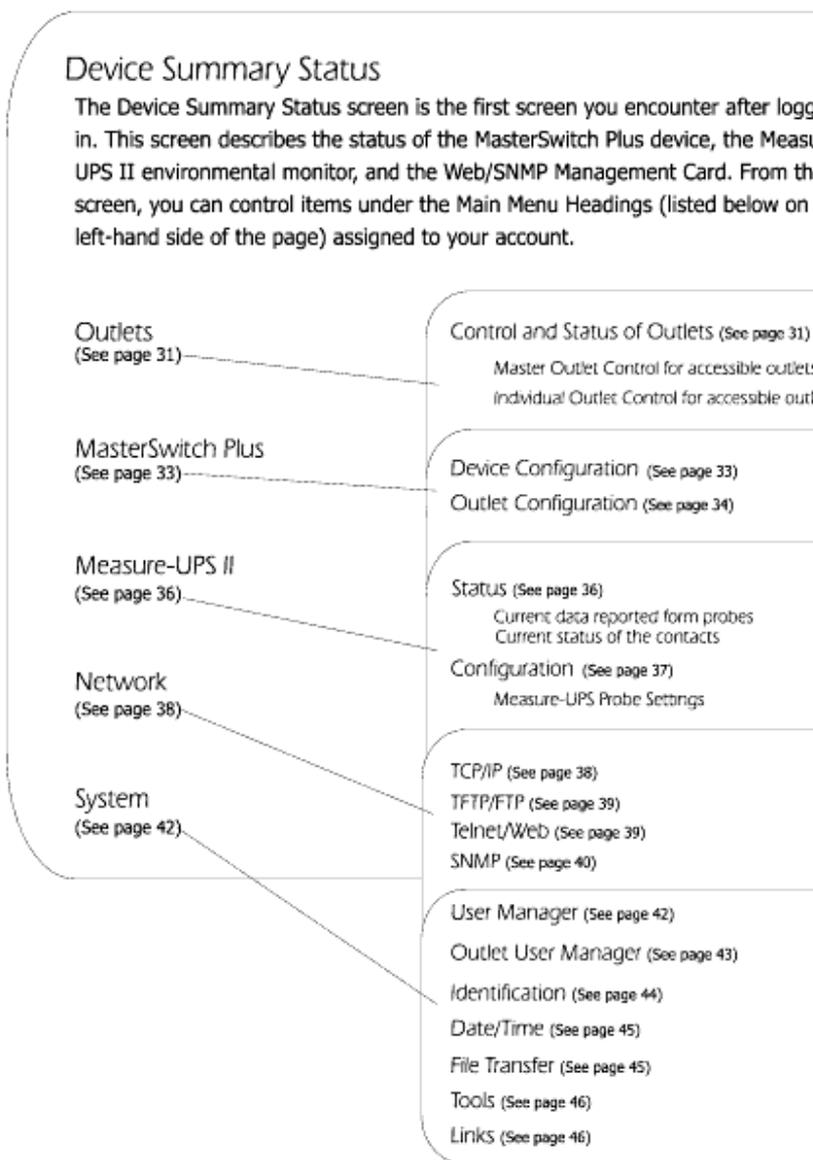
Account Type	Access to MasterSwitch Plus Menus						
	Outlets	MasterSwitch Plus Configuration	Measure-UPS	Network	System	Logout	Help
Administrator	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Device Manager	Yes	Yes	Yes	No	No	Yes	Yes
Outlet User	Yes	No	No	No	No	Yes	Yes

**Table 13: Types of MasterSwitch Plus Access**

Continued on next page

MasterSwitch Plus permits only one Administrator account. The Administrator has unrestricted access.

Figure 19 presents the Main Menu Headings available to the Administrator and the settings that are available under each menu.



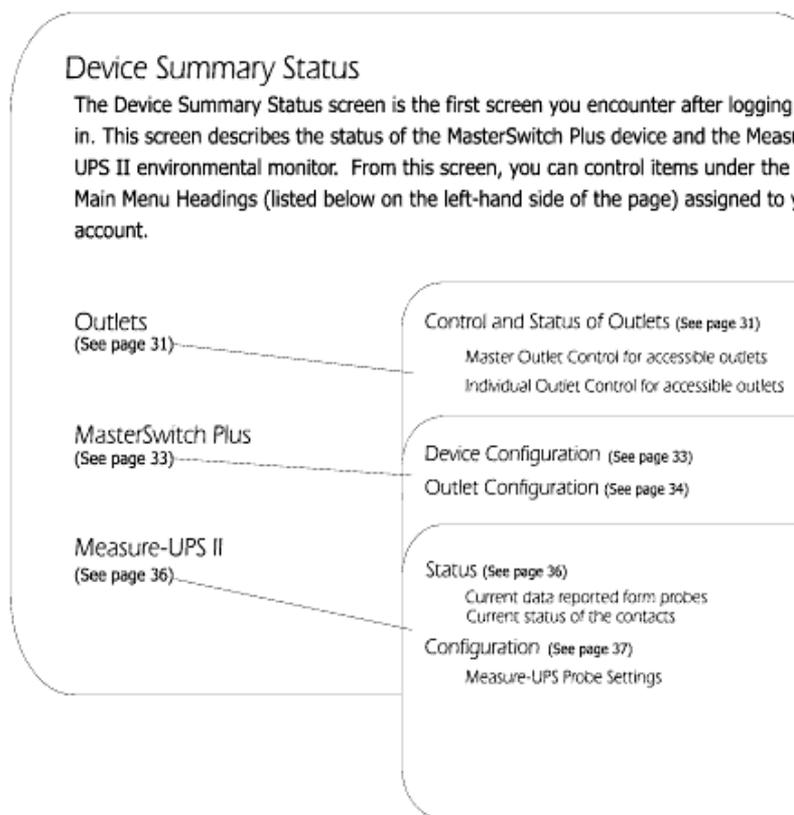
**Figure 19: Administrator Account Access**

## Manager account

MasterSwitch Plus permits only one Device Manager Account. The Device Manager Account can access all outlets and devices (MasterSwitch Plus, MasterSwitch Plus Extension Unit, and Measure-UPS II).

## Manager access

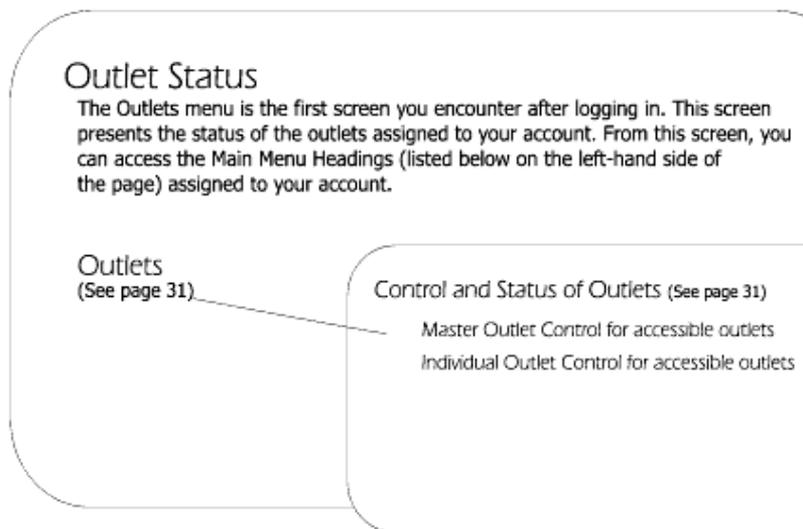
Figure 20 presents the Main Menu Headings available to the Device Manager Account. Figure 21 lists the main settings that are available under each menu.



**Figure 20: Device Manager Account Access**

MasterSwitch Plus permits up to thirty-two Outlet User Accounts. Outlet users have access to and control over the outlets assigned to their account.

Figure 21 presents the top-level menu items available to the Outlet User and the settings that are available under each menu.



**Figure 21: Outlet User Account Access**

## Introduction

Each interface offers menu items for configuring MasterSwitch Plus and its settings. The configurable items are divided among MasterSwitch Plus Main Menu Headings. Access to Main Menu Headings and the configurations they house depends on your assigned user account. (See Password-Protected User Accounts for more information on user accounts.) To familiarize you with the configurable items in MasterSwitch Plus, this chapter:

- Discusses the differences between the Web and Control Console interfaces.
- Presents each Main Menu Heading and describes the settings under each heading that you can configure based on your user account.
- Lists and defines each item under the five Main Menu Headings.

## Items in Available Items

The Control Console and Web interfaces differ in the items available for MasterSwitch Plus outlet and device configuration.

MasterSwitch Plus Configurable Item		Web	Control Console
Outlet Configuration	Outlet Name	Yes	Yes
	Restart Delay	Yes	Yes
	Power On Delay	Yes	Yes
	Power Off Delay	Yes	Yes
	Reboot Duration	Yes	Yes
	URL	Yes	No
	Outlet Control Mode	No	Yes
	Battery Capacity Threshold	No	Yes
	Low Battery Warning Control	No	Yes
	UPS Low Battery Multiplier	No	Yes
	Will Device Confirm	No	Yes
	Toggle Measure-UPS II alarms	No	Yes
	Initial State	No	Yes
	Alarm Action Delay	No	Yes

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MasterSwitch Plus Configurable Item		Web	Control Console
Device Configuration	Device Name	Yes	Yes
	Power On Time Delay	Yes	Yes
	Manual Button	No	Yes
	Restore Factory Defaults	No	Yes
	View Manufacturing Data	No	Yes
	View Self Test Results	No	Yes

**Table 14: Configurable Items Available for Each Interface, continued**

**Note:** The information in this chapter is based on the Web interface. If you are using the Control Console, some of the terminology used in this chapter may be different from the terminology in the interface you are using.

The Outlets menu provides the number, name, state, and control action for each outlet. From this menu, you can control all outlets assigned to your account or you can control individual outlets.

**Note:** On the Control Console, you can access outlet information by selecting Device Manager (1).

of outlets

Table 15 lists and defines the items available for Outlet Control.

Item	Definition
Immediate On	Immediately turns an outlet on. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Sequenced On <sup>†</sup>	Turns on every outlet according to its Power On Delay time. (This is only available for Master Control of Outlets)
Delayed On <sup>†</sup>	Turns an outlet on after the outlet's Turn On Delay expires. The sequence diagram in Delayed On sequence illustrates this command. This command is available any time after the unit's Power On Time Delay has expired and the outlet is off.
Immediate Off	Immediately turns an outlet off.
Graceful Reboot <sup>†</sup>	<p>Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch Plus with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. The outlet will be restarted after the Reboot Duration expires. The sequence diagram in Graceful reboot sequence illustrates the this command.</p> <p><b>Note:</b> If this command is applied to all outlets, then the Reboot Duration delay for an outlet will not begin until all the outlets have shut down.</p>

**Table 15: Outlet Control Items**

<sup>†</sup> Only available in Graceful Shutdown mode

Continued on next page

of outlets,

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Item	Definition
Immediate Reboot <sup>†</sup>	Immediately turns an outlet off and turns it back on after the outlet's Reboot Duration expires. The sequence diagram in Reboot sequence illustrates the this command.
Shutdown <sup>†</sup>	Gracefully shuts down and optionally restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch Plus with the appropriate signaling cable, this operation will ensure that your server's operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. You can program the outlet to restart automatically by specifying a Restart Delay. The Restart Delay can be set to as long as 999.9 hours. The sequence diagram in Shutdown sequence illustrates the this command.
Battery Capacity Threshold Override <sup>†</sup>	Allows an outlet to restart when the UPS battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams in Outlet start-up sequence and Graceful Shutdown sequence for on-battery events illustrate the use of this command.
Cancel <sup>†</sup>	Cancels a delayed startup or shutdown. The sequence diagrams in Figures 3–6 and Figures 8–11 illustrate the use of this command.

**Table 15: Outlet Control Items, continued**

<sup>†</sup> Only available in Graceful Shutdown mode

outlets

On the Web interface, if the Outlet number is orange, the outlet is in Annunciator mode. This limits the Control Action of the outlet to No Action, Immediate Off, and Immediate On. The Control Mode (Annunciator or Graceful Shutdown) can be assigned using the Control Console.

For more information on assigning individual outlets to users, see Outlet User Manager. For additional information on Control Modes, see Outlet properties.

Administrators and Device Managers configure the MasterSwitch Plus unit outlets through this menu.

Configuration

Table 16 lists and defines the device configuration items available for MasterSwitch Plus.

Property	Description	Available Settings
Device Name	A string of characters used to identify the MasterSwitch Plus unit.	A maximum of 23 printable characters <b>Default:</b> = unnamed
Power On Time Delay	The time that MasterSwitch Plus will delay after AC power is applied before starting the outlet's power on sequence.	<b>Range:</b> 0–2:46:39 <b>Default:</b> 0
Manual Button	Governs whether or not the manual button functions. (This item is only available if you are using the Control Console.)	<b>Enabled:</b> the button functions according to the description Manual button <b>Disabled:</b> no functions <b>Default:</b> Enabled
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch Plus unit. All unit properties are set to the defaults shown in this table. Outlet Properties are restored to the defaults shown in Defaults for outlet properties.	Enter Yes to restore defaults. Press ESC to cancel request.
View Manufacturing Data	Displays the following information: Model Number, Manufacture Date, Hardware Rev, Firmware Rev, and Serial Number.	These items are provided for informational purposes and cannot be changed.
View Self-Test Results	Allows you to display the results of the unit's last power up self-test. The tests performed are: Program Memory: confirms whether or not the EPROM chip is working properly. Non-Volatile Memory: confirms whether or not the EEPROM chip is working properly.	Pass or Fail

**Table 16: Device Configuration**

Table 17 lists and defines the Outlet Configuration items available. See Defining outlet properties for the default settings for the Outlet Configuration items.

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	23 characters maximum
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	<b>Range:</b> 0–999:59:59 <b>Note:</b> Time is rounded up by 6-minute intervals
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	<b>Range:</b> 0–2:46:30
Power Off Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	<b>Range:</b> 0–2:46:30
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	<b>Range:</b> 0–2:46:30
URL	The Outlet’s HTTP link in URL form or a Telnet address.	(http://site.com/page) or (789.456.123.456)
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown Annunciator
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	<b>Range:</b> 0–100%
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet’s Low Battery signal after the UPS has gone on battery.	<b>Programmed Delay:</b> 0–16:39:59 <b>On Runtime Reboot:</b> Never When the UPS’s remaining falls below the UPS’s UPS Low Signal Time

**Table 17: Outlet Configuration Items**

Continued on next page

Item	Definition	Available Settings
UPS Low Battery Multiplier	<p>Adjusts the UPS Low Battery Signal Time. This property allows each outlet to be programmed to generate a low battery signal at a different time. MasterSwitch Plus will assert the outlet's Low Battery signal when both of the following conditions apply:</p> <ul style="list-style-type: none"> <li>the Low Battery Warning Control to On Runtime Remaining or Programmed Delay, and</li> <li>the UPS is on battery and the time remaining falls below the product of the UPS Low Battery signal time and the UPS Low Battery Multipliers.</li> </ul>	<p>Time.</p> <p><b>Range:</b> 1–7 is set</p> <p>UPS run-</p> <p>and</p>
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	<p><b>Yes</b></p> <p><b>No</b></p>
Toggle Measure-UPS II alarms	Accesses submenu to enable or disable Measure-UPS II alarms.	<p><b>Enabled</b></p> <p><b>Disabled</b></p>

**Table 17: Outlet Configuration Items, continued**

This menu provides status information about the temperature and humidity sensed by up to two Measure-UPS II probes; this menu also allows you to configure settings for Measure-UPS II.

Table 18 lists and defines the status information reported by the Measure-UPS II probes.

Item	Definition
Temperature	The temperature (in Celsius) sensed by Measure-UPS II probes.
High Temperature Violation	Reports whether the high temperature threshold is disabled or (when enabled) whether the current temperature exceeds the threshold (Yes or No).
Low Temperature Violation	Reports whether the low temperature threshold is disabled or (when enabled) whether the current temperature exceeds the threshold (Yes or No).
Humidity	The relative humidity (as a percentage) sensed by Measure-UPS II probes.
High Humidity Violation	Reports whether the high humidity threshold is disabled or (when enabled) whether the current humidity exceeds the threshold (Yes or No).
Low Humidity Violation	Determines whether the low humidity threshold is disabled or (when enabled) if the current humidity exceeds the threshold. (Yes or No)
Trap Thresholds	Defines the high and low temperature (in Celsius) and relative humidity (as a percentage) thresholds that Measure-UPS II will use to identify a trap condition.
Send Traps On	Enables or disables sending traps for each threshold violation.

**Table 18: Measure-UPS II Status**

contacts

The status section also reports information about the status of the four contact switches and includes the Firmware Version of the Measure-UPS II environment monitor.

Item	Definition
Device 1 (Contact Zone 1) Alarm through Device 4 (Contact Zone 4) Alarm:	The contacts by number and name, whether a contact alarm is Disabled (when Enabled) if the contact sense alarm condition (Yes or No).

**Table 19: Measure-UPS II Contact Settings**

ation

The Configuration section provides the definable Trap Threshold settings for probes and Measure-UPS II contact names and trap settings. Table 20 lists and defines the configurable items available for Measure-UPS II.

Item	Definition
Trap Threshold Options	Define the high and low temperature (in Celsius) and relative humidity (as a percentage) thresholds that the Measure-UPS will use to identify a trap condition. (You must enable the Send Traps item in order for Master-Switch Plus to react to the alarm.)
Contact Name 1–4	Defines a name for each contact, with each name having up to eight (8) characters.
Contact Zone 1–4	Enables or disables the contacts.

**Table 20: Measure-UPS II Probe Settings**

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The Network menu provides control and status information of the Network parameters. Only the Administrator can access the Network menu and settings.

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The TCP/IP section provides the necessary settings for MasterSwitch Plus and allows you to configure TCP/IP settings. Table 21 lists and defines the TCP/IP items available in the TCP/IP section.

<b>Item</b>	<b>Description</b>
System IP	The MasterSwitch Plus IP address
Subnet Mask	The network subnet mask
Default Gateway	The local default gateway (router address)
BOOTP	Enables or disables BOOTP requests for TCP/IP settings at startup.

**Table 21: TCP/IP Items**

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Continued on next page

For control of file transfers, the TFTP/FTP section allows access to the settings for the TFTP and FTP Client and FTP Server. Table 22 lists and defines the items available on the TFTP/FTP menu.

Item	Definition
<b>TFTP Client</b>	
Remote Server IP:	The network address of the TFTP server used for downloads.
<b>FTP Client</b>	
Remote Server IP:	The network address of the FTP server used for downloads.
User Name	The user name for access to the FTP server.
Password:	The password for access to the FTP server.
<b>FTP Server</b>	
Access:	Enable or Disable FTP server access.
Port:	The TCP/IP port on which the FTP server on the Management Card resides. Default port: 21

**Table 22: TFTP/FTP Items**

Table 23 lists and defines the items available for Telnet and Web ports.

Item	Definition
<b>Telnet</b>	
Access	Enables or Disables Telnet Access.
Port	The TCP/IP port where the Telnet server for the MasterSwitch Plus unit resides. Default port: 23
<b>Web</b>	
Access	Enables or Disables Web Access.
Port	The TCP/IP port where the Web server for the MasterSwitch Plus unit resides. Default port: 80

**Table 23: Telnet/Web Access Ports Items**

The SNMP section displays the SNMP settings, including the Access Control and Trap Receiver Settings. Table 24 lists and defines the items available on the menu.

Item	Definition
SNMP Access	Enables or disables SNMP access.
Access Control	Controls access to each of the four SNMP channels.
Trap Receiver	Defines the NMSs (up to 4) that traps are sent to.

**Table 24: SNMP Items**

**Access control**

The Access Control section (Table 25) identifies the current settings for all SNMP channels and provides the configurable values for a selected channel.

Item	Definition
Community Name	Password the NMS (identified by the NMS IP option) must use for SNMP access to MasterSwitch Plus. The allowed access type is defined by the Access Type option. Note: Up to 15 characters.
NMS IP	Configures the channel to allow only one NMS (using a specific NMS IP address), or all NMSs (using 0.0.0.0 for the NMS IP value), to have access to the channel.
Access Type	Defines whether an NMS (identified by the NMS IP option) can Write (use Gets and Sets), Read (use only Gets), or be Disabled (cannot use Gets and Sets at all).

**Table 25: SNMP Access Control Items**

Continued on next page

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## Trap Receiver

The Trap Receiver section (Table 26) identifies the current settings for all trap receivers. You can also change the values for a selected trap receiver through the menu.

<b>Item</b>	<b>Definition</b>
Community Name	Password MasterSwitch Plus uses when it sends traps to the NMS identified by the Receiver NMS IP option. Note: Up to 15 characters.
Receiver NMS IP	The specific NMS (using its IP address) that will receive traps sent by MasterSwitch Plus. Note: To send no traps to any NMS set the Trap Receiver IP to 0.0.0.0
Trap Generation	Enables or Disables MasterSwitch Plus to send traps to the NMS identified by the Receiver NMS IP option
Authentication Traps	Enables or Disables MasterSwitch Plus to send authentication traps to the NMS identified by the Receiver NMS IP

**Table 26: SNMP Trap Receiver Items**

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The System menu provides control and status information for the User Manager and Outlet User Manager. The configurable System parameters include User Accounts, Identification Values, Date/Time, File Transfers, and URL links. Only the Administrator has access to the System menu.

Manager

Under the User Manager section, the properties of the Administrator and Device Manager are configured. The Administrator has unrestricted access, but the Device Manager can only configure MasterSwitch Plus and Measure-UPS II; the Device Manager cannot configure Network and System parameters. Table 27 lists the items and defines the items available under the User Manager menu.

Item	Definition
Auto Logout	The amount of time of inactivity before the user is automatically logged out. <b>Default:</b> 3 minutes.
Authentication	A setting of Basic causes the Web Interface to use standard login (base64 encoded passwords); MD5 causes the Web Interface to use an MD5-based authentication login. <b>Default:</b> Basic
<b>Administrator</b>	
User Name	User name (10 characters maximum). <b>Default:</b> apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). <b>Default:</b> apc
Authentication Phrase	Authentication phrase (only for MD5), Phrase must be 15–32 characters long. <b>Default:</b> admin user phrase
<b>Device Manager User</b>	
User Name	User name (10 characters maximum). <b>Default:</b> apc
Password	Password only for HTTP 1.1 authentication (10 characters maximum). <b>Default:</b> apc
Authentication Phrase	Authentication phrase for MD5. The phrase must be 15–32 characters long. <b>Default:</b> device user phrase

**Table 27: User Manager Options**

---

## User Manager

Thirty two individual outlets can be assigned to users, each with their own word. An Outlet User account allows control of only those outlets assigned to that particular account. Accounts can also be disabled to prevent an Outlet User from logging in. Only the Administrator can create and manage individual Outlet User accounts. The table below lists and defines the items available to configure individual account access.

Item	Definition
User Name	Outlet user name for both HTTP 1.1 and MD5 authentication. (10 characters maximum.) Note: A User Name in Orange indicates the user's account has been disabled.
Password	Outlet user password for HTTP 1.1 authentication. (10 characters maximum.)
Authentication Phrase	Outlet user authentication phrase for MD5. The phrase must be 15–32 characters long
User Description	Identification/description of outlet user. (30 characters maximum)
Account Status	Enables, disables, or deletes Outlet's account. Note: A disabled account prevents the Outlet User of the account from logging in. The User Name will appear in Orange if the account has been disabled.
Device Outlet Access	Selects the outlets users will only have access to

**Figure 22: Outlet User Manager Items**

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## User List

The Current Outlet User List is a summary of the existing enabled or disabled accounts. The Outlet Access column provides a summary of which outlets the user has permission to access.

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The Identification section defines MasterSwitch Plus system identification options. Each option shows its current value. Table 28 lists and defines the configuration items for System Identification.

Item	Definition
Name	The system name used to identify the device. Name will be used for sysName OID in SNMP agent.
Contact	The contact or owner of the device. Will be used for sysContact OID in SNMP agent.
Location	The physical location of the device. Will be used for sysLocation OID in SNMP agent

**Table 28: System Identification Items**

ne

The System menu's Date/Time section defines the MasterSwitch Plus date and time settings. Table 29 lists and defines the Date/Time items.

Item	Definition
Date	The date for the system in the form of: MM/DD/YY.
Time	The time for the system in the form of: HH:MM:SS (24 hour time).

**Table 29: Date and Time Options**

Continued on n

The File Transfer menu provides access for managing file transfers. Table 30 and defines the items available for file transfers.

Item	Description
<b>Describe the Current transfer settings</b>	
Remote TFTP Server IP	IP address of the remote TFTP server defined in Network's TFTP/FTP settings. <b>TFTP:</b> Remote Server IP
Remote FTP Server IP	IP address of the remote FTP server defined in Network's TFTP/FTP settings. <b>FTP:</b> Remote Server IP
Remote FTP Server User Name	User name of the FTP server defined in Network's TFTP/FTP settings. <b>FTP Client:</b> User Name
Remote FTP Server Password	Password of the FTP server defined in Network's TFTP/FTP settings. <b>FTP Client:</b> Password
<b>Configure the Name of the File to Download</b>	
Filename	The name of the file to be downloaded
<b>Initiate the Transfer</b>	
Result of Last File Transfer	Displays the results of the last file transfer
Initiate File Transfer Via	Chooses whether the file will be transferred via TFTP or FTP

**Table 30: File Transfer Options**

Continued on next page

In the Tools section, you can reset or reboot the Management Card. The Action options are chosen from a pull-down menu. Table 31 lists and defines the options available in the Tools section.

Item	Description
No Action	Causes no action.
Reboot Card	Re-initializes the Management Card's operating system. Note: Loads are NOT rebooted.
Reset Card to Defaults	Restores all configuration settings to default values (values are stored in Management Card's EEPROM). WARNING: This will reset the TCP/IP settings and enable BOOTP!
Reset Card to Defaults Except TCP/IP	Restores all configuration settings to default values except TCP/IP settings (values are stored in Management Card's EEPROM).

**Table 31: Tools Options**

In the Links section, you can configure URL links in the form of text that will appear on the left hand side Navigation menu. (The APC Links are pre-defined.) Table 32 lists and defines the hyper-link items available from this menu.

Item	Definition
<b>User Links</b>	
Name	The link name (up to 3) that will appear on the menu bar.
URL	The HTTP link in URL form: http://mysite.com/mypage.com
<b>APC Links</b>	
Name	View the names of the APC links.
URL	Define the URL of each APC link.

**Table 32: Links Options**

**Note:** This option is not available on the Control Console interface.

## Introduction

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The Web/SNMP Management Card (hereby referred as the Management Card) automatically recognizes two types of binary files: firmware and configuration files. Both types of files contain a header and one or more Cyclical Redundancy Checks (CRCs) to ensure that the data contained in the files is not corrupted before or during the transfer operation.

When new firmware is transmitted to the Management Card, the program is updated and new features become available. When a configuration file is transmitted to the Management Card, the configuration settings are updated accordingly, and the Management Card ignores any other type of files transmitted.

There are several ways to transfer firmware and configuration files to the Management Card. This chapter describes the following options available for transferring files to the Management Card: Upgrading the Management Card's Firmware and Updating the Management Card's Configuration Settings.

**Note:** Firmware upgrade is available for the Management Card on the Switch plus device.

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**e defined** Broadly defined, firmware is highly specialized, reliable software that runs on PC type computers. The firmware allows the Management Card to perform its work, like managing the MasterSwitch plus device.

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**of upgrading** Upgrading the firmware on the Management Card has several benefits. First, the firmware will have the latest bug fixes and performance improvements. Second, any new features that have been added will become available for immediate use. Third, keeping the firmware versions consistent across your network simplifies the management task, since all Management Cards will support the same features in the same manner.

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**g latest firmware** To get the latest firmware version, contact APC Customer Support. The firmware upgrade consists of the following two files: the AOS (APC Operating System) module and the application module. The AOS module contains the operating system and network stack. The application module provides the Management Card with several user interfaces and the ability to speak to MasterSwitch plus Measure-UPS II. Depending on the type of upgrade, there may be additional steps. Contact APC Customer Support for details.

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**ou begin** Before you begin a firmware upgrade, it is important that you understand the basic terminology, as well as the steps required. Becoming familiar with the information in this section will save you time when upgrading firmware on a Management Card.

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Continued on next page

---

A firmware upgrade consists of two files; one of the files is the APC Operating System module (AOS), and the other is the application module.

**The AOS module.** This file contains the operating system and network stack. The AOS module file name has the following format:

AOS101.bin

- AOS: indicates that this is a APC Operating System module.
- 101: indicates that the version is v1.0.1.
- bin: indicates that this is a binary file.

**The application module.** This file provides the Management Card with serial console user interfaces and the ability to communicate with the MasterSwitch plus the MasterSwitch UPS. The application module file name will have the following format:

msp101.bin

- msp: indicates that this is an application module for the MasterSwitch.
- 101: indicates that the version is v1.0.1.
- bin: indicates that this is a binary file.

The AOS module must be transmitted to the Management Card first. Once the AOS module has been successfully transferred, the application module must be transmitted to the Management Card. Upgrading the Firmware for detailed instructions on how to transfer both modules to the Management Card.

---

Below are the methods, listed in order of simplicity, used to upgrade the Management Card's firmware:

- Upgrading using the Web/SNMP Management Card Wizard
  - Upgrading multiple Management Cards that are available on the network. See Upgrading firmware for detailed instructions.
  - Upgrading using XMODEM for Management Cards that are not available on the network. Procedure for upgrading using XMODEM for detailed instructions.
-

## Upgrading a single Management Card on the

To upgrade a single Management Card that is available on the network, use the command prompt FTP Client. To perform an upgrade using this method, the Management Card must be:

- configured with a System IP, Subnet Mask, and Default Gateway;
- attached to the network; and
- set up so that FTP Server is enabled.

To upgrade using a command prompt FTP Client, perform the following steps in the order given:

- 1 Open an MS-DOS command prompt window on a PC that is connected to the network. Go to the directory that contains the firmware upgrade files and enter the commands shown in **bold**:

```
C:\>cd\apc
C:\apc>dir
Volume in drive C has no label
Volume Serial Number is 405F-1BD2
Directory of C:\apc
. <DIR>          10-08-98 4:59p .
.. <DIR>         10-08-98 4:59p ..
AOS101 BIN      327,680 10-08-98 1:02p aos101.bin
MSP101 BIN      458,752 10-07-98 4:39p msp101.bin
2 file(s)       786,432 bytes
2 dir(s)        763,691,008 bytes free

C:\apc>
```

- 2 Open an FTP client session:

```
C:\apc> ftp
ftp>
```

- 3 Connect to the Management Card:

- If the Management Card's FTP Server Port is 21 (the default), enter the following command:

```
ftp> open 150.250.6.10
```

- If you have changed the Management Card's default FTP Server Port to a value other than 21, then use the following command:

```
ftp> open 150.250.6.10 21000
```

ing a single  
ment Card on the  
continued

- 4 Log in using the Administrator user name and password. If you have changed your passwords, they may be different than the defaults shown below, "apc" and "apc".

```
Connected to 150.250.6.10.  
220- APC FTP server ready.  
220  
User (150.250.6.10:(none)):apc  
331 User name okay, need password.  
Password:apc  
230 User logged in, proceed.  
ftp>
```

**Note:** Typically, the password will appear on the screen as \*\*\*.

- 5 Upgrade the AOS:

```
ftp> bin  
200 Command okay.  
ftp>  
ftp> put AOS101.bin  
200 Command okay.  
150 Opening data connection for AOS101.bin  
250 Requested file action okay, completed.  
Management Card Rebooting....  
327680 bytes sent in 5.99 seconds (54.70 Kbytes/sec)  
ftp>
```

- 6 Close the FTP client session:

```
ftp>quit  
C:\apc>
```

- 7 Wait 20 seconds.

- 8 Repeat Steps 3–8 for the application module. In Step 6, use the application module file name (the one with the msp prefix) in place of the AOS module file name.

ing multiple  
ment cards on the

To upgrade multiple management cards using an FTP client, write a script that automatically performs the steps in the previous section.



- 
- 7 After the XMODEM transfer is complete, set the baud rate to 2400. The Management Card will automatically reboot itself.  
**Note:** Never remove the Management Card before it completes a reboot cycle or the card will be damaged. The reboot cycle is complete when the status LED turns off, then turns solid green, and then slowly flashes red after 20 seconds.
  - 8 Repeat Steps 1–7 to install the application module. In Step 6, substitute the application module file name (the one with the msp prefix) for the AOS module file name.
-

---

You can verify that the firmware upgrade was successful by looking at the Transfer Result message. This message is available in the Control Console interface in the System->File Transfer menu and via SNMP using the mfiletransferStatusLastTransferResult OID.

---

## result codes

Table 33 lists the possible Last Transfer Result codes.

Code	Description
Successful	The file transfer was successful.
Result not available	There are no recorded file transfers.
Failure unknown	The last file transfer failed for an unknown reason.
Server inaccessible	The TFTP or FTP server could not be found on the network
Server access denied	The TFTP or FTP server denied access.
File not found	The TFTP or FTP server could not locate the requested file.
File type unknown	The file was downloaded but the contents were not recognized.
File corrupt	The file was downloaded but at least one CRC was bad.

**Table 33: Last Transfer Result Codes**

You can also verify that the expected versions of the newly upgraded APC Operating System and application modules are displayed in the Web interface Control Console System->About Card menu and via SNMP using the MIB I sysDescr OID.

---

---

**ation settings**

The Management Card stores its configuration settings internally. These include TCP/IP, TFTP, FTP, Web, Measure-UPS II, password, and system settings. Configuration settings do not include MasterSwitch plus settings.

---

**onfiguration**

There are several ways to edit the Management Card's configuration settings. One method is to log into either the Web interface or Control Console serially, or through Telnet. Any setting that can be edited can be changed in these interfaces. Another method is to perform Sets via SNMP. Only settings which have OID and MIB defined as read-write can be edited.

---

**ation files**

Configuration files provide another way to alter the settings of a Management Card. A configuration file is a binary-encoded file that includes a header, multiple entries, and configuration data; it is not editable in a text editor, since such changes cause the CRCs to be incorrect.

After transferring a configuration file to the Management Card, the Card will assume all of the new settings specified in the configuration file. A configuration file will have a .cfg extension.

---

**onfiguration**

Configuration files can be created with the Web/SNMP Management Card Wizard. The Wizard operates under Windows 95, Windows 98, and NT 4.0. See Web/SNMP Management Card Wizard for details on how to create a configuration file.

---

**ring****ation files to a****ment Card**

There are several ways to transfer a configuration file to a Management Card. They can:

- Specify the configuration file as the BOOTP filename in a BOOTP response.
  - Use the Web/SNMP Management Card Wizard (included on CD-ROM) to transfer the configuration file to one or more Management Cards.
  - Upload the configuration file to the Management Card using FTP.
  - Initiate a TFTP or FTP download of a configuration file via Web, Control Console, or SNMP.
-

## Configuring the Management Card using a BOOTP filename

To update the configuration settings using a BOOTP bootup filename, follow the steps below in the order given:

- 1 Create a binary configuration file (.cfg extension). See Web/Management Card Wizard for details.
- 2 In the BOOTPTAB file of your BOOTP server, specify the Management Card's System IP, Subnet Mask, and Default Gateway. Specify the configuration file as the Bootup Filename.  
**Note:** The Bootup Filename must be less than 33 characters, and cannot contain path information.
- 3 Install or reboot the Management Card, to initiate a BOOTP request. You can reboot the Management Card in the Control Console or Web Interface, under the System>Tools menu, or in SNMP via the mcontrolRestartAgent OID. You can also reboot the Management Card by pressing the white Reset button on the faceplate.

## Understanding the update process

When the Management Card receives the BOOTP response it will assume the System IP, Subnet Mask, and Default Gateway. The Management Card will also automatically recognize that a configuration file has been specified in the Bootup Filename and will attempt to download that file.

The Management Card will make a TFTP request for the Bootup Filename from the same IP address that supplied the BOOTP response. If a TFTP server is present on that computer and the configuration file is in the appropriate directory, the Management Card will download the configuration file and assume all of the configuration file's settings.

If the TFTP request fails, the Management Card will make an FTP request for the Bootup Filename from the same computer that supplied the BOOTP response. The FTP request will use the FTP Client User Name and Password, previously configured in the Management Card, to log in to the FTP server. If the FTP server is present and the configuration file is in the appropriate directory, the Management Card will download the configuration file and assume all of that file's specified settings.

You can see whether the file transfer was successful by looking at the Web Interface or Control Console System->File Transfer menu or SNMP via the mfiletransferStatusLastTransferResult OID.

To update the configuration settings using the Management Card Wizard, follow the steps below in the order given:

**Note:** Please Refer to Chapter 6 Web/SNMP Management Card Wizard for a detailed description of how to update the configuration settings of one or more Management Cards. The following steps describe only the general process of updating the configuration settings. The steps do not address many of the available options.

- 1 Install (if necessary) and run the Web/SNMP Management Card Wizard (included on CD-ROM). For details on installing the Wizard, see Web/SNMP Management Card Wizard.
- 2 If you have a saved ini file, load it and change any settings as needed. You can also create and save new settings.
- 3 Click Finish.
- 4 Select the settings you want to transmit to the Management Cards.
- 5 Click Next> to continue.
- 6 You can view, print, and save your new settings. When finished click Next> to continue.
- 7 Choose the Network (via FTP) and click Next> to continue.
- 8 If you have saved a list of Management Card IP addresses, load it now. If you do not have a saved list, enter the IP addresses of the Management Cards that you want to send the configuration settings to. Enter the FTP Server Port and Administrator user name and password for the Management Cards that you are transmitting the settings to.
- 9 Save the new IP address list and click <Next> to continue.
- 10 Click Apply to transmit the configuration settings to all of the specified Management Cards. You can save, print, or clear the window contents and the download results.

---

Continued on next page

To update the configuration settings using an FTP Client, follow the steps below in the order given:

- 1 Create a configuration file by using the Web/SNMP Management Wizard (included on CD-ROM). See Web/SNMP Management Card for details.
- 2 Open an MS-DOS command prompt window on a machine that is connected to the network.
- 3 Go to the directory containing the configuration file and enter the following commands shown in bold:

```
C:\>cd\apc
C:\apc>dir
Volume in drive C has no label
Volume Serial Number is 405F-1BD2
Directory of C:\apc
. <DIR>          10-08-98 4:59p .
.. <DIR>         10-08-98 4:59p ..

MYCONFIG CFG 146 10-08-98 1:02p myconfig.cfg
1 file(s)          146 bytes
2 dir(s)          763,691,008 bytes free
C:\apc>
```

- 4 Open an FTP client session:

```
C:\apc> ftp
ftp>
```

- 5 Connect to the Management Card:

- If the Management Card's FTP Server Port is 21 (the default) use the following command:

```
ftp> open 150.250.6.10
```

- If you have changed the Management Card's default FTP Server Port to a value other than 21, use the following command:

```
ftp> open 150.250.6.10 21000
```

- 6 Log in using the Administrator user name and password:

```
Connected to 150.250.6.10.  
220- APC FTP server ready.  
220  
User (150.250.6.10:(none)):apc  
331 User name okay, need password.  
Password:apc  
230 User logged in, proceed.  
ftp>
```

**Note:** Your passwords may be different than the defaults of "apc". Passwords typically will appear on the screen as \*\*\*.

- 7 Upload the configuration file, identified by a .cfg extension:

```
ftp> bin  
200 Command okay.  
ftp>ftp> put myconfig.cfg  
200 Command okay.  
150 Opening data connection for myconfig.cfg  
250 Requested file action okay, completed.  
Management Card Rebooting....  
146 bytes sent in 0.00 seconds (146000.00 Kbytes/sec)  
ftp>
```

- 8 Close the FTP client session:

```
ftp>quit  
C:\apc>
```

- 9 Verify that the file transfer was successful by looking at the Web interface or Control Console System->File Transfer menu or SNMP via the mfiletransferStatusLastTransferResult OID.

## g by initiating a wnload

To update the configuration settings, using a TFTP download, follow the steps below in the order given:

- 1 Create a configuration file by using the Web/SNMP Management Wizard. See Web/SNMP Management Card Wizard for details.
- 2 Configure the TFTP Remote Server IP to the address of the computer is running the TFTP server by using one of the following procedures:
  - Web Interface: Log in to the Web interface as the administrator and access the Network->TFTP/FTP page. Configure the TFTP Client Remote Server IP to the address of the TFTP server.
  - Control Console: Log in to the Control Console as the administrator and then access the Network->TFTP Client menu. Configure the Remote Server IP to the address of the TFTP server.
  - SNMP: Set the mfiletransferConfigTFTPServerAddress OID to the address of the TFTP server.
- 3 Set the name of the configuration file by using one of the following methods:
  - Web Interface: Access the System->File Transfer page. Set the Filename to the name of the configuration file you want to download. The Filename may include path information if desired.
  - Control Console: Access the System->File Transfer->Settings menu. Set the Filename to the name of the configuration file you want to download. The Filename can include path information.
  - SNMP: Set the mfiletransferConfigSettingsFilename to the name of the configuration file you want to download. The Filename can include path information.
- 4 Initiate the TFTP download using one of the following methods:
  - Web Interface: Access the System->File Transfer page. Select the method from the Initiate File Transfer Via drop down box. Click Apply to initiate the download.
  - Control Console: Access the System->File Transfer->TFTP Client menu. Enter **Yes** to initiate the download.
  - SNMP: Set the mfiletransferControlInitiateFileTransfer OID to initiateefFileTransferDownloadViaTFTP.
- 5 Verify that the file transfer was successful by checking the Web interface or Control Console System->File Transfer menu or SNMP via the

---

To update the configuration settings using a FTP download, follow the steps in the order given:

- 1 Create a configuration file by using the Web/SNMP Management Wizard (included on CD-ROM). See Web/SNMP Management Card.
- 2 Configure the FTP Remote Server IP, User Name, and Password to one of the following methods:
  - Web Interface: Log in to the Web interface as the administrator, then access the Network->TFTP/FTP page. Configure the FTP Client Remote Server IP, User Name and Password to the address, user name and password of the FTP server.
  - Control Console: Log in to the Control Console as the administrator, then access the Network->FTP Client menu. Configure the Remote Server IP, User Name and Password to the address, user name and password of the FTP server.
  - SNMP: Set the mfiletransferConfigFTPServerAddress, mfiletransferConfigFTPServerUser, and mfiletransferConfigFTPServerPassword OIDs to the address, user name and password of the FTP server.
- 3 Set the name of the configuration file through one of the following methods:
  - Web Interface: Access the System->File Transfer page. Set the Filename to the name of the configuration file you want to download. The Filename can include path information.
  - Control Console: Access the System->File Transfer->Settings page. Set the Filename to the name of the configuration file you want to download. The Filename can include path information.
  - SNMP: Set the mfiletransferConfigSettingsFilename to the name of the configuration file you want to download. The Filename can include path information.

g by initiating a  
load, continued

- 4 Initiate the FTP download through one of the following methods:
  - Web Interface: Access the System->File Transfer page, then FTP from the Initiate File Transfer Via drop down box. Click to initiate the download.
  - Control Console: Access the System->File Transfer->FTP Client menu. Enter **Yes** to initiate the download.
  - SNMP: Set the mfiletransferControlInitiateFileTransfer OID to initiateefFileTransferDownloadViaFTP.
- 5 Verify that the file transfer was successful by checking the Web interface or Control Console System->File Transfer menu or at SNMP via the mfiletransferStatusLastTransferResult OID.

g that the update  
successful

You can verify that the configuration file transfer was successful by looking at the Last Transfer Result message. This message is available in the Control Console Web interface in the System->File Transfer menu and via SNMP using the mfiletransferStatusLastTransferResult OID. Table 34 lists the possible Last Transfer Result codes.

Code	Description
Successful	The file transfer was successful.
Result not available	There are no recorded file transfers.
Failure unknown	The last file transfer failed for an unknown reason.
Server inaccessible	The TFTP or FTP server could not be found on the network
Server access denied	The TFTP or FTP server denied access.
File not found	The TFTP or FTP server could not locate the requested file.
File type unknown	The file was downloaded but the contents were not recognized.
File corrupt	The file was downloaded but at least one CRC was bad.

**Table 34: Last Transfer Result Codes**

## Introduction

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The Web/SNMP Management Card Wizard is a Windows application designed specifically to pre-configure, reconfigure, and upgrade multiple Web/SNMP Management Cards. The Wizard works locally through the serial port of your Management Card or remotely over your TCP/IP network. Using the Wizard to configure the Management Card, you can:

- Configure the required settings by automatic discovery remotely or locally
  - Preconfigure multiple Management Cards before deployment
  - Reconfigure multiple Management Cards after being deployed
  - Upgrade the Firmware of the Management Card
  - Create a Configuration file for BOOTP
  - Create a Configuration file
- 

## Requirements

The Wizard runs on Windows 95, Windows 98, and Windows NT 4.0 Intel-based workstations.

---

## Getting updated versions of the Wizard

Updated versions of the Wizard are available as a free download from the Download Software page at <http://www.apcc.com>. Access to some of the Wizard's features may require a firmware upgrade, which may involve a charge. For information on updating Management Card's firmware, see Upgrading the Management Card's Firmware.

---

## Configuring Management Card Settings

Using the Wizard, all of the Management Card's settings, except URL names and links, can be configured locally or remotely.

**Note:** You cannot configure any MasterSwitch Plus settings using the Wizard.

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Continued on next page

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## g the Wizard

If autorun is enabled on your CD-ROM drive, the installation program will start automatically when the Utility CD is inserted. Otherwise, run the setup.exe installation program found in the Wizard directory and follow the on-screen instructions. During installation, a shortcut link is created in the Start menu to this link to launch the Wizard application.

---

## Help

The Wizard is equipped with on-line Help. To access this feature, click the Help button located in the left hand corner of the Wizard screen.

---

## Configuration of required settings

You can quickly configure only the required settings using the Wizard. For more instructions, see Configuring the required settings.

---

## Configuring multiple Management Cards before deployment

Pre-configuring multiple Management Cards before they are deployed depends on your organization's deployment strategy. The following list describes the different deployment options:

- Using the Wizard, you can pre-configure and deploy all of the Management Card's settings locally or the TCP/IP settings remotely through auto deployment of the Management Card. See Pre-configuring the Management Card for more instructions.
  - You can deploy your Management Cards without any pre-configuration. Let a BOOTP server assign the TCP/IP settings (System IP, Subnet Mask, and Default Gateway) and use the Wizard to reconfigure any of the Management Card's settings remotely. See Reconfiguring deployed Management Cards for details.
  - You can deploy your Management Cards without any pre-configuration. Let a BOOTP server assign the TCP/IP settings (System IP, Subnet Mask, and Default Gateway) and specify a configuration file (.cfg extension). The Management Card will assume all settings specified in the configuration file. Configuration files are created using the Wizard. See Creating a configuration file for BOOTP for instructions.
- 

Continued on next page

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**Configuring multiple  
Management Cards after  
deployment**

Reconfiguring multiple Management Cards after they are deployed depends on your organization's preferences. The following list describes the options available.

- You can use the Wizard to reconfigure any of the Management Cards remotely. See [Reconfiguring deployed Management Cards for instructions](#).
- You can create a configuration file (.cfg extension) with the Wizard and transmit it to the Management Card. See [Creating a configuration file for instructions](#).

---

**Upgrading firmware using  
the Wizard**

You can easily upgrade the firmware of many Management Cards simultaneously using the Wizard. See [Upgrading firmware for instructions](#).

---

---

The Management Card Wizard allows you to direct the configuration of Management Cards to fit your needs. This section provides instructions on pre-configure, reconfigure, and upgrade Management Cards using the Management Card Wizard. Use the procedure that would best fit your needs.

---

## Configuring the required

To configure the Management Card's required settings, follow the steps below in the order given:

- 1 Use the link in the Start menu to launch the Wizard application. The Wizard will automatically detect any unconfigured Management Cards and will prompt you to configure the network settings.
- 2 Configure the Management Cards TCP/IP settings:  
For remote configuration, wait until the Wizard prompts you for the TCP/IP settings and go on to Step 3.  
To configure the Management Card's TCP/IP settings locally:
  - a Select the Express (Recommended) option from the Installation Options screen. Click NEXT > to continue.
  - b Select the Locally (via. Serial Port) option from the Express Configuration screen. Click NEXT > to continue.
- 3 Configure your network settings. At a minimum, you must configure the TCP/IP settings (System IP, Subnet Mask, Default Gateway). Please contact your network administrator to obtain valid TCP/IP settings. As soon as the Management Card's TCP/IP settings are configured before deployment, the Management Card can be reconfigured remotely at a later date.
- 4 Click the checkbox 'Start a Web browser when finished' to connect the Web to the Management Card that you are about to configure. The Wizard launches a default Web browser. Click Finish and wait for a few seconds to let the Card reboot.
- 5 After the correct (IP format) information is entered, the Finish button becomes enabled. Click this button to transmit the TCP/IP settings. The Wizard automatically checks to see if the System IP address you entered is in use on the Network. If it is discovered as an IP address in use, simply re-enter a valid IP address and click Finish.

**Note:** The Finish button becomes enabled only after the IP address is entered correctly. To continue, follow the on-screen instructions.

To pre-configure the Management Card, follow the steps below in the order

- 1 Use the link in the Start menu to launch the Wizard application. Click Next > to continue.
- 2 Select the Custom (Advanced) option from the Installation Options screen. Click Next > to continue.
- 3 Select the 'Define a New Configuration File (Typical)' option from the Custom Installation screen. Click NEXT > to continue.
- 4 Configure your network settings. At a minimum, you must configure the TCP/IP settings (System IP, Subnet Mask, Default Gateway, and BOOTP). As long as the Management Card's TCP/IP settings are configured, after deployment, the Management Card can be re configured remotely at a later time.

**Note:** If you intend to use the Management Card Wizard to configure multiple Management Cards after deployment then do NOT disable the Management Card's Server Access.

- 5 Continue clicking NEXT > to cycle through the Management Card configuration settings. Any settings that you do not want to configure should be disabled on their own alone.
- 6 Stop at the screen titled "Customize the settings that will be transmitted to the Management Card," and choose to transmit the TCP/IP settings (System IP, Subnet Mask, Default Gateway, and BOOTP) and any additional options you wish to configure. Click NEXT > to continue.
- 7 Verify the selections you have made on the Configuration Summary screen; you can save or print the settings. If you save the settings, you can load them into the Wizard at a later time. Click Next > to continue.
- 8 Select the Locally (via serial port) option from the Transmit Current Settings screen. Click Next > to continue.
- 9 Follow the on-screen instructions. Click Apply to transmit the new settings to the Management Card. You will be prompted when the transmission is complete or if there was a communications failure.
- 10 To define the TCP/IP settings for the next Management Card that you want to configure, click the Rewind button on the Transmit Settings Locally screen.

To create a BOOTP configuration file, follow the steps below in the order given.

- 1 Use the link in the Start menu to launch the Wizard application. Click Next > to continue.
- 2 Select the Custom (Advanced) option from the Installation Options screen. Click Next > to continue.
- 3 Select the 'Define a New Configuration File (Typical)' option from the Custom Installation screen
- 4 Click NEXT > to continue.

**Note:** Generally, when using a configuration file in conjunction with BOOTP, the configuration file will contain only settings that are generic across multiple Management Cards.

- 5 Click Next > to continue through the Management Card's various screens. Any settings that you do not want to configure should be left alone.

**Note:** If you intend to use the Management Card Wizard to create Management Cards after they are deployed, then do NOT select FTP Server Access.

- 6 Stop at the screen titled "Customize the settings that will be transmitted to the Management Card," and choose the settings you want to transmit to the Management Card. At a minimum, you should deselect the BOOTP settings (System IP, Subnet Mask, Default Gateway, and BOOTP) if those settings are specified by the BOOTP server. It is also recommended that FTP Server Access be deselected. Click Next > to continue.
- 7 Verify the selections you have made in the Configuration Summary screen and print the summary text box.

- 8 Save your settings.

**Note:** Saving automatically produces two files. One of the files is an editable configuration file (.ini extension) that can be reloaded into the Wizard, the other is a binary configuration file (.cfg extension). The binary configuration file contains only the settings that were selected in the Customize the settings that will be transmitted to the Management Card screen

**a configuration**  
**BOOTP, continued**

- 9 Specify the Management Card's System IP, Subnet Mask, and Default Gateway in the BOOTPTAB file of your BOOTP server. Specify the configuration file(.cfg extension) that was saved in the Bootup Filename, which may be up to 32 characters in length and may contain path information.
- 10 Install or reboot the Management Card to make a BOOTP request. You can reboot the Management Card in the Control Console or Web Interface using the System->Tools menu, or in SNMP via the mcontrolRestartManagementCard MIB OID. You can also reboot by pressing the white Reset button on the front panel.

**summary of**

When the Management Card receives the BOOTP response, it will assume the System IP, Subnet Mask, and Default Gateway. The Management Card will also automatically recognize that a configuration file has been specified in the Bootup Filename and it will attempt to download that file.

The Management Card will first make a TFTP request for the Bootup Filename from the same IP address that supplied the BOOTP response. If a TFTP server is present on that computer, and the configuration file is in the appropriate directory then the Management Card will download the configuration file and assume all of the specified settings.

If the TFTP request fails then the Management Card will make an FTP request for the Bootup Filename from the same computer which supplied the BOOTP response. The FTP request will use the FTP Client User Name and Password (defaults are apc) previously configured in the Management Card to login to the FTP server. If the FTP server is present and the configuration file is in the appropriate directory then the Management Card will download the configuration file and assume the specified settings.

Continued on next page

To reconfigure the Management Card, follow the steps below in the order

- 1 Use the link in the Start menu to launch the Wizard application. Click Next > to continue.
- 2 Select the Custom (Advanced) option from the Installation Options screen. Click Next > to continue.
- 3 Select the 'Define a New Configuration File (Typical)' option from the Custom Installation screen
- 4 Click NEXT > to continue.

**Note:** Generally, when using a configuration file in conjunction with BOOTP, the configuration file will contain only settings that are generic across multiple Management Cards.

- 5 Click Next > to continue through the Management Card's various screens. Any settings that you do not want to configure should be left alone.

**Note:** If you intend to use the Management Card VNC, then do NOT disable FTP Server Access.

- 6 Stop at the screen titled "Customize the settings that will be transmitted to the Management Card." Select the settings you want to transmit to the deployed Management Cards. Deselect, the TCP/IP (System IP, Subnet Mask, Default Gateway, and BOOTP) and FTP Server Access settings because they are not transmitted. Finish selecting the options you want to reconfigure.

- 7 Click Next > to continue. Verify the selections you have made, on the Configuration Summary Screen. Save and print the summary text by clicking the appropriate buttons. If you save these settings, you can use them into the Wizard at a later time.

**Note:** Make sure that you have selected ONLY the settings you want to reconfigure. You can inadvertently overwrite the deployed Management Card settings if you have not properly deselected settings that you do NOT want to reconfigure. All settings that have a YES in the Send column of the Configuration Summary screen will be transmitted.

- 8 Click Next > to continue.

uring deployed  
ment Cards,  
d

- 9 Select the Remotely (over network via FTP Server) option from the Transmit Current Settings screen. Click Next > to continue
- 10 Add the IP addresses of the Management Cards that you want to configure on the Remote File Transfer screen. If the deployed Management Cards have different settings for the Administrator User Name, Password, and FTP Server Port then change the values in the wizard to reflect those values. If you have a saved list of Management Card IP addresses, you can load them by clicking the Load... button. Click Next > to continue
- 11 Click Apply in the Remote File Transfer via FTP screen to transmit the settings to all of the Management Cards specified in the previous screen. After transmitting the settings to all of the Management Cards, a transmission log will be available. The log can be saved, printed, or cleared by clicking the appropriate button.

a configuration

To create a configuration file, follow the steps below in the order given:

- 1 Use the link in the Start menu to launch the Wizard application. Click Next > to continue.
- 2 Select the Custom (Advanced) option from the Installation Options screen. Click Next > to continue.
- 3 Select the 'Define a New Configuration File (Typical)' option from the Custom Installation screen.
- 4 Click Next > to continue through the Management Card's various screens. Any settings that you do not want to configure should be left alone.  
**Note:** If you intend to use the Management Card Wizard to configure the Management Cards after they are deployed, then do NOT select FTP Server Access.
- 5 Stop at the screen titled 'Customize the settings that will be transmitted to the Management Card,' and choose the settings you want to transmit to the Management Card. At a minimum, you should deselect the Transmission settings (System IP, Subnet Mask, Default Gateway, and BOOTP) if those settings are specified by the BOOTP server. It is also recommended that FTP Server Access be deselected.

Continued on next page

## Configuration

Continued

- 6 Click Next > to continue.
- 7 Verify the selections you have made in the Configuration Summary screen and print the summary text box.  
**Note:** Make sure that you have selected ONLY the settings you want to reconfigure. You can inadvertently overwrite the deployment Card settings if you have not properly deselected the settings that you do NOT want to reconfigure. All settings that have a YES in the Send column of the Configuration Summary screen will be transmitted.
- 8 Save your settings.  
**Note:** Saving automatically produces two files. One of the files is an editable configuration file (.ini extension) that can be reloaded into the Wizard, the other is a binary configuration file (.cfg extension). The binary configuration file contains only the settings that were selected in the Customize the settings that will be transmitted screen of the Management Card screen.
- 9 Transmit the binary configuration file (.cfg extension) to the Management Card. See Firmware & Configuration File Transfers for detailed explanations of the various file transfer options available.

## Upgrading firmware

Make sure that the Management Cards that you want to upgrade have had their TCP/IP settings configured and that they are connected to the network. To upgrade the Management Card's firmware, follow the steps below in the order given.

- 1 Use the link in the Start menu to launch the Wizard application.
- 2 The main screen displays the software version of the Wizard. Click Next > to continue.
- 3 Select the Custom (Advanced) option from the Installation Options screen. Click Next > to continue.
- 4 Select the 'Upgrade Firmware' option from the Custom Installation screen. Click Next > to continue.

**Note:** You cannot configure any MasterSwitch plus settings (via the serial port) or remotely (over the network via FTP) using the Wizard.

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- 5 Press the Browse buttons for both the APC Operating System and Configuration Firmware Modules. Select the appropriate file. If the wrong file is selected a warning will be displayed. See Firmware & Configuration Transfers for details about how to obtain new firmware modules from APC.
  - 6 Add the IP addresses of the Management Cards that you want to upgrade. If the deployed Management Cards have different settings for the Administrator User Name, Password, and FTP Server Port then change the values in the wizard to reflect those values. If you have previously saved a list of Management Card IP addresses then you can load them by clicking the Load... button. Click Next > to continue.
  - 7 Click Apply to transmit the new firmware to all of the Management Cards specified in the previous screen. After transmitting the firmware to the Management Cards, a transmission log will be available. The log can be saved, printed, or cleared by clicking the appropriate button.
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## Security Features

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MasterSwitch Plus provides several security features whose availability depends on the interface you are using. This chapter describes each security option. In general, the security features of MasterSwitch Plus provide a reasonable level of access control and authentication control. As a device that passes information across the network, MasterSwitch Plus is subject to the same security risks as other network devices. If your network is connected to the Internet or other external networks, you should consider incorporating additional security measures, for example, firewalls.

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### Encryption versus Authentication

MasterSwitch Plus does not currently use encryption. The data and communications between MasterSwitch Plus and the client interfaces, such as Telnet and the Web interface, are read by capturing the network traffic going to and from MasterSwitch Plus. Most applications do not transfer sensitive data that would pose a security risk.

The card does provide basic authentication using user names and passwords to control access and to verify the IP address. Basic authentication is sufficient for most environments. MasterSwitch Plus can provide a greater level of security by enabling MD5 authentication for the Web interface. For information on using MD5 authentication, see "MD5 Authentication".

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### User names, passwords and community names

The Administrator, Device Manager, and Outlet user names and passwords are used for logging into the Control Console and Web interfaces. All user names, passwords, and community names for SNMP are transferred over the network as plain text. Anyone capable of monitoring the network traffic can determine the user names and passwords required for access to MasterSwitch Plus. Any similar devices, such as Telnet, a Web server, or an SNMPv1 agent will face the same security risk due to the limitations of the protocols.

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You can define the TCP ports to be detected by Telnet, FTP, or Web servers. The ports are set initially at the standard “well known port” for the particular protocol. To hide the interfaces, you can use arbitrary ports from 5000–65535. Once an interface uses a non-standard port, you must specify the port when using that interface, such as a Web browser. Hiding the servers provides an added level of security.

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The Web interface option for MD5 authentication enables a higher level of security than provided by the basic HTTP authentication scheme. The MD5 scheme is very similar to CHAP and PAP remote access protocols. When MD5 is enabled, the Web server requests a user name and a password phrase (distinct from the user password). The user name and password phrase are not transmitted over the network, as in basic authentication. A Java login applet combines the user name and password phrase, and a session-unique challenge number to calculate an MD5 hash number. The hash number is then returned to the server so that it can verify that the user has the correct login information. By passing back only the hash number, the login information is not revealed. In addition to the login authentication, each form post for configuration or control operations is also authenticated with a unique challenge and hash response. This scheme does not involve any encryption, so pages are transmitted in their plain-text form. In addition, after the authentication login, subsequent page access is restricted by IP addresses and a hidden session cookie.

Since the MD5 authentication scheme is available only for the Web interface, you must disable the less secure interfaces, including Telnet, FTP, and SNMP. For security, it is possible to disable write-only access so that read and trap facilities are still available.

The MD5 authentication scheme provides a much higher level of security than the plain-text type access methods. However, sophisticated attacks are almost impossible to prevent. Well-configured firewalls are an essential element in an overall security scheme.

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Table 35 describes each of the interfaces and access methods.

Interface	Security Access	Notes
DTE Control Console	<ul style="list-style-type: none"> <li>– User name &amp; password</li> </ul>	Always enabled.
Telnet Control Console	<ul style="list-style-type: none"> <li>– User name &amp; password</li> <li>– Selectable server port</li> <li>– Server Enable/Disable</li> </ul>	The user name and password are transmitted plain-text.
SNMP	<ul style="list-style-type: none"> <li>– Community Name</li> <li>– NMS IP filters</li> <li>– Agent Enable/Disable</li> <li>– Four access communities with read/write/disable capability</li> </ul>	IP filters only allow access from designated IP addresses.
FTP Server	<ul style="list-style-type: none"> <li>– User name &amp; password</li> <li>– Selectable server port</li> <li>– Server Enable/Disable</li> </ul>	Administrator access only.
Web Server	<ul style="list-style-type: none"> <li>– User name &amp; password</li> <li>– Selectable server port</li> <li>– Server Enable/Disable</li> <li>– MD5 Authentication option</li> </ul>	In basic HTTP authentication mode, the user name and password are transmitted base-64 encoded (no encryption). In MD5, authentication mode uses the user name and password phrase.

**Table 35: Security Access**

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MasterSwitch Plus provides help menus on each interface to assist you if you are having trouble finding what you need. The help menu is located on the lower right hand side of the screen on the Web interface. On the Control Console, type **?** to access the help menu.

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Listed below are the various subjects that the help files offer.

**Contents.** The Contents screen provides a complete listing of the help information.

**Assistant Online.** Assistant Online brings APC Customer Service to the Web interface. When you select Assistant Online, MasterSwitch Plus will transmit information about the Management Card to APC's Assistant Online server. The server will process the information and tell you if a newer version of firmware is available and how to proceed. Assistant Online can also link you to extensive context-sensitive help.

**About Card.** About Card provides information about MasterSwitch Plus components: the Hardware factory, Application module, and APC OS(AOS) information. The About Card is where you will find the serial number, hardware revision, and the date and time the version and AOS was loaded.

**Local Help Pages.** MasterSwitch Plus has internal help pages that can be accessed by selecting Help in the Navigation frame or by clicking the "?" at the end of black title bars.

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# Chapter 8 Managing the Expansion Unit

## Introduction

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If you have purchased only the MasterSwitch Plus Expansion Unit (AP9225) and your configuration does not include an AP9225, you can configure the Expansion Unit through MasterSwitch Plus menus. For information on how to access the Expansion Unit, see Accessing the Control Console.

**Note:** When logging in, you will not need a username.

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## Navigation through the

The MasterSwitch Plus menus allow you to manage the MasterSwitch Plus Expansion Unit on a Measure-UPS II. All menus list items by number and name. To navigate through the menus, you will need to remember the following list of operations:

- To enter a selection on any of the menus, type its related one- or two-digit number, a character command and press RETURN (or ENTER, depending on the keyboard you are using).
  - To see the results of the last changes you have made, it will sometimes be necessary to press RETURN or ENTER.
  - To return to the previous screen, press ESC.
  - To exit the MasterSwitch Plus menus, type Q (case-sensitive) and press RETURN menu.
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Continued on next page

The main menu displays:

- The state of the UPS,
- Information about the MasterSwitch Plus unit,
- Available commands for the unit and its outlets (on demand operation)
- Available submenus for configuring the accessed unit and its outlets
- Available submenus for the Measure-UPS II, and
- A command for accessing the next unit (cascading setup only).

The following table lists and defines the menu items available from the Main

Item	Description
Version	Displays the version of the MasterSwitch Plus firm
Unit Name	Identifies the MasterSwitch Plus unit that has been accessed. Note: The Unit Name can be changed in the Unit Properties menu.
UPS State	Displays the status of the UPS. The possible states are: <b>Inactive:</b> UPS is in sleep mode <b>On Line:</b> UPS is operating normally <b>AC Fail:</b> UPS is operating on battery <b>Unknown:</b> communication with UPS has failed
Outlet Name	Identifies each outlet. Note: Each outlet's names is changeable at the associated outlet properties menu.
Outlet State	Displays the current state of the outlet. The possible states are: <b>On:</b> outlet is turned on <b>On in hh:mm:ss:</b> outlet will be turned on after specified time period elapses <b>Off:</b> outlet is turned off <b>Off in hh:mm:ss:</b> outlet will be turned off after specified time period elapses
To Change Unit Properties	Instructs you to enter an U to access the Unit Properties menu. Note: The Enable/Disable Alarms setting on the Unit Properties menus controls the behavior of each individual outlet with regard to Measure-UPS II alarms

**Table 36: Main Menu Definitions**

Definitions,

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Item	Description
To Change Outlet Properties	Instructs you to enter the associated outlet number (1–8) to access its outlet properties.
To Change Measure-UPS II Properties	Instructs you to enter M to access the Measure-UPS II properties menu (available only if an Measure-UPS II is present).
To Change Units	Instructs you to enter an I to access the Measure-UPS II Switch Plus unit in the cascading setup.
To Change Outlet States	<p>Instructs you to enter various commands to initiate on-demand outlet actions. After entering a command, you will be asked to enter an outlet number (1–8) to perform the action on the associated outlet or you will be asked to enter an A to perform the action on all the outlets. The various commands you may enter are:</p> <ul style="list-style-type: none"><li><b>N:</b> On—Immediately turns an outlet on. Power is available any time after the unit's Power Off Time Delay has expired and the outlet is off.</li><li><b>S:</b> Shutdown—Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChute Plus, and is connected to MasterSwitch Plus with the appropriate signal cable, this operation will ensure that your server operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet when the Power Off Time Delay expires. You can program the outlet to restart automatically by specifying a Restart Delay. The Restart Delay can be set to as long as 999.9 hours. The sequence diagram in the shutdown sequence illustrates the this command.</li></ul>

**Table 36: Main Menu Definitions, continued**

Continued on next page

<p>To Change Outlet States, continued</p>	<p><b>C:</b> Cancel—Cancels a delayed startup or sequence diagrams in Figures 3–6 and Figures illustrate the use of this command.</p> <p><b>D:</b> Delayed On—Turns an outlet on after Turn On Delay expires. The sequence diagram Delayed On sequence illustrates this command. This command is available any time after the unit's On Time Delay has expired and the outlet is off.</p> <p><b>F:</b> Off—Immediately turns an outlet off.</p> <p><b>R:</b> Reboot—Immediately turns an outlet off and back on after the outlet's Reboot Duration expires. The sequence diagram in Reboot sequence illustrates the this command.</p> <p>Graceful Reboot—Gracefully shuts down and restarts an outlet. If the server is running shutdown software, such as PowerChuteplus, and is connected to a MasterSwitchplus with the appropriate software cable, this operation will ensure that your server operating system is shutdown before the outlet is turned off. Otherwise, it will turn off the outlet after the Power Off Time Delay expires. The outlet is restarted after the Reboot Duration expires. The sequence diagram in Graceful reboot sequence illustrates the this command.</p> <p>Note: If this command is applied to all outlets, the Reboot Duration delay for an outlet will not expire until all the outlets have shut down.</p> <p><b>O:</b> Override—Allows an outlet to restart when battery charge has not exceeded the Battery Capacity Threshold. The sequence diagrams in Outlet start-up sequence and Graceful Shutdown sequence for on-battery events illustrate the use of this command.</p>
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**Table 36: Main Menu Definitions, continued**

The Unit Properties menu is accessible by entering U at the Main menu.

The Unit Properties menu displays:

- Information about the MasterSwitch Plus unit,
- Available commands for configuring the accessed unit, and
- Available commands for displaying more detailed information.

Table 37 lists and defines the items available from the Unit Properties menu.

Item	Description
Name	A string of characters used to identify the MasterSwitch Plus unit. Allows a maximum of 23 printable ASCII characters. <b>Default:</b> unnamed
Address	Allows you to specify the unit's address (1–4) in a cascading manner. Enter 1 for the unit connected closest to the UPS, 2 for the next unit, and so on for up to 4 units. See the document included on the CD titled Setup of the MasterSwitch Plus Expansion Unit for more instructions on setting up Expansion Unit addresses. <b>Default:</b> 1 Note: If the addresses for all units are not set up properly, the unit will not operate properly.
Manual Button	Allows you to enable/disable the unit's manual reset button. If enabled, the button functions according to the description of the manual button. If disabled, the button does not function. <b>Default:</b> Enabled
Password	Allows you to set the unit's password. The password is case sensitive and can be up to 9 printable characters. <b>Default:</b> apc (lower case)
Restore Factory Defaults	Reinstates the original settings for your MasterSwitch Plus unit. When selected, all unit properties are set to the defaults shown in this table. Other properties are restored to the defaults shown in Defaults for Expansion Unit properties.
View Manufacturing Data	Displays the following information: Model Number, Manufacturing Date, Hardware Rev, Firmware Rev, and Serial Number. These values are provided for your information and cannot be configured.

**Table 37: Unit Properties definitions**

initions,

d

Item	Description
View Self-Test Results	Allows you to display the results (Passed or Failed) of the u power up self-test. The tests performed are: <b>Program Memory:</b> confirms whether or not the working properly. <b>Non-Volatile Memory:</b> confirms whether or not t working properly.
Menu Timeout Period	Automatically logs you off after the specified period of inact
Power On Time Delay	The time that MasterSwitch Plus will delay after AC power before starting the outlet's power on sequence. <b>Range:</b> 0–2:46:39 <b>Default:</b> 0

**Table 37: Unit Properties definitions, continued**

MasterSwitch Plus has eight Outlet Properties menus—one for each outlet. To access these menus, enter an outlet number (1–8) from the Main menu. The Outlet Properties menu varies according to the Outlet Control mode selected for the chosen outlet.

**Shutdown menu**

Table 38 describes the menu items that appear on the Outlet Properties menu when the Outlet Control Mode is set to Graceful Shutdown. See Defaults for Outlet Properties for the default settings for these items.

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	23 characters maximum
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown Annunciator
Will Device Confirm	Indicates whether the device connected to the outlet can assert a shutdown signal.	<b>Yes</b> <b>No</b>
Low Battery Warning Control	Selects the method MasterSwitch Plus uses for determining when to assert the outlet's Low Battery signal after the UPS has gone on battery.	<b>Programmed Delay</b> 0–16:39:54 <b>On Runtime Remaining</b> When the UPS's remaining runtime falls below the UPS's UPS Low Battery Signal Time <b>Never</b>
UPS Low Battery Multiplier	Adjusts the UPS Low Battery Signal Time. This property allows each outlet to be programmed to generate a low battery signal at a different time. MasterSwitch Plus will assert the outlet's Low Battery signal when both of the following conditions apply: <ul style="list-style-type: none"> <li>the Low Battery Warning Control is set to On Runtime Remaining or Programmed Delay, and</li> <li>the UPS is on battery and the runtime remaining falls below the product of the UPS Low Battery signal time and the UPS Low Battery Multiplier.</li> </ul>	<b>Range:</b> 1–7 is set  UPS runtime and

**Table 38: Graceful Shutdown Items**

Shutdown menu

continued

Item	Definition	Available Settings
Restart Delay	The delay between an outlet shutting off due to a Graceful Shutdown and the outlet being restarted.	<b>Range:</b> 0–999:59:59 Note: Time is rounded down by 6-minute intervals
Power Off Delay	The time from the triggering event (such as a server confirming a shutdown) until the outlet is turned off.	<b>Range:</b> 0–2:46:30
Power On Delay	Determines the time interval between the triggering event and the outlet being turned on.	<b>Range:</b> 0–2:46:30
Reboot Duration	The delay between the outlet shutting off because of Reboot and the outlet restarting.	<b>Range:</b> 0–2:46:30
Battery Capacity Threshold	Sets the minimum percentage of Battery Capacity required of the UPS before an outlet can be turned on.	<b>Range:</b> 0–100%
Enable/Disable UPS Alarms	Measure-UPS II Alarm Masks: Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Enabled and disabled for each of the 12 Measure-UPS II alarms.
Select Another Outlet	Allows you choose an another outlet to configure.	

**Table 38: Graceful Shutdown Items, continued**

Continued on next page

## Annunciator menu items

Table 39 lists and defines the items that appear on the Outlet Properties menu when the Outlet Control mode is set to Annunciator. See Defaults for outlet properties for the default settings for these items.

Item	Definition	Available Settings
Outlet Name	Identifies each outlet.	20 characters maximum
Outlet Control Mode	Establishes mode for associated outlet.	Graceful Shutdown Annunciator
Initial State	Defines the initial state of the outlet.	<b>Off</b> <b>On</b>
Alarm Action Delay	The amount of time that a Measure-UPS II alarm must be asserted before the outlet is toggled.	<b>Range:</b> 0–2:45:00
Enable/Disable UPS Alarms	Measure-UPS II Alarm Masks: Indicates whether or not an outlet will react to a specific Measure-UPS II alarm.	Settings are enabled or disabled for each of the Measure-UPS II alarms.
Select Another Outlet	Allows you choose another outlet to configure.	

**Table 39: Annunciator Menu Items**

## Measure-UPS II menu

The Measure-UPS II Properties menu is accessible by entering M at the Measure-UPS II menu when a Measure-UPS II accessory is present.

The Measure-UPS II Properties menu displays current information for:

- Current temperature and humidity reading for two probes,
- High and low temperature thresholds for two probes, and
- High and low humidity thresholds for two probes.

To change a threshold setting, enter the number next to it on the menu.

Continued on next page

The following table describes the menu items that appear on the Measure-UPS II Properties menu. After selecting an alarm threshold (1–8), press SPACEBAR to change to the next available setting. Continue pressing SPACEBAR to cycle through the available list of threshold settings, including the Disabled setting.

Item	Description
Temp (Celsius)	Displays the current ambient temperature reading of each attached probe. Temperature is displayed in ###.## degrees Celsius.
Humidity	Displays the current relative humidity reading of each attached probe. Humidity is displayed in ###.##% relative humidity.
Low Limit	Allows you to disable or set the low alarm threshold for temperature and humidity for each probe. Temperature threshold is in degrees Celsius and humidity is in percent relative humidity. If alarm limit is exceeded, an alarm will be asserted to all outlets whose Enable Alarm settings for that alarm are set to Enabled.
High Limit	Allows you to disable or set the high alarm threshold for temperature and humidity for each probe. Temperature threshold is in degrees Celsius and humidity is in percent relative humidity. If alarm limit is exceeded, an alarm will be asserted to all outlets whose Enable Alarm settings for that alarm are set to Enabled.
Disable All Alarms	Allows you to control Measure-UPS II operation. The options are: <b>Yes:</b> all alarm limits are set to Disabled. MasterSwitch will disable all Measure-UPS II alarms. <b>No:</b> all alarm limits are reset to previous configuration.

**Table 40: Measure-UPS II Properties menu**

## MasterSwitch Plus with PowerChute Plus and APC Accessories

### PowerChute Plus and on-demand operation

The following commands are available in PowerChute Plus to perform actions on the server connected to Outlet #1 of MasterSwitch Plus:

- Scheduled Shutdown
- Shut Down System Now

**Note:** The Shut Down System Now command will turn off Outlet #1. This will require you to turn it on with the Manual button (or through the Change Outlet States item on the Main menu) to restart.

### MasterSwitch Plus and PowerChute Plus settings

Several settings in PowerChute Plus are affected by the configuration of MasterSwitch Plus. Refer to the following table for information concerning each setting and its new meaning.

PowerChute Plus Setting	Relationship to MasterSwitch Plus
UPS Low Battery Signal Time	Multiplied by the UPS Low Battery Multiplier for each outlet of MasterSwitch Plus. See Outlet properties: Graceful Shutdown mode for more information.
UPS Turn Off Delay	Overridden by the Power Off Delay for each outlet in MasterSwitch Plus. See Outlet properties: Graceful Shutdown mode for more information.
UPS Wakeup Delay Time	Overridden by the Power On Time Delay for each outlet in MasterSwitch Plus. See Outlet properties: Graceful Shutdown mode for more information.
UPS Wakeup Delay (Capacity)	Overridden by the Battery Capacity Threshold for each outlet in MasterSwitch Plus. See Outlet properties: Graceful Shutdown mode for more information.

### APC Accessories and UPS commands

UPS control commands available with APC accessories are not supported when used with MasterSwitch Plus. Therefore on-demand operation through APC accessories is not supported at this time.

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## warranty

American Power Conversion (APC) warrants MasterSwitch Plus to be free of defects in materials and workmanship for a period of two years from the date of purchase. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. This warranty does not apply to equipment which has been damaged by accident, negligence, or misapplication, or which has been altered or modified in any way. This warranty applies only to the original purchaser.

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## obtaining service

To obtain service under warranty you must obtain a Returned Material Authorization (RMA) number from APC or a designated APC service center. Equipment must be returned to APC or an APC service center with transportation charges prepaid. Requests must be accompanied by a brief description of the problem encountered and the date of date and place of purchase. See If problems persist for further information on obtaining service.

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## warranty limitations

**Except as provided herein, American Power Conversion makes no warranties, express or implied, including warranties of merchantability or fitness for a particular purpose.** Some jurisdictions do not permit the exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

**Except as provided above, in no event will APC be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of this product, even if advised of the possibility of such damage.**

Specifically, APC is not liable for any costs, such as lost profits, lost production, equipment, loss of use of equipment, loss of software, loss of data, costs of installation, claims by third parties, or otherwise. This warranty gives you specific rights and you may also have other rights which vary from state to state.

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If you have problems with your MasterSwitch Plus power control unit, the troubleshooting chart (Table 42) covers many of the problems that might arise with MasterSwitch Plus. If you encounter a problem with your MasterSwitch Plus, refer to the troubleshooting chart first. There may be a simple solution you are overlooking.

The following table shows the solution to common problems with connecting and configuring MasterSwitch Plus.

Problem	Possible Cause	Solution
A server connected to a Basic port does not detect On Battery or Lo Battery signal.	Wrong cable is being used.	Verify that you are using the correct cable. Refer to "Choosing additional cables: Table 1," in the Installation and Quick Start Manual.
	Server shutdown software is not configured for simple signaling.	Configure PowerChute Plus for simple signaling. For instructions, see the documentation supplied with PowerChute Plus.
One or more servers shuts down when the UPS is on battery, but does not reboot when power returns	PowerChute Plus is configured to start shutdown on an AC Fail event and the shutdown time for operating system is set too short.	If the MasterSwitch Plus Low Battery Warning Control is set to Programmed Delay, make the delay shorter than the AC Fail shutdown delay in PowerChute Plus FlexEvents.
	MasterSwitch Plus Low Battery Warning Control is set to Programmed Delay	If the server is capable of UPS shutdown, consider setting the Will Reboot property to Yes.
To UPS Status LED is flashing green and red.	Communication cable is not fastened securely or the wrong cable is being used.	Verify that all cables are securely fastened and that the cable has AAT number 940-1000.
	UPS is connected to the wrong port.	Verify that the UPS is connected to the To UPS port on MasterSwitch Plus.

**Table 42: Troubleshooting**

Continued on next page

troubleshooting  
problems, continued

Problem	Possible Cause	Solution
To UPS Status LED is flashing green and red.	UPS is not capable of advanced communication.	Only Smart-UPS, Matrix-UPS Symmetra PowerArray can communicate with MasterSwitch Plus.
	There is a problem with the UPS.	Contact Technical Support at the number listed on the back cover of the manual.
Cannot access the MasterSwitch Plus Control Console.	DTE equipment is using incompatible terminal settings.	Change DTE equipment settings to match the MasterSwitch Plus baud rate (2400), with 8 data bits, 1 stop bit, and no flow control.
One or more outlets turn off when the UPS is On Battery, but do not restart when power returns.	Power On Time Delay is set to Remain Off.	Change the Power On Time Delay setting.
	Battery Capacity Threshold has not been exceeded.	Reduce the Battery Capacity Threshold setting or perform an on-demand override.
	A Measure-UPS alarm for the outlet is active.	Clear the alarm.
The UPS is On Battery and the server does not shut down the OS.	Low Battery Warning Control is set to Never.	Change the Low Battery Warning Control setting.
	Will Device Confirm is set to Yes and: a) the server is not confirming OS shutdown, or b) wrong cable is being used.	a) Some versions of PowerChute do not support the Confirm feature. See the documentation supplied with PowerChute Plus. b) Verify that you are using the correct cable. Refer to "Choosing optional cables: Table 1," in the Installation and Quick Start Manual.

**Table 42: Troubleshooting, continued**

Continued on next page

ms persist

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For problems not covered in the troubleshooting chart (see Troubleshooting 42), or if the problem persists, follow this procedure:

- 1 Note the serial number and date of purchase of the MasterSwitch Plus unit. Contact Technical Support at the phone number or address on the back cover of this manual.
  - 2 Be prepared to provide a description of the problem. A technician may solve the problem over the phone, if possible, or will give you a Return Material Authorization (RMA) number.
  - 3 If the MasterSwitch Plus unit is under warranty, repairs are free of charge. If the warranty has expired, there will be a nominal charge for repairs.
  - 4 Pack the MasterSwitch Plus unit carefully to avoid damage in transit. Damage sustained in transit is not covered under the warranty. Enclose a copy in the package with your name, address, RMA number, a copy of the receipt, daytime phone number, and check (if applicable).
  - 5 Mark the RMA number clearly on the outside of the shipping box. The factory will not accept any materials without this marking.
  - 6 Return the MasterSwitch Plus unit by insured, prepaid carrier to the address on the back cover of this manual.
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policy

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As a general policy, American Power Conversion (APC) does not recommend the use of any of its products in life support applications where failure or malfunction of an APC product can be reasonably expected to cause failure of the application or to significantly affect its safety or effectiveness. APC does not recommend the use of any of its products in direct patient care. APC will not knowingly recommend its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the user or customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

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uses of life-support

Life-support devices include but are not limited to neonatal oxygen analyzers, ventilators, stimulators (whether used for anesthesia, pain relief, or other purposes), artificial respiration devices, blood pumps, defibrillators, arrhythmia detectors and alarm systems, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal warming devices, incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as "critical" by the U.S. Food and Drug Administration. Hospital-grade wiring devices and leakage current protection may be ordered as optional options on many APC UPS systems. APC does not claim that units of this type are certified or listed as Hospital Grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

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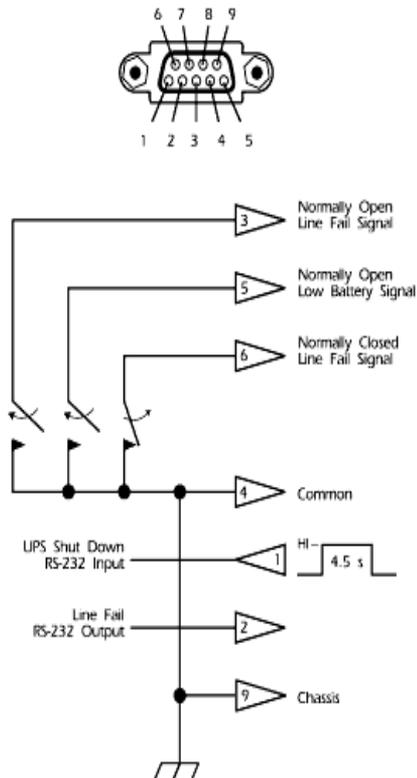
## Basic port interface

The following limitations and capabilities apply to the Basic port interface (pins 1-8) of MasterSwitch Plus:

- Pins 3, 5, and 6 are open collector outputs which must be pulled up to a common referenced supply no greater than +40 Vdc. The transistors are capable of a maximum non-inductive load of 25 mA dc. Use only 500 Ω resistors in common.
- The output at Pin 2 generates a LO-to-HI RS-232 level when signaling an On Battery condition. The pin is normally at a LO RS-232 level.
- The MasterSwitch Plus unit may be signaled to shut down the UPS by signaling a HI RS-232 level to Pin 1 for 4.5 seconds. Shutdown occurs on the UPS status and the MasterSwitch Plus shutdown message (see the properties).

## Basic port pin assignments

The following figure shows the Basic port pin assignments.



**Figure 23: Basic port pin assignments**

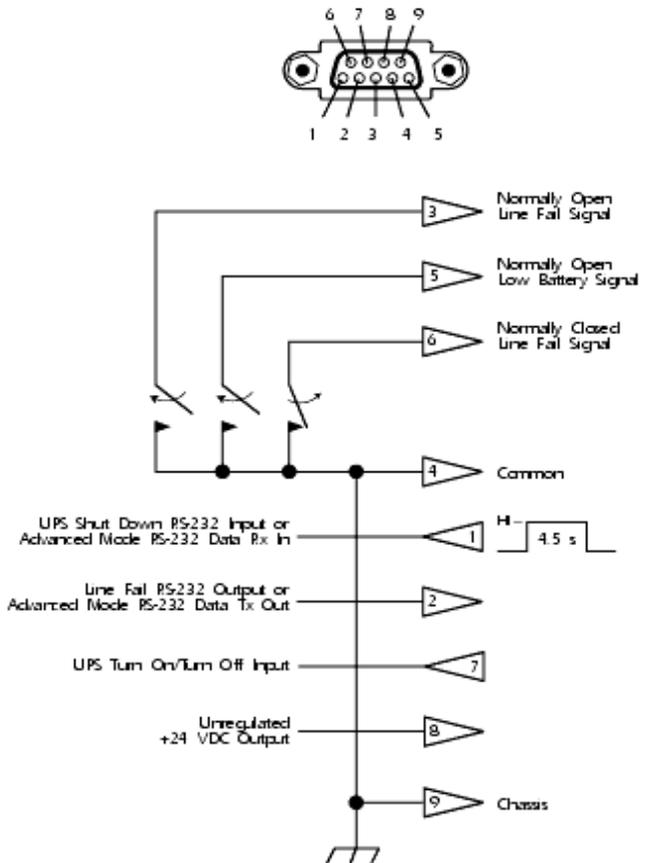
## Advanced port interface

The Advanced port of MasterSwitch Plus has the same limitations and capabilities as the Basic ports (see Basic port interface), with the following additional limitations and capabilities:

- Applying a momentary (approximately 1 second) high RS-232 level turns the UPS and its loads on. A momentary low RS-232 level turns the UPS and loads off. Pin 7 should be normally unconnected. This signal is processed through the MasterSwitch Plus.
- DC operating voltage is available on Pin 8 of the Advanced port. The voltage is the UPS battery voltage or the voltage from an external source, which is greater.

## Advanced port pin assignments

The following figure shows the Advanced port pin assignments.



**Figure 24: Advanced Port Pin Assignments**

The following table shows the product specifications for MasterSwitch Plus

Item	Specification
<b>Electrical</b>	
Input: Nominal input voltage Acceptable input voltage Nominal input frequency Overcurrent protection Input connector	120 VAC 100–140 VAC 50/60 Hz 15 A resettable circuit breaker 15 ft (4.5 m) attached NEMA 5-15 line cord
Output: Output connectors	8 NEMA 5-15 receptacles
Maximum total current draw:	15 A
<b>Physical</b>	
Size (H × W × D): Stand-alone  With mounting brackets	2.125 × 17.0 × 6.5 in (5.4 × 43.2 × 16.5 cm)  1.875 × 19.0 × 6.5 in (4.8 × 48.3 × 16.5 cm)
Weight:	7.75 lb (3.51 kg)
Shipping weight:	12.0 lb (5.45 kg)
<b>Environmental</b>	
Elevation (above MSL): Operating Storage	0 to 10,000 ft (0 to 3000 0 to 50,000 ft (0 to 15 0
Temperature: Operating Storage	32 to 104°F (0 to 40°C) 32 to 113°F (0 to 45°C)
Operating Humidity:	0 to 95%, non-condensing
<b>Approvals</b>	
EMC verification:	FCC Class A; DOC Class A
Safety Agency:	CSA; UL

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