

**MultiLink 1.5<sup>™</sup>**



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# MULTILINK™

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## Version 1.5 Release User Manual

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## **1.0 WHAT IS MULTILINK?**

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Liebert developed the MultiLink software to protect computers from costly damage such as loss of data resulting from power failures—from single computers to large networks. The MultiLink software constantly monitors Liebert's Uninterruptible Power Supply (UPS), warns computer users of impending power loss, and initiates graceful operating system shutdowns when needed. See **2.0 - How Does MultiLink Work?** for details on how the software monitors the UPS.

## **2.0 HOW DOES MULTILINK WORK?**

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MultiLink uses the SNMP protocol and IP addresses to communicate with targeted client computers (running MultiLink 1.5) using the network—instead of requiring separate, expensive hardware and cables that might run alongside network lines.

When utility power fails and the UPS begins powering the computer network, the UPS senses this, triggering MultiLink to activate timers and issue notifications that utility power has been interrupted. If the timers expire before utility power is returned, the software begins executing scripts to control certain applications and shut down the operating system, preventing loss of valuable data.

When utility power is restored, the UPS prompts MultiLink to cancel the timers and notify targeted computers of the return to normal status.

All targeted computers must be running MultiLink 1.5.

### 3.0 HOW DO YOU CONTACT LIEBERT FOR TECHNICAL SUPPORT?

For help on deciding how to set up MultiLink or any other Liebert product, contact Software Technical Applications Support Center at:

<b>UNITED STATES</b>	Phone: 1 800 222 5877
<b>FRANCE</b>	Phone: +33 (0) 1 46 87 51 52
<b>GERMANY</b>	Phone: +49 (0) 89 99 19 220
<b>ITALY</b>	Phone: +39 (0) 2 98250 324
<b>NETHERLANDS</b>	Phone: +31 (0) 475 503333
<b>UNITED KINGDOM</b>	Phone: +44 1628403200
<b>WORLDWIDE</b>	Phone: 1 614 841 6755
	FAX: 1 614 841 5471
	All Products: <a href="http://www.liebert.com">http://www.liebert.com</a> MultiLink: <a href="http://multilink.liebert.com">http://multilink.liebert.com</a>
	E-mail: <a href="mailto:monitoring@liebert.com">monitoring@liebert.com</a>



## 4.0 WHO CAN BENEFIT FROM MULTILINK?

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Any computer user—from the person with a single computer to the business with a multiple network system—can protect valuable data using Liebert’s UPS and MultiLink to perform an orderly shutdown of the operating system.

### 4.1 Configurations

The application can monitor virtually any configuration (see examples in **Table 1**):

- Any individual computer with a single Liebert UPS
- Any single network with multiple computers and a single Liebert UPS
- Interconnected network segments with computers powered by one or more Liebert UPSs

### 4.2 Connections

MultiLink works with either type of connection between the Liebert UPS and computers:

- Serial port connection to a single computer that can be networked to other computers
- SNMP card in the Liebert UPS

MultiLink 3.x can notify computers running MultiLink 1.5 of “On Battery” and “Low Battery” events for coordinated shutdown of the operating system. MultiLink 3.x also can notify 1.5 clients of “Return to Normal” events, indicating that utility power has been restored. For more information about MultiLink 3.x, refer to its user manual, available from Liebert.

### 4.3 Platforms

MultiLink 1.5 functions on multiple platforms. Visit the Liebert Web site for a list of currently supported platforms.

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## 5.0 WHAT IS REQUIRED TO USE MULTILINK?

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Visit the Liebert Web site at <http://multilink.liebert.com> for links to currently supported systems. The Web site always has the most detailed and up-to-date information on system requirements.

The prospective user must have:

- The MultiLink software (downloadable from the Liebert Web site, <http://multilink.liebert.com>). Visit the Web site or contact your local Liebert representative, value-added reseller or distributor for information.
- This manual (downloadable from the Liebert Web site).
- A supported Liebert UPS linked to a computer by a serial port connection or to a network by an SNMP card.
- If using a *serial port connection* to the UPS:
  - A special cable for communication between the UPS and the computer—available from Liebert or built with instructions in **Appendix B - Making Your Own MultiLink UPS Cable**.
  - Serial port availability on one computer protected by each UPS (see **Appendix C - Technical Information & Frequently Asked Questions**).
- IP port availability (see **Appendix C - Technical Information & Frequently Asked Questions**).
- TCP/IP connectivity throughout the network.
- A supported Java™ Runtime Environment (JRE), downloadable from your operating system vendor's Web site. For more details, visit the Liebert Web site at <http://multilink.liebert.com> (**Novell only**).
- For other requirements specific to various operating systems, see **Appendix A - Operating System Details**.

## 6.0 WHAT DO YOU NEED TO DO BEFORE INSTALLING MULTILINK?

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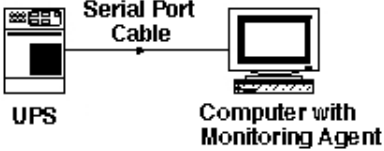
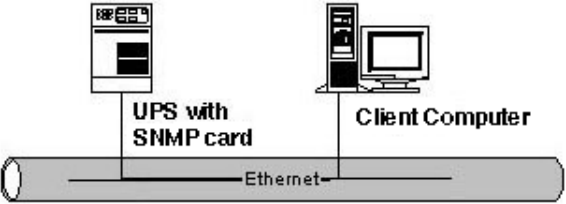
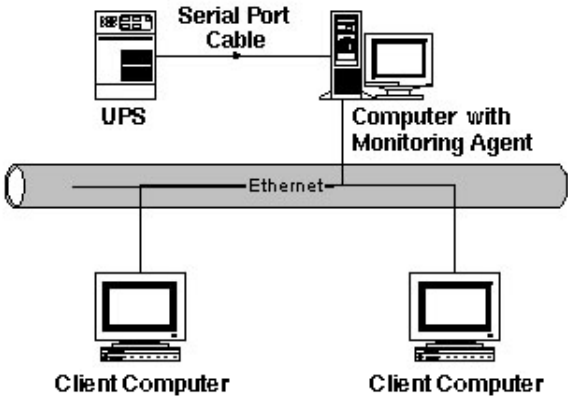
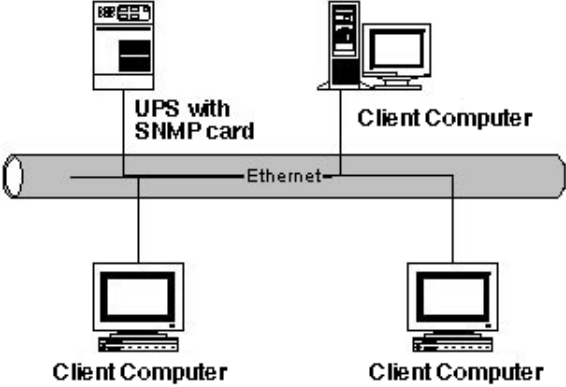
To set up MultiLink properly, you will need to take certain steps in advance of installation:

1. MultiLink can be configured four basic ways, and you will need to determine which method is right for your system. See **7.0 - Determining Your Configuration** for details on the four configurations.
2. Check with your System Administrator about the need to disable certain network software (see **Appendix C - Technical Information & Frequently Asked Questions**).
3. For platform-specific requirements, see **Appendix A - Operating System Details**.
4. If using a *serial port connection* to the UPS:
  - You will need to buy or make a custom cable. MultiLink will NOT function properly with an ordinary serial cable connected to the UPS.
  - You may purchase a MultiLink UPS cable by contacting your local Liebert representative, value-added reseller, or distributor.
  - To make a cable, see **Appendix B - Making Your Own MultiLink UPS Cable** for instructions.

## 7.0 DETERMINING YOUR CONFIGURATION

Before installing MultiLink, refer to the figures below to determine which configuration applies to each computer where the software is to be installed. The configuration will affect the way MultiLink is installed and how it runs. For example, the configuration will determine which components of the software are installed, which IP ports need to be available, and which configuration settings are available for editing after installation.

**Table 1 Configuration Descriptions**

<p style="text-align: center;"><b>Configuration 1</b></p>  <p style="text-align: center;">Serial Port Cable</p> <p style="text-align: center;">UPS                      Computer with Monitoring Agent</p> <p>Serial port connection between the UPS and a single computer with monitoring agent</p>	<p style="text-align: center;"><b>Configuration 3</b></p>  <p style="text-align: center;">UPS with SNMP card                      Client Computer</p> <p style="text-align: center;">Ethernet</p> <p>SNMP card in the UPS connected to a single networked computer [See <b>*SNMP CARD NOTE</b> below for SNMP configuration requirements]</p>
<p style="text-align: center;"><b>Configuration 2</b></p>  <p style="text-align: center;">Serial Port Cable</p> <p style="text-align: center;">UPS                      Computer with Monitoring Agent</p> <p style="text-align: center;">Ethernet</p> <p style="text-align: center;">Client Computer                      Client Computer</p> <p>Serial port connection between the UPS and a computer with monitoring agent, which is networked to other targeted client computers</p>	<p style="text-align: center;"><b>Configuration 4</b></p>  <p style="text-align: center;">UPS with SNMP card                      Client Computer</p> <p style="text-align: center;">Ethernet</p> <p style="text-align: center;">Client Computer                      Client Computer</p> <p>SNMP card in the UPS connected to multiple networked computers [See <b>*SNMP CARD NOTE</b> below for SNMP configuration requirements]</p>

### **\*SNMP CARD NOTE**

For configurations 3 and 4, you must configure the SNMP card in the UPS as follows:

1. From the SNMP card's configuration menu, select **Display/Modify Communities**. Enter the client computer's IP address and the community string **LiebertEM** (case sensitive).
2. From the SNMP card's configuration menu, select **Display/Modify Trap Communities**. Enter the client computer's IP address and the community string **LiebertEM** (case sensitive).
3. Repeat Steps 1 and 2 for each client that uses MultiLink.

For complete details, see the documentation for your SNMP card.

## 8.0 INSTALLING THE SOFTWARE

After downloading the file from the Web site, follow these instructions to install the software.



### NOTE ON UPGRADING FROM MULTILINK 1.1

*When you upgrade from MultiLink 1.1 to MultiLink 1.5, the software will maintain your configuration, including settings for IP and serial ports.*

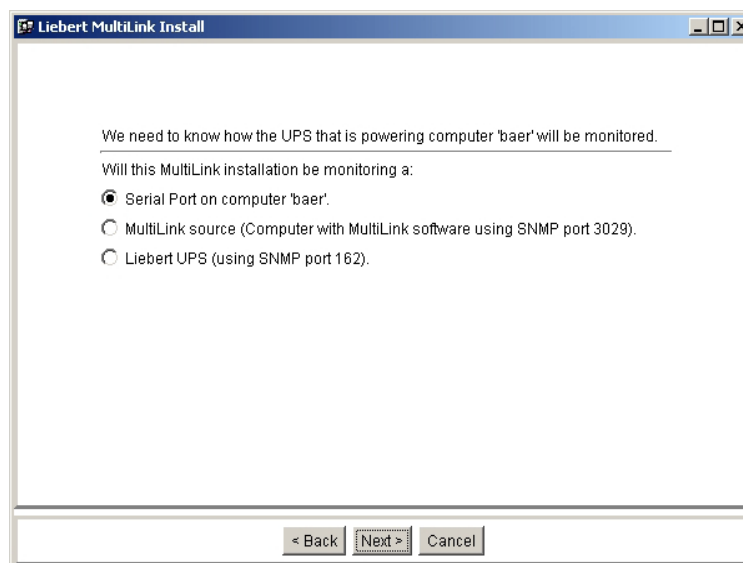
## 8.1 Executing the Downloaded File, Unzipping if Necessary

For detailed instructions, see **Appendix A - Operating System Details**.

## 8.2 Installing MultiLink

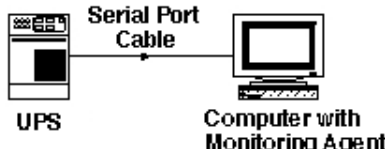
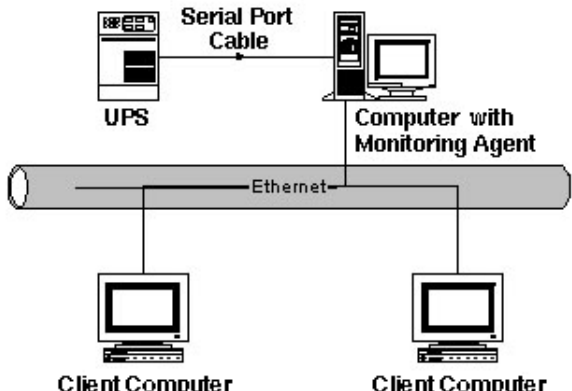
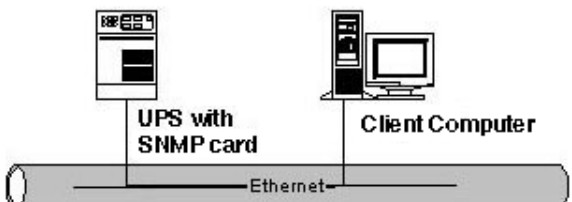
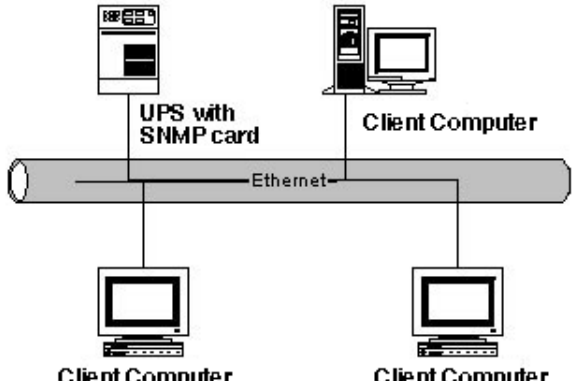
Follow instructions on the screen for installation.

- Read the Liebert Software Program License Agreement. If you do not accept the terms and conditions, cancel the installation and delete the files you downloaded.
- Install the program in the default location or specify an alternate location, if you prefer.
- Specify the type of connection between your UPS and your computer or network. The options are:
  1. **Serial Port on computer 'name'**
  2. **MultiLink Source (Computer with MultiLink software using SNMP port 3029)**
  3. **Liebert UPS (using SNMP port 162)**

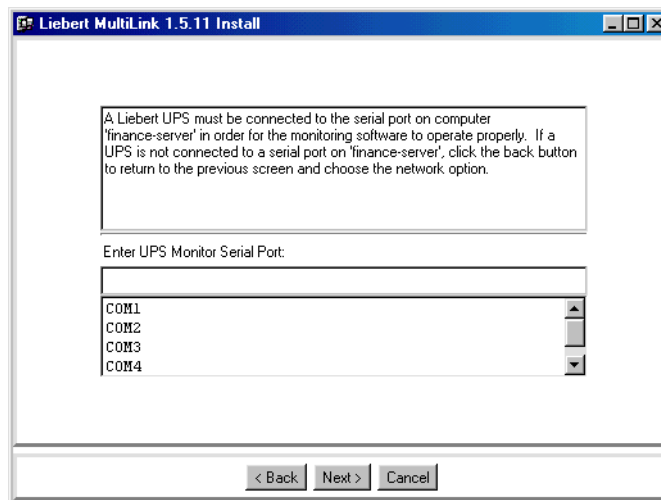


- You must enter this information correctly for proper installation and configuration of MultiLink. For help in deciding which option to choose, see **7.0 - Determining Your Configuration** or the following table.

**Table 2 Configuration Options for Installation**

For this configuration:	Choose this option:
<p style="text-align: center;"><b>Configuration 1</b></p>  <p style="text-align: center;">UPS                      Computer with Monitoring Agent</p>	<p>For the computer with monitoring agent in Configuration 1 (one-on-one serial port configuration), choose:</p> <p style="text-align: center;"><b>Serial Port on computer 'name'</b></p>
<p style="text-align: center;"><b>Configuration 2</b></p>  <p style="text-align: center;">UPS                      Computer with Monitoring Agent</p> <p style="text-align: center;">Client Computer                      Client Computer</p>	<p>For the computer with monitoring agent in Configuration 2, choose:</p> <p style="text-align: center;"><b>Serial Port on computer 'name'</b></p> <p>(This computer will monitor the UPS and notify targeted client computers of UPS-related events.)</p> <p>For each targeted client computer in Configuration 2, choose:</p> <p style="text-align: center;"><b>Network directly via an SNMP card or a Serial Port on another computer</b></p>
<p style="text-align: center;"><b>Configuration 3</b></p>  <p style="text-align: center;">UPS with SNMP card                      Client Computer</p>	<p>For the targeted client computer in Configuration 3 (one-on-one SNMP card configuration), choose:</p> <p style="text-align: center;"><b>Network directly via an SNMP card or a Serial Port on another computer</b></p>
<p style="text-align: center;"><b>Configuration 4</b></p>  <p style="text-align: center;">UPS with SNMP card                      Client Computer</p> <p style="text-align: center;">Client Computer                      Client Computer</p>	<p>For each targeted client computer in Configuration 4 (SNMP network configuration), choose:</p> <p style="text-align: center;"><b>Network directly via an SNMP card or a Serial Port on another computer</b></p>

- If you chose **Serial Port on computer ‘name’**:
  - a. You may enter the serial port where the UPS monitor cable is connected by either double-clicking on the port’s name or typing the name into the box.



- b. If the serial port selected during installation becomes invalid, select a different port by clicking on the port’s name from the list or by typing the port’s name into the box.

**NOTE**

*Make sure that the selected serial port is available. Make sure that the selected port is a serial port on the computer, not on a terminal expander. This port must support the modem control lines shown in **Appendix B - Making Your Own MultiLink UPS Cable**.*

- For Configuration 4 (SNMP network configuration) in **Table 2**, you must configure the SNMP card in the UPS. For details, see **\*SNMP CARD NOTE** and the documentation for your SNMP card.
- During installation, the software checks for the availability of IP ports 3027 and 3029.

**NOTE**

*If the ports required by MultiLink are unavailable, they may be in use by another program. If so, the user should consider having the System Administrator free the port.*

**NOTE**

*If connecting via a UPS SNMP card, use the **Network** tab in the Configuration Editor to change IP port 3029 to 162 after installation. See **9.5 - Checking Network Settings** for details.*

- If an error message appears, contact your System Administrator for assistance or see **Appendix C - Technical Information & Frequently Asked Questions**.
- Review the install summary and click the **Install** button to proceed.

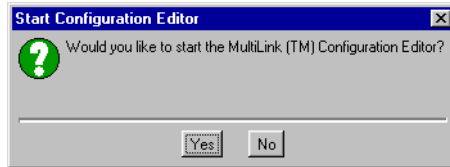
### 8.3 Checking Permissions for Multiple Users, if Needed

If there are multiple users of the system on which MultiLink is being installed, the System Administrator should check the permissions on the installed files, and vary the permissions as desired. The default permissions may not be appropriate. For example, you may want to restrict access to the Configuration Editor. You may also want to restrict permission to edit the scripts that are executed when certain UPS-related events occur.

## 8.4 Starting the Configuration Editor

After installation, MultiLink prompts you to begin configuration. Liebert recommends opening the Configuration Editor now to review or modify the configuration settings. (For details on configuring MultiLink, see **9.0 - Configuring MultiLink for Your System.**)

- To open the Configuration Editor now, click **Yes** in the dialog box.





## 9.0 CONFIGURING MULTILINK FOR YOUR SYSTEM

The Configuration Editor allows you to specify how the software notifies users of UPS-related events.

### Computer with Monitoring Agent (Configurations 1 and 2 in Table 2)

For the computer with monitoring agent, the Configuration Editor has five tabs:

- Clients
- UPS
- Events
- Logging
- Network

Begin with **9.1 - Setting Up the Computer With Monitoring Agent** to configure this computer.

### Client Computers (Configurations 2, 3, and 4 in Table 2)

For any computer that was set up as a client, the Configuration Editor has only three tabs:

- Events
- Logging
- Network

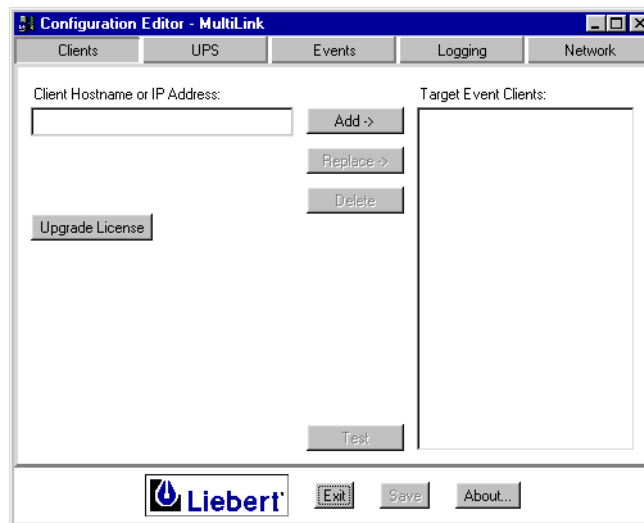
Go to **9.3 - Configuring the Timing of Events** to begin configuring this computer.

If using an SNMP card, refer to your SNMP card documentation for instructions on setting up the community string. All SNMP agents must be configured to use the **LiebertEM** community string (case sensitive). See **\*SNMP CARD NOTE** for more information.

## 9.1 Setting Up the Computer With Monitoring Agent (Configurations 1 and 2 only in Table 2)

The **Clients** tab offers access to three functions:

1. Upgrading the Liebert MultiLink license to permit notifications of UPS-related events to targeted client computers
2. Designating which client computers will be notified when a UPS-related event occurs. (Note that each targeted computer must have MultiLink 1.5 software installed.)
3. Checking configuration of targeted client computers by sending test messages

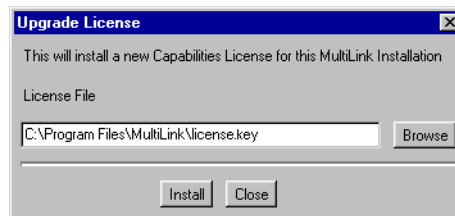


### 9.1.1 Upgrade the MultiLink License

The **Upgrade License** button permits the System Administrator to configure MultiLink to perform an orderly shutdown of multiple workstations on a computer network when all workstations are powered by the same UPS.

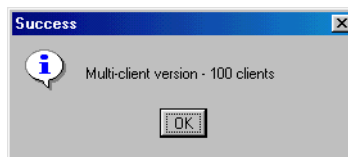
Contact your local Liebert representative or distributor to obtain an upgrade license. The license is available for various numbers of workstations (see **Table 5 - MultiLink License Kits** for part numbers). Each targeted computer must have MultiLink 1.5 software installed.

- To set up a MultiLink upgrade license, click on the **Upgrade License** button to open the Upgrade License window.
- In the **License File** box, enter the name of the appropriate file—**license.key**—with its full path, or click on the **Browse** button to locate the file, which is available from your local Liebert representative or distributor.
- Click on the **Install** button to begin the installation.



- Read the Liebert MultiLink Software License agreement, which opens next. If you do not accept the terms and conditions, cancel the installation and delete the license file from your computer.
- If you accept the terms and conditions, click **Accept** and the new capabilities license will be installed.

A message box appears after successful installation.



After installing the upgrade license, configure the targeted MultiLink 1.5 clients as described in **9.1.2 - Designate Targeted Client Computers**.

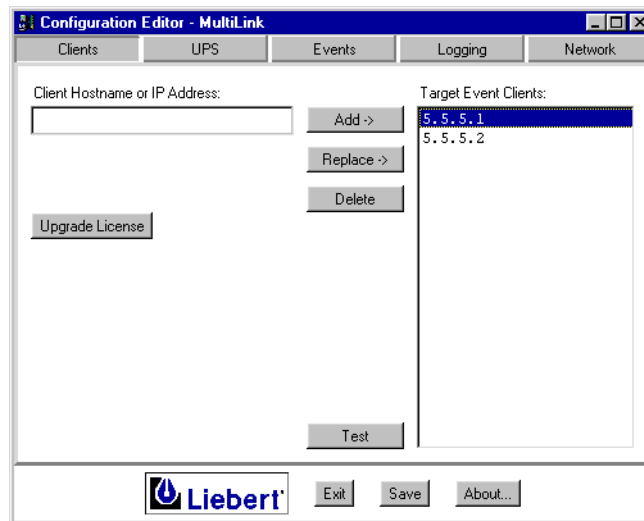
## 9.1.2 Designate Targeted Client Computers

After installing the upgrade license, you can proceed to add workstations (IP addresses or hostnames) to the list of targeted client computers. Computers in that list must have MultiLink 1.5 installed if they are to receive notification of specified UPS-related events. See **Appendix C - Technical Information & Frequently Asked Questions** for information about IP addresses and hostnames.

This section also describes how to make changes to the list of targeted clients by replacing or deleting listed computers.

### To Add a Targeted Client Computer:

- In the **Client Hostname or IP Address** box, enter the IP address or hostname of each targeted client computer to be notified of a UPS-related event.
- Click on the **Add** button and the computer will appear in the **Target Event Clients** list. See **Appendix C - Technical Information & Frequently Asked Questions** for information about IP addresses and hostnames.

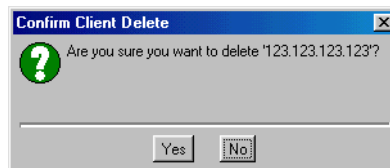


### To Replace a Targeted Client Computer:

- Enter the IP address or hostname of the replacement computer in the **Client Hostname or IP Address** box.
- In the **Target Event Clients** list, click on the name of the computer to be replaced. (Click a second time on a computer to deselect it. Double-clicking on the name of a targeted client computer in the **Target Event Clients** list copies it to the **Client Hostname or IP Address** box where it can be edited.)
- Click on the **Replace** button.

### To Delete a Targeted Client Computer:

- Click on one or more entries in the **Target Event Clients** list. (Click a second time on a computer to deselect it.)
- Click on the **Delete** button, and a message box asks for confirmation that you wish to delete the selected client(s).

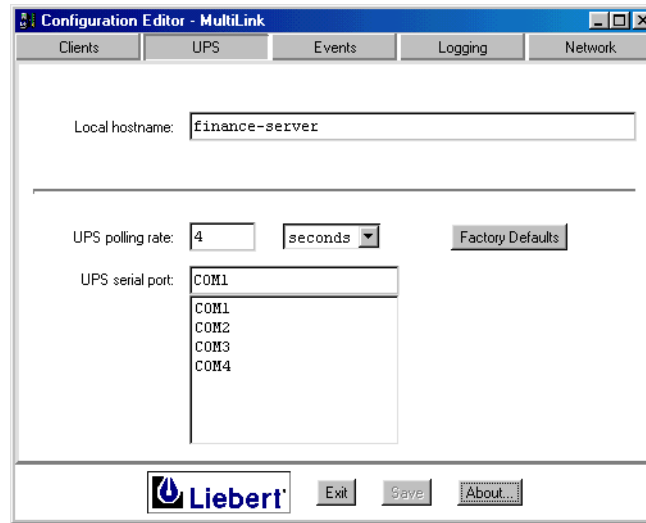


## 9.1.3 Verify Configuration

The Test feature has been provided to verify that the client configuration is correct. See **Appendix C - Technical Information & Frequently Asked Questions** for use of the **Test** button.

## 9.2 Configuring the UPS Polling Rate and Serial Port (Configurations 1 and 2 only in Table 2)

The **UPS** tab permits you to specify how often the software checks the status of the UPS. The default setting is 4 seconds, as shown.

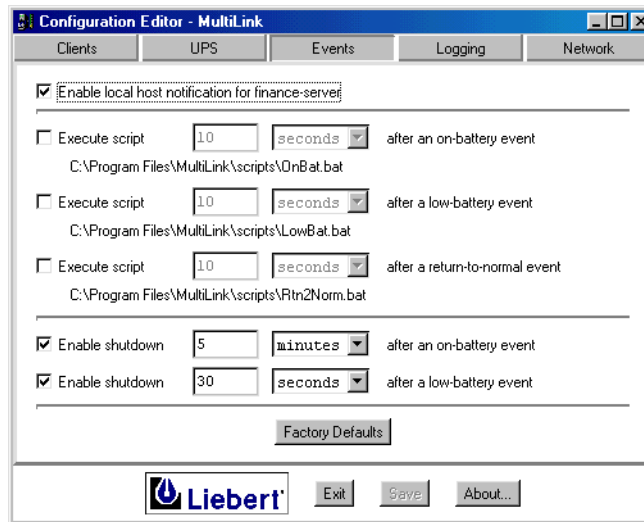


- To change the **UPS polling rate** setting, enter a number in the box and select units (seconds or minutes) as desired. At any time, you may restore the original polling rate setting by clicking on the **Factory Defaults** button. The typical range is 2 to 60 seconds.
- The **UPS serial port** displays the port you selected during installation. If no longer valid, select a different port by double-clicking on your choice. You may also enter the name of the port manually. Any port name entered manually becomes part of the list of available ports. For further information on serial ports, see **Appendix A - Operating System Details**.

### 9.3 Configuring the Timing of Events (All Configurations in Table 2)

Configuring the timing of UPS-related events may be the most important aspect of setting up MultiLink. This feature allows you to specify the timing of warnings and operating system shutdown. By modifying special scripts provided with the software, you can automate the control of certain applications. The **Events** tab allows configuration of the following:

Event	Description
<b>On Battery</b>	External power is interrupted and the UPS begins supporting the computers.
<b>Low Battery</b>	The UPS has supplied power for some time and its reserves are reduced to a low level.
<b>Return to Normal</b>	External power is restored after an On Battery event and the computers' power is supplied by the utility.



- For MultiLink to notify this computer of UPS-related events, check the **Enable local host notification** box.
- There are three **Execute script** check boxes that allow activation of scripts to control applications that have command-line options. For example, to shut down a database after an on-battery notification, put the commands to do so in the on-battery script. The script files are in the scripts subdirectory of the location where the MultiLink program files were installed.

Type of event	Default operation	Times before launching scripts	
		Default time	Typical range
On-battery	Off (unchecked)	10 seconds	5-20 seconds
Low-battery	Off (unchecked)	10 seconds	0-30 seconds
Return to normal	Off (unchecked)	10 seconds	0-30 seconds

- The **Enable shutdown** boxes specify the time that elapses before MultiLink shuts down the operating system.

Type of event	Default operation	Times before launching scripts	
		Default time	Typical range
On-battery	On (checked)	5 minutes	5-15 minutes
Low-battery	On (checked)	30 seconds	0-60 seconds

- Appropriate times will vary according to the type of UPS in service and the number of computers being powered. If you enter a number outside Liebert's typical range, an information box will alert you and ask you to confirm your choice.
- Return to the default settings at any time by clicking on the **Factory Defaults** button.



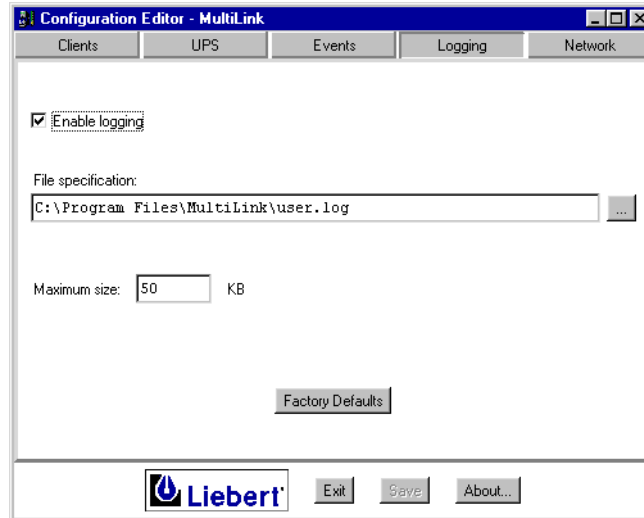
**NOTE**

*Backup copies should be made of any special scripts used.*

## 9.4 Setting Up the Log File (All Configurations in Table 2)

The **Logging** tab allows automatic creation of a file detailing UPS-related events and the times they occurred.

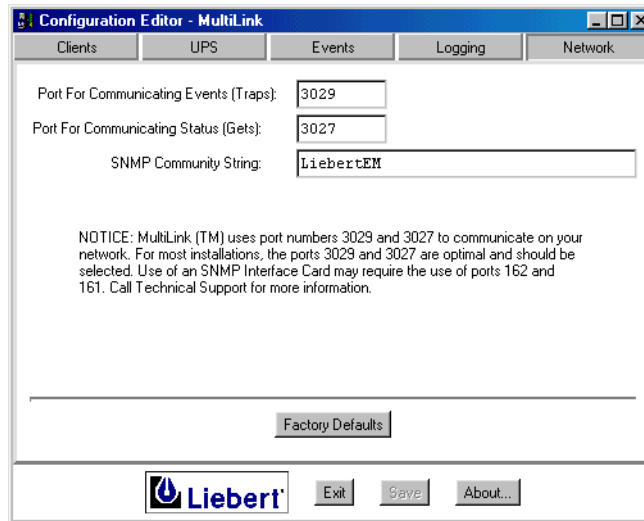
The log file is a comma-delimited file (values are separated by commas) that can be easily imported into a spreadsheet or database application or viewed with a text editor or word processing program.



- To activate this feature, click the **Enable Logging** box.
- The **File Specification** box displays the log's default file name and its location. Liebert recommends using these defaults to simplify troubleshooting with Liebert's technical support staff.
- The size of the log file can be controlled by entering a limit in the **Maximum Size** box. The default file size is 50 KB. The typical range of sizes is 10 KB to 100 KB. When the user log reaches the maximum size, it is renamed to **user.bak** and a new log file is created. Any previous **user.bak** file is replaced unless it has been renamed or moved to another directory.
- You can return to the default settings at any time by clicking on the **Factory Defaults** button.

## 9.5 Checking Network Settings

The **Network** tab has three boxes for the IP ports and the SNMP Community String.



Liebert highly recommends using the factory default values for the **Network** tab settings. The default values are:

Setting	Default Value	
	Serial Port	SNMP Agent
Port for Communicating Events (Traps)	3029	162
Port for Communicating Status (Gets)	3027	161
SNMP Community String	LiebertEM	

To receive traps, a targeted client computer must use the same ports for communicating events and status as the computer with monitoring agent.

MultiLink uses ports 3029 and 3027 for network communications. These ports are optimal for most installations, but use of an SNMP Interface Card may require use of port 162 for Communicating Events (Traps) and port 161 for Communicating Status (Gets).

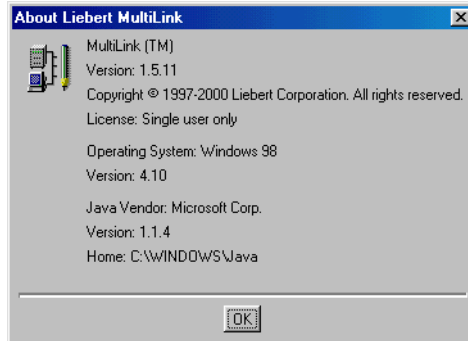
Use the **Test** button to determine whether your configuration functions. See **9.1.3 - Verify Configuration** for details.

## 9.6 Saving Changes

If you made any changes to the Configuration Editor settings, click on the **Save** button to retain them.

## 9.7 Checking MultiLink Version

Click on the **About** button for details about the version of MultiLink on your system and other information about the software.



As shown above, the details include:

- the MultiLink version number
- the number of targeted client computers allowed by your upgrade license
- the operating system and its version
- the Java vendor and its version

## 9.8 Closing the Configuration Editor

Click the **Exit** button to end the Configuration Editor session. If you have not saved your changes, MultiLink will warn you to do so. Unsaved changes will be lost.



## 10.0 VIEWING UPS STATUS

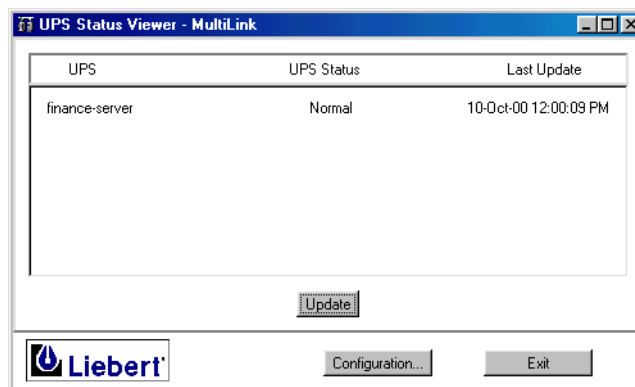
This feature allows a user to determine the status of the UPS(s):

- Normal (utility power is intact)
- On battery (the UPS is supplying power to the computers)
- Low battery (power drain has reduced the reserves of the UPS to a low level)
- Weak battery (utility supplying power, but UPS battery weak)

The Status Viewer may also alert the user to communication or configuration problems. See **Appendix C - Technical Information & Frequently Asked Questions**.

### 10.1 Opening the Status Viewer

The Status Viewer displays the time of the last update and the condition of all configured UPSs in the list. For instructions on opening the UPS Status Viewer, see information about your platform in **Appendix A - Operating System Details**.

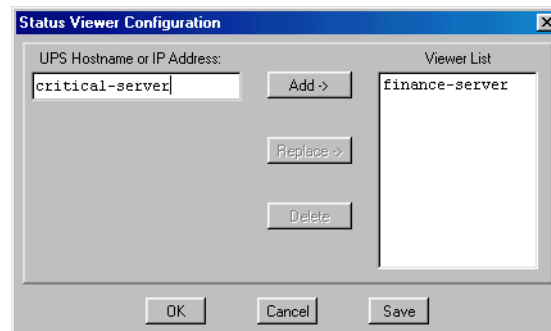


- Click on the **Update** button to get new information on the status of each configured UPS. During the update, an hourglass icon appears to the left of each UPS being checked.
- To alter the list of configured UPSs, click on the **Configuration** button as described in **10.2 - Adding or Deleting a UPS in the Status Viewer List**. (After making changes, you must return to this window and click on the **Update** button to view the status of each changed UPS.)
- To close the window, click on the **Exit** button.

## 10.2 Adding or Deleting a UPS in the Status Viewer List

The Status Viewer Configuration window allows you to make changes to the list of configured UPSs.

- In the UPS Status Viewer window (see **10.1 - Opening the Status Viewer**), click on the **Configuration** button to update the list of UPSs.



- Follow these instructions to add a UPS, make a change to a UPS or remove a UPS from the **Viewer List**.



### NOTE

When entering the IP address or hostname of the UPS in the following steps, try the port number specified in the **Port for Communicating Status (Gets)** box in the **Network** tab, as shown in **9.5 - Checking Network Settings**.

If that fails, you might need to use the following format to specify a full URL to view SNMP agent, for example:

```
snmp://hostname or IP address:port_number
```

where *hostname* is the name of the computer (for example, *critical-server*) and *port\_number* is the port number specified in the **Port for Communicating Status (Gets)** box in the **Network** tab (for example, 3027 or 161).

### To Add a UPS:

- Enter the IP address or hostname of the UPS in the **UPS Hostname or IP Address** box.
- Click on the **Add** button and the UPS will appear in the **Viewer List** box.

### To Replace a UPS:

- Enter the IP address or hostname of the replacement UPS in the **UPS Hostname or IP Address** box.
- In the **Viewer List**, click on the name of the UPS to be replaced. (Click a second time on a UPS to deselect it. Double-clicking on the name of a UPS in the **Viewer List** list copies it to the **UPS Hostname or IP Address** box where it can be edited.)
- Click on the **Replace** button.

### To Delete a UPS:

- Click on one or more entries in the **Viewer List**. (Click a second time on a UPS to deselect it.)
- Click on the **Delete** button, and a message box asks for confirmation that you wish to delete the UPS(s).

### To Save Changes:

- Click on the **Save** button to save any changes to the Configuration file. To close the window without saving any changes, click on **Cancel**.
- When you have completed any changes, click on **OK**. If you have not saved your changes, a message box will display a warning to save your changes or they will be lost.

This returns you to the **Status Viewer** window where you must click on the **Update** button to display the changes. See **10.1 - Opening the Status Viewer** above.

## **11.0 RUNNING MULTILINK**

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After installation and configuration, MultiLink is constantly running in the background, protecting your system from data loss.

The installation modifies the computer's configuration so that certain services are always running and are automatically restarted every time the computer is started up.

To verify that MultiLink services are running, see **Appendix A - Operating System Details**.

## 12.0 NOTIFYING CLIENTS OF EVENTS

MultiLink constantly monitors the UPS according to the settings in the configuration file. The software notifies targeted client computers when any of the following events occur:

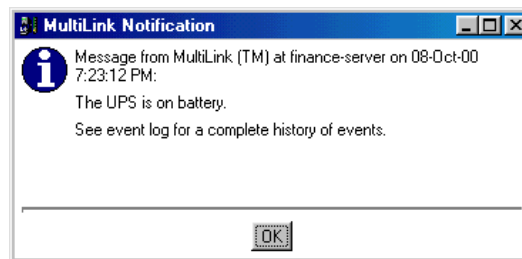
- **On Battery** - UPS supplying power to the computers
- **Low Battery** - power drain has reduced the reserves of the UPS to a low level
- **Return to Normal** - utility power is restored after an on-battery or low-battery event
- **Weak Battery** - utility supplying power, but UPS battery weak

Notification may appear on the screen in the form of a graphic (dialog box) or as text (console message). The method depends on your operating system and choices made during configuration.

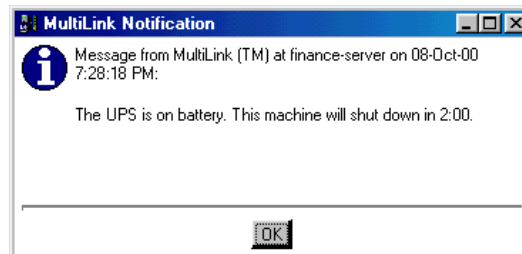
### On-Battery notification

When MultiLink detects an on-battery event, the following occurs:

1. Based on configuration settings, it prompts targeted clients to display a **UPS Alert**:



2. If the **Execute Script** box in the Configuration Editor is checked:
  - A script timer starts that may lead to executing the on-battery script, which the user or System Administrator has written, to perform site-specific operations for applications that have command-line options.
  - If this timer expires, the script is executed.
3. If the **Enable Shutdown** box in the Configuration Editor is checked:
  - A shutdown timer begins.
  - If this timer expires before power is restored (Return to Normal), the operating system is shut down.
  - Two (2) minutes before the shutdown timer expires, the MultiLink software displays the alert shown below. A counter in the dialog box ticks off the time until the system is shut down.



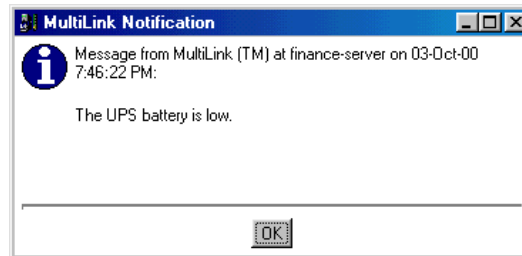
- To prevent the computer operating system shutdown, click on the **Cancel** button in the countdown dialog box shown above. A message asks you to confirm whether you wish to cancel the shutdown.

## Low-Battery notification

The Low-Battery event functions as a safety net, prompting an orderly shutdown of the operating system before power is lost. The Low-Battery event will override a longer on-battery timer. Timers for this event typically are set for much shorter times than for other UPS-related events.

When MultiLink detects a low-battery event:

1. It displays a **UPS Alert**.

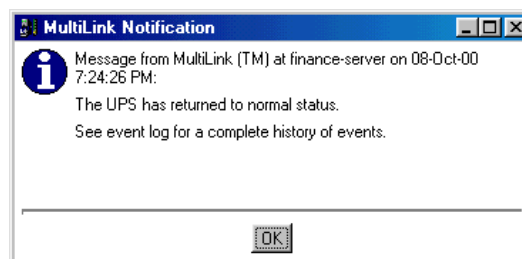


2. If the **Execute Script** box in the Configuration Editor is checked:
  - A script timer starts that may lead to executing the low-battery script, which the user or System Administrator has written, to perform site-specific operations for applications that have command-line options.
  - If this timer expires, the script is executed.
3. If the **Enable Shutdown** box in the Configuration Editor is checked:
  - A shutdown timer begins.
  - If this timer expires before power is restored (Return to Normal), the operating system is shut down.
  - Twenty (20) seconds before the shutdown timer expires, the MultiLink software displays an alert. A counter ticks off the time until the system is shut down.
  - To prevent the computer operating system shutdown, click on the **Cancel** button. That prompts MultiLink to ask you to confirm whether you wish to cancel the shutdown.
  - Click on **Yes** to prevent the operating system shutdown; click on **No** to proceed with the shutdown.

## Return-to-Normal notification

When MultiLink detects a Return-to-Normal event:

1. It displays a **UPS Alert**:



2. If the **Execute Script** box in the Configuration Editor is checked:
  - A script timer starts that may lead to executing the return-to-normal script, which the user or System Administrator has written, to perform site-specific operations for applications that have command-line options.
  - If this timer expires, the script is executed.
3. MultiLink will cancel any timers that are running, such as those for on-battery events, low-battery events, and scripts.

Exercise caution in scripting for reopening an application or database in the Return-to-Normal event. For example, if power is restored before a script has closed a database, a Return-to-Normal script might attempt to reopen it.

### **Weak-Battery notification**

Weak Battery is a maintenance indicator with a status separate and apart from the Low-Battery event. It occurs when the UPS' capacity falls below 15-20 percent and utility power is intact. The Weak Battery feature is not supported by all UPS models.

When MultiLink detects a weak-battery event:

- It displays a **UPS Alert**.

The Weak Battery script performs only a notification.

## **13.0 UNINSTALLING MULTILINK FROM YOUR SYSTEM**

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To remove the MultiLink software from your network, run the uninstall program that came with MultiLink. For details, see **Appendix A - Operating System Details**.

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## 14.0 LIEBERT SOFTWARE PROGRAM LICENSE AGREEMENT

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MultiLink<sup>®</sup> Software License revision January 10, 2003

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**APPENDIX A - OPERATING SYSTEM DETAILS**

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For details on your operating system, see:

<b>Operating System</b>	<b>Refer to:</b>
Windows XP/2000/NT/Me/98/95	<b>A.1 - Windows XP/2000/NT/Me/98/95</b>
Sun Solaris	<b>A.2 - Sun Solaris</b>
Linux	<b>A.3 - Linux</b>
Hewlett Packard HP-UX	<b>A.4 - Hewlett Packard HP-UX</b>
IBM AIX	<b>A.5 - IBM AIX</b>
Novell NetWare	<b>A.6 - Novell NetWare</b>

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## A.1 WINDOWS XP/2000/NT/ME/98/95

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### A.1.1 Platform-Specific Requirements

In addition to the general requirements listed in 5.0 - **What is Required to Use MultiLink?**, prospective MultiLink users must also have:

- Windows XP, 2000, NT™, Me (Millennium Edition), 98 or 95 on an Intel Pentium-class processor
- At least 10 MB of free disk space
- At least 64 MB of RAM
- A mouse
- TCP/IP network protocol

### A.1.2 Installation Notes

#### Pre-Installation Checklist

1. If you are not using an SNMP hardware card with your UPS, then MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP service with Windows XP/2000/NT.

If you are using an SNMP hardware card with your UPS, there can be a conflict with the SNMP ports used on Windows XP/2000/NT. MultiLink must take ownership of ports 162/161 to communicate with the SNMP-enabled UPS. In this case, the Windows SNMP services (if running) will cause a conflict. If you are using an SNMP hardware card, you must disable the SNMP services. To check these services, see below.

- Windows XP/2000—run the Computer Management application by pressing the **Start** button, then clicking on **Programs, Administrative Tools**, and finally **Computer Management**. Expand the **Services and Applications** item in the tree and then click on **Services**.
- Windows NT—open the Services window by pressing the **Start** button, then clicking on **Settings, Control Panel**, and finally **Services**.

If the services SNMP and SNMP Trap Service are not present or are shown as not running (blank status) and Disabled, you may proceed. Otherwise, these services must be stopped and/or disabled before you can install MultiLink.

2. Installation on Windows XP/2000/NT requires Administrative privileges.
3. On Windows Me/98/95, no additional pre-installation checks are required.

#### Serial Port Selection

The preconfigured serial ports are COM1 through COM4. You may select one of these or enter another as appropriate.

### A.1.3 Notes on Running MultiLink

#### Starting MultiLink Applications

During installation, shortcuts are created in the MultiLink folder in the Start menu of the user performing the installation. There are shortcuts for these MultiLink applications:

- Configuration Editor
- UPS Status Viewer
- Uninstall

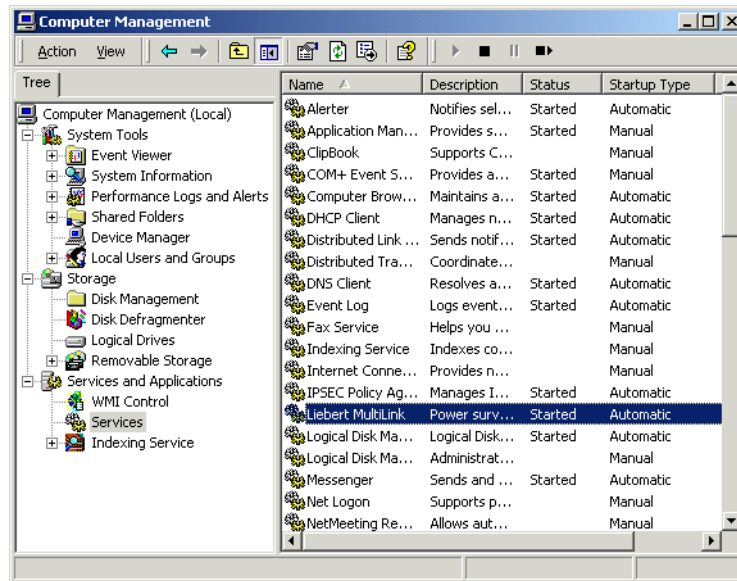
To execute one of these programs, click on the **Start** button, then click on **Programs, MultiLink**, and finally on the desired program shortcut.

#### Verify MultiLink is Running—Windows XP/2000

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so:

- Right-click on **My Computer** to open a pop-up menu, then click on **Manage** to open the Computer Management window as shown below. In that window, click on **Services and Applica-**

tions, then on **Services**. If the MultiLink service is running, **Liebert MultiLink** appears in the list with a status of **Started**.

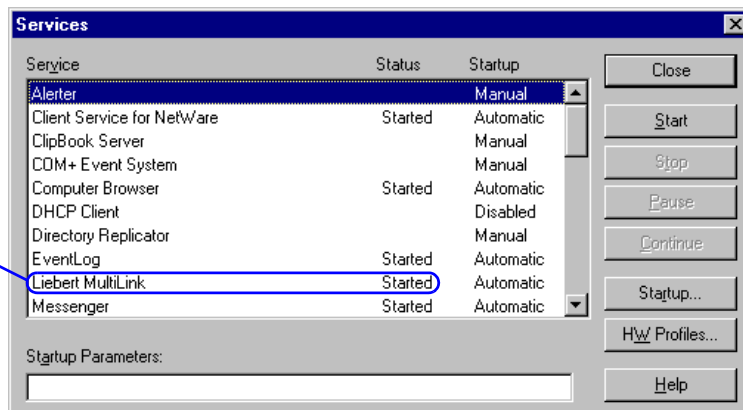


### Verify MultiLink is Running—Windows NT

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so:

- Open the **Services** window as shown below by pressing the **Start** button, then clicking on **Settings, Control Panel**, and finally **Services**. If the MultiLink service is running, **Liebert MultiLink** appears in the list with a status of **Started**.

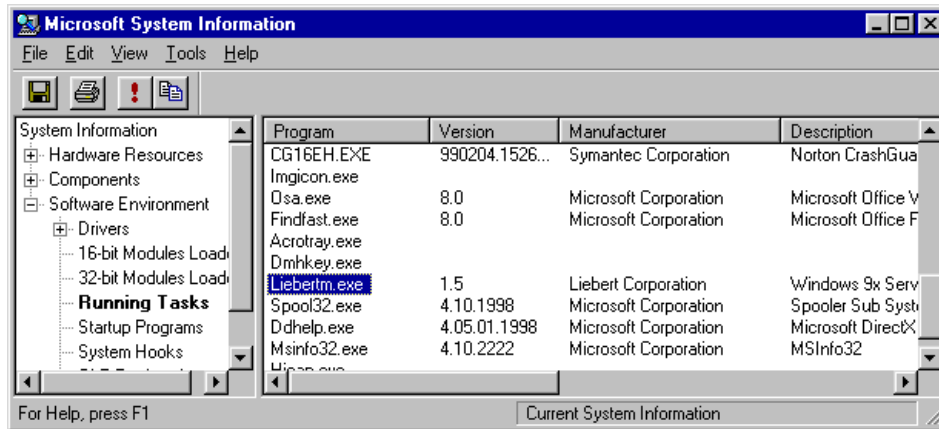
Appearance in window shows MultiLink service is running



## Verify MultiLink is Running—Windows Me/98

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so:

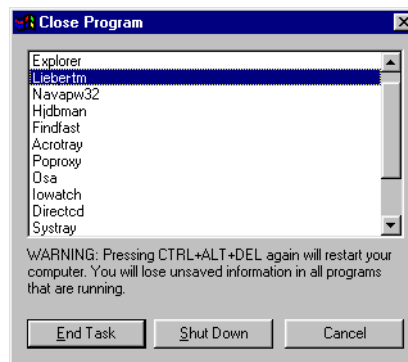
- Run the System Information utility as shown below by pressing the **Start** button, then clicking on **Programs, Accessories, System Tools**, and finally **System Information**. In the System Information tree, click on **Software Environment**, then **Running Tasks**. The **Liebertm.exe** program should appear in the list.



## Verify MultiLink is Running—Windows 95

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so:

- Press the **Ctrl, Alt, and Delete** keys simultaneously to display the **Close Program** dialog box. The **Liebertm** program should appear in the list.



## Identifying a Computer's IP address

There are several ways to determine a computer's IP address. Use the one you are familiar with or the applicable method below.

### For Windows XP/2000/NT/Me/98:

1. For Windows XP, 2000 and NT, launch a Command Prompt window; for Windows Me and 98, launch an MS-DOS Prompt window.
2. At the prompt enter:  
`ipconfig /all | more`
3. Execute the command by pressing the Enter key.
4. The screen will display the IP address. If the computer has more than one network adapter, the IP address will be the numbers associated with the active Network Interface Card.

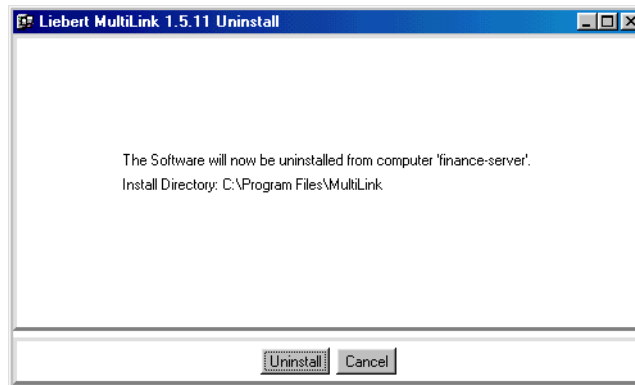
### For Windows 95 (also available for Windows Me/98):

1. Launch an MS-DOS prompt window.
2. At the prompt enter:  
`winipcfg /all`
3. Execute the command by pressing the Enter key.
4. This opens the IP Configuration window; select the active network adapter from the drop-down list.
5. The computer's IP address will show automatically beside IP Address.

## A.1.4 Uninstalling MultiLink

To remove the MultiLink software from your computer, use the Uninstall shortcut created during installation:

- Press the Start button, then click on **Programs, MultiLink**, and finally the **Uninstall** icon. This opens the following window.



- Click on the **Uninstall** button. A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed.

The uninstall process stops the MultiLink service and removes all MultiLink files from the hard drive

## A.2 SUN SOLARIS

### A.2.1 Platform-Specific Requirements

In addition to the general requirements listed in **5.0 - What is Required to Use MultiLink?**, prospective MultiLink users must also have:

- SunSoft Solaris on a SPARC processor
- At least 20 MB of free disk space (during installation, the /tmp directory must have at least 30 MB free)
- Common Desktop Environment or Sun OpenWindows (X Window System)
- A mouse
- TCP/IP network protocol

### A.2.2 Installation Notes

#### Pre-Installation Checklist

Comply with the following requirements, then return to **8.2 - Installing MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the pmadm utility to disable ttymon from monitoring the port. To disable ttymon, you must perform the following commands:
 

```
pmadm -l
```

 This command lists the **PMTAG** and **SVCTAG** for each port. You will substitute the values of these tags in the following command:
 

```
pmadm -d -p {PMTAG} -s {SVCTAG}
```
3. If you are using an SNMP card, check for SNMP daemons. Execute the command
 

```
ps -ef | grep -i snmp.
```

 If the processes snmpdx or snmpdm are running, they must be disabled before you can install MultiLink.
 

If you are not using an SNMP hardware card with your UPS, then MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

#### Serial Port Selection

The preconfigured serial ports are /dev/term/a and /dev/term/b. You may select one of these or enter another as appropriate.

#### Post-Installation Notes

The MultiLink installation program places the script `LiebertM` in the `/etc/init.d` directory. It also creates `K30LiebertM` and `S90LiebertM` links in the `/etc/rc1.d` and `/etc/rc2.d` directories.

### A.2.3 Notes on Running MultiLink

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`). See the CDE documentation or `xhost` man page for more information about the desktop security mechanism.

```
/usr/openwin/bin/xhost +`hostname`
```

**Note:** The characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

## Starting MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these MultiLink applications:

- `bin/ConfigEditor`—Configuration Editor
- `bin/UpsViewer`—UPS Status Viewer
- `Uninstall`—Uninstall MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

## Verify MultiLink is Running

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so, use `/etc/init.d/LiebertM show` to get a list of the active MultiLink processes.

## Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

### A.2.4 Uninstalling MultiLink

- Go to the directory where the MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- Click the **Uninstall** button. A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops MultiLink services that are running and removes all MultiLink files from the hard drive.



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## A.3 LINUX

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### A.3.1 Platform-Specific Requirements

In addition to the general requirements listed in **5.0 - What is Required to Use MultiLink?**, Prospective MultiLink users must also have:

- A Linux distribution with a version 2.4.18 or later kernel running on a 333 MHz Intel Pentium II-class processor. Use `uname -r` to determine the version of your kernel and note that, in most cases, this will be different from the version of your Linux distribution.
- GNU C Runtime Library (glibc) version 2.1 or greater. To check the version of glibc that you have, use `ls -l /lib/libc.so.6`. If this is not found, you do not have glibc on your system. If the file to which this is linked begins with `libc-2.1`, `libc-2.2`, etc., then you have an acceptable version of glibc. Consult the documentation for your Linux distribution for more information on upgrading to the required version of glibc.
- Additional packages as may be required by the Sun JRE v1.4.2. For more information, see: <http://java.sun.com/j2se/1.4.2/jre/install-linux.html>
- A Linux distribution that manages services (daemons) using the System V method. This uses an `init.d` directory and several `rc?.d` directories located either in `/etc/rc.d` or just `/etc` (e.g., `/etc/rc.d/init.d`).
- 45 MB of free disk space (during installation, the `/tmp` partition must have 60 MB free)
- 128 MB of RAM
- Xfree86 (X Window System) with either the KDE or Gnome desktop environment
- A mouse or other pointing device
- TCP/IP network protocol

Most recent popular Linux distributions meet these requirements. MultiLink has been tested on:

Red Hat® Linux 8.0 and 9.0  
SuSE Linux 7.3 and 8.0

MultiLink has been tested with both KDE and Gnome desktop environments.

### A.3.2 Installation Notes

#### Pre-Installation Checklist

Comply with the following requirements, then return to **8.2 - Installing MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, you must disable `getty` or `ttymon` from monitoring that port. These services may be started during initialization via entries in `/etc/inittab` or startup scripts located in `/etc/rc.d` depending on your particular Linux distribution. MultiLink will not function properly if it is using the same serial port as one of these processes. Consult the documentation for your Linux distribution for more information on how to disable `getty`/`ttymon` on the UPS serial port.
3. If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the process `snmpd` is running, it must be disabled before you can install MultiLink. Consult the documentation for your Linux distribution for more information on how to uninstall SNMP.  
If you are not using an SNMP hardware card with your UPS, MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

#### Serial Port Selection

The preconfigured serial ports are `/dev/ttyS0` and `/dev/ttyS1`. You may select one of these or enter another as appropriate.

**Note:** Be careful to not pick the port used by the serial mouse if your system has one.

## Post-Installation Notes

The MultiLink installation program places the script `LiebertM` in the `/etc/rc.d/init.d` (or `/etc/init.d`) directory. It also creates `K30LiebertM` and `S90LiebertM` links in several of the `/etc/rc.d/rc?.d` (or `/etc/rc?.d`) directories.

### A.3.3 Notes on Running MultiLink

If running an X Window system window manager, all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`). See the `xhost` documentation for more information about the desktop security mechanism.

```
/usr/bin/X11/xhost +`hostname`
```

**Note:** the characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

### Starting MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these MultiLink applications:

- `bin/ConfigEditor`—Configuration Editor
- `bin/UpViewer`—UPS Status Viewer
- `Uninstall`—Uninstall MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

### Verify MultiLink is Running

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so, use `/etc/rc.d/init.d/LiebertM show` to get a list of the active MultiLink processes. You may see what appears to be a large number of processes for MultiLink. Most of these are not actual processes but are due to the implementation of Java native threads on Linux.

### Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

### A.3.4 Uninstalling MultiLink

- Go to the directory where the MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- Click the Uninstall button. A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the Yes button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops MultiLink services that are running and removes all MultiLink files from the hard drive.

## A.4 HEWLETT PACKARD HP-UX

### A.4.1 Platform-Specific Requirements

In addition to the general requirements listed in **5.0 - What is Required to Use MultiLink?**, prospective MultiLink users must also have:

- Hewlett Packard HP-UX 11.0 or 11i for HP 9000
- At least 20 MB of free disk space (during installation, the /tmp directory must have at least 30 MB free)
- Common Desktop Environment (X Window System)
- A mouse
- TCP/IP network protocol

### A.4.2 Installation Notes

#### Pre-Installation Checklist

Comply with the following requirements, then return to **8.2 - Installing MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the SAM utility to disable getty or uugetty at system startup from monitoring the port where you are connecting the UPS. Optionally, you can delete or comment the following line (or similar) from the /etc/inittab file:
 

```
ttpl:234:respawn:/usr/sbin/getty -h tty0p1 9600
```
3. If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the processes `snmpd` or `snmpdm` are running, they must be disabled before you can install MultiLink.
 

If you are not using an SNMP hardware card with your UPS, MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

#### Serial Port Selection

The preconfigured serial ports are /dev/tty0p0 and /dev/tty1p0. You may select one of these or enter another as appropriate.

#### Post-Installation Notes

The MultiLink installation program places the script `LiebertM` in the /sbin/init.d directory. It also creates `K300LiebertM` and `S900LiebertM` links in the /sbin/rc1.d and /sbin/rc2.d directories.

### A.4.3 Notes on Running MultiLink

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., /etc/profile). See the CDE documentation or xhost man page for more information about the desktop security mechanism.

```
/usr/bin/X11/xhost +`hostname`
```

**Note:** The characters surrounding `hostname` are the grave accent (``) that is usually found on the same keyboard key as the tilde (~).

#### Starting MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., /opt/MultiLink). These scripts may be used to execute these MultiLink applications:

- `bin/ConfigEditor`—Configuration Editor
- `bin/UpsViewer`—UPS Status Viewer
- `Uninstall`—Uninstall MultiLink

For convenience, you may want to add the bin subdirectory to your PATH.

## Verify MultiLink is Running

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so, use `/sbin/init.d/LiebertM show` to get a list of the active MultiLink processes.

## Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

### A.4.4 Uninstalling MultiLink

- Go to the directory where the MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- Click the **Uninstall** button. A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops MultiLink services that are running and removes all MultiLink files from the hard drive.

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## A.5 IBM AIX

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### A.5.1 Platform-Specific Requirements

In addition to the general requirements listed in **5.0 - What is Required to Use MultiLink?**, prospective MultiLink users must also have:

- AIX 4.3 or 5.1 for RISC System/6000
- At least 20 MB of free disk space (during installation, the /tmp directory must have at least 30 MB free)
- Common Desktop Environment (X Window System)
- A mouse
- TCP/IP network protocol

### A.5.2 Installation Notes

#### Pre-Installation Checklist

Comply with the following requirements, then return to **8.2 - Installing MultiLink**.

1. During installation you must be logged in as “root.”
2. If using a serial port connection to the UPS, use the SMIT utility to disable getty at system startup from monitoring the port where you are connecting the UPS.
3. If you are using an SNMP card, check for SNMP daemons. Execute the command `ps -ef | grep -i snmp`. If the process `snmpd` (or similar) is running, it must be disabled before you can install MultiLink.  
If you are not using an SNMP hardware card with your UPS, MultiLink can use its default port settings of 3029/3027, and there is no need to disable the SNMP daemons.
4. Make sure the MultiLink distribution file has execute permission (`chmod +x <file>`), then execute it.

#### Serial Port Selection

The preconfigured serial ports are `/dev/tty0` and `/dev/tty1`. You may select one of these or enter another as appropriate.

#### Post-Installation Notes

The MultiLink installation program places the script `LiebertM` in the `/usr/sbin` directory and modifies the `/etc/rc.tcpip` file to execute this script.

### A.5.3 Notes on Running MultiLink

If running the Common Desktop Environment (CDE), all users meant to receive pop-up messages must allow access to their desktop. This can be accomplished by adding the following command to a common logon script (e.g., `/etc/profile`). See the CDE documentation or `xhost` man page for more information about the desktop security mechanism.

```
/usr/bin/X11/xhost +`hostname`
```

**Note:** The characters surrounding `hostname` are the grave accent (```) that is usually found on the same keyboard key as the tilde (`~`).

#### Starting MultiLink Applications

During installation, shell scripts are created in the product installation directory tree (e.g., `/opt/MultiLink`). These scripts may be used to execute these MultiLink applications:

- `bin/ConfigEditor`—Configuration Editor
- `bin/UpsViewer`—UPS Status Viewer
- `Uninstall`—Uninstall MultiLink

For convenience, you may want to add the `bin` subdirectory to your `PATH`.

## Verify MultiLink is Running

When operating properly, MultiLink is running constantly in the background. To verify that it is doing so, use `/usr/sbin/LiebertM show` to get a list of the active MultiLink processes.

## Identifying a Computer's IP Address

Run the following command:

```
hostname
```

You will next see output similar to this:

```
frodo
```

The result of this command will show your machine name. In this example, the machine name is `frodo`. Then run the following command:

```
more /etc/hosts
```

You will next see output similar to this:

```
127.0.0.1 localhost
10.0.0.10 frodo
10.0.0.11 bilbo
```

The result of this command will list one or more entries of IP address and name pairs. In this example:

The IP address for machine name `frodo` is `10.0.0.10`

The IP address for machine name `bilbo` is `10.0.0.11`

### A.5.4 Uninstalling MultiLink

- Go to the directory where the MultiLink files are located (e.g., `/opt/MultiLink`) and run `Uninstall`.
- Click the **Uninstall** button. A confirmation box asks if you are sure you want to uninstall the software.
- Pressing the **Yes** button will begin removing the software.
- A message box appears when the process is completed. The uninstall process stops MultiLink services that are running and removes all MultiLink files from the hard drive.

## A.6 NOVELL NETWARE

### A.6.1 Platform-Specific Requirements

In addition to the general requirements listed in **5.0 - What is Required to Use MultiLink?**, prospective MultiLink users must also have:

- NetWare 4.11, 4.2, 5.0, 5.1 or 6.0 server with JAVA and NETDB modules loaded
- At least 20 MB of free disk space on SYS: volume
- Novell's NetWare Client on Windows XP, 2000, NT™, 98 or 95 on an Intel Pentium-class processor
- Read/write access to SYS:\System\  
(SYS must be mapped to a drive on the client for installation and for operating the Configuration Editor and Status Viewer)
- At least 20 MB of free disk space in the client's %TEMP% directory for installation
- A mouse on the client workstation
- TCP/IP network protocol
- Novell Java Virtual Machine (JVM)—your operating system and JVM version determine which MultiLink download you will need. Refer to the following table to select the proper download for your system based on server version and Java type. For the most up-to-date information on this topic, visit the Liebert Web site at:

<http://www.liebert.com>

Platform	Release	Download
Novell NetWare 4.11-12, 5.0-1 With Java 1.1.7b ONLY	MultiLink Version 1.5 - build 37, September 26, 2001	ML_15_037_NW.exe (self-extracting zip file)
Novell NetWare 5.1, 6.0 With Java 1.2.x or 1.3.x ONLY	MultiLink Version 1.5 - build 42, September 3, 2002	ML_15_042_NW_j2.exe (self-extracting zip file)

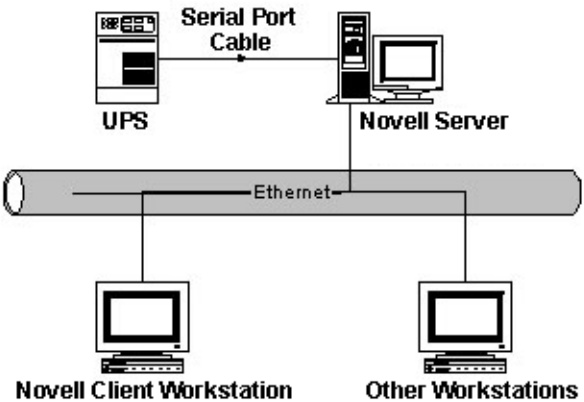
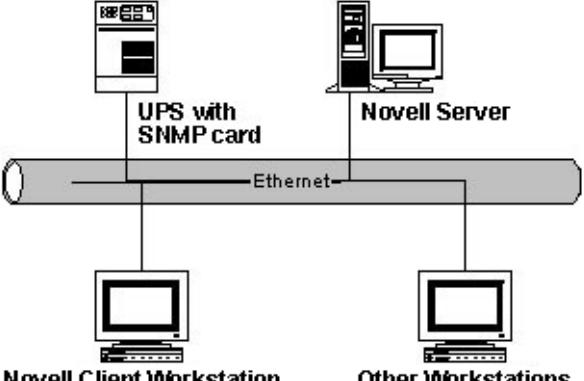
### A.6.2 Installation on the Novell Server

- Download the self-extracting MultiLink file and execute it on a NetWare client workstation. This workstation must be set up as a NetWare client and have Windows XP, 2000, NT, Me, 98, or 95 installed. The target for the installation will be the Novell server.
- The program will be installed into SYS:\System\ML (this cannot be changed) on the server that you select.

### A.6.3 Determining Your Configuration

- Specify your network configuration using the examples in the table below.

**Table 3 Configuration Options for Novell Installation**

For this configuration:	Choose this option:
<p style="text-align: center;"><b>Configuration 2</b></p>  <p style="text-align: center;">UPS      Serial Port Cable      Novell Server</p> <p style="text-align: center;">Ethernet</p> <p style="text-align: center;">Novell Client Workstation      Other Workstations</p>	<p>For the <b>SERVER</b> in Configuration 2, choose: <b>Serial Port on computer 'name'</b></p> <p>Installation must be done from a NetWare client workstation.</p> <p>To be notified of UPS-related events, each client workstation in Configuration 2 must have MultiLink installed and running.</p>
<p style="text-align: center;"><b>Configuration 4</b></p>  <p style="text-align: center;">UPS with SNMP card      Novell Server</p> <p style="text-align: center;">Ethernet</p> <p style="text-align: center;">Novell Client Workstation      Other Workstations</p>	<p>For the <b>SERVER</b> in Configuration 4 (SNMP network configuration), choose: <b>Network directly via an SNMP card or a Serial Port on another computer</b></p> <p>Installation must be done from a NetWare client workstation.</p> <p>To be notified of UPS-related events, each client workstation in Configuration 4 must have MultiLink installed and running.</p>

### A.6.4 Starting the Configuration Editor

After installation, MultiLink prompts you to begin configuration. Liebert recommends opening the Configuration Editor now to review or modify the configuration settings.

To continue installation, see **9.0 - Configuring MultiLink for Your System**.

### A.6.5 Installation Notes

#### Serial Ports

The preconfigured serial ports are 0/0, 0/1, and 1/1 (where "0/1" represents port "1" on AIO board "0"). You may select one of these or enter another as appropriate.

**Note:** Be careful to not pick the port used by the serial mouse if your Novell system has one.



### A.6.6 Upgrading from MultiLink 1.5 Build 037 and Earlier

If you are upgrading your software from MultiLink 1.5 build 037 (or an earlier build) to MultiLink 1.5 build 042 (and later builds), you must first upgrade the JVM on the server from version 1.1 or 1.2 to version 1.3:

- Stop the MultiLink 1.5 service, which is running on the server, by issuing the `LIEBERTM STOP` command at the server console.
- Verify that the service has stopped by issuing the `LIEBERTM STATUS` command at the server console.
- Open the `SYS:\SYSTEM\AUTOEXEC.NCF` file in a text editor. Search for (ignoring case) and delete any instances of "`SYS:\SYSTEM\ML\LIEBERTM.NCF`" (the MultiLink service startup command) that appear in that file.
- Install the 1.3 JVM on the NetWare server. Follow the instructions provided with the JVM installation package.
- Reboot the server after the JVM installation is complete.
- Verify that `JAVA` is loaded on the server by issuing the command `MODULES JAVA` at the server console. You may also want to verify the version of the `JAVA NLM` that is loaded to ensure the JVM upgrade was successful.
- Execute the new MultiLink 1.5 installation program and follow the instructions as you would during a normal installation or upgrade.

## A.6.7 Upgrading from MultiLink 1.1

If you are upgrading your software from MultiLink 1.1 to MultiLink 1.5 build 042 (and later builds):

- Stop the MultiLink 1.1 service, which is running on the server, by executing the `UNLOAD JAVA` command at the server console. **(This method will kill ALL Java processes running on the server.)**
- To verify that the MultiLink 1.1 service has stopped and all NLMs have been unloaded, execute these two commands on the server:
 

```
MODULES LX232
MODULES LXNWSERV
```
- If nothing is returned from these commands, the modules have been unloaded. If they produce output, the associated NLM still needs to be unloaded.
- To unload an NLM, use the command `UNLOAD ****`, where “\*\*\*\*” is the name of the NLM. For example, the command to unload `LXNWSERV.NLM` would be `UNLOAD LXNWSERV`.
- Before beginning the install, issue the command `UNLOAD AIOCOMX` for each instance of `AIOCOMX` related to the use of MultiLink.
- Open the `SYS:\SYSTEM\AUTOEXEC.NCF` file in a text editor. Search for and delete any lines containing instances of “com.liebert.dpg.executor.LxM1Executor” (the MultiLink 1.1 service startup command) that appear in that file.
- Install the 1.3 JVM on the NetWare server. Follow the instructions provided with the JVM installation package.
- Reboot the server after the JVM installation is complete.
- Verify `JAVA` is loaded on the server by issuing the command `MODULES JAVA` at the server console. You may also want to verify the version of the `JAVA` NLM that is loaded to ensure the JVM upgrade was successful.
- Execute the new MultiLink 1.5 installation program and follow the instructions as you would during a normal installation/upgrade.

Upgrading to MultiLink 1.5 from MultiLink 1.1 leaves two lines in the `AUTOEXEC.NCF` file:

```
LOAD NWSNUT
LOAD AIOCOMX
```

These are loads of NetWare system NLMs. Because of the way the `AUTOEXEC.NCF` file is “cleaned,” removing these would be dangerous because every instance of them would be removed. These other instances of the NetWare system NLMs might be required by other programs.

The old `AUTOEXEC.NCF` (the file’s name prior to “cleaning”) is renamed to `AUTOEXEC.M15`.

Upgrades do NOT delete the old `SYS:\System\SNML` search path. Uninstalling does NOT delete the `SYS:\System\ML` search path. However, both of these search paths will disappear when the system is rebooted.



### NOTE

*Do NOT use the commands `JAVA -SHOW` and `JAVA -KILL#####` to stop the MultiLink 1.1 service. Attempting to do so will result in two `LX*NLMs` that cannot be unloaded. It is impossible to continue the upgrade installation with `LXNWSERV.NLM` still loaded. The `JAVA` NLM must be unloaded and then reloaded for the upgrade to proceed.*



### NOTE

*If the UPS is connected to a local serial port, MultiLink will detect at startup whether `AIOCOMX` is running. If it is not running, MultiLink 1.5 will load one instance of `AIOCOMX`. This is all that is required if you are using 0/0. If MultiLink detects any instance of `AIOCOMX` at startup, it will not load any additional instances. If you are using 0/1 or 1/1 for MultiLink, you will need to make sure there is an appropriate number of `LOAD AIOCOMX` statements in the `AUTOEXEC.NCF` file.*

## A.6.8 Starting MultiLink Applications

MultiLink services are configured and started during installation. Installation also creates .NCF and .LNK command files in the bin subdirectory of the product installation directory (e.g., SYS:\System\ML\bin). These scripts may be used to execute the following MultiLink GUI applications:

- Configuration Editor (MLconfig.ncf & MLconfig.lnk)
- UPS Status Viewer (UPSview.ncf & UPSview.lnk)

This path (e.g., SYS:\System\ML\bin) is added to the server's search path during installation so that the GUI applications may be started from the console by typing the command filename.

The server must be configured to support Java's GUI (NWGFX) in order to run the GUI applications on the server.

The .LNK files are provided for the convenience of starting the GUI on your NetWare client workstation. To run the applications on the NetWare client, you must have access to SYS:\System\ML.

## A.6.9 Notes on Running MultiLink

1. When operating properly, MultiLink is running constantly in the background. To verify that it is doing so, get a list of all active Java programs running through the `java -show` command (there should be an entry with 'Classname' of 'com.liebert.dpg.executor.LxM1Executor' if the MultiLink service is running).
2. The Configuration Editor may be run at either the Novell server or a client workstation. However, when setting up the log file to track UPS-related events, the Configuration Editor's **Browse** button is operable only when the Configuration Editor is being run at the server. The **Browse** button is disabled when the Configuration Editor is opened at a client workstation. Setting up or altering the log file at a workstation requires specifying the file's entire path.

### Message Format

MultiLink notification appears in the format below. The MultiLink console application may display one or two countdown timers simultaneously.

```

Liebert MultiLink 1.5                               NetWare Loadable Module
-----
Countdown to system shutdown on jupiter
Message from MultiLink at jupiter on 09-Nov-00 8:49:27 AM:
The UPS is on battery. This machine will shut down in 1:55.
[Press <c> to cancel shutdown.]

Last UPS Status Alert received:
Message from MultiLink at jupiter on 09-Mar-99 8:49:27 AM:
The UPS is on battery.

```

## A.6.10 Stopping MultiLink Services

Stop the MultiLink services by entering "LiebertM stop" at the server console.

The MultiLink services may then be restarted by entering "LiebertM start" at the server console.

### A.6.11 Adding or Deleting a UPS

The Status Viewer Configuration window allows you to make changes to the list of configured UPSs.

- In the UPS Status Viewer window (see **10.1 - Opening the Status Viewer**), click on the **Configuration** button to update the list of UPSs.
- Follow these instructions to add a UPS, make a change to a UPS or remove a UPS from the **Viewer List**.

#### To Add a UPS:

- Enter the IP address or hostname of the UPS in the **UPS Hostname or IP Address** box.
- Click on the **Add** button and the UPS will appear in the **Viewer List** box.

#### To Replace a UPS:

- Enter the IP address or hostname of the replacement UPS in the **UPS Hostname or IP Address** box.
- In the **Viewer List**, click on the name of the UPS to be replaced. (Click a second time on a UPS to deselect it. Double-clicking on the name of a UPS in the **Viewer List** list copies it to the **UPS Hostname or IP Address** box where it can be edited.)
- Click on the **Replace** button.

#### To Delete a UPS:

- Click on one or more entries in the **Viewer List**. (Click a second time on a UPS to deselect it.)
- Click on the **Delete** button, and a message box asks for confirmation that you wish to delete the UPS(s).

### A.6.12 Identifying a Computer's IP Address

Refer to Novell's INETCFG instructions.

### A.6.13 Uninstalling MultiLink

To remove the MultiLink software from your server, use the Uninst.lnk created during installation.

## APPENDIX B - MAKING YOUR OWN MULTILINK UPS CABLE

If you have a serial port connection to the UPS, you will need a custom cable. MultiLink will NOT function properly with ordinary serial cables. To make your own cable, follow the instructions in this appendix. (You may purchase a MultiLink UPS cable by contacting your local Liebert representative, value-added reseller, or distributor.)

You should prepare and attach the cable **before** installing MultiLink so that the system will be ready to use the software.

### B.1 MATERIALS YOU WILL NEED

- Two connectors, one with pins, the other with sockets, either DB25 or DB9
- RJ11 or RJ12 cable
- Two connectors, RJ11 or RJ12, depending on the cable being used

### B.2 INSTRUCTIONS

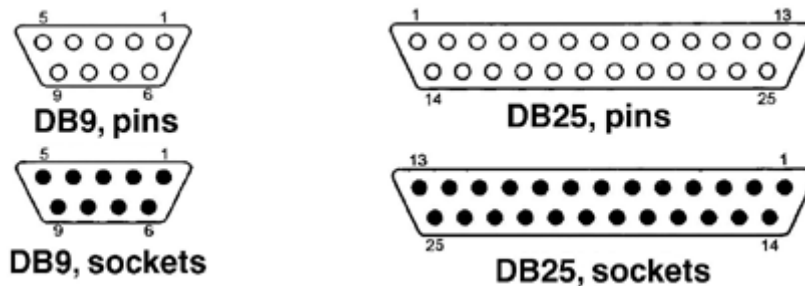
Follow these directions to build the cable:

#### 1. Determine the connector your UPS needs

Examine the back of your UPS.

- Does it have a 9-pin or 25-pin connector?
- Is the connector a pin or socket type? (A pin connector has protruding pins; a socket connector has holes.)
- If the back of the UPS has a socket connector, the cable connector must have a pin connector and vice versa.
- The diagrams in **Figure 1 - Serial Port Connectors** will help determine the type of connector you have. The circles denote pins and the dots denote sockets.

**Figure 1 Serial Port Connectors**



#### 2. Determine the connector your computer needs

Examine the back of your computer.

- Does it have a 9-pin or 25-pin connector?
- Is the connector a pin or socket type? (A pin connector has protruding pins; a socket connector has holes.)
- If the back of the UPS has a socket connector, the cable connector must have pins and vice versa.
- The diagrams in **Figure 1 - Serial Port Connectors** will help determine the type of connector you have. The circles denote pins and the dots denote sockets.

#### 3. Determine the length of the cable you need

Measure the distance between the UPS and the computer. The cable must be long enough to reach each machine's connector and to go around obstructions. Keep the cable as short as possible, preferably less than 25 feet. Do not lay the cable near electromagnetic interference sources such as AC power lines, fluorescent lights, and induction motors.

**4. Buy the parts**

The parts are available at most electronics stores or large computer stores as well as through mail-order companies. The following illustration shows some of the parts you may need.



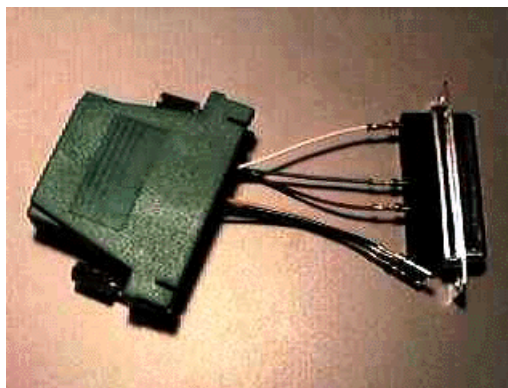
**5. Assemble the UPS and computer connectors**

Assemble the UPS and computer connectors according to the table below. The face of the connector has a number assigned to each hole or pin.

UPS Interface Port			Wire Color	Computer Interface Port		
DB25	DB9	Function		Signal	DB9	DB25
16	9	ON Battery	Red	<<<TX	3	2
17	8	ON Battery	Green	RX>>>	2	3
11	1	LOW Battery	Black	<<<RTS	7	4
9	7	LOW Battery	Yellow	DCD>>>	1	8
7	5	UPS Ground	If cable has shield, connect shield at UPS		Not connected	Not connected
19	4	UPS Off	Must NOT be connected		Not connected	Not connected

**NOTE**  
*Unlisted pins and sockets are not connected.*

The following picture shows a possible pin-wire insertion for a connector.



- 6. Assemble the connector housing and connect the cable to it**
- 7. Connect the cable to the computer and UPS**

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## APPENDIX C - TECHNICAL INFORMATION & FREQUENTLY ASKED QUESTIONS

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### 1. What is a DHCP server?

DHCP is the acronym for Dynamic Host Configuration Protocol. This protocol allows hostnames to be allocated dynamically when computers are connected to a network. This protocol is often used to remotely grant a hostname to a computer for a limited time, as when a student uses a computer for a quarter or longer. See RFC-1541 for more detailed information. (RFCs are *Request For Comment* documents that set forth regulations on how communication occurs on the Internet. These documents are controlled by the Internet Engineering Task Force (IETF) and are available for viewing at the IETF Web site.)

### 2. How do I identify possible IP port conflicts? How do I resolve the conflict?

Conflicts with ports 161, 162, 3027 and 3029 can be resolved by stopping SNMP services or daemons from running. This product does not support running the “monitor” or the “shutdown-client” on the same machine as a Network Management System (NMS).

For the proper procedure to stop the SNMP services or daemons, see **3.0 - How Do You Contact Liebert for Technical Support?** to get assistance.

### 3. What do the following errors mean?

These are error messages that can be generated by the UPS Status Viewer application.

- **UPS configuration error**

UPS configuration error means that the device that we are communicating with has responded, but does not understand the SNMP status request that we sent. This can occur if (for example) we are communicating with an SNMP-aware device that is not a UPS, such as an SNMP-manageable file server.

- **Communication send error**

Communication send error means that an unknown problem has occurred trying to communicate with the target UPS.

- **Communication timeout**

The Communication timeout error occurs whenever we do not hear back from the device we attempted communication with. This can occur if, for example, the specified device has been turned off, your computer has been unplugged from the network, or the SNMP community string is misconfigured on one of the systems.

- **UPS destination unknown**

UPS destination unknown means that we are unable to find the specified address. Looking for IP address 300.0.-1.-1, for example, will generate an UPS destination unknown error.

### 4. What is a service or a daemon?

Both are processes initiated at boot time that require no user intervention to start and run. Some platforms, such as Windows NT, call them *services*; Unix terms them *daemons*.

### 5. Why do I see the screen flash when the UPS goes to on-battery or returns to normal?

The flash is caused by display of an empty script window (windows that are devoid of text).

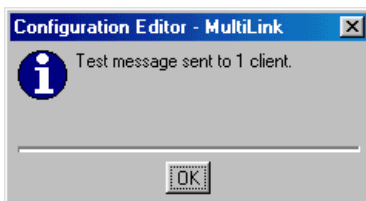
### 6. Should I use IP addresses or hostnames to configure MultiLink? How do I use the Test button in the Configuration Editor? (Applies to Configurations 1 and 2 in Table 2)

MultiLink routes alerts and notifications by IP addresses. It utilizes name service lookup to translate between IP addresses and hostnames, which are more easily understood by computer users who see them in the notification messages and in the user log. DNS configuration problems may delay display of MultiLink notification messages. If this is a persistent problem, Liebert suggests using IP addresses instead of hostnames. However, if IP addresses are dynamically assigned on your network, you may have to use hostnames.

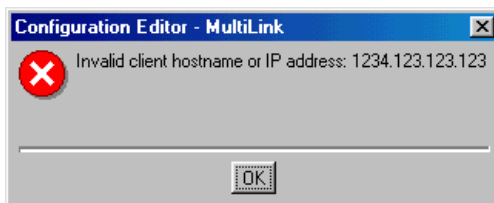


In general, notification messages should appear within five seconds of the triggering event. A longer delay may indicate problems with the local DNS configuration. If this is suspected, check the following:

- a. From a machine running the UPS monitor, launch the Configuration Editor.
- b. Click on the **Clients** tab.
- c. Select one or more configured hostnames and click on the Test button. This causes the MultiLink software to send a test message to each selected computer.
- d. If any test messages are successful, the following message appears on the computer running the Configuration Editor, showing the total number of successful test messages. (For Novell, the following message is displayed only if the Configuration Editor is running on the server.)

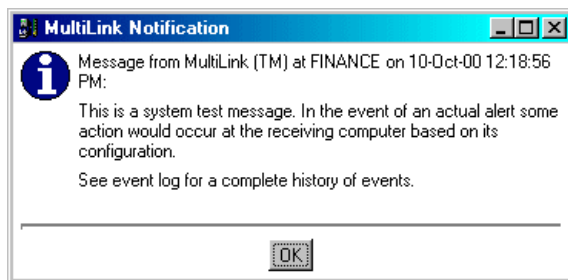


For each test message that fails to reach the targeted computer, the following message appears on the computer running the Configuration Editor.



The error message shown above indicates there is a name service configuration problem. The selected entry probably is not configured in the name service. This should be corrected. If it is configured with its associated reverse lookup entry, there might be a problem accessing the name service. You should try to ping the name server and correct any problems there with your System Administrator. Assuming everything is working properly to this point, you should check the configuration at the client end.

- e. A test message is successful if a targeted computer receives the following message:



This message should appear within five seconds of the triggering test event. If it does not, compare the time it is displayed with the time on the message. If the lapse is more than 10 seconds, there is a local name service problem. If the message is received within two seconds, the local name service configuration is correct.

If test messages are received in a timely fashion and the entry was a hostname, DNS or other name services are correctly configured.

For NetWare servers, the message above will appear on the MultiLink screen.



## APPENDIX D - ORDERING PARTS FROM LIEBERT

The tables below list part numbers for items available from Liebert Global Services. To obtain any item, contact your local Liebert representative, value-added reseller, or distributor.

**Table 4 Cables to Connect UPS and Computer**

Part Number	Description
ML9P9S	MultiLink Standard Contact Closure cable for UPSs equipped with DB9 ports
ML25P9S	MultiLink Standard Contact Closure cable for UPSs equipped with DB25 ports

**Table 5 MultiLink License Kits**

Part Number	Description
MLLKB	MultiLink License Kit—5 Computers
MLLKC	MultiLink License Kit—10 Computers
MLLKD	MultiLink License Kit—20 Computers
MLLKG	MultiLink License Kit—100 Computers
Contact your local Liebert representative, value-added reseller or distributor.	MultiLink License Kit—Unrestricted

## **MultiLink 1.5™**

### **The Company Behind the Products**

With over a million installations around the globe, Liebert is the world leader in computer protection systems. Since its founding in 1965, Liebert has developed a complete range of support and protection systems for sensitive electronics:

- Environmental systems—close-control air conditioning from 1 to 60 tons
- Power conditioning and UPS with power ranges from 300 VA to more than 1000 kVA
- Integrated systems that provide both environmental and power protection in a single, flexible package
- Monitoring and control—from systems of any size or location, on-site or remote
- Service and support through more than 100 service centers around the world and a 24/7 Customer Response Center

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### **Technical Support/Service**

#### **Web Site**

[www.liebert.com](http://www.liebert.com)

#### **Monitoring**

800-222-5877

[monitoring@liebert.com](mailto:monitoring@liebert.com)

Outside the US: 614-841-6755

#### **Single-Phase UPS**

800-222-5877

[upstech@liebert.com](mailto:upstech@liebert.com)

Outside the US: 614-841-6755

#### **Three-Phase UPS**

800-543-2378

[powertech@liebert.com](mailto:powertech@liebert.com)

#### **Environmental Systems**

800-543-2778

#### **Outside the United States**

614-888-0246

#### **Locations**

##### **United States**

1050 Dearborn Drive

P.O. Box 29186

Columbus, OH 43229

##### **Italy**

Via Leonardo Da Vinci 8

Zona Industriale Tognana

35028 Piove Di Sacco (PD)

+39 049 9719 111

Fax: +39 049 5841 257

##### **Asia**

23F, Allied Kajima Bldg.

138 Gloucester Road

Wanchai

Hong Kong

+852 2 572 2201

Fax: +852 2 831 0114