



**Models MT3334ZDX  
and MT3334ZDXV**

**Data/Fax Modem  
Data/Fax/Voice Modem**

**Owner's Manual (User Guide)**



## User Guide

S000343A Revision A

Models MT3334ZDX and MT3334ZDXV

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## Chapter 1 - Introduction and Description

### Introduction

Welcome to the world of data communications. You have acquired one of the finest intelligent data/fax modems available today, the MultiModemZDX, from Multi-Tech Systems. This Owner's Manual will help you install, configure, test and use your MultiModemZDX.

### Requirements

In addition to the contents of the MultiModemZDX package, you will need the following equipment.

#### Computer

The MultiModemZDX (MT3334ZDX or MT3334ZDXV) can be connected to any computer with an RS-232 serial port, such as the IBM PC, XT, AT, and PS/2 computers, and most IBM compatibles. *Note that your computer system should have a processing speed of at least 75 MHz in order to take full advantage of the telephony features of this product.*

#### Serial Cable

You will need a serial cable to connect the MultiModemZDX to your computer. Serial cables are available at computer stores and many office supply stores. The cable must have a DB-25P connector at the modem end. For IBM and compatible computers, the other end may have a DB-25P connector or a DB-9S connector, depending on your particular computer and whether you are using the COM1 or the COM2 serial port.

#### Telephone Line

You must have a telephone line with a conveniently located connector (jack) to accept the cable that comes with the MultiModemZDX. If you do not have a telephone jack near your computer, you should install an extension before proceeding.

## **Communications Software**

You will need data communications (datacomm), fax communications software and, for the MultiModemZDX, an appropriate application software package to access the Personal Voice-Mail features of the MultiModemZDXV. The MultiModemZDX is also compatible with datacomm and fax programs you may already own.

## **Product Features**

General features include:

- Compliance with major ITU-T, TIA, and EIA international standards to ensure compatibility with other modems.
- Distinguishes data, fax, or voice calls using DTMF and tone detection with software packages supporting these features.
- Caller ID to identify your caller's phone number (available on U.S. products).

### **Data**

- Supports the enhanced ITU-T V.34 standard, with data transmission speeds to 33.6K bps, while also maintaining compatibility with lower-speed modems.
- Supports asynchronous data rates at 33.6K, 31.2K, 28.8K, 26.4K, 24K, 21.6K, 19.2K, 16.8K, 14.4K, 12K, 9600, 4800, 2400, 1200, and 300 bps.
- Automatic fallback to slower speeds in noisy line conditions, and fall-forward to faster speeds as conditions improve.
- ITU V.42 LAP-M and MNP Class 3 and 4 error correction.
- ITU V.42bis (4-to-1) and MNP 5 (2-to-1) data compression.
- Automatic disabling of compression when transferring already-compressed files.
- Autodial, redial, pulse (rotary) and touch-tone dial.
- Dial tone and busy signal detection for reliable call-progress detection.
- Compatibility with the standard AT command set used by most communication programs.

## **Fax**

- Supports V.17, Group 3 fax communication standards, allowing it to communicate with other fax modems as well as with fax machines.
- Responds to Class 1 fax commands, enabling it to exchange editable and encrypted faxes with other Windows 95 computers.
- Sends and receives faxes from your computer at 14,400 bps, 9600 bps, 7200 bps, 4800 bps, 2400 bps, or 300 bps.

## **Voice (Model MT3334ZDXV only)**

- Full-duplex speakerphone support with adjustable speaker volume control. Can record and play back answering machine messages using optional microphone and speaker.
- Remote/local telephone answering machine (TAM) capabilities include voice mail control, record/playback, and call screening.
- Supports the TIA/EIA IS-101 AT+V voice command set.

**Note:** For more information on +V commands supported by the MT3334ZDXV refer to Multi-Tech's [Voice +V Commands Developer's Kit](#) (P/N 82039200). This document is available upon request.

## **About this Manual**

This manual is divided into five chapters and three appendices. The information contained in each chapter and appendix is as follows:

### **Chapter 1 - Introduction and Description**

Chapter 1 begins with a short product introduction and description; followed by a guide (which you are now reading) to the use of this manual.

### **Chapter 2 - Installation and Connection**

Chapter 2 documents the procedure for connecting the MultiModemZDX to your computer and to the phone line. Details are given, supported by illustrations as a guide for installing your MultiModemZDX to the point of operation. There is also a Troubleshooting section in the event your MultiModemZDX is not operating properly.

## **Chapter 3 - AT Commands, S-Registers and Result Codes**

Chapter 3 documents default and option AT commands, S-Registers and Result Codes supported by the MultiModemZDX.

## **Chapter 4 - Testing Your Modem**

Chapter 4 covers the modem's built-in test features. These are: Power-on Self Test, Local Analog Loopback, Digital Loopback and Remote Digital Loopback Tests. We have included a description of each test and how to use each test procedure.

## **Chapter 5 - Service, Warranty & Technical Support**

Chapter 5 provides instructions for getting modems serviced at the factory, statements on your ten-year warranty, information about our user Bulletin Board Service (*BBS*) and receiving technical support via the CompuServe and Internet forums.

## **Appendices**

Appendix A - Technical Specifications

Appendix B - Tone Dial Frequencies

Appendix C - Regulatory Information

## Chapter 2 - Installation

### Introduction

This chapter will provide you with the basic steps necessary to install and configure your MultiModemZDX. Before attempting any procedure, be sure to read the safety warnings in the following section.

### Safety Warnings

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines.
5. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
6. Do not use the telephone to report a gas leak in the vicinity of the leak.

### Installation Process

The installation of the MultiModemZDX consists of making the physical connections necessary to render the modem functional with your computer. This includes making the proper serial, phone line, and power connections.

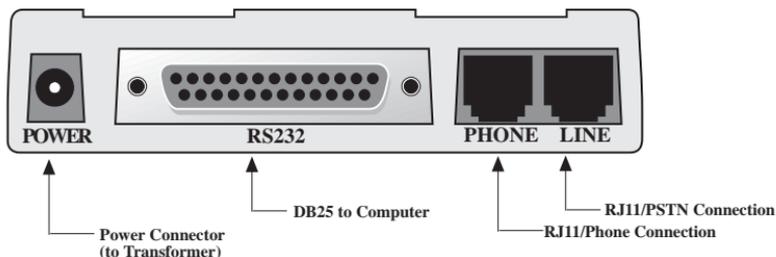


Figure 2-1. MultiModemZDX Connections

To install your MultiModemZDX:

1. Attach the MultiModemZDX to dial-up phone lines using the RJ11 telephone cord. This is accomplished by plugging one end of the cable provided with the MultiModemZDX into the telephone jack in your home or office; and plugging the other end into the LINE jack on the MultiModemZDX.

The LINE jack is not interchangeable with the PHONE jack on the MultiModemZDX. Do not plug the telephone into the LINE jack or the line cable into the PHONE jack.

2. Attach your MultiModemZDX to your PC or terminal with an RS232 (or V.24) cable (see Figure 2-1). Be sure to tighten the mounting screws on the DB connectors.
3. Connect your telephone set to phone jack via RJ11 cable.
4. Attach your MultiModemZDX to the AC Power transformer and plugging the AC connector into a live AC outlet.
5. Turn on power by flipping the "ON/OFF" switch on the side of the MultiModemZDX to the "ON" position.

**Note:** Use only the power supply provided with the MultiModemZDX. Use of any other power supply will void the warranty and could damage the modem.

6. Make sure modem and computer/terminal serial port baud rates are adjusted. (Note that several programs can check this for you. If you have MS-DOS 5.0 or higher, a program called MSD.EXE [Microsoft Diagnostics] is in your DOS directory. Typing MSD at the DOS prompt brings up a screen that provides a variety of information about your computer. Select COM ports and it lists information about your com port, e.g., UART Type, Address, and IRQ, to name a few. Once you know your serial port's UART type, you can set your communications's software appropriately.)
7. Proceed to Chapter 3 of this manual, or to your data communications software manual.

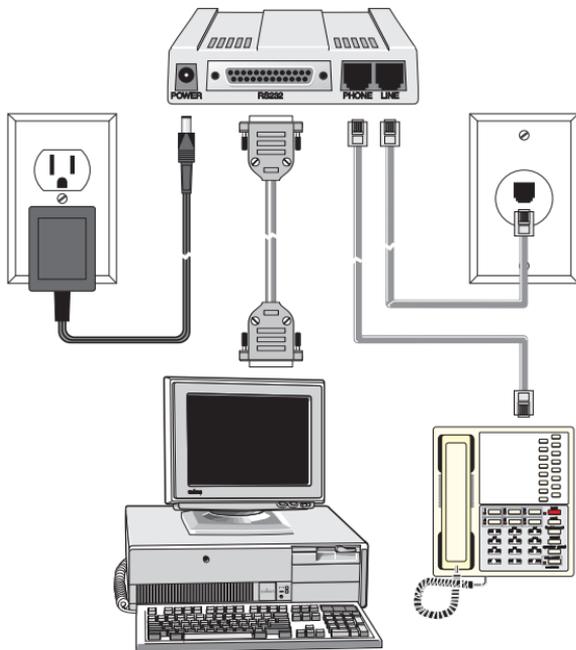


Figure 2-2. MultiModemZDX Connections

## LED Indicators

The MultiModemZDX has ten LED indicators (Figure 2-3) to report status (such as verifying proper installation) and line activity (such as monitoring the status of a connection).

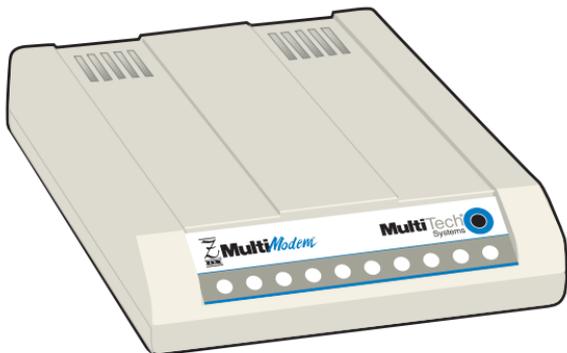


Figure 2-3. Front Panel

### TD

**Transmit Data.** The TD LED flashes when data is being transmitted (on for a space, off for a mark). Signals on this circuit are generated by the terminal and transferred to the transmitter of the MultiModemZDX. The transmitting terminal should hold this line in the marking state when no data is being transmitted, including intervals between characters or words. The TRANSMIT (TD) LED indicates the status of this circuit.

### RD

**Receive Data.** The RD LED flashes when data is being received (on for a space, off for a mark). Data signals received from the remote MultiModemZDX are presented on this line. When no carrier signal is being received (pin 8 negative), this line will be forced into a marking condition. The RECEIVE (RD) LED indicates the status of this signal.



Carrier Detect. This LED lights when a valid carrier signal from another modem is detected.



V.34. This LED is lit when the modem is connected in V.34 mode at 33,600 bps.



V.32*bis*. This LED is lit when the modem is connected in V.32*bis* mode. Note at speeds lower than a V.32*bis* connection, the MultiModemZDX speed LEDs remain unlit.



9600*bps*. This LED is lit when the modem is connected at 9600 bps.



Off Hook. The condition of Off Hook indicates to the central office that the MultiModemZDX wants the phone line to do something (i.e., dial or answer a call). This LED is also lit when the MultiModemZDX has achieved on-line status.



Terminal Ready. When TR is lit, the MultiModemZDX can answer an incoming call. This signal (TR or DTR) provides a means for the terminal or computer to control the MultiModemZDX's connection to the communications channel. A high DTR signal is required by the MultiModemZDX to be able to communicate. The state of the TR LED matches that of the DTR circuit on pin 20 of the RS232/V.24 interface.



Error Correction. This LED is lit when the modem is set for V.42 error correction, and flashes on and off when data compression is activated.



Fax. This LED is lit when the modem is connected in Fax mode.

## Is Your MultiModemZDX Ready for Use?

As soon as you have connected power to the modem, if you're an experienced modem user, you may simply want to check your modem's settings for data compression, error correction, and so on. You may find that you can get moving quite quickly if you just issue the **AT&V<cr>** command. This command lists how your modem is currently configured. If you come across a setting you're unsure of, refer to Chapter 3 of this manual for **AT** command and S-Register explanations and defaults. If you're a novice, please continue to the next sections of this chapter.

---

## Operating Your MultiModemZDX

You control your MultiModemZDX by issuing **AT** commands and setting S-Registers. Right now your MultiModemZDX is set up for the most typical user application, that is, as a traditional modem set to make a dial-up call to a remote installation where the call is answered automatically; therefore, you shouldn't need to change the current default configuration. (If however, you know that your application does not follow this profile, please refer to Chapter 3 for AT Commands and S-Registers.)

In operating your MultiModemZDX it is likely that you will use your data communications software to either:

- enter "terminal" mode, where you can "speak most directly" to the modem by issuing AT commands, or to
- launch a datacomm session through a set of modem configurations which you select and then associate with a target telephone number. Once you have created, saved, and named this set of information according to your connection needs and your datacomm software's conventions, the software then simplifies your dialing because you needn't reconfigure your modem, nor run the risk of mistakenly keying-in incorrect information.

Either way, you need to understand that an **AT** command is the method by which your modem is controlled, and must therefore prefix nearly all commands. **AT** stands for attention, and alerts the modem that a command follows. You may enter these commands with either upper- or lower-case characters. Entering **AT** automatically sets the modem's serial baud rate to match your computer's and also sets the modem's parity. It also clears the modem's command buffer. Once you're in terminal mode, enter **AT** followed by **<CR>** to check whether your modem is operational. If everything's fine, your modem will respond *OK*.

### Simple Operations

You can dial by using the **ATD** command and the phone number of the modem with which you wish to connect, e.g., **ATD6127853500**. Your modem will dial the number; a "scrambling" noise is heard as the modem negotiates the kind of connection it can make, and once the modems have settled on a common connection, a connect message on your computer's video is displayed. To hang up a call, enter **+++ATH<CR>**. Your modem will return on hook, just as if you had returned a phone's handset to its cradle. Your video now displays *OK*, signifying that your modem is ready for your next command.

## Remote Configuration

The Remote Configuration feature is a network management tool that allows you to configure modems remotely. This means you could configure modems anywhere in your network from one location without having to visit the sites or rely on remote users to follow your instructions. You can download new parameters and implement new features.

S-Register S9 has been set up to contain the special Remote Configuration escape code. When calling a Remote Configuration equipped modem, you enter the proper Remote Escape Code entering your Set-up Password. You can then execute AT commands as if you were connected locally. If you set S-Register S9 to 0 (zero), Remote Configuration is disabled. Setting S9 to a value other than zero, defines the escape key. For example, if S9 = 37, the % (percent sign) would be the escape key. The S9 value can be stored with the &W0 command.

To store the remote configuration password, type the following:

```
AT#S=password<RETURN>
```

The password can be from 1 to 8 characters in length and is case sensitive. This password can be changed in command mode but not in remote configuration. If no user password has been stored, the default password is "MTSMODEM". If a user password has been set, the default password is disabled.

To enter Remote Configuration from online mode, enter the value in S9 three times, the type ATpassword <RETURN>. For example:

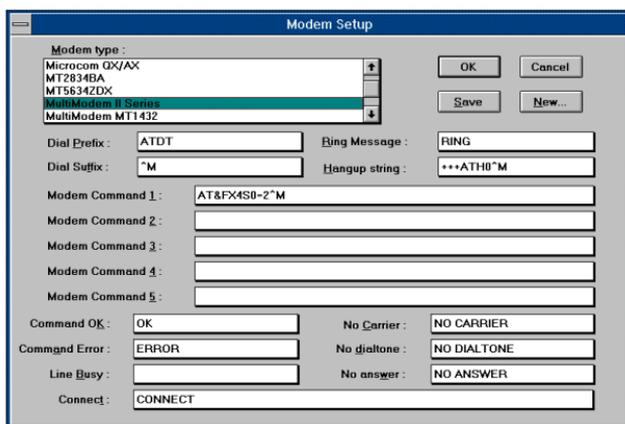
If S9 = 37, enter: %%%ATpassword<RETURN> and you will be in command mode.

**Note:** If an AT&F (load factory defaults) command is entered, or if an ATZ (modem reset) command is entered and S9 has not been saved, S9 will return to zero. However, if either of these two commands are entered, the password will remain saved.

## Software Configuration

Communications software must be configured to work with the MultiModemZDX, your computer, and the remote system it is calling. Fortunately, most communications programs make the process easy by providing a default initialization string to your modem as well as defaults for most of the other required parameters.

Some software programs allow you to select your modem type from a menu. By this method, initialization strings that correspond to a particular modem type can be selected to operate optimally with the software it is utilizing.



**Figure 2-4. MultiModemZDX Initialization Setup**

Other software programs require you enter an initialization string in the software modem setup screen. If this is the requirement in your software application, enter the following command string to initialize your modem: ***AT&F<cr>***

This setting configures your modem to operate optimally with the software it is utilizing.

**Note:** Refer to your respective software manual for further information on your communications software.

## Hardware/Software Confirmation

To confirm that your modem (hardware) and communications package (software) is working properly:

1. Go into terminal mode in your communications package.
2. To determine if your computer and modem are communicating properly, Enter: **AT<CR>** At this point your video monitor should display *OK*. If the characters you typed do not appear or if double characters appear, see the troubleshooting section of this chapter.
3. To confirm how your MultiModemZDX is configured, enter **AT&V<cr>**. What is then reported is how the MultiModemZDX is currently configured.

```

MT5634ZDX - HyperTerminal
File Edit View Call Transfer Help
-----
Option              Selection      AT Cmd
-----
V22b Guard Tone     Disabled      4C
Flow Control        Hardware     4K
Error Control Mode   V42, MNP, Buffer \N
Data Compression    Enabled       4C
AutoAnswerRing#     0            S0
AT Escape Char      43           S2
CarriageReturn Char 13           S3
Linefeed Char       10           S4
Backspace Char      8            S5
Blind Dial Pause    2 sec        S6
Rollover Timeout    50 sec       S7
", " Pause Time     2 sec        S8
Press any key to continue; ESC to quit.

Option              Selection      AT Cmd
-----
No Carrier Disc     2000 msec    S10
DTEF Dial Speed     95 msec      S11
Escape GuardTime    1000 msec    S12
Data Calling Tone    Disabled     S35
Line Rate           33600        S37
Press any key to continue; ESC to quit.
-----
Connected 0:04:58  Auto detect  57600 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo

```

Figure 2-5. MultiModemZDX Configuration Confirmation

---

## Troubleshooting

Your MultiModemZDX 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. Problems you may encounter include:

- None of the LEDs light when the modem is on;
- The modem does not respond to commands;
- The modem dials but is unable to make a connection;
- The modem disconnects while online;
- The modem cannot connect when answering;
- Slow file transfer;
- Losing data; or
- Garbage characters on the monitor.

### None of the LEDs Light When the Modem Is On

When you turn on the MultiModemZDX, 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 on the modem by turning on a power strip.
- If the power supply 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 module is firmly connected to the modem and to the wall outlet or power strip.
- If the power strip is on and the modem switch is on, try moving the modem power supply to another outlet on the power strip.
- Test the outlet is live by plugging 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 may be defective. Call Tech Support for assistance.

**Note:** Do not under any circumstances replace the power supply module with one designed for another product, as it may 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 LEDs Light When the Modem Is On.”)
- Make sure you are issuing the modem commands from the data communications software, either manually in terminal mode or automatically once you have configured the software. (You cannot send commands to the modem from the DOS prompt.)
- Make sure you are in terminal mode in your data communications program, then type **AT** and press ENTER. If you get an *OK* response, your connections are good and the problem likely is in your phonebook entry or session settings.
- Try resetting your modem by turning it off and on. Make sure there is a reset command (**&F**) in your initialization string, or your modem may not initialize correctly.
- If you don't get an *OK*, the problem may still be in the communications software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communications 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. Many communications software packages also allow multiple terminals to be open, but only one can access the modem at a time. If your package reports that it cannot make a connection, yet the modem's *TR* indicator is on, click on the Window menu to see if more than one terminal is open. The modem's *TR* indicator shows that the software has made a connection with the modem through the COM port.
- Your communications software settings may not match the physical port the modem is connected to. The serial cable may be plugged into the wrong connector—check your computer documentation to make sure. Or you may 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 communications software is configured correctly, and you still don't get an *OK*, the fault may 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 correct. Check the cable description on the packaging to make sure the cable is the right one for your computer.

- 
- Peripheral expansion cards, such as bus mouse and sound cards, may 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 communications port. Be sure to disable any unused ports.

To look for address or IRQ conflicts if you use Windows 3.1x, select *File, Run* in Program Manager, type *MSD*, and press ENTER. Then select *Mouse, COM Ports*, and *IRQ Status* and note the addresses and IRQs that are in use. If you find an IRQ conflict, note which IRQs are not being used, then change one of the conflicting devices to use one of the unused IRQs. If you find an address conflict, change the address of one of the conflicting devices.

To change a port address or IRQ in Windows 3.1x, double-click the *Control Panel* icon, then the *Ports* icon. Click on the port you want to change, click *Settings*, click *Advanced*, and select the new port address and/or interrupt. If you wish to use COM3 or COM4, note that COM3 shares an IRQ with COM1, as does COM4 with COM2, so you should change their IRQs to unused ones, if possible.

If you use Windows 95, 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 *Communications 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 will appear 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.

- The serial port may 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 may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem is possibly defective. Call Tech Support for assistance (see Chapter 5).

## The Modem Dials But Cannot Make Connection

There can be several reasons the MultiModemZDX 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.

You can narrow the list of possibilities by using extended result codes. To enable them, enter **ATV1X4** and press ENTER while in terminal mode, or include **V1X4** in the modem's initialization string. When you dial again, the modem will report 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 may 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 may be installed behind a company phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem may not recognize the dial tone and may 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 may be busy, in which case you should try again later, or it may indicate that you have failed to add a **9**, 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 your communications package, select *Setup, Modem*; then select the modem type you are using, and type the new prefix in the Dial Prefix box. To change the dial prefix in Windows Terminal, select *Settings, Modem Commands*. To change it in Windows 95 HyperTerminal, select *Call, Connect* from the menu bar, click *Dialing Properties*, and type 9 in the local and long distance boxes in *How I Dial from This Location*.

- If the modem reports *NO ANSWER*, the other system has failed to go off-hook, or you might have dialed a wrong number. Check the number.
- If the modem reports *NO CARRIER*, the phone was answered at the other end, but no connection was made. 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 may be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.

## The Modem Disconnects While Online

- If you have call waiting on the same phone line as your modem, it may interrupt your connection when someone tries to call you. If you have call waiting, disable it before each call. In most telephone areas, you can disable call waiting by preceding the telephone number with **\*70** (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 your communications package, select *Setup, Modem*; then select the modem type you are using, and type the new prefix in the Dial Prefix box. To change the dial prefix in Windows Terminal, select *Settings, Modem Commands*. To change it in Windows 95 HyperTerminal, select *Call, Connect* from the menu bar, 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 may have had a poor connection because of line conditions or the problem may have originated on the other end of the line. Try again.
- If you were online with a BBS, it may 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.

## The Modem Cannot Connect When Answering

- Auto-answer may be disabled. Turn on auto-answer in your datacomm program or send the command *ATS0=1* to your modem in terminal mode.

---

## Slow File Transfer

- You may have an older UART. For best throughput, install a 16550AFN UART or a Multi-Tech ISI serial port card.
- If you are running under Windows 3.1 and have a 16550AFN UART, you must replace the Windows serial driver, COMM.DRV, to take full advantage of the UART's speed.
- If you are using a slow transfer protocol, such as Xmodem or Kermit, 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.
- Try entering the **&V** (View Parameters) command, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable.

## Losing Data

- If you are using data compression and a high speed serial port, set the serial port baud rate to four times the data rate.
- Your UART may not be reliable at serial port speeds over 9600 bps or 19,200 bps. Turn off data compression, reset your serial port speed to a lower rate, or replace your serial port with a faster one.
- Make sure the flow control method you selected in software matches the method selected in the modem.
- If you are running under Windows 3.1 and have a 16550AFN UART, you may need to turn on the 16550's data buffers and/or replace the Windows serial driver, COMM.DRV.
- Try entering the **&V** (View Parameters) command, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable.

## Garbage Characters on the Monitor

- Your computer and the remote computer may 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 communications software.
- You may be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you may get a better connection.
- 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 **&V** (View Parameters) command, making a screen print of the diagnostics listing, and checking for parameters that may be unacceptable.

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

### Command Summary

This section summarizes your modem's AT commands, S-Registers and Result codes.

Command: **AT**      **Attention Code**  
Values:      n/a  
Description:      The attention code precedes all command lines except **A/** and the escape sequence.

Command: **ENTER** or **Carriage Return <CR> Key**  
Values:      n/a  
Description:      Press the ENTER or Carriage Return key to execute most commands.

Command: **A**      **Answer**  
Values:      n/a  
Description:      Answer an incoming call before the final ring.

Command: **A/**      **Repeat Last Command**  
Values:      n/a  
Description:      Repeat the last command string. Do not precede this command with **AT**. Do not press ENTER to execute.

Command: **Bn**      **Communication Standard Setting**  
Values:       $n = 0$  or  $1$   
Default:       $1$   
Description: **B0**      Select ITU-T V.22 mode when modem is at 1200 bps.  
**B1**      Select Bell 212A when modem is at 1200 bps.

Command: **Cn**      **Carrier Control**  
Values:       $n = 1$   
Default:       $1$   
Description: **C1**      Normal transmit carrier switching (included for backward compatibility with some software).

Command: **Ds Dial**  
Values:  $s$  = dial string (phone number and dial modifiers)  
Default: none  
Description: Dial telephone number  $s$ , where  $s$  may be up to 40 characters long and include the 0–9, \*, #, A, B, C, and D characters, and the **L, P, T, V, W, S**, comma (,), semicolon (;), !, @, ^ and \$ dial string modifiers.

**Dial string modifiers:**

**L** Redial last number. (Must be placed immediately after **ATD**.)  
**P** Pulse-dial following numbers in command .  
**T** Tone-dial following numbers in command (default).  
**V** Switch to speakerphone mode and dial the following number. Use **ATH** command to hang up.  
**W** Wait for a new dial tone before continuing to dial. (**X2, X4, X5, X6**, or **X7** must be selected.)  
**S** Dial a telephone number previously stored using the  $\&Zn=x$  command (see  $\&Zn=x$  command for further information). The range of  $n$  is 0-3.  
, Pause during dialing for time set in register S8.  
; Return to command mode after dialing. (Place at end of dial string.)  
! Hook flash. Causes the modem to go on-hook for one-half second, then off-hook again.  
@ Wait for quiet answer. Causes modem to wait for a ringback, then 5 seconds of silence, before processing next part of command. If silence is not detected, the modem returns a NO ANSWER code.  
\$ Calling Card "Bong" Detection  
^ Disable data calling tone transmission.

Command: **En Echo Command Mode Characters**  
Values:  $n = 0$  or  $1$   
Default:  $1$   
Description: **E0** Do not echo keyboard characters to the computer.  
**E1** Do echo keyboard characters to the computer.

---

Command:	<b>Fn</b>	<b>Echo Online Data Characters</b>
Values:	$n = 1$	
Default:	1	
Description:	F0	Enable online data character echo. (Not supported.)
	F1	Disable online data character echo (included for backward compatibility with some software).
Command:	<b>Hn</b>	<b>On-Hook/Off-Hook Control</b>
Values:	$n = 0$ or $1$	
Default:	0	
Description:	H0	Go on-hook to hang up.
	H1	Go off-hook to make the phone line busy.
Command:	<b>In</b>	<b>Information Request</b>
Values:	$n = 0-4$	
Default:	None	
Description:	I0	Display default speed and controller firmware version.
	I1	Calculate and display ROM checksum (e.g., "12AB").
	I2	Check ROM and verify the checksum, displaying <i>OK</i> or <i>ERROR</i> .
	I3	Display default speed and controller firmware version.
	I4	Display firmware version for data pump (e.g., "94").
Command:	<b>Ln</b>	<b>Monitor Speaker Volume</b>
Values:	$n = 0, 1, 2,$ or $3$	
Default:	2	
Description:	L0	Select low volume.
	L1	Select low volume.
	L2	Select medium volume.
	L3	Select high volume.
Command:	<b>Mn</b>	<b>Monitor Speaker Mode</b>
Values:	$n = 0, 1, 2,$ or $3$	
Default:	1	
Description:	M0	Speaker always off.
	M1	Speaker on until carrier signal detected.
	M2	Speaker always on when modem is off-hook.
	M3	Speaker on until carrier is detected, except while dialing.

---

**Command: Nn Modulation Handshake**Values:  $n = 0$  or  $1$ Default:  $1$ Description: N0 Modem performs handshake only at communication standard specified by S37 and the **B** command.N1 Modem begins handshake at communication standard specified by S37 and the **B** command. During handshake, fallback to a lower speed can occur.**Command: On Return Online to Data Mode**Values:  $0$  or  $1$ 

Default: None

Description: O0 Exit online command mode and return to data mode (see +++AT&lt;CR&gt; Escape Sequence command).

O1 Issue a retrain and return to online data mode.

**Command: Qn Enable/Disable Result Codes**Values:  $n = 0$  or  $1$ Default:  $0$ 

Description: Q0 Enable Result Codes.

Q1 Disable Result Codes.

**Command: Sr=n Set Register Value**Values:  $r =$  S-register number;  $n$  varies

Default: None

Description: Set value of register  $Sr$  to value of  $n$ , where  $n$  is entered in decimal format.**Command: Sr? Read Register Value**Values:  $r =$  S-register number

Default: None

Description: Read value of register  $Sr$  and display value in 3-digit decimal form.**Command: Vn Terse/Verbose Result Code Format**Values:  $n = 0$  or  $1$ Default:  $1$ 

Description: V0 Displays Result Codes as digits (terse response).

V1 Displays Result Codes as words (verbose response).

---

Command:	<b>Xn</b>	<b>Result Code Selection</b>
Values:	$n = 0-4$	
Default:	4	
Description:	X0	Basic Result Codes (e.g., <i>CONNECT</i> ); does not look for dial tone or busy signal.
	X1	Extended Result Codes ( <i>CONNECT 33600 V42bis</i> , etc.); does not look for dial tone or busy signal.
	X2	Extended Result Codes with <i>NO DIALTONE</i> ; does not look for busy signal.
	X3	Extended Result Codes with <i>BUSY</i> ; does not look for dial tone.
	X4	Extended Result Codes with <i>NO DIALTONE</i> and <i>BUSY</i> .
Command:	<b>Yn</b>	<b>Long Space Disconnect</b>
Values:	$n = 0$	
Default:	0	
Description:	Y0	Disable sending or responding to long space break signal on disconnect.
	Y1	Enable sending or responding to long space break signal on disconnect. (Not supported.)
Command:	<b>Zn</b>	<b>Modem Reset</b>
Values:	$n = 0$ or $1$	
Default:	None	
Description:	Z0	Reset modem to profile saved by the last <b>&amp;W</b> command.
	Z1	Same as Z0.
Command:	<b>&amp;Cn</b>	<b>Data Carrier Detect (DCD) Control</b>
Values:	$n = 0$ or $1$	
Default:	1	
Description:	&C0	Ignores the state of carrier on the remote modem and DCD circuit is always on.
	&C1	DCD turns on when the remote modem's carrier signal is detected and DCD is off when the carrier signal is not detected.

---

**Command: &Dn Data Terminal Ready (DTR) Control**Values:  $n = 0, 1, 2, \text{ or } 3$ 

Default: 2

Description: &amp;D0 Modem ignores the true status of the DTR signal and responds as if it is always on.

&amp;D1 When DTR drops while in online data mode, the modem enters command mode, issues an OK, and remains connected.

&amp;D2 When DTR drops while in online data mode, the modem hangs up.

&D3 When DTR drops, the modem hangs up and resets as if an **ATZ** command were issued.**Command: &Fn Load Factory Default Settings**Values:  $n = 0$ 

Default: None

Description: &amp;F0 Load factory settings as active configuration.

**Command: &Gn V.22bis Guard Tone Control**Values:  $n = 0, 1, \text{ or } 2$ 

Default: 0

Description: &amp;G0 Disable guard tone.

&amp;G1 Enable 550 Hz guard tone.

&amp;G2 Enable 1800 Hz guard tone.

**Command: &Jn Auxiliary Relay Control**Values:  $n = 0$ 

Default: 0

Description: &amp;J0 The auxiliary relay is never closed.

&amp;J1 Not supported—responds ERROR.

**Command: &Kn Flow Control Selection**Values:  $n = 0, 3, \text{ or } 4$ 

Defaults: 3

Description: &amp;K0 Flow control disabled.

&amp;K3 Enable CTS/RTS hardware flow control.

&amp;K4 Enable XON/XOFF software flow control.

**Command: &Mn Communications Mode**Values:  $n = 0$ 

Defaults: 0

Description: &amp;M0 Asynchronous mode.

---

Command:	<b>&amp;Qn</b>	<b>Asynchronous Communications Mode</b>
Values:	$n = 0, 5, \text{ or } 6$	
Defaults:	5	
Description:	&Q0	Asynchronous with data buffering. Same as <b>IN0</b> .
	&Q5	Error control with data buffering. Same as <b>IN3</b> .
	&Q6	Asynchronous with data buffering. Same as <b>IN0</b> .
Command:	<b>&amp;Sn</b>	<b>Data Set Ready (DSR) Control</b>
Values:	$n = 0 \text{ or } 1$	
Default:	0	
Description:	&S0	Force DSR high (on).
	&S1	Let DSR follow CD.
Command:	<b>&amp;Tn</b>	<b>Test Commands</b>
Values:	$n = 0, 1, 3 \text{ or } 6$	
Default:	None	
Description:	&T0	Abort. Stop any test in progress.
	&T1	Local analog loop test.
	&T3	Local digital loopback test.
	&T6	Remote digital loopback test.
Command:	<b>&amp;V</b>	<b>View Current Configuration</b>
Values:	n/a	
Description:		Displays the active modem settings.
Command:	<b>&amp;Wn</b>	<b>Store Current Configuration</b>
Values:	$n = 0$	
Default:	None	
Description:	&W0	Store active modem settings in NVRAM; load them at power-on or following the <b>ATZ</b> command instead of loading the factory defaults from ROM.
Command:	<b>&amp;Yn</b>	<b>Select Stored Configuration for Hard Reset</b>
Values:	$n = 0$	
Default:	0	
Description:	&Y0	Select stored configuration 0 on power-up. (For backward compatibility with some software.)
Command:	<b>&amp;Zn=x</b>	<b>Store Telephone Number</b>
Values:	$n = 0, 1, 2 \text{ or } 3$	
	$x = \text{Dialing string}$	
Default:	None	
Description:		Stores telephone dial string $x$ in memory location $n$ . Dial the stored number using the command <b>ATDS=n</b> .

---

Command: **\Kn Set Break Control**  
Values:  $n = 5$   
Default: 5  
Description: \K5 Modem sends break signal received from the DTE to the remote modem.

Command: **\Nn Error Correction Mode Selection**  
Values:  $n = 0-5$   
Default: 3  
Description: \N0 Non-error correction mode with data buffering (same as **&Q6**).  
              \N1 Direct mode.  
              \N2 MNP reliable mode.  
              \N3 V.42/MNP auto-reliable mode.  
              \N4 V.42 reliable mode.  
              \N5 V.42, MNP, or non-error correction (same as **\N3**).

Command: **\Wn Protocol Result Code**  
Values:  $n = 0$  or 1  
Default: 1  
Description: \W0 Disable protocol Result Code appended to DCE speed.  
              \W1 Enable protocol Result Code appended to DCE speed.

Command: **%Cn Data Compression Control**  
Values:  $n = 0$  or 1  
Default: 1  
Description: %C0 Disable V.42bis/MNP 5 data compression.  
              %C1 Enable V.42bis/MNP 5 data compression.

Command: **\$D DTR Dialing**  
Values:  $n = 0$  or 1  
Default: 0  
Description: \$D0 Disables DTR Dialing.  
              \$D1 Enables DTR Dialing.

**Command: \$MB Modem Baud Rate**Values:  $n = \text{speed}$ 

Default: 33600

Description: \$MB75	Selects CCITT V.23 mode.
\$MB300	Selects 300 bps on-line.
\$MB1200	Selects 1200 bps on-line.
\$MB2400	Selects 2400 bps on-line.
\$MB4800	Selects 4800 bps on-line.
\$MB9600	Selects 9600 bps on-line.
\$MB14400	Selects 14400 bps on-line.
\$MB19200	Selects 19200 bps on-line.
\$MB28800	Selects 28800 bps on-line.
\$MB33600	Selects 33600 bps on-line.

**Command: \$SB Serial Port Baud Rate**Values:  $n = \text{speed}$ 

Default: 115200

Description: \$SB300	Selects 300 bps at serial port.
\$SB1200	Selects 1200 bps at serial port.
\$SB2400	Selects 2400 bps at serial port.
\$SB4800	Selects 4800 bps at serial port.
\$SB9600	Selects 9600 bps at serial port.
\$SB19200	Selects 19200 bps at serial port.
\$SB38400	Selects 38400 bps at serial port.
\$SB57600	Selects 57600 bps at serial port.
\$SB115200	Selects 115200 bps at serial port.

## S-Registers

Certain Command Mode configurations are stored in memory registers called, S-Registers. The **S** command is used to assign a value to, and to read the current value of an S-Register. To assign a value to an S-Register, enter the letter **S**, followed by the S-Register number and an equals sign (=). To read an S-Register value, enter the letter **S** followed by the S-Register number and a question mark (?), then hit RETURN. To verify that the S-Register value was entered correctly, enter for example, **ATS8?** and hit RETURN. You should receive a response of the assigned value given to that S-Register.

Register: **S0**  
Unit: rings  
Range: 0, 1-255  
Default: 0  
Description: Sets the number of rings before the modem answers. **ATS0=0** disables auto-answer completely.

Register: **S1**  
Unit: rings  
Range: 0, 1-255  
Default: 0  
Description: Counts the number of rings that have occurred.

Register: **S2**  
Unit: decimal  
Range: 0-127  
128-255  
Default: 43(+)  
Description: Sets ASCII code for the escape character. Values greater than 127 disable the escape sequence.

Register: **S3**  
Unit: decimal  
Range: 0-127  
Default: 13(^M)  
Description: Sets ASCII code for the carriage return character.

Register: **S4**  
Unit: decimal  
Range: 0-127  
Default: 10(^J)  
Description: Sets ASCII code for the line feed character.

Register: **S5**  
Unit: decimal  
Range: 0-32, 33-127  
Default: 8(^H)  
Description: Sets ASCII code for the backspace character. Values greater than 32 disable the backspace character.

Register: **S6**  
Unit: seconds  
Range: 2-65  
Default: 2  
Description: Sets the time the modem waits after it goes off-hook before it begins to dial the telephone number.

Register: **S7**  
Unit: seconds  
Range: 1-255  
Default: 50  
Description: Sets the time the modem waits for a carrier signal before aborting a call. Also sets the wait for silence time for the @ dial modifier.

Register: **S8**  
Unit: seconds  
Range: 0-65  
Default: 2  
Description: Sets the length of a pause caused by a comma character in a dialing command.

Register: **S9**  
Unit: ASCII  
Range: 0-127  
Default: 0  
Description: Defines Remote Configuration Escape Character.

Register: **S10**  
Unit: 100ms  
Range: 1-254  
Default: 20  
Description: Sets how long a carrier signal must be lost before the modem disconnects.

Register: **S11**  
Unit: 1 ms  
Range: 50-150  
Default: 95  
Description: Sets spacing and duration of dialing tones.

Register: **S28**  
Unit: decimal  
Range: 0, 1-255  
Default: 1  
Description: 0 disables, 1–255 enables V.34 modulation.

Register: **S30**  
Unit: 1 minute  
Range: 0-255  
Default: 0  
Description: S30 specifies the length of time (in minutes) that the modem waits before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

Register: **S35**  
Unit: decimal  
Range: 0-1  
Default: 0  
Description: 0 disables, 1 enables the V.25 data calling tone, which allows remote data/fax/voice discrimination.

Register: **S36**  
Unit: decimal  
Range: {0,2}, {1,3}, {4,6}, {5,7}  
Default: NA  
Description: This register specifies the action to take in the event of negotiation failure when error control is selected. (See S48.)

Register: **S37**  
Unit: decimal  
Range: 0-19  
Default: 0  
Description: Sets the maximum dial line rate.  
0 = maximum modem speed  
1 = reserved  
2 = 1200/75 bps  
3 = 300 bps  
4 = reserved  
5 = 1200 bps  
6 = 2400 bps  
7 = 4800 bps  
8 = 7200 bps  
9 = 9600 bps  
10 = 12000 bps  
11 = 14400 bps  
12 = 16800 bps  
13 = 19200 bps  
14 = 21600 bps  
15 = 24000 bps  
16 = 26400 bps  
17 = 28800 bps  
18 = 31200 bps  
19 = 33600 bps

Register: **S42**  
Unit: decimal  
Range: 0-1  
Default: 1  
Description: *For testing and debugging only.* Enables/disables the V.32bis and V.22bis auto rate. Retrain and fallback are disabled in data mode. 0 = disable; 1 = enable.

Register: **S43**  
Unit: decimal  
Range: 0-1  
Default: 1  
Description: *For testing and debugging only.* Enables/disables V.32bis start-up auto mode operation. 0 = disable; 1 = enable.

Register: **S48**  
Unit: decimal  
Range: 7 or 128  
Default: 7

Description: The following chart lists the S36 and S48 configuration settings necessary to negotiate certain types of connections.

	<b>S48=7</b>	<b>S48=128</b>
<b>S36=0,2</b>	LAPM or Hangup	Do not Use
<b>S36=1,3</b>	LAPM or Async	Async
<b>S36=4,6</b>	LAPM, MNP, or Hangup	MNP or Hangup
<b>S36=5,7</b>	LAPM, MNP, or Async	MNP or Async

Register: **S89**  
Unit: seconds  
Range: 0, 5-255  
Default: 10

Description: Sets the length of time in the off-line command mode before the modem goes into standby mode. A value of zero prevents standby mode; a value of 1–4 sets the value to 5.

## Result Codes

When the modem receives an AT command from the terminal or PC, it tries to execute the command, then sends a status message to the PC or terminal which reports the "results" of the command (hence the name "result codes"). The MultiModemZDX Command mode provides you with several responses, or "*Result Codes*", that provide visual responses during Command mode operation. These Result Codes are displayed on your PC's video monitor.

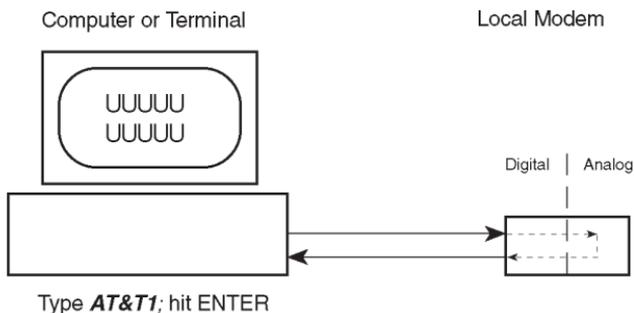
<b>Terse</b>	<b>Verbose</b>	<b>Description</b>
0	OK	Command executed
1	CONNECT	Modem connected to line
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal lost or not detected
4	ERROR	Invalid command
5*	CONNECT 1200	Connected at 1200 bps
6	NO DIALTONE	No dial tone detected
7	BUSY	Busy signal detected
8	NO ANSWER	No answer at remote end
10*	CONNECT 2400	Connected at 2400 bps
11*	CONNECT 4800	Connected at 4800 bps
12*	CONNECT 9600	Connected at 9600 bps
13*	CONNECT 14400	Connected at 14400 bps
14*	CONNECT 19200	Connected at 19200 bps
24*	CONNECT 7200	Connected at 7200 bps
25*	CONNECT 12000	Connected at 12000 bps
26*	CONNECT 16800	Connected at 16800 bps
40*	CONNECT 300	Connected at 300 bps
55*	CONNECT 21600	Connected at 21600 bps
56*	CONNECT 24000	Connected at 24000 bps
57*	CONNECT 26400	Connected at 26400 bps
58*	CONNECT 28800	Connected at 28800 bps
59*	CONNECT 31200	Connected at 31200 bps
60*	CONNECT 33600	Connected at 33600 bps
88	DELAYED	Delay is in effect for the dialed number
89	BLACKLISTED	Dialed number is blacklisted
90	BLACKLIST FULL	Blacklist is full

\* EC is added to these Result Codes when the extended Result Codes configuration option is enabled. EC is replaced by one of the following codes, depending on the type of error control connection: V42bis (V.42 error control [LAP-M] and V.42bis data compression); V42 (V.42 error control [LAP-M] only); MNP5 (MNP 4 error control and MNP 5 data compression); MNP4 (MNP 4 error control only); NoEC (No error control protocol).

## Chapter 4 - Modem Testing

### Local Analog Loopback Test/V.54 Loop 3

In this test, data from your computer or terminal is sent to your modem's transmitter, converted into analog form, looped back to the receiver, converted into digital form and then received back at your monitor for verification. No connection to the phone line is required. See Figure 4-1.



**Figure 4-1. Local Analog Loopback Test**

The test procedure is as follows:

1. Connect the modem to your computer. With your communication software, set the desired baud rate.
2. Type **AT&T1** and hit ENTER. This places your modem in Analog Loopback mode, in the Originate mode. The modem is now out of the Command mode and in a pseudo On-Line mode.
3. Once you receive a connect message (if responses are enabled), enter data from your keyboard. For this test, typing multiple upper case "U" characters is a good way to send an alternating test pattern of ones and zeros.
4. For a more complete test, you should also test the modem in Answer mode. To do this, you must "escape" from Originate mode by entering an Escape Sequence (**+++AT<CR>**). Then type **AT&T1** and hit ENTER to place the modem in Analog Loopback mode, in the Answer mode. Then repeat step 3.
5. Your modem passes this test if the data entered from your keyboard are the same as the data received on your monitor. If different data is appearing on your monitor, your modem is probably causing the problem, although it could also be your computer. If your modem passes this test, but you are receiving errors while On-line, the remote modem or the phone line could be at fault.

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## Digital Loopback Test/V.54 Loop 2 (Local/Manual)

The Digital Loopback Test is an on-line test that loops data sent from one modem across the phone line to another modem, then back to the first modem. See Figure 4-2.

There are two ways to put a modem into Digital Loopback mode.

1. Locally or Manually, described in this section.
2. Remotely or Automatically, see next section.

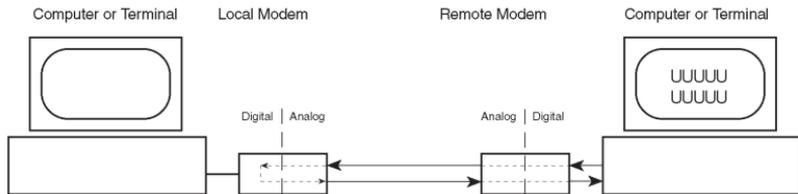
**Note:** If you wish to abort any test in progress, enter **AT&T0<CR>**.

All loopback tests will operate at all speeds except 300 bps. Disable error correction (**ATN0&W0<CR>**) before engaging in loopback tests.

In this test the local modem is placed in Digital Loopback mode. Data is entered and transmitted from the remote modem (which is not in digital loopback mode), sent across the phone line to the local modem and looped back to the remote modem.

The test procedure is as follows:

1. Go into Terminal mode. Type **AT** and hit ENTER; you should get an *OK* message.
2. Dial the remote modem by entering the Dial command and the phone number, to establish On-line mode.
3. Type the Escape Sequence (**+++AT<CR>**) which brings your modem into Command mode, while still maintaining the pseudo On-line mode with the remote modem.
4. Type **AT&T3** from the local PC and hit ENTER. Once you receive an *OK* message from your modem (if responses are enabled), the local modem is placed in Digital Loopback mode.
5. Data is typed from the remote keyboard. For this test, typing multiple upper case "U" characters is a good way to send an alternating test pattern of ones and zeros. The data received by the local modem will enter its analog receiver, be converted to digital data, be reconverted into analog, and then looped through its transmitter back to the remote modem. Your modem passes this test if the data entered from the remote keyboard is the same as the data received on the remote monitor.



Type **AT** in Terminal mode; hit ENTER; dial remote modem; establish On-line mode; enter escape sequence; type **AT&T3** and hit ENTER

**Figure 4-2. Digital Loopback Test(local/manual)**

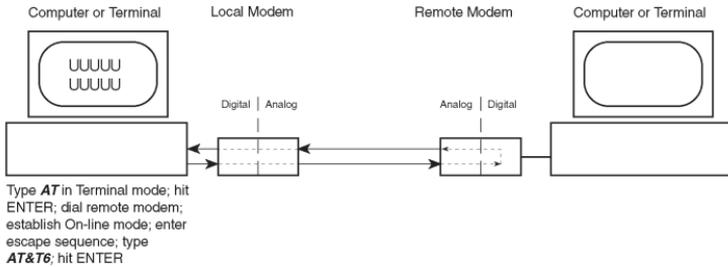
- When testing is complete, you may end the test by typing an Escape Sequence (**+++AT<CR>**) to bring your modem into Command mode. The modem should respond with an **OK** message. If you wish to stay On-line with the remote modem for normal data transmission, type **AT00** and hit ENTER. If you wish to terminate the call, type **ATH0** and hit ENTER to hang up.

## Digital Loopback Test/V.54 Loop 2 (Remote/Auto)

In this test, your modem must be On-line with another modem set up to respond to a request for Digital Loopback (note that some modems may not support Remote Loopback or may have this feature disabled). The test procedure is as follows:

- Go into Terminal mode. Type **AT** and hit ENTER; you should get an **OK** message.
- Dial the remote modem by entering the Dial command and the phone number, to establish On-line mode. **Note:** The **&T6** command must be set on the remote modem to run this test.
- Type the Escape Sequence (**+++AT<CR>**) which brings your modem into Command mode, while still maintaining the connection with the remote modem.
- Type **AT&T6** and hit ENTER. The local modem responds to this command by transmitting an unscrambled marking signal, which causes the remote modem to place itself in Digital Loopback mode. Then the local modem exits Command mode and enters pseudo On-line mode.

5. Type data from your keyboard. For this test, typing multiple upper case "U" characters is a good way to send an alternating test pattern of ones and zeros. The data received by the remote modem will enter its analog receiver, be converted to digital data, be reconverted into analog, and then looped through its transmitter back to the local modem. Your modem passes this test if the data entered from the local keyboard is the same as the data received on your monitor.



**Figure 4-3. Digital Loopback Test (remote/automatic)**

## Chapter 5 - Service, Warranty and Tech Support

### See New Warranty Policy - Multi-Tech Web Site

This chapter starts out with statements about your modem's 10-year warranty (limited to customers in the U.S., Canada, Mexico and the United Kingdom). The next section, Tech Support, should be read carefully if you have questions or problems with your modem. It includes the technical support telephone numbers, space for recording your modem information, and an explanation of how to send in your modem should you require service.

### Limited Warranty

Multi-Tech Systems, Inc. ("*MTS*") warrants that its products will be free from defects in material or workmanship for a period of ten years from the date of purchase, or if proof of purchase is not provided, ten years from date of shipment. **MTS MAKES NO OTHER WARRANTY, EXPRESSED 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 the 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 PURCHASE PRICE FOR DEFECTIVE PRODUCTS.**

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## On-line Warranty Registration

To register your Multi-Tech product on-line, click on the following link:

<http://www.multitech.com/support/register.htm>

## Tech Support

Multi-Tech has an excellent staff of technical support personnel available to help you get the most out of your Multi-Tech product. If you have any questions about the operation of this unit, call 1-800-972-2439. Please fill out the modem information (below), and have it available when you call. If your modem requires service, the tech support specialist will guide you on how to send in your modem (see Section 5.3.2).

### Recording Modem Information

Please fill in the following information on your Multi-Tech modem. This will help tech support in answering your questions.

Modem Model No.: \_\_\_\_\_

Modem Serial No.: \_\_\_\_\_

Modem Firmware Version: \_\_\_\_\_

DataComm/FAX/Voice

Software Version: \_\_\_\_\_

COM Port #: \_\_\_\_\_

The modem model and serial numbers are silkscreened on the bottom of your modem. The software versions are printed on the diskette labels. Type **ATI4** to display the modem firmware version. Please note the status of your modem before calling tech support. This screen messages, diagnostic test results, problems with a specific application, etc. Use the space below to note modem status:

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## Service

If your tech support specialist decides that service is required, modems may be sent (freight prepaid) to our factory. Return shipping charges will be paid by Multi-Tech Systems (within North America).

Include the following with your modem:

- a description of the problem.
- return billing and return shipping addresses.
- contact name and phone number.
- check or purchase order number for payment if the modem is out of warranty. (The standard repair charge for this modem is \$95. This price is valid at the time of this publication but could change in the future. Check with your technical support specialist.)
- if possible, note the name of the technical support specialist with whom you spoke.

If you need to inquire about the status of the returned product, be prepared to provide the **serial number** of the product sent (see previous section).

Send modems to this address:

**MULTI-TECH SYSTEMS, INC.  
2205 WOODALE DRIVE  
MOUNDS VIEW, MINNESOTA 55112  
ATTN: SERVICE OR REPAIRS**

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## About the Multi-Tech BBS - No Longer Available

Multi-Tech Systems maintains a Bulletin Board Service (*BBS*) for its customers. The information available via the BBS includes: new product information, product upgrade data, problem solving tips, and a message service for you to leave questions for which you would like additional information. The phone number for the Multi-Tech BBS is (612) 785-3702 or (800) 392-2432 (U.S.A. and Canada).

The BBS can be accessed by any asynchronous modem operating at speeds of 33,600-1200 bps (V.34 and downward compatible) with a setting of word length of 8 bits, 1 stop bit, and no parity.

### Logging on to the Multi-Tech BBS

To log on to the Multi-Tech BBS, perform the following steps:

1. Set your communications program to **8-N-1**.
2. Dial to our BBS at (800) 392-2432 (USA and Canada) or (612) 785-3702 (international and local).
3. At the prompt, type your first name, last name, and password; then press RETURN. If you are a first time caller, the BBS will ask if your name is spelled correctly. If you answer yes, a questionnaire will appear. You must complete the questionnaire to use the BBS on your first call.
4. Press RETURN until the Main Menu appears. From the Main Menu you have access to three main areas: the Files Menu, and Message Menu, and Bulletins. For help on menu commands, type ?.

### Downloading a File

If you know the file name:

1. From the Main Menu, type **F** to access the Files Menu, then type **D**.
2. Enter the name of the file you wish to download from the BBS.
3. If a password is required, enter the password.
4. Answer **Y** or **N** to the automatic logoff question.
5. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).

6. If you select Zmodem, the transfer will begin automatically. If you select another protocol, you may have to initiate the transfer yourself. (In most data communications programs, the PAGE DOWN key initiates the download.)

**If you don't know the file name:**

1. From the Main Menu, type **F** to access the Files Menu. For a list of file areas, type **L** twice. (If you do not type the second **L**, you will list all of the files on the BBS.)
2. Mark the file areas you would like to examine by typing each file area's list number and a RETURN.
3. Enter **L** to list all the files in the selected file areas. Enter **C** to go forward in the file list and **P** to go back.
4. Mark one or more files for download by entering **M**, the list numbers of the files, and a RETURN
5. Enter **D**. You will see a list of the files you have marked. Enter **E** if you would like to edit the list; otherwise enter **D** again to start the download process.
6. Select a file transfer protocol by typing the indicated letter, such as **Z** for Zmodem (the recommended protocol).
7. If you select Zmodem, the file will transfer automatically. If you select another protocol, you may have to initiate the transfer yourself. (In MEWTERM and many other communications programs, the PAGE DOWN key initiates the download.)
8. When the download is complete, enter **S** to return to the File Menu.

## Reading a Message

When you log on, the BBS will tell you if you have a personal message (mail). At the prompt *Would you like to read it now?*, type **R** to read the message. This is the only point at which you can read your mail, since you cannot read any messages from the Message Menu.

## Leaving a Message

The Multi-Tech BBS has no public discussion areas. To leave a personal message, select the Message Menu by typing **M** at the Main Menu. Type **E**, then press RETURN to select the Sysop conference. Enter the name of the recipient (or "Sysop"), the subject, and the message text. Press ESCAPE to finish, then type **S** to save the message and exit. To abort the message at any point, leave any of the fields blank and press RETURN.

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## Bulletins

When you log on, the BBS will ask if you would like to view the bulletin menu. The bulletins are menu-driven; to read a bulletin, enter its number. You can also access the bulletins by typing **B** at the Main Menu.

## About CompuServe/Internet - No Longer Available

In addition to the BBS, Multi-Tech provides support through CompuServe's Modem Vendor Forum (*GOMODEMVEN*) under *GO MULTITECH*. Refer to your CompuServe documentation for special operating procedures.

Multi-Tech is a commercial provider on the Internet, and we retrieve e-mail messages from the following mailboxes on a periodic basis:

*mtsmktg@multitech.com*  
*mtssales@multitech.com*  
*international@multitech.com*

Marketing Dept.  
 Sales Dept.  
 International Marketing &  
 Sales  
 Publications Dept.

*writers@multitech.com*

If you prefer to receive support via the internet, you can **contact Tech Support via e-mail**.

Multi-Tech's presence includes a Web site at:

<http://www.multitech.com>

and an ftp site at:

<ftp://ftp.multitech.com>

## Multi-Tech Fax-Back Service - No Longer Available

Multi-Tech's fax-back system provides 24-hour access to sales, marketing, and technical literature. Dial 612-717-5888, follow the voice prompts, and request document number 10 for a catalog of available documents.

For convenience, have your fax number handy: \_\_\_\_\_ .

From the catalog of available documents, you can order newsletters, white papers, press releases, etc. from the sales and marketing index (pages 1-4), or order basic modem operation and troubleshooting guides from the technical support and engineering index. Just enter the applicable FB Doc. # from the left column of the catalog.

## Appendix A - Technical Specifications

Your MultiModemZDX meets the following specifications:

<b>Tradename</b>	<b>MultiModemZDX</b>
<b>Model Numbers</b>	<b>MT3334ZDX, and MT3334ZDXV</b>
<b>Data Rates (modem)</b>	33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
<b>Data Rates (fax)</b>	14,400, 9600, 7200, 4800, 2400 bps
<b>Data Format</b>	Serial, binary, asynchronous at 75-300, 1200, 2400, 4800, 7200, 9600, 14,400, 16,800 or 19,200, 21,600, 24,000, 26,400, 28,800, 31,200, 33,600 bps
<b>Compatibility</b>	ITU V.42bis, V.42, Enhanced V.34, ITU V.32bis, V.32, V.21, V.22bis, V.22, V.23, ITU V.17, Group 3 T.4, T.30 and EIA TR-29 Class 2
<b>Fax Compatibility</b>	ITU-T V.17, Group 3, V.29, V.27ter and EIA TR-29 Class 2
<b>Voice Compatibility</b>	IS-101 AT+V command compatible (MT3334ZDXV only)
<b>Error Correction/</b>	V.42 (LAP-M or MNP 3 & 4),
<b>Data Compression</b>	V.42bis, (4:1 throughput), MNP 5 (2:1 throughput)
<b>Speed Conversion</b>	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600 and 115,200 bps
<b>Flow Control</b>	Xon/Xoff, Hardware RTS/CTS, ENQ/ACK
<b>Mode of Operation</b>	Fax On-line modes, and "AT" command modes supporting Full duplex over dial-up lines, "+VAT" (for MT3334ZDXV only) Answering Machine and Voice Mail functions

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**Intelligent Features**

Automatic or manual dialing, Automatic or manual answer, Microprocessor-controlled, remote configuration, EIA extended Automode, adaptive line probing, automatic symbol rate and carrier frequency during start-up, retrain and rate renegotiation, DTMF detection, Autodial, Redial, Repeat dial, Dial linking, Tone dial, Dial pauses, Call status display, Auto-parity and data rate selection, Keyboard-controlled modem options, Nonvolatile memory and on-screen displays for modem option parameters and two telephone numbers/command lines of up to 60 digits each, Help menus

**Command Buffer**

60 characters

**Data Modulation**

Trellis Coded Modulation (TCM) at 33,600, 31,200, 28,800, 26,400, 24,000, 21,600, 19,200, 16,800, 14,400, 12,000 and 9600 bps, Quadrature Amplitude Modulation (QAM) at 9600 (non-trellis), 4800 and 2400 bps, PSK at 1200 bps, FSK at 300 bps

**Fax Modulation**

V.17 TCM at 14400, 12000, 9600, and 7200 bps V.29 QAM at 9600 and 7200 bps V.27ter DPSK at 4800 and 2400 bps V.21CH2 FSK at 300 bps (Half Duplex)

**Carrier Frequencies**

1800 Hz V.32/V.32bis/Enhanced V.34/33.6K/31.2K/28.8K/26.4K/24K/21.6K/19.2K/16.8K/14.4K/12K/9.6K/4.8K

**Voice Compression and Sampling Rate**

PCM 128, 8000 kHz or IMA ADPCM 8000 kHz (selectable via +V commands). *Note that your computer system should have a processing speed of at least 75 MHz to take full advantage of the telephony features of this product.*

<b>Carrier Frequencies</b> <b>2400 &amp; 1200 bps</b> <b>(V.22bis/V.22)</b>	Transmit Originate:	1200 Hz
	Transmit Answer:	2400 Hz
	Receive Originate:	2400 Hz
	Receive Answer:	1200 Hz

**Carrier Frequencies**

<b>V.21</b>	980 Hz Mark, 1180 Hz Space for Transmit Originate
	1650 Hz Mark, 1850 Hz Space for Transmit Answer
	1650 Hz Mark, 1850 Hz Space for Receive Originate
	980 Hz Mark, 1180 Hz Space for Receive Answer
<b>V.23</b>	390 Hz Mark, 450 Hz Space for Transmit Originate
	1300 Hz Mark, 2100 Hz Space for Transmit Answer
	1300 Hz Mark, 2100 Hz Space for Receive Originate
	390 Hz Mark, 450 Hz Space for Receive Answer

**Carrier Frequencies Fax**

<b>V.21 CH2</b>	Transmit Originate: 1650 Hz Mark, 1850 Hz Space
<b>(Half Duplex)</b>	Transmit Answer: 1650 Hz Mark, 1850 Hz Space
<b>V.27ter</b>	Originate/Answer: 1800 Hz
<b>V.29 QAM</b>	Originate/Answer: 1800 Hz
<b>V.17 TCM</b>	Originate/Answer: 1800 Hz
<b>Transmit Level</b>	-11dBm (dial-up)
<b>Frequency Stability</b>	±0.01%
<b>Receiver Sensitivity</b>	-43 dBm under worst-case conditions
<b>AGC Dynamic Range</b>	43 dB

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<b><i>Interface</i></b>	EIA RS232C/CCITT V.24
<b><i>Connectors</i></b>	DB25 ( <i>RS232C</i> ) connector; Two RJ11 modular phone jack: for line, and telephone set, power jack.
<b><i>Diagnostics</i></b>	Power-on Self Test, Local Analog Loop, Local Digital Loop, Remote Digital Loop.
<b><i>Indicators</i></b>	LEDs for Send Data, Receive Data, Carrier Detect, various speed indicators, Off Hook, Terminal Ready, Error Correction, Fax.
<b><i>Controls</i></b>	Power ON/OFF Switch
<b><i>Speaker</i></b>	Speaker with software- or command-controlled volume.
<b><i>Operating Temperature</i></b>	0° to 50° C
<b><i>Power Requirement</i></b>	115 Volts AC, 60 Hz, .3 amp (2-prong outlet-mounted transformer); 240V/50Hz optional (international)
<b><i>Power Consumption</i></b>	5 Watts
<b><i>Dimensions</i></b>	14.8 x 10.8 x 2.9 cm (L x W x D)
<b><i>Weight</i></b>	224 grams
<b><i>Limited Warranty</i></b>	Five years

## Appendix B - Tone Dial Frequencies

Hz	Digits			
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D
Hz	1209	1336	1477	1633

The tone-dialing method combines two frequencies for each of the twelve digits found on a Touch Tone dial pad. This method is referred to as Dual-Tone Multi-Frequency (*DTMF*) dialing. The four horizontal rows on a Touch-Tone keypad use the four low frequencies (697, 770, 852, 941 Hz), while the three vertical columns use the three high frequencies (1209, 1336, 1477 Hz). The generally accepted tone frequency tolerance is +0.02%.

For example, the digit 4 would be dialed by combining two tone frequencies. It would use the frequency 770 Hz from the second row, and the frequency 1209 Hz from the first column. In another example, the digit 9 would be dialed with the tone frequencies of 852 Hz and 1477 Hz.

The extended DTMF characters (A, B, C, D) are the high-end frequencies (1633 Hz) defined on some telephone sets with a fourth vertical column of buttons. This fourth column provides for extended PBX control functions; the actual functions provided are dependent on the PBX manufacturer's implementation and feature set.

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## Appendix C - Regulatory Information - See Web Site

### Multi-Tech Web Site Publishes Current Regulations

1. This equipment complies with Part 68 of the Federal Communications Commission (FCC) rules. On the outside surface of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence number (REN). If requested, this information must be provided to the telephone company.
2. As indicated below, the suitable jack (Universal Service Order Code connecting arrangement) for this equipment is shown. If applicable, the facility interface codes (FIC) and service order codes (SOC) are shown.

An FCC-compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See installation instructions for details.

3. The ringer equivalence number (REN) is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line, as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.
4. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
5. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications in order to maintain uninterrupted service.

6. If trouble is experienced with this equipment (the model of which is indicated below) please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have repairs made. If the equipment is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
7. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.
8. This equipment cannot be used on public coin service provided by the telephone company. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)
9. If so required, this equipment is hearing-aid compatible.

Manufacturer:	Multi-Tech Systems, Inc.
Model Numbers:	MT3334ZDX, MT3334ZDXV
FCC Registration #:	AU7USA-31068-MME
Ringer Equivalence:	0.4B
Modular Jack (USOC)	RJ11C or RJ11W (single line)
Service Center in USA:	Multi-Tech Systems Inc. 2205 Woodale Drive Mounds View, MN 55112 Voice (612) 785-3500/ FAX (612) 785-9874

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**NOTE:** 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 when the equipment is operated in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. 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.

Connect the equipment into an outlet on a circuit different from that of which the receiver is connected.

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

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

The Telephone Consumer Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via a telephone fax machine unless such message clearly contains in a margin at the top or bottom of each page or the first page of the transmission, the date and time it is sent and an identification of the business or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity, or individual. See the cover page of your fax software manual for setup details.

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

## Canadian Limitations Notice

**Notice:** The ringer equivalence number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence numbers of all the devices does not exceed 5. The ringer equivalence number for this product is 0.2.

**Notice:** The Industry Canada label identifies certificated equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

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## Compliance with BAPT Requirements

Approved for connection to telecommunications system specified in the instructions for use subject to the conditions set out in them.

**Warning:** Interconnection directly, or by way of other apparatus, of ports marked "SAFETY WARNING see instructions for use" with ports marked or not so marked may produce hazardous conditions on the network. Advice should be obtained from a competent engineer before such a connection is made.

This apparatus has been approved for the use of the following facilities:

- Auto-calling
- Loop disconnect and MF dialing
- Phone number storage and retrieval by a predetermined code
- Operation in the absence of proceed indication
- Automatic storage of last number dialed
- Tone detection-busy
- Auto clear from the originating end
- DTR dialing
- Modem
- PBX timed break register recall

## European Low Voltage Directive

When correctly installed and maintained, the modem will present no hazard to the user. When correctly installed the modem will be connected to the PSTN or a PW and to a Data Terminal Equipment (DTE), whose modem connections comply with ITU recommendation V28. The DTE connections are therefore taken to be safe voltages (less than  $\pm 30$  volts).

The main power source shall be installed near to the equipment and shall be easily accessible. The plug that connect to the apparatus to the main power supply must be fitted with a 5A fuse that complies with BS11362.

Ports which are capable of connecting to other apparatus are defined as SELV. To ensure conformity with EN41003, ensure that these ports are only connected to ports of the same type on other apparatus.

## **Compliance with BS6305 Clause 6.2, BS6320 Clause 7.2, and BAPT/SITS/82/005S/D**

- a. The modem is suitable for connection to the Public Switched Telephone Network (PSTN) provided by British Telecommunications plc or Kingston Communications (Hull) plc. Circuit supply by British Communications, Mercury Communication, or Hull City Council. Only direct exchange lines may be used, not shared service.
- b. The modem is suitable for household, office, and similar general indoor use. It is not suitable for use as an extension to a payphone.
- c. BT lines supplied must support either loop disconnect or multifrequency tone signalling.
- d. REN (Ringer Equivalence Number).

The REN value of a unit is calculated from  $3/n$  where  $n$  is the total number of units which can be connected in parallel which will still cause the standard bell (as defined in BS6305 Appendix D) to ring.

REN values of less than 0.3 cannot be assigned.

$$\text{REN} = 1$$

If a telephone or other device is connected in parallel with the modem, the combined REN must not exceed 4. A BT supplied telephone may be assumed to have REN of 1.0 unless otherwise noted.

The approval of this modem for connection to the British Telecom public switched telephone network is INVALIDATED if the apparatus is subject to any modification in any material way not authorized by BAPT or if it is used with or connected to:

- i. internal software that has not been formally accepted BAPT.
- ii. external control software or external control apparatus which cause the operation of the modem associated call set-up equipment to contravene the requirements of the standard set out in BAPT/SITS/82/005S/D.

All other apparatus connected to this modem and thereby connected directly or indirectly to the British Telecom public switched telephone network must be approved apparatus as defined in Section 22 of the British Telecommunications Act 1984.

The REN number for this apparatus = 1

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## Compliance with BS6789: Section 3.1 and Part 2

- a. The modem is not capable of allowing Auto Call using '999' or other PABX emergency numbers.
- b. Modes other than modes 1, 2, or 3 should not be used on the BT PSTN. This modem is a mode 1 device.
- c. Users are advised to check the numbers entered during the Auto Call set up phase prior to dialing.
- d. The user should not issue any sequence of commands to the modem which would cause the modem to exceed the maximum allowable pause of 8 seconds from the time the modem goes off hook until dialing begins.
- e. For correct operation of the call progress monitor, the power has to be properly connected and switched on.

## Compliance with BS6328 Part 1

- a. The modem is not suitable for use on circuits with British Telecommunications signaling at a normal frequency of 2280 Hz.
- b. The modem does not require signaling or otherwise employ the frequency range dc to 200 Hz.
- c. The modem may be connected to a point to point two-wire or four-wire Private Circuit.
- d. The modem does not require dc from the Private Circuit for correct operation. The modem may be damaged if connected, in a private circuit mode, to a circuit supplying dc current (the maximum permissible direct current is zero amps).

## Modem CE Mark EMC and Safety Compliance

The CE mark is affixed to the enclosed Multi-Tech product to confirm compliance with the following European Community Directives:

Council Directive 89/336/EEC of 3 May 1989 on the approximation of 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;

both amended by

Council Directive 93/68/EEC of 22 July 1993 on the harmonization of CE marking requirements.

## Australian and New Zealand Modem Warning Notice

### Australian Modem Warning Notice

Modems connected to the Australian telecommunications network must have a valid AUSTEL permit. This modem has been specifically configured to ensure compliance with AUSTEL Standards. The following commands can affect compliance and must not be set outside the acceptable range.

#### Modem Commands:

<u>Command</u>	<u>Default</u>	<u>Permissible Range</u>
A:	-	Do not use
ATB	B0	Do not change
AT&G	&G2	Do not change
AT&P	&P1	Do not change
ATSn	see table below	
<u>S-Register</u>	<u>Default</u>	<u>Permissible Range</u>
S6	4	2 - 5

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### Call Attempts/Retries:

Applications software shall be configured so that no more than 3 attempts are made to establish a connection to a given number (Note: if the modem can detect service tones, up to 10 attempts can be made). There must be at least 2 seconds between call attempts. If the call sequence is unsuccessful, there shall be a delay of at least 30 minutes before attempting to call the number again.

**Failure to set the modem, and any communications software used with the modem, to the values shown above will result in the modem being operated in a non-compliant manner. Consequently, there would be no permit in force for this equipment, and the Telecommunications Act 1991 prescribes a penalty of \$12,000 for the connection of non-permitted equipment.**

### For Voice Modems:

“Distortion may be generated because of low bit rate voice, and reduced voice quality may result.”

**WARNING:** For safety reasons, only connect AUSTEL permitted or AUSTEL certified equipment.”

Refer to the applicable MultiModemII Owner's Manual for additional information.

### Protection Against Contact with TNV Circuit (Internal PC Cards)

The protective cover is fastened to the modem card by means that will only allow a tool to remove the cover. **Warning:** removal of the protective cover will render the AUSTEL permit void.”

### New Zealand Telecom Warning Notice

“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.”

**WARNING NOTICE:** No ‘111’ or other calls can be made from this device during a mains power failure”.

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