



***Data/Fax Industrial Temperature Modem
MT5634IND***

User Guide



User Guide
MT5634IND
Data/Fax Industrial Temperature Modem
S000369A Rev. A

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Revision	Date	Description
A	01/07/05	Initial release.

Patents

This device is covered by one or more of the following patents: 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; D353,598; 5,355,365; 5,309,562; 5,301,274. Other patents pending.

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Technical Support

Country	By Email	By Phone
France:	support@multitech.fr	(33) 1-64 61 09 81
India:	support@multitechindia.com	91 (124) 6340778
U.K.:	support@multitech.co.uk	(44) 118 959 7774
U.S. and Canada:	support@multitech.com	(800) 972-2439
Rest of the World:	support@multitech.com	(763) 717-5863

Internet Address: <http://www.multitech.com>

World Headquarters

Multi-Tech Systems, Inc.
 2205 Woodale Drive
 Mounds View, Minnesota 55112 U.S.A.
 (763) 785-3500 or (800) 328-9717
 Fax (763) 785-9874
<http://www.multitech.com>

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Chapter 1 – Description and Specifications

Introduction

This guide highlights the features and specifications of the MT5634IND modem and shows you how to set up and operate your Multi-Tech MultiModemIND.

Safety Warnings

- Use this product only with UL- and CUL-listed computers (US).
- Never install phone wiring during a lightning storm.
- Never install a phone jack in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated phone wires or terminals unless the phone line has been disconnected at the network interface.
- Use caution when installing or modifying phone lines.
- Avoid using a phone during an electrical storm; there is a risk of electrical shock from lightning.
- Do not use a phone in the vicinity of a gas leak.
- To reduce the risk of fire, use only 26 AWG or larger telephone line cord.

MultiModem Package Contents

AC-Powered Version

- One MT5634IND industrial data/fax modem
- Two mounting brackets
- RS-232 serial cable
- One RJ-11 phone cable
- One universal power supply with power cord
- One printed Quick Start Guide
- One MT5634IND product CD containing the modem drivers, User Guide, Quick Start Guide, AT Commands Reference Guide, Fax Commands Reference Guides, Global Wizard software, PhoneTools (a data communications program), and Acrobat Reader

DC-Powered Version

- One MT5634IND industrial data/fax modem
- Two mounting brackets
- RS-232 serial cable
- One RJ-11 phone cable
- One fused power cable
- One printed Quick Start Guide
- One MT5634IND product CD containing the modem drivers, User Guide, Quick Start Guide, Global Wizard software, PhoneTools (a data communications program), and Acrobat Reader

AT Commands

AT commands and Fax commands for the MT5634IND modem are published in separate Reference Guides included on the MultiModemIND CD and posted on the Multi-Tech Web site.

Features and Technical Specifications

Data Interface	Serial, Binary, Asynchronous
Data Rates	Serial interface supports speeds up to 56K
Server-to-Client Data Rates	56K speeds when accessing a server (actual speed depends on server capabilities and line conditions)
Client-to-Server Data Rates	Up to 48Kbps when accessing a V.92 server (actual speed depends on server capabilities and line conditions); otherwise, the same rates as client-to-client data rates apply (see Client-to-Client Data Rates).
Client-to-Client Data Rates	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
Fax Rates	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400, 300 bps
Modem Compatibility	V.92, V.90, V.34, V.32bis, V.32, V.22bis, V.22, Bell 212A and 103/113, V.21, V.23, V.42bis, V.44
Fax Compatibility	ITU-T "Super" Group 3; Class 1.0, 2.0, 2.1; T.4; T.30; V.21; V.27ter; V.29; V.34; V.17; and TIA/EIA Class 1, 2; TR29.2
Error Correction	V.42
Data Compression	V.44, V.42bis
Flow Control	XON/XOFF; hardware (RTS/CTS)
Transmit Level	-13 dBm
Environmental	Temperature range -40°C to +85°C
Mechanical Dimensions & Weight	4.3" w x 2.4" h x 0.94" d; 4.2 oz. (11 cm x 6.1 cm x 2.4 cm; 120 g)
Command Buffer	60 characters
Other Features	<p>Global approvals in many countries for worldwide use</p> <p>Desktop or panel mounting</p> <p>Industrial chassis (a rugged, water-resistant, industrial chassis made of aluminum)</p> <p>Automatic fallback to slower speeds in noisy line conditions and fall-forward to faster speeds as conditions improve</p> <p>Fully AT command compatible</p> <p>2-wire leased-line support</p> <p>Flash memory for easy updates</p> <p>Callback security; Remote configuration</p> <p>Caller ID (in U. S.)</p> <p>Autodial, redial, repeat dial, dial pauses; Pulse or tone dial and touch-tone dial</p> <p>Dial tone and busy signal detection for reliable call progress reporting</p> <p>Nonvolatile memory for storage of custom settings and two telephone numbers</p> <p>Call status display</p> <p>Auto parity and data rate selections</p> <p>On-screen displays for modem option parameters</p>
Manufacturing Information	<p>Trade Name: MultiModem</p> <p>Model Number: MT5634IND</p> <p>Registration Number: The embedded SocketModem MT5634SMI is the registered part of this product: AU7USA-25814-M5-E</p> <p>Ringer Equivalence: 0.3B</p> <p>Modular Jack (USOC): RJ11</p>
Certification	<p>EMC Safety Approvals:</p> <p>FCC Part 15 Class B – Emissions for U.S.A. and Canada</p> <p>EN55022 Class B – Emissions for EU countries. Needed for CE marking</p> <p>EN55024 – Immunity for EU countries. Needed for CE marking</p> <p>EN61000-6-2 – Immunity for industrial environments</p> <p>Safety Certifications:</p> <p>UL60950-1 – U.S.A. and Canada Safety</p> <p>EN60950-1 – Safety for EU countries. Needed for CE marking</p> <p>GR1089 – Clause 4 NEBS Tested</p> <p>Reliability:</p> <p>Temperature Range: -40°C to +85°C</p> <p>EN60068-2-6 – Vibration 10 to 500 Hz sine vibration 5g</p> <p>EN60068-2-30 – Temp/Humidity Damp Heat cycling</p> <p>EN60068-2-1 – Cold (-40°C)</p> <p>EN60068-2-2 – Dry Heat (+85°C)</p> <p>EN60068-2-14 – Change of Temperature (-40°C to +85°C)</p> <p>IEC 68-2-27 – Shock – 3 shocks/3mS duration 50g</p>
Warranty	5 years

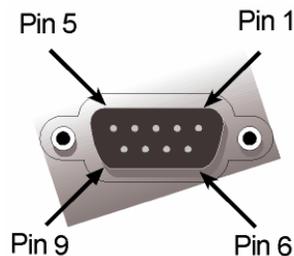
Electrical Specifications

Power Consumption	Typical: 155 mA (.945 W @ 9V DC) 180 mA maximum 155 mA @ 6V DC 96 mA @ 10V DC 68 mA @ 15V DC 54 mA @ 20V DC 38 mA @ 30V DC 30 mA @ 40V DC 26 mA @ 48V DC
Power Requirements	6V DC +/- 5% to 48V DC +/- 10%

LED Indicators

LED	Description
TD	Transmit Data. This LED is lit when modem is transmitting data to another modem.
RD	Receive Data. This LED is lit when the modem receiving data from another modem.
CD	Carrier Detect. This LED is lit when the modem detects a valid carrier signal from another modem. It is on when the modem is communicating with the other modem and off when the link is broken.
TR	Terminal Ready. (Also called Data Terminal Ready.) This LED indicates the PC is turned on and ready to communicate. This LED is lit when a data communications program initializes the modem. It goes off when the communications program disconnects the COM port. When it goes off, a connected modem will disconnect.
PWR	Power. This LED Indicates the presence of DC power when lit.

RS-232 9-Pin Connector



Pin	Description
1	DCD
2	RX Data
3	TX Data
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	RI

About the Leased-Line Operation Feature

The MultiModemIND can be used on a two-wire leased line.

A leased line is a private, permanent telephone connection between two points. Unlike normal dialup connections, a leased line is always active. The modems automatically connect when they are attached to the line and are turned on. Because a leased line is always active, one of the two modems on the line must be configured as the *originate* modem and the other as the *answer* modem; however, it does not matter which is which.

In the event of an interruption, leased-line modems automatically reconnect when the data line or power is restored.

Setup

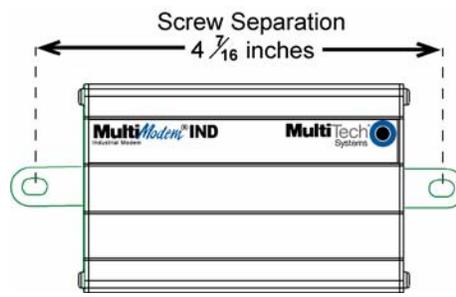
1. Connect a modular telephone cable to the LINE jack. Connect the other end of the cable to a two-wire lease-line jack or terminals supplied by the telephone company.
2. Turn on the modem.

Chapter 2 – Installation

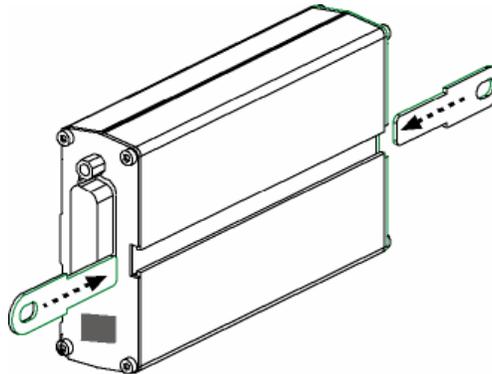
Step 1 – Desktop Placement or Panel-Mounting

The MT5634IND is design to be used on the desktop or to be panel-mounted. For panel-mounting, follow these directions for attaching the mounting brackets:

1. Typically, the modem is mounted against a flat surface with two mounting screws. Drill the mounting holes at the desired location. The mounting holes must separated by $4 \frac{7}{16}$ inches center-to-center.



2. To attach the brackets to the modem, slide the mounting brackets into the corresponding slots on the back of the chassis.

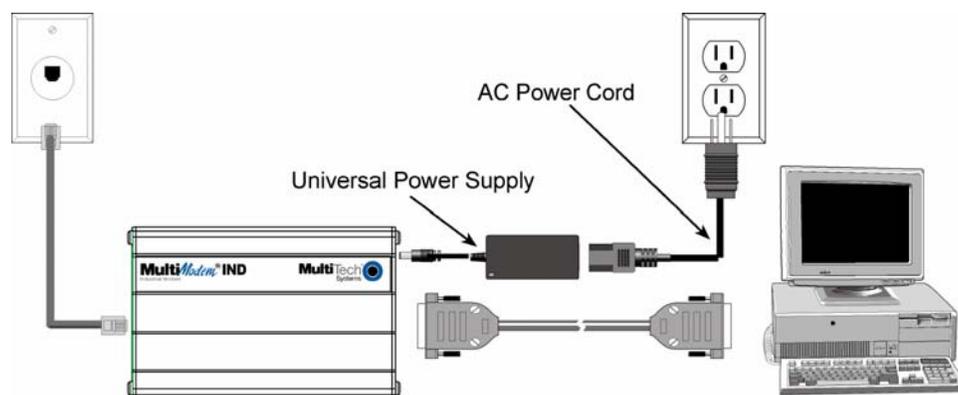


3. Attach the modem to the surface with two screws.

Step 2 – Connect the Modem to Your System

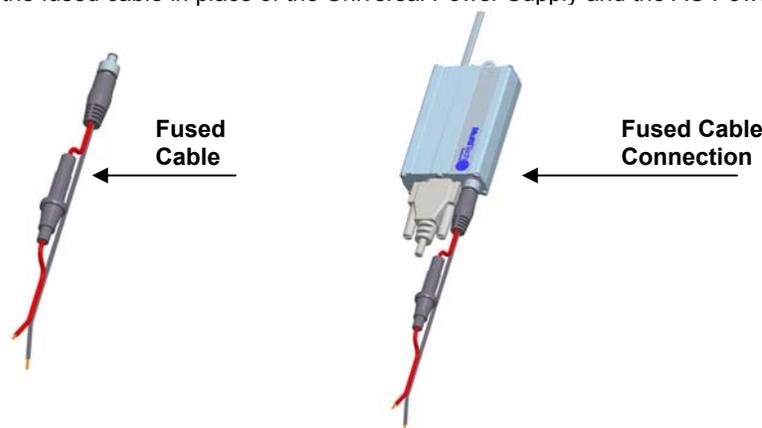
For AC Power

Turn off your computer. Place the modem in a convenient location, and then connect it to your computer's serial port, the phone line, and AC power.



For DC Power

For DC power, use the fused cable in place of the Universal Power Supply and the AC Power Cord.



Steps for connecting Your Modem to Your System

RS-232 Connection

Plug one end of the serial cable into the RS-232 connector on the modem, and plug the other end into a serial port connector on your computer, such as COM1 or COM2.

Phone Line Connection

Plug one end of the phone cable into the MT5634IND LINE jack and the other end into a phone line wall jack.

Power Connection

For AC

Plug the power supply cable with attached transformer block into the power connector on the MultiModem. Then plug the AC cord receptacle into the transformer block, and plug the other end of the AC cord into a power outlet or power strip.

Note: Use only the power supply supplied with the MT5634IND. Use of any other power supply will void the warranty and could damage the modem.

For DC

Plug the fused cable into the power connector on the MultiModem. Then attach the two wires at the other end of the fused cable to a DC power source.

Step 3 – Install the Modem Driver

If you use Windows 98+, you must install the modem driver, which is installed using the Windows Plug and Play feature. Follow the four-step procedure below. If you use another operating system, see your operating system manual.

1. Make sure your modem is connected properly, and then turn on your computer. Windows should detect your new modem and open the **Install New Modem** wizard.
2. Insert the MT5634IND product CD, and then click **OK**.
3. Windows installs and configures the modem.
4. Click **Finish** to exit.

Windows NT – The Install New Modem wizard presents one additional prompt before Step 2. At this prompt, select: **Don't detect my modem; I will select it from a list**, and then click **Next**.

A dialog box with a list of manufacturers and a list of modem models appears. Select the Multi-Tech Systems MT5634IND (the driver is named Multi-Tech MT5634SMI-V92-IND).

Note: If Windows cannot identify your modem (for instance, if it identifies your modem as a "Standard Modem"), click **Change**. Return to the MT5634IND CD and open the drivers section. Select the Multi-Tech MT5634SMI-V92-IND driver.

Step 4 – Configure the Modem for Your Country or Region

Different countries have different requirements for how modems must function. Therefore, before you use your modem, you must configure it to match the defaults of the country/region in which you are using it. You must also do this if you move the modem to another country/region after it has been configured for the first country/region. You can use one of two country/region configuration methods:

- The Global Wizard
- AT Commands

Using the Global Wizard

The Global Wizard configuration utility is recommended for computers running Windows 95 or newer.

1. Insert the MultiModemIND product CD into the CD-ROM drive. The Autorun menu should appear.
2. Click **Initial Setup and Country/Region Selection**.
3. Choose either:
 - **Run Global Wizard from CD**. This will not load the wizard onto your hard drive, or
 - **Install Global Wizard on the HD**. This will install the wizard onto your PC for future use.
4. The **Global Wizard** dialog box appeared. Click **Next**.
5. The Global Wizard searches for your modem and identifies it. Click **Next**.
6. Select the country/region in which the modem will be used. Click **Next**.
7. Review your country/region choice. If it is correct, click **Next** to configure the modem.
8. When Global Wizard announces that the parameters have been set, click **Finish** to exit.

Using AT Commands

Non-Windows users can configure the modem using AT commands. You must enter these commands in your communication program's terminal window. To configure the country/region code, the initialization string must contain the AT command for your specific country or region.

1. Run a communications program, such as PhoneTools (included on the MT5634IND CD) or HyperTerminal.
2. Type **AT%T19,0,nn**, where **nn** is the country/region code in hexadecimal notation. Click **Enter**. The message **OK** displays.
3. To verify that the correct country/region has been configured, type: **ATI9** and click **Enter**.
4. The country/region code displays:

Example:	Country/Region	AT Command (hexadecimal)	Result code (decimal)
	Euro/NAM	AT%T19,0,34 (default)	52

A list of country/region codes can be found on the Multi-Tech Web site at

<http://www.multitech.com/PRODUCTS/Categories/Modems/global/configuration.asp#chart>

Step 5 – Install Data Communications Software

Data communications software is designed to send and receive messages. Multi-Tech includes PhoneTools, a communications software program with your modem. However, the modem will work with other data communications software, such as HyperTerminal.

To install PhoneTools, insert the CD into the CD-ROM drive; click the PhoneTools icon. You will be asked to choose your language. The software automatically loads onto your PC.

PhoneTools

PhoneTools is a data communications program included as part of your MultiModemIND purchase. With this software you can:

- Upload and download data files.
- Send faxes at preset times.
- Store incoming voice messages and faxes.
- Retrieve stored messages, faxes, and telephone numbers (telephone number retrieval requires Caller ID service from your telephone company).
- Print a received fax.

For detailed information about operating your modem under PhoneTools, please refer to the PhoneTools user documentation included with the PhoneTools software.

Chapter 3 – AT Commands, S-Registers and Result Codes

AT commands and Fax commands for the MT5634IND are published in a separate Reference Guide included on the MT5634IND CD and posted on the Multi-Tech Web site.

Chapter 4 – Remote Configuration

Remote configuration is a network management tool that allows you to configure MT5634IND modems anywhere in your network from one location. With password-protected remote configuration, you can issue **AT** commands to a remote modem for maintenance or troubleshooting as if you were on site.

Basic Procedure

The following steps can be used when the connection is established by the **local** or the **remote** modem.

Note: The remote computer must be running and a communication program must be ready for a data connection, which will be indicated by a lighted **TR** indicator on the front of the modem.

1. Establish a data connection with a remote MT5634IND modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and press **Enter**.
Example: %%%ATMTSMODEM.
You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with **OK**.
3. You can now send **AT** commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0** and pressing **Enter**.
5. Type **ATO** and press **Enter** to exit remote configuration. You can now break the connection in the normal way.

Setup

Multi-Tech modems are shipped with a default setup password (MTSMODEM). Because anyone who has the *User Guide* knows the default setup password, you should change the password.

Changing the Setup Password

1. Open a data communications program such as HyperTerminal or PhoneTools.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxx** if you have replaced the MTSMODEM password with xxxxxxxx) and press **ENTER**. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. To change the password, type **AT#S=xxxxxxx**, where xxxxxxxx stands for the password, and then press **ENTER**. The password can include any keyboard character, and can be up to eight characters long. The modem responds with **OK**.
CAUTION: Passwords are case-sensitive. The next time you enter the password, it must be in the same case as you set it up.
4. The new password is saved automatically. You can now either enter more **AT** commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.

Changing the Remote Escape Character

To further improve security, you can change a remote modem's remote configuration escape character either locally or remotely. The remote configuration escape character is stored in register **S9**. The factory default is 37, which is the ASCII code for the percent character (%). Setting **S9** to 0 (zero) disables remote configuration entirely. **CAUTION:** If you do this remotely, you won't be able to change it back remotely.

1. Establish a remote configuration link with the remote modem as described in Basic Procedure.
2. Type **ATS9=n**, where **n** is the ASCII code for the new remote configuration escape character, and then press **Enter**.
3. Save the new value by typing **AT&W** and pressing **Enter**.
4. Type **ATO** and press **Enter** to exit remote configuration.

Chapter 5 – Callback Security

This chapter describes how to use callback security with your modem. Callback security protects your network from unauthorized access and helps control long-distance costs. When callback security is enabled, all callers are requested to enter a password. If a valid password is received, the modem hangs up and returns the call by dialing a phone number that is stored with the password. The person being called back must then enter the password a second time to establish a connection.

Up to 30 callback passwords and dialing strings can be stored in the modem. Each dialing string can be up to 34 or 35 characters long and can contain commands as well as phone numbers. For mobile callers, the dialing string can be programmed to allow the caller to bypass the stored callback number by entering a temporary callback number, to enter an extension at the callback number, or to make a direct connection without callback.

For local security, the passwords and dialing strings that are stored in the modem are protected from tampering by a setup password, which you should change when you set up the modem. You can further protect the modem against tampering by disabling its ability to respond to most AT commands. To check for attempted break-ins, you can request the modem to display the number of failed password attempts.

Your modem was shipped with a default setup password (MTSMODEM). The same password is used for both callback security and remote configuration. Because anyone who has access to this guide has access to the default password, you should change the password during your initial setup.

Changing the Setup Password

1. Open a data communications program such as PhoneTools.
 2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxx** if you have replaced the MTSMODEM password with xxxxxxxx). Press **ENTER**. The modem responds with **OK** if the setup password is correct and **ERROR** if it is wrong.
 3. To change the password, type **AT#S=xxxxxxx**, where xxxxxxxx stands for the password, and then press **Enter**. The password can include any keyboard character, and can be up to eight characters long. The modem responds with **OK**.
 4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.
- CAUTION:** Passwords are case-sensitive. The next time you enter the password, it must be in the same case as you set it up.

Turning Callback Security On and Off

Callback security must be turned on to enter many callback security commands.

1. Open a data communications program such as PhoneTools.
2. In the terminal window, type **AT#Sxxxxxxx**, where xxxxxxxx is your password. Press **Enter**. The modem responds with **OK** if the setup password is correct and **ERROR** if it is wrong.
3. Type one of the following commands:
 - **To turn off callback security:** Type **AT#CBS0** and press **Enter**. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and the stored dialing command locations 0–3 become available.
 - **To turn on both local and remote callback security:** Type **AT#CBS1**. Press **Enter**. With local security turned on, you must enter the setup password before you can enter any AT command except the **AT**, **ATIn**, and **AT#Sxxxxxxx** commands.
 - **To turn on remote callback security only:** Type **AT#CBS2** and press **Enter**. With remote callback security turned on, each caller is asked to enter a password, is called back, and then is asked to enter the password again before a connection can be made. Also, dialing command locations 0–3 for use with the **DS=y** dialing command are replaced by callback dialing command locations 0–29.
 - **To temporarily disable callback security if the modem is set to #CBS1 or #CBS2 (for instance, to call another modem):** Type **AT#CBS3** and press **Enter**. The modem returns to its original setting when you issue the hangup command (**+++ATH**) or the modem is reset. Note that if a remote modem breaks the connection, callback security remains disabled.

Setting Callback Security Message Parity

The password prompt and messages parity must match the parity of the computer to which the modem is connected.

1. Open a data communications program such as PhoneTools.
2. In the terminal window, type **AT#Sxxxxxxx**, where xxxxxxxx is your password. Press **Enter**. The modem responds with **OK** if the setup password is correct and **ERROR** if it is wrong.
3. The modem's parity default value is **No parity (AT#CBP0)**. To change the modem's default to use even parity, type **AT#CBP2**. Press **Enter**. For odd parity, type **AT#CBP1**. Press **Enter**.
4. To store the new parity value, type **AT&W**. Press **Enter**.

Assigning Callback Passwords and Phone Numbers

1. Open a data communications program such as PhoneTools.
2. In the terminal window, type **AT#Sxxxxxxx**, where xxxxxxxx is your password. Press **Enter**. The modem responds with **OK** if the setup password is correct and **ERROR** if it is wrong.
3. Enable callback security by typing **AT#CBS1** or **AT#CBS2** and pressing **Enter**.
4. To store a callback password for the first callback memory location, type **AT#CBN0=xxxxxxx**, where xxxxxxxx is the first password. Press **Enter**. The password must be unique, must be six to eight characters in length, and must not contain a + or - character.
5. To store a callback password for the second callback memory location, type **AT#CBN1=xxxxxxx**, where xxxxxxxx is the second password. Press **Enter**. Note that the memory location number in the command is incremented by one.
6. Repeat as many times as necessary, up to memory location 29, until all passwords are entered.
7. To store a callback phone number in the first memory location, type **AT&Z0=[+][-]ATxxxxxxx[??]**, where xxxxxxxx is the dialing string. Press **Enter**. The phone number must be preceded by **DT** for tone dialing or **DP** for pulse dialing. The dialing string can also include other AT commands. Example: **AT&Z0=+ATM0DT5551212**. Up to 35 characters can be used. The +, -, and ??? characters are optional:
 - + Number entry. Enables a mobile caller to enter his current phone number for callback.
 - Direct connection. Enables a caller to choose direct connection without being called back.
 - ,??? Extension entry. Must be used with the + command. Enables a caller to enter an extension number for callback. The number of ? characters must equal the number of digits in the extension.
8. To store a callback phone number in the second memory location, type **AT&Z1=[+][-]ATxxxxxxx[??]**, where xxxxxxxx is the dialing string, and press **Enter**. Note that the memory location number in the command is incremented by one.
9. Repeat, through memory location 29, until all dialing strings are entered.
10. To review your entries, type **AT&V** and press **Enter**.

Calling Procedures

Use the following procedures to call a modem that has callback security enabled. Note that Autoanswer must be enabled on the calling modem (**S0=1**).

Password-Only Callback

Use this procedure when calling from a fixed location.

1. Using a data communications program such as PhoneTools, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:
Password>
3. Type the password corresponding to the phone number for your modem. Press **Enter**. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears, and the modems disconnect:
OK Disconnecting
5. After the delay specified by the **#CBDn** command, the callback modem calls the number associated with the password. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.
6. After the modems reconnect, the following message reappears: **Password>**
7. Type the same password that you used to initiate the call. You are allowed three attempts to enter the password, after which you will be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection: **OK Connecting**

Number-Entry Callback

Mobile callers should use this procedure when calling from a phone number different from the one stored with the password. The password that is used must be set up for optional number-entry callback.

1. Using a data communications program such as PhoneTools, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:
Password>
3. Type a number-entry password, press the plus key (+), type **ATDT** and the number to call back to, and press **Enter**. You have three attempts or one minute to enter a valid password.
Note: When you type your phone number, be sure to include the long distance and area codes if they are needed.
4. If the password is valid, the following message appears, and the modems disconnect:
OK Disconnecting
5. After the delay specified by the **#CBDn** command, the callback modem calls the number that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.
6. After the modems reconnect, the following message reappears:
Password>
7. Type the same password that you used to initiate the call. You are allowed three attempts to enter the password, after which you will be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:
OK Connecting

Extension-Entry Callback

Use this procedure when calling from an extension at the callback number. The password that you use must be set up for an optional extension-entry callback.

1. Using a data communications program such as PhoneTools, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:
Password>
3. Type an extension-entry password, press the plus key (+), type the extension to call back to, and press **Enter**. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears, and the modems disconnect:
OK Disconnecting
5. After the delay specified by the **#CBDn** command, the callback modem calls the extension that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBAn** command.
6. After the modems reconnect, the following message reappears:
Password>
7. Type the same password you used to initiate the call. You are allowed three attempts to enter the password. After that, you will be disconnected.
8. If the password is valid, the following message appears, and the modems establish a working connection:
OK Connecting

Direct Connection

Use this procedure when you want to connect without first being called back. The password that you use must be set up for an optional direct connection.

1. Using a data communications program such as HyperTerminal or PhoneTools, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:
Password>
3. Type a direct connection password, press the - key, and then press ENTER. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears and the modems establish a working connection:
OK Connecting

Note: You can make all calls direct connect regardless of whether the password or phone number has the - character by using the %H1 command

Callback Security Commands

The AT Commands related to Callback to Security are included in the AT Commands Reference Guide included on MT5634IND MultiModem CD.

Chapter 6 – Troubleshooting

Your modem was thoroughly tested at the factory before it was shipped. If you are unable to make a successful connection, or if you experience data loss or garbled characters during your connection, it is possible that the modem is defective. However, it is more likely that the source of your problem lies elsewhere. The following symptoms are typical of problems you might encounter:

- None of the LEDs light when the modem is on.
- The modem does not respond to commands.
- The modem cannot connect when dialing.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer is slower than it should be.
- Data is being lost.
- There are garbage characters on the monitor.
- The modem doesn't work with Caller ID.
- Fax and data software can't run at the same time.

If you experience problems, please check the following possibilities before calling Technical Support.

None of the Indicators Light

When you turn on the modem, the LED indicators on the front panel should flash briefly as the modem runs a self-test. If the LEDs remain off, the modem is probably not receiving power.

- Make sure the modem's power switch is on, especially if you normally turn the modem on by turning on a power strip.
- If the modem is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.
- Make sure the power supply is firmly connected to the modem and the power supply's power cord is firmly connected to both to the power supply and the wall outlet or power strip.
- If the power strip is on and the modem switch is on, try moving the power supply to another outlet on the power strip.
- Test that the outlet is live by plugging another device, such as a lamp, into it.
- The modem or power supply may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem or power supply might be defective. Call Technical Support for assistance.

CAUTION: Do not under any circumstances replace the power supply with one designed for another product; doing so can damage the modem and void your warranty.

The Modem Does Not Respond to Commands

- Make sure the modem is plugged in and turned on. (See "None of the Indicators Light.")
- Make sure you are issuing the modem commands from data communication software, either manually in terminal mode or automatically by configuring the software. (You cannot send commands to the modem from the DOS prompt.)
- Make sure you are in terminal mode in your data communication program, then type **AT** and press ENTER. If you get an OK response from your modem, your connections are good and the problem likely is in the connection setup in your communication software.
- Try resetting your modem by turning it off and on. If you are using DOS or Windows 3.1 communication software, make sure the initialization string includes **&F** as the first command, to cancel any "leftover" command that could affect the modem's operation.
- If you don't get an OK, the problem may still be in the communication software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communication programs connect to the COM port automatically. Some connect when the software loads and remain connected until the program terminates. Others can disconnect without exiting the program. The modem's TR indicator lights to show that the software has taken control of the modem through the COM port.

- Your communication software settings may not match the physical port to which the modem is connected. The serial cable might be plugged into the wrong connector—check your computer documentation to make sure. Or you might have selected a COM port in your software other than the one the modem is physically connected to—compare the settings in your software to the physical connection.
- If the modem is on, the cable is plugged into the correct port, the communication software is configured correctly, and you still don't get an OK, the fault might be in the serial cable. Make sure it is firmly connected at both ends.
- Is this the first time you have used the cable? If so, it may not be wired correctly. Check the cable description on the packaging to make sure the cable is the right one for your computer.
- Peripheral expansion cards, such as sound and game cards, might include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communication port. Be sure to disable any unused ports.
Windows 9x: Right-click on **My Computer**, select **Properties** from the menu, click on the **Device Manager** tab, double-click on **Ports**, then double-click on the communication port your modem is connected to. In the port's **Properties** sheet, click on the **Resources** tab to see the port's input/output range and interrupt request. If another device is using the same address range or IRQ, it appears in the **Conflicting Device List**. Uncheck **Use automatic settings** to change the port's settings so they do not conflict with the other device, or select the port the conflicting device is on and change it instead. If you need to open your computer to change switches or jumpers on the conflicting device, refer to the device's documentation.
Windows NT 4.0: To look for address or IRQ conflicts, click Start, Programs, Administrative Tools (Common), and Windows NT Diagnostics. In the **Windows NT Diagnostics** dialog box, click the **Resources** tab to see which input/output ranges and interrupt requests are in use. If you need to open your computer to change switches or jumpers on the conflicting device, refer to the device's documentation.
- The serial port might be defective. If you have another serial port, install the modem on it, change the COM port setting in your software, and try again.
- The modem might have a problem beyond the scope of this user guide. If you have another Multi-Tech modem, try the other modem. If there is no problem with the other modem, call Technical Support for assistance.

The Modem Cannot Connect When Dialing

There can be several reasons the modem fails to make a connection. Possibilities include

- lack of a physical connection to the telephone line.
- a wrong dial tone.
- a busy signal.
- a wrong number.
- no modem at the other end.
- a faulty modem, computer, or software at the other end.
- incompatibility between modems
- poor line conditions.

You can narrow the list of possibilities by using extended result codes. Extended result codes are enabled by default. If they have been disabled, include **V1X4** in the modem's initialization string, or in terminal mode enter **ATV1X4** and press Enter. When you dial again, the modem reports the call's progress.

- If the modem reports **NO DIALTONE**, check that the modem's telephone line cable is connected to both the modem's LINE jack (not the PHONE jack) and the telephone wall jack. If the cable looks secure, try replacing it. If that doesn't work, the problem might be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a corporate phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone and might treat it as an error. Check your PBX manual to see if you can change the internal dial tone. If you can't, change your modem's initialization string to replace **X4** with **X3**, which will cause the modem to ignore dial tones.
- If the modem reports **BUSY**, the other number might be busy, in which case you should try again later. However, it might indicate that you have failed to add a **9**, the prefix to the phone number if you must dial 9 for an outside line.

If you must dial 9 to get an outside line, the easiest way to dial it automatically is to include it in the modem's dial prefix; e.g., **ATDT9**. Note the comma, which inserts a pause before the number is dialed. By inserting **9**, into the dial prefix, you do not have to include it in each directory entry.

To change the dial prefix in Windows HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, and type **9** in the local and long distance boxes in **How I dial from this location**.

- If there is no answer on the remote end, the modem reports *NO CARRIER*. You might have dialed a wrong number, and a person answered instead of a computer, or you might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call, and the modems might be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.
- Poor line conditions can affect the connection. When using V.34 or V.32 client-to-client connections in poor conditions, setting **S38=0** may result in better performance.

The Modem Disconnects While Online

- If you are not using Modem on Hold, Call Waiting can interrupt your connection when someone tries to call you. If you have Call Waiting service, disable it before each call. In most telephone areas in North America, you can disable Call Waiting by preceding the telephone number with ***70** (but first check with your local telephone company).
You can automatically disable Call Waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT*70,** – note the comma, which inserts a pause before the number is dialed). To change the dial prefix in Windows HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, check **This location has Call Waiting**, and select the correct code for your phone service.
If you have extension phones on the same line as your modem, you or someone else can interrupt the connection by picking up another phone. If this is a frequent problem, disconnect the extension phones before using the modem, or install another phone line especially for the modem.
- Check for loose connections between the modem and the computer, the telephone jack, and AC power.
- You might have had a poor connection because of line conditions or the problem might have originated on the other end of the line. Try again.
- Your ISP might have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

Modem Cannot Connect When Answering

- The default DTR Control command (**&D2**) inhibits autoanswer. To enable autoanswer, change DTR Control to **&D0**, and make sure **&Q0**, **&Q5**, or **&Q6** is also set. For more information, see the **&D** command in the AT Commands Reference Guide. For information on changing the modem's default configuration, see "Install and Configure Your Software" in Chapter 2.
- Autoanswer might be disabled. Turn on autoanswer in your communications program or send the command **ATS0=1** (**ATS0=2** if you have Caller ID service) to your modem in terminal mode.

File Transfer Is Slower Than It Should Be

- If you are using a slow transfer protocol, such as Xmodem, try Zmodem or Ymodem/G instead.
- Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.
- Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.
- Does your Internet service provider (ISP) use the same 56K protocol as your modem? The default setting of your modem is to connect using either the V.92 or the V.90 protocol, depending on which one the ISP's modem is using. If your ISP uses the V.90 protocol, the maximum speed you will be able to upload at is 33,600 bps. Check with your ISP to see which protocols it supports.
- Are you trying to send a file to another client modem? If so, then your maximum possible connect speed is 33,600 bps. You can upload at speeds up to 48,000 bps only when connected to an ISP that supports the V.92 protocol.
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

Data Is Being Lost

- If you are using data compression and a high speed serial port, set the serial port baud rate to two to six times the data rate.
- Make sure the flow control method you selected in software matches the method selected in the modem.
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

There Are Garbage Characters on the Monitor

- Your computer and the remote computer might be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communication software.
- You might be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you might get a better connection the second time.
- At speeds above 2400 bps, the remote modem might not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

The Modem Doesn't Work with Caller ID

- Caller ID information is transmitted between the first and second rings, so if autoanswer is turned off (**S0=0**) or if the modem is set to answer after only one ring (**S0=1**), the modem will not receive Caller ID information. Check your initialization string, and if necessary change it to set the modem to answer after the second ring (**S0=2**).
- Make sure that you have Caller ID service from your telephone company.

Fax and Data Software Can't Run at the Same Time

- Communication devices can be accessed by only one application at a time. In Windows 95 and higher, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.

Appendix A – Flash Upgrade

Your modem is controlled by semi-permanent firmware, which is stored in flash memory. Multi-Tech's firmware is nonvolatile; that is, it remains stored in memory when the modem is turned off and can be upgraded as new features are added.

Multi-Tech's *Flash Wizard* can be downloaded from Multi-Tech's FTP site and is available on the MT5634IND CD. Use this Flash Wizard for upgrading your firmware. Documentation for using the Flash Wizard is included with the wizard.

Flash Wizard Software for Windows®: <ftp://ftp.multitech.com/utilities/flashwizard/>

Flash Wizard Software for Linux: <http://mtflashwiz.sourceforge.net/>

Appendix B – Regulatory Compliance

Regulatory Compliance Statements



EMC, Safety, and R&TTE Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;

and

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;

and

Council Directive 1999/5/EC of 9 March on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries.

Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

Telecom Requirements for the United States

FCC Part 15 Regulation

This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Plug the equipment into an outlet on a circuit that is different from the one used by the receiver.

Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

WARNING – Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada

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

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.

New Zealand Telecom Warning Notice

1. The grant of a Telepermit for any item of terminal equipment indicates only that Telecom has accepted that the item complies with minimum conditions for connection to its network. It indicates no endorsement of the product by Telecom, nor does it provide any sort of warranty. Above all, it provides no assurance that any item will work correctly in all respects with another item of Telepermitted equipment of a different make or model, nor does it imply that any product is compatible with all of Telecom's network services.
This equipment is not capable under all operating conditions of correct operating conditions of correct operation at the higher speed which it is designated. 33.6 kbps and 56 kbps connections are likely to be restricted to lower bit rates when connected to some PSTN implementations. Telecom will accept no responsibility should difficulties arise in such circumstances.
2. Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.
3. This modem shall not be used in any manner which could constitute a nuisance to other Telecom customers.
4. This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing. Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should NOT contact the Telecom Faults Service. The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.
5. Warning Notice: No '111' or other calls can be made from this device during a mains power failure.
6. This equipment may not provide for the effective hand-over of a call to another device connected to the same line.
7. Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:
For repeat calls to the same number:
 - There shall be no more than 10 call attempts to the same number within any 30 minute period for any single manual call initiation, and
 - The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.
 For automatic calls to different numbers:
 - The equipment shall be set to ensure that automatic calls to different numbers are spaced such that there is no less than 5 seconds between the end of one call attempt and the beginning of another.
8. For correct operation, total of the RN's of all devices connected to a single line at any time should not exceed 5.

South African Statement

This modem must be used in conjunction with an approved surge protection device.

Other

The above country-specific examples do not cover all countries with specific regulations; they are included to show you how each country may differ. If you have trouble determining your own country's requirements, check with Multi-Tech's Technical Support for assistance.

Appendix C – Multi-Tech Warranty Statement and Product Repair

Warranty

Multi-Tech Systems, Inc., (hereafter “MTS”) warrants that its products will be free from defects in material or workmanship for a period of two, five, or ten years (depending on model) from date of purchase, or if proof of purchase is not provided, two, five, or ten years (depending on model) from date of shipment.

MTS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by Customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory — transportation prepaid.

MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PRICE FOR DEFECTIVE PRODUCTS.

Online Warranty Registration

If you have access to the World Wide Web, you can register your Multi-Tech product online at the following URL:
<http://www.multitech.com/register/>

Product Repair

Repair Procedures for U.S. and Canadian Customers

In the event that service is required, products may be shipped, freight prepaid, to our Mounds View, Minnesota factory:

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112
Attn: Repairs, Serial # _____

A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS to destinations in U.S. and Canada.

Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

For out of warranty repair charges, go to www.multitech.com/DOCUMENTS/Company/warranty/

Extended two-year overnight replacement service agreements are available for selected products. Please call MTS customer service at (888) 288-5470 or visit our web site at www.multitech.com/PARTNERS/Programs/orc/ for details on rates and coverage's.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at (800) 972-2439 or email support@multitech.com. Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (800) 328-9717 or (763) 717-5631, or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Repair Procedures for International Customers (Outside U.S.A. and Canada)

Your original point of purchase Reseller may offer the quickest and most economical repair option for your Multi-Tech product. You may also contact any Multi-Tech sales office for information about the nearest distributor or other repair service for your Multi-Tech product. The Multi-Tech sales office directory is available at www.multitech.com/PARTNERS/Channels/offices/

In the event that factory service is required, products may be shipped, freight prepaid to our Mounds View, Minnesota factory. Recommended international shipment methods are via Federal Express, UPS or DHL courier services, or by airmail parcel post; shipments made by any other method will be refused. A Returned Materials Authorization (RMA) is required for products shipped from outside the U.S.A. and Canada. Please contact us for return authorization and shipping instructions on any International shipments to the U.S.A. Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check drawn on a U.S. bank or your company's purchase order for repair charges. Repaired units shall be shipped freight collect, unless other arrangements are made in advance.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you or email support@multitech.com. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A., or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Repair Procedures for International Distributors

International distributors should contact their MTS International sales representative for information about the repairs for their Multi-Tech product.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our International Technical Support department at +(763)717-5863. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A. or email mtsrepair@multitech.com.

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

Replacement Parts

SupplyNet, Inc. can supply you with replacement power supplies, cables, and connectors for selected Multi-Tech products. You can place an order with SupplyNet via mail, phone, fax, or the Internet at the following addresses:

Mail: SupplyNet, Inc.
614 Corporate Way
Valley Cottage, NY 10989
Phone: 800 826-0279
Fax: 914 267-2420
Email: info@thesupplynet.com
Internet: <http://www.thesupplynet.com>

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