Zoltrix, Inc.

41778 Christy Street
Fremont, CA 94538

56K External Modem

FCC ID: H4TFM-REB3X

Model: FM-REB3X

User's Manual (Preliminary)

Zoltrix

56,000

Win HSP PnP
Voice/Speaker Phone*
Modem
Installation Manual

* The Speaker phone function requires a full duplex Sound card

Manual V 1.0
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Check out the Zoltrix WWW Site at http://www.zoltrix.com
or call the Zoltrix BBS to download details on AT Commands,
S-Registers, additional drivers, and much more! (510) 657-7413

FCC Warning

Class B Computing Device

Information to the User

This equipment has been tested and found to comply with the limits for a class B digital device pursuant to part 15 of 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 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 to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help and for additional suggestions.

The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

FCC Warning

The user is cautioned that changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

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Hardware Manual Summary

This manual offers you information on the setting up and installing of the *Zoltrix Win HSP Voice/Speaker Phone/Modem*. It is written for both first-time users as well as users who may already have a familiarity with fax/modems or other computer peripherals.

If you are not familiar with the terminology, please refer to the Glossary in Appendix G.

Chapter 1, "*Internal Fax/Modem Installation*", provides step by step instructions on the set up of your fax/modem. Topics include electro-static discharge (ESD), inserting the modem, and connecting telephone lines.

Chapter 2, "*Windows 95 Driver Installation*", provides step by step instructions on the set up of the modem software drivers. Topics include Windows 95 setup and the testing of port settings for conflicts and the testing of the modem driver.

Chapter 3, "*Using the Fax/Modem*", discusses the option of controlling of the fax/modem by customizing the INITialization string and includes general information on setting up both Fax and Modem software.

Appendix A, "*Quick Reference*", lists AT commands summaries and S-Register Summaries for the *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem*.

Appendix B, "*Regulatory Information*", lists important FCC information.

Appendix G, "*Glossary*", lists common data communication terms used in this manual.

Appendix S, "*Specifications*", lists technical specifications of the *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem*.

Appendix T, "*Troubleshooting*", discusses possible configuration problems and solutions with the modem.

Chapter 1
INTERNAL FAX/MODEM INSTALLATION

1 Introduction

Congratulations on your purchase. The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem* uses state-of-the-art Host Signal Processing to support data, facsimile and voice modem functions on one chip. This innovative, high-speed modem provides you with the highest reliability, greatest performance and the easiest upgrading of any modem on the market.

1.1 Before You Start

If you've never installed an add-in board in your computer before, please follow the instructions in this section carefully. Read the entire section before beginning.

1.1.1 Electro-static Discharge (ESD)

Some of the components on your board are sensitive to static electricity (Electro-Static Discharge), so before you handle the fax/modem, you need to discharge any static electricity that you may have been generated. This can be done by touching any unpainted metal surfaces of your computer's chassis or by grasping a cold water pipe. This is called "grounding". Ground yourself before you take the board out of the static-shielded bag and everytime you intend to handle the board.

The board should be kept in the static-shielded bag anytime it is not installed in your computer. Never bring the board close to anything plastic where high levels of ESD (Electro-Static Discharge) may exists. Because ESD can even reside on the outside of the static-shielded bag, you should never place the board on top of the bag.

Also, please read through the User's Manual for your computer for any precautions that should be followed for your particular computer.

1.1.2 Safety Precautions

Some general safety precautions you should follow are:

1. **Turn OFF the computer before you begin. Also, turn OFF any external devices that are connected to your computer, such as printers.**

2. Handle the board gently by the edges. Some of the component leads under the board have very sharp edges and may cause serious injury.

1.2 Necessary Equipment

Make sure that you have the following equipment at hand before you begin.

* The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem*
* A Pentium-100 or faster compatible computer with 256K cache memory
* An available 16 bit expansion slot
* A modular telephone cable
* A modular telephone outlet
* A small, flat-blade screwdriver
* A small pair of pliers or tweezers
* A telephone set (Optional)

1.3 Installation Steps

The steps to install your modem are shown in order in this section. For some steps, you may need to refer to your computer's User's Manual.

1.3.1 Selecting the COM Port

The *Zoltrix Win HSP Voice/Speaker Phone/Modem* can use COM ports 1 to 4 and IRQ's 2,3,4,5,10,11,12 & 15. This is selected automatically. There are no hardware jumpers or dip switches to set. Refer to Chapter 2 for the Windows software installation instructions. You may want to read the section (T.2 Determining What Serials Ports Are Installed in Your Computer) to determine if you have any available com port addresses left on your computer.

1.3.2 Inserting the Fax/Modem

1. Turn off the power to the computer. Also, turn off any external devices that are attached, such as a printer and monitor.

2. Take out the mounting screws on the back of you computer. Refer to your computer manual if you cannot locate them.

3. Remove the computer cover. Refer to your computer manual if you cannot determine how to remove the cover.

4. Select an empty slot. You may need to remove the metal slot cover first, using a small screwdriver.

5. Discharge any static electricity in your body by touching any bare metal surface on the chassis of the computer and remove the modem from the static-shielded bag.

6. Press the board firmly into the slot ensuring that the gold tabs on the fax/modem are aligned with the connectors in the slot.

7. Insert the screw and tighten slightly. Check to ensure that the telephone jacks in the back of the modem are unobstructed. If so, then tighten the screw securely.

8. Replace the computer cover.

1.3.3 Installing Telephone Lines

The Fax/Modem has two modular telephone jacks on the back of the modem. You will need to connect your Fax/Modem to the wall outlet via a modular telephone cord.

If your wall outlet is not a modular type, you can purchase an inexpensive converter at most electronics or phone stores. It is suggested that you connect your modem to a *"dedicated line"*. A dedicated line is a regular phone line that does not go through a switchboard, PBX, etc...

You can also connect a telephone set to your modem, enabling you to use the phone when the modem is not in use. The modem can also be used as an autodialer with your telephone set. It is recommended that you use a single line phone outlet (RJ11). However, you can use a two-line (RJ14) phone line, but the modem will only work on the first line using the center pair of wires.

To connect the telephone line to the modem follow these steps:

1. Insert one end of the phone line into the jack on the modem labeled **Line** or **Wall**.

2. Insert the other end of the phone line into the phone jack,(usually located on the wall).

If you wish to use a phone in conjunction with your modem, please follow these steps:

1. Insert the line from the phone into the modem jack labeled **Phone**.

2. Make sure that the other end of the phone line is connected to the telephone

Chapter 2

WINDOWS 95 DRIVER INSTALLATION

2   Introduction

The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem* is designed to operate in Windows 95 only. In addition, the *Win HSP PnP Voice/Speaker Phone/Modem* complete solution allows the modem to be upgraded with enhancements and features through software upgrades rather than a chip change or a board swap. The *Win HSP PnP Voice/Speaker Phone/Modem* may be upgraded with features and protocols as they become available from PCtel, the chipset manufacturer. It will be software upgradable to the new ITU 56K standard that is expected to be ratified by the ITU sometime in 1998. Check the Zoltrix web site for more details as they become available at:

http://www.zoltrix.com

2.1   Windows 95 Software Setup

To setup the *Win HSP PnP Voice/Speaker Phone/Modem*, you must complete the following installation procedure:

2.1.1   Setup Com Port and modem driver

1.   Start Windows 95. As soon as Windows 95 starts you will see a screen simular to the following:

2.   Click the ☐ **OK** ☐ button

This will bring up a screen simular to the following:

Install From Disk

Insert the manufacturer's installation disk into the drive selected, and then click OK.

OK

Cancel

Copy manufacturer's files from:

Browse...
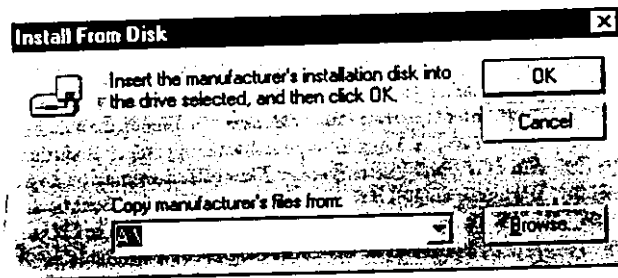
3.   Insert the *Win HSP PnP Voice/Speaker Phone/Modem* setup diskette into drive A:

4.   Click the **OK** button.

This will bring up a screen simular to the following:

PC-TEL HSP Modem Setup

PCtel Modem

PCtel Setup

Welcome to the Setup Program.

This program will setup the PC-TEL/HSP Modem on your hard disk.

Install   Help   Exit   Uninstall
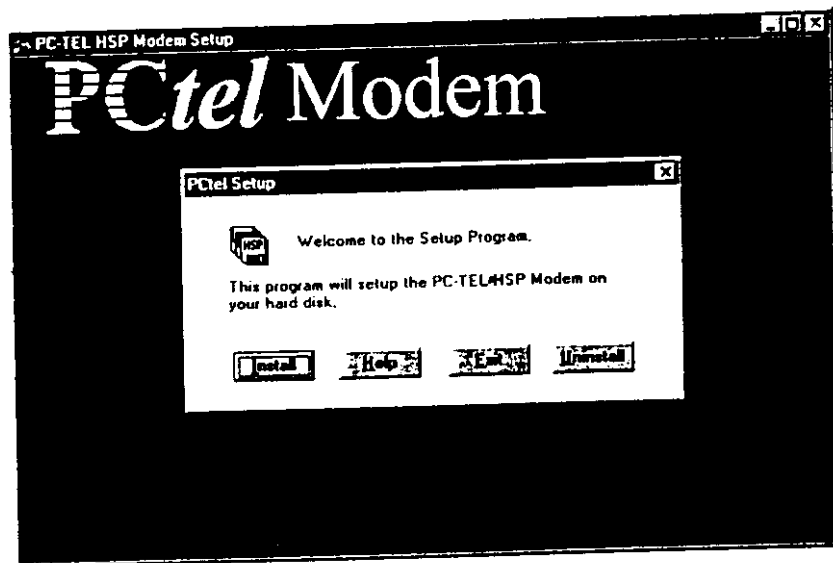
5.   Click on the *Install* button.

This will bring up a screen simular to the following:

PCtel Setup

HSP 336-DELUXE PNP MODEM will be
installed on your system.

The following CPU is detected on Win95:
  ◉ Pentium or AMD K5   ◯ MMX or AMD K6
  ◯ Others
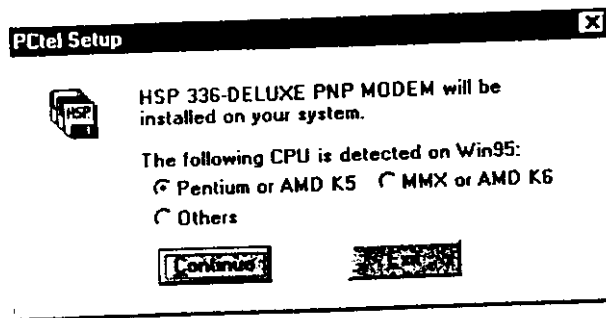
[Continue]   [   ]

6. If the incorrect CPU type was detected, select the correct type and then click on continue.

PC-TEL HSP Modem Setup

PCtel Modem

PCtel Setup

Setup Complete

The HSP Modem has been successfully installed on
your hard disk.

Setup Program will reboot Windows to Activate
the HSP Modem !!
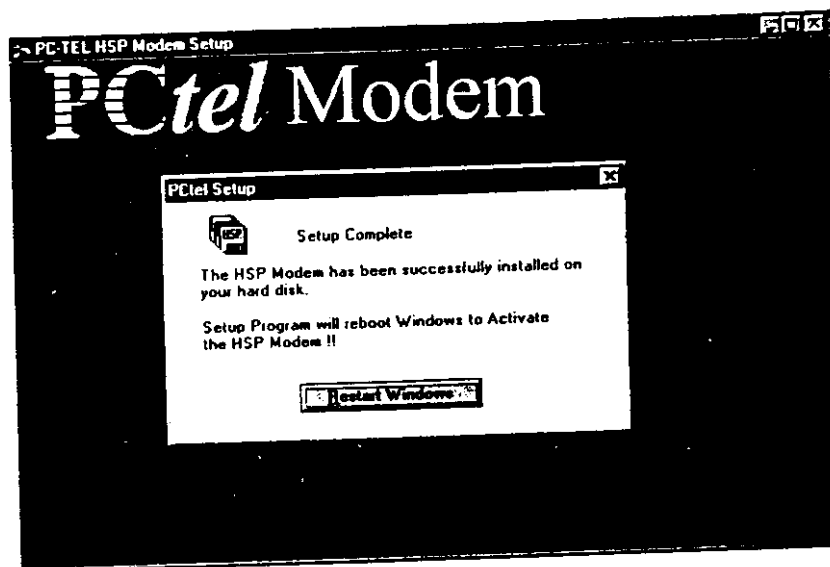
[Restart Windows]

7. After all the files are copied you will see a screen similar to the previous screen.
   Click on the *Restart Windows* to complete the installation of the Driver.
   When Win95 restarts, you may see the PCtel Serial wave driver installed. This will complete
   the installation.

2.1.2   Testing the modem driver for the *Win HSP PnP Voice/Speaker Phone/Modem*

After installing the software drivers and restarting Windows 95, use the following procedure to verify that the *Win HSP PnP Voice/Speaker Phone/Modem* is working.

1.   Double click on the [icon] **Modems** ICON in the Control Panel.

2.   Click on the | **Diagnostics** | tab.

This will bring up a screen simular to the following:
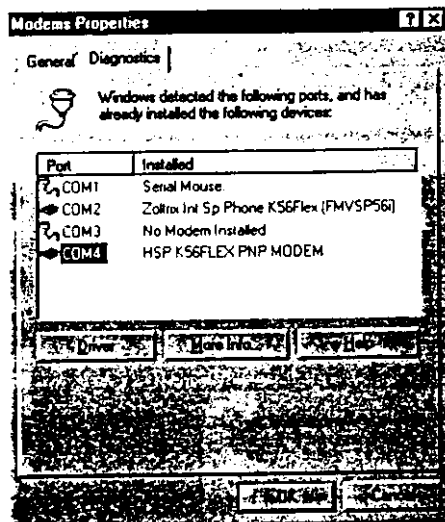
3.   Click on the port the HSP K56FLEX PNP MODEM is assigned to (**as indicated in the above picture**).

4.   Click on the [button] button to allow Windows 95 to querry the modem.

Windows 95 will give you a short report on the status. If Windows 95 reports:
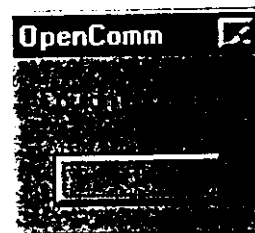
You need to verify that the port settings of the HSP port is not conflicting with any other devices.

2.1.3   Checking the HSP port settings for conflicts

1.   Double click on the ![System icon] ICON in the Control Panel.

   System

2.   Click on the **Device Manager** tab.

   This will bring up the following screen:

3.   Double Click on ⊕ Modem (as indicated on the next picture)
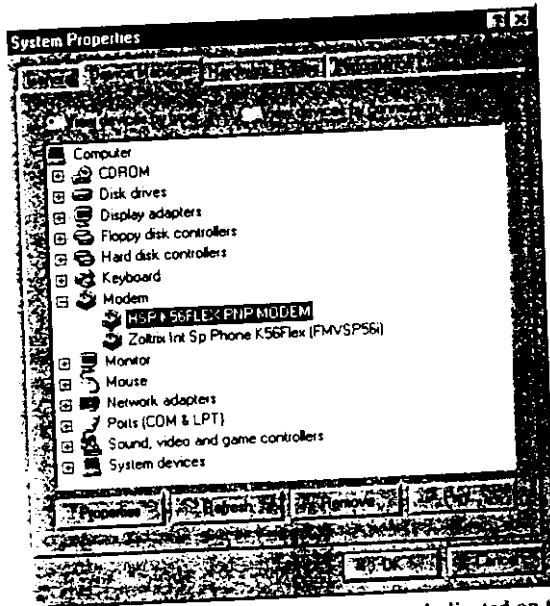
4. Click on HSP K56FLEX PNP MODEM (as indicated on the previous picture)

5. Click on the � button.
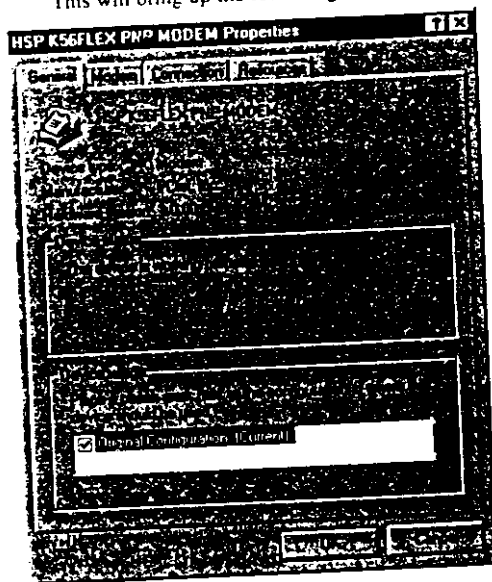
    This will bring up the following screen:

6. Click on the ▓▓▓▓▓ tab.

This will bring up the following screen:
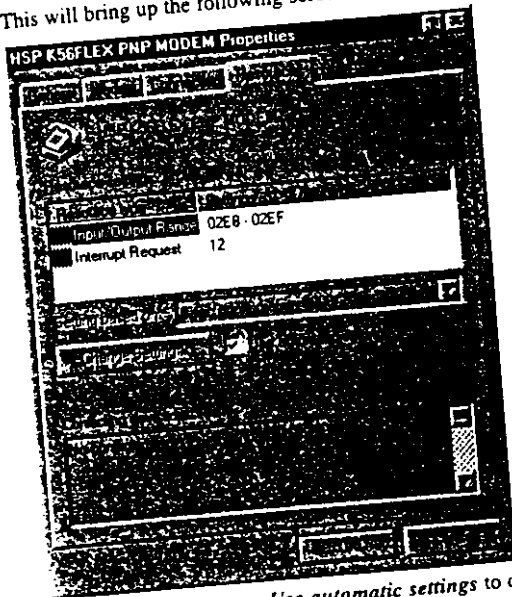
7. Click on the box next to *Use automatic settings* to deselect the check mark (as indicated on the next picture).
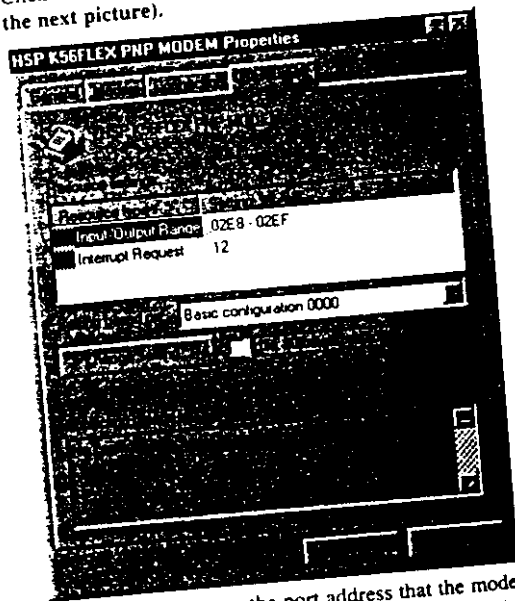
8. If you wish to change the port address that the modem is using, Click on the arrow to the right of *Basic configuration 0* and select the configuration that matches the port address you wish to use.

9. Click on *Interrupt Request* (as indicated on the next picture).
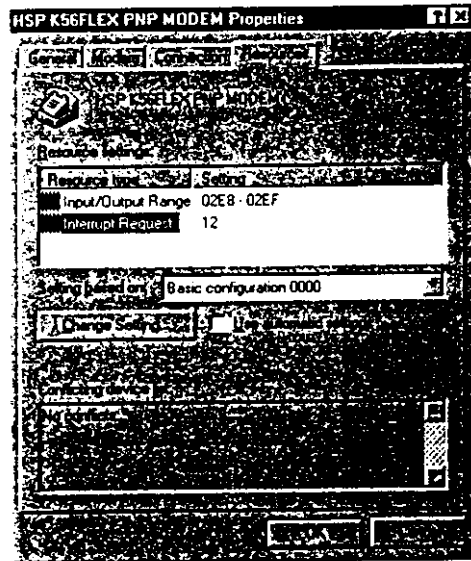
10. Click on the [button image] button.

This will bring up the following screen:

10. Click on the up or down arrow next to the Value field to select another IRQ.

Note: Make sure that the information displayed in the Conflict Information window says "No devices are conflicting".

11. Click the [OK button] button to exit the *Edit Interrupt Request* Window.

12. Click the [OK button] button to exit the *Modem Communication Port Properties* Window.

Chapter 3

Using the Modem

3.1 Introduction

The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem* can be used to transfer or receive data files, send and receive faxes to and from any ITU-T Group III fax machine or fax card, as an automated voice answering machine and a full duplex speaker phone (with a full duplex sound card). All of these functions require different types of commands to be sent to the modem to perform either function. This is done automatically by your software or manually through commands issued via your keyboard.

Some advanced features may require that you issue the commands manually. This process is explained in the remainder of this chapter.

3.1.1 How to Obtain the Complete AT Commands

The complete detailed descriptions of all the AT commands are not provided in this manual. You may obtain a complete listing of the commands from the World Wide Web at:

http://www.zoltrix.com/modem.htm

You may also contact the Zoltrix BBS at (510) 657-7413 and follow the directions below.

1. Log onto the Zoltrix BBS by entering your name and following the onscreen directions.
2. Check the Modem Drivers file area for the driver updates.

3.1.2 Default Initialization Strings

Your modem has been preset at the factory to optimize its performance. These factory programmed defaults allow the modem to achieve the best possible connection under the worst of telephone line conditions. This is done by programming the modem with a set of instructions called the "INIT (short for initialization) String".

The INIT string instructs the modem how to execute each communication session including implementing or not implementing error correction and data compression during the session. The factory default INIT string stored in the modem is as follows:

AT&F&C1&D2

If the program that you are using allows the entry or editing of an INIT string, consider entering AT&F&C1&D2. However, you should note the original INIT string in case you need to set it back to the programs default settings.

3.1.3 Customizing Your Modem Settings

If you want to custom configure your stored profiles, we suggest that you always use AT&F&C1&D2 as the first part of your customized INIT string and add other settings to the end. For example, if you wish to change the duration of the dial tone to 55ms by adding an S11 option to your string, the resulting string would be as follows:

AT&F&C1&D2S11=55

Notice that **AT&F&C1&D2** is the first part of the string and the new option S11=55 has been appended to the end of the string.

Note: If the modem's performance suffers after the settings have been modified, issue AT&F&C1&D2&W to the modem. This will instruct the modem to restore the default init string and store it in the modems N.V. Ram (Permanent memory). If your model does not support the N.V. Ram , change the INIT string to the default string.

3.1.4   Limiting the Modem's Top Speed

If you experience problems connecting to slower modems (2400 or 1200 bps), you may need to instruct your modem to limit the top speed to attempt. This should not be necessary in most cases, but, there are some 2400 bps and 1200 bps or even 9600 bps modems that you may not connect to without using one of the following methods.

Once you know the top speed of the modem you are attempting to connect with, just add one of the following commands to the end of your INIT string.

PC Tel Based 56.000's

Command	Top Speed	Modulation
N1	Auto Detect	(Default)
N0S37=3	300 bps	(V.21 or Bell 103) See Bn command.
N0S37=4	1.200 bps	(V.22 or Bell 212a) See Bn command.
N0S37=6	2.400 bps	(V.22bis)
N0S37=7	4.800 bps	(V.32)
N0S37=8	7,200 bps	(V.32bis)
N0S37=9	9,600 bps	(V.32)
N0S37=10	12,000 bps	(V.32bis)
N0S37=11	14,400 bps	(V.32bis)
N0S37=12	33,600 bps	(V.34)

3.1.5   The Use and Setup of V.42bis Modems

When a V.42bis connection is established, there is a theoretical maximum compression of the data of 4-to-1. In order to compress or decompress the data and then transmit or receive it, the data must be transferred from the terminal to the modem and from the modem to the terminal, four times faster than the modem is transmitting or receiving it. Therefore, when you set up your software for use with a high-speed 28,800 bps or 33,600 bps modem with hardware V.42bis and MNP5, you must set the Data Terminal Equipment (DTE) speed to the highest possible "virtual" transmission speed.

This is the highest speed that the modem would virtually transmit with data compression (115,200 bps for the V.34/28,800 bps & V.34+ 33,600 bps modems). To set the DTE speed, you select that speed with the software you are using.

Because the DTE and DCE rates differ, the modem must use a process of hardware "handshaking", where the modem lets the computer know when to stop sending data and when to start sending again. This hardware handshaking must be used for all types of connections. Therefore, what is know as "Speed Buffering", must be used when a normal connection is established. "Speed Buffering" is the Normal Mode connections equivalent of the hardware handshaking done for MNP and V.42bis connections.

3.1.6 Modem Software Compatibility

Nearly all communication software executes an automatic detection sequence to determine which modem you have installed. This way the software retrieves the proper settings from an internal listing to set itself up correctly for your modem. If the modem is not recognized a listing is usually made available for the user to select from.

If your program includes such a listing that does not include this modem, you can often select another modem with the same speed. Then find the software's setup screen where you can edit the modems Initialization string and change the Initialization string to the string listed in section 3.1.2 (DEFAULT INITIALIZATION STRING). If your software does not allow you to edit the Initialization string, this may not work. You should then contact the software company to see if they have a setting for this modem.

The following lists the general guidelines to the Software and Hardware setups required for the operation described in the previous paragraphs.

Software Setup

Baud Rate (DTE Rate)   115,200 bps
Lock DTE rate   Yes
FLW CTL   RTS/CTS or Hardware

Note: It is very important to ensure that the software locks its BAUD rate. You will not enjoy the benefits of Data Compression if the software is set to the carrier rate of the modem. Communication software refers to this feature in different ways. If you are unsure how to do this with your software, either read the manual or call tech support for your communication program.

Hardware Setup

The modem should already be set correctly. But if you experience any difficulties, refer to section 3.1.2. With the previous Hardware & Software setups, you should be able to make a connection with virtually any other modem, regardless of the speed or error-correcting protocols supported. If, however, you experience problems, refer to the Custom Hardware Setups in sections 3.1.4.

3.1.7 Fax Software Compatibility

The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem* supports Class 1 fax software. If there is a listing of fax/modems to select from and this modem is not listed , select a *generic class 1*. If a initialization string is required you can use the Default Initialization String found in section 3.1.2.

To verify that your modem supports Class 1, use the following instructions to determine the correct Fax Class for your fax/modem:

1.   Install the modem and make sure that it is functioning properly.
2.   Launch your communication program or any program that allows you to enter AT Commands.
3.   Enter the following command at the terminal prompt and press the [Enter] key.

<center>AT+FCLASS=? [Enter]</center>

The modem will respond with something similar to the following examples:

Modem Response	Fax Class supported by Fax/Modem
[0,1]	Class 1
[0,2]	Class 2
[0,1,2]	Class 1 and Class 2

3.1.8   Using the Voice features

The *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem* can also be used as a voice answering machine and a full duplex speaker phone, when used with the supplied Fax/Data/Voice software.

The speaker phone function requires that you have a full duplex sound card installed and operating in your computer. There are no special connections required between the sound card and the *Zoltrix Win HSP PnP Voice/Speaker Phone/Modem*. The microphone and speakers connected to the sound card will be used for the functions automatically by the Fax/Data/Voice program.

For more information on how to use the answering machine feature and the speaker phone feature of the modem, refer to the software manual and/or on-line help.

3.2.   Issuing AT Commands

If you would like to learn more about how to control your modem directly with the use of AT commands, refer to the following web page:

http://www.zoltrix.com/usemodem.htm

Table A-1. AT Command Summary

Command	Title	Default
A/	Re-execute Command	none
ATA	Answer	none
* ATBn	Set CCITT or Bell Mode	1 (US)
ATDn	Dial	T
* ATE	Command Echo	1
ATHn	Switch-Hook Control	none
ATIn	Identification	none
* ATLn	Speaker Volume	1
* ATMn	Speaker Control	1
* ATNn	Modulation Handshake	1
ATOn	Return To The On-line State	none
* ATP	Set Pulse Dial as Default	none
* ATQn	Result Code Display	0
ATSn?	Reading S Registers	none
ATSn=x	Writing To S Registers	none
* ATT	Set Tone Dial as Default	none
* ATVn	Result Code Form (Message Control)	1
* ATWn	Negotiation Progress Reporting	0
* ATXn	Extended Result Codes	4
* ATYn	Control Long Space Disconnect	0
ATZn	Reset	none
* AT&Cn	DCD Option	0
* AT&Dn	DTR Option	0
AT&F	Restore Factory Configuration	none
* AT&Gn	Set Guard Tone	0
* AT&Kn	DTE/Modem Flow Control	3
* AT&Pn	Dial Pulse Ratio	0 (US)
* AT&Sn	DSR Option	0
AT&Tn	Test And Diagnostic	none
* AT&Un	Enable/Disable trellis coding	0
AT&V	View Active Profile	none
AT&Wn	Store User Profile	none
* AT&Yn	Designate Default User Profile	0
AT&Zn=x	Store Phone Number (n= 0-9)	none
* AT\An	Maximum MNP Block Size	1
AT\Bn	Transmit Break	3
* AT\Gn	Modem to Modem Flow Control	0
* AT\Kn	Break Control	5
* AT\Ln	MNP Block Transfer Control	0
* AT\Nn	Operation Mode Control	3
* AT%Cn	Compression Control	3
* AT%En	Enable/Disable Auto Retrain	0
AT%L	Report Received Signal Level	none
* AT%Nn	Dynamic CPU loading usage	7

*   **Command setting may be stored in one of two user profiles with the AT&Wn command.**

Table A-2. Result Codes

Result Code	Numeric Value	Description
OK	0	Modem successfully executed a command line.
CONNECT	1	Connection made at 300 bps.
RING	2	Modem detected an incoming call.
NO CARRIER	3	Modem lost or could not detect a remote carrier signal within the Register S7 time.
ERROR	4	Modem found an error in the command line.
CONNECT 1200	5	Modem established a connection at 1200bps.
NO DIALTONE	6	Modem did not detect a dial tone within 5 seconds after going off-hook.
BUSY	7	Modem detected a busy signal.
NO ANSWER	8	Five seconds of silence was not detected when using the @ command in the dial command line.
CONNECT 110	24	Modem established a connection at 110 bps.
CONNECT 0300	21	Modem established a connection at 300 bps.
CONNECT 0600	9	Modem established a connection at 600 bps.
CONNECT 1200TX/75RX	22	Modem established a connection at transmit 1200/receive 75 bps.
CONNECT 75RX/1200RX	23	Modem established a connection at transmit 75/receive 1200 bps.
CONNECT 2400	10	Modem established a connection at 2400 bps.
CONNECT 4800	11	Modem established a connection at 4800 bps.
CONNECT 9600	12	Connection made at 9600 bps.
CONNECT 7200	13	Connection made at 7200 bps.
CONNECT 12000	14	Connection made at 12000 bps.
CONNECT 14400	15	Connection made at 14400 bps.
CONNECT 16800	59	Connection made at 16800 bps.
CONNECT 19200	16	Connection made at 19200 bps. (If W1 or W2 commands active, then carrier rate. Otherwise indicates software rate)
CONNECT 21600	61	Connection made at 21600 bps.
CONNECT 24000	62	Connection made at 24000 bps.
CONNECT 26400	63	Connection made at 26400 bps.
CONNECT 28800	20	Connection made at 28800 bps.
CONNECT 31200		Connection made at 31200 bps.
CONNECT 33600		Connection made at 33600 bps.
CONNECT 38400	17	Connection made at 38400 bps. (Indicates software rate {DTE})
CONNECT 57600	18	Connection made at 57600 bps. (Indicates software rate {DTE})
CONNECT 115200	19	Connection made at 115,200 bps. (Indicates software rate {DTE})
CONNECT 32000		K56Flex connection made at 32,000 bps.
CONNECT 34000		K56Flex connection made at 34,000 bps.
CONNECT 36000		K56Flex connection made at 36,000 bps.
CONNECT 38000		K56Flex connection made at 38,000 bps.
CONNECT 40000		K56Flex connection made at 40,000 bps.
CONNECT 42000		K56Flex connection made at 42,000 bps.
CONNECT 44000		K56Flex connection made at 44,000 bps.
CONNECT 46000		K56Flex connection made at 46,000 bps.
CONNECT 48000		K56Flex connection made at 48,000 bps.
CONNECT 50000		K56Flex connection made at 50,000 bps.
CONNECT 52000		K56Flex connection made at 52,000 bps.
CONNECT 54000		K56Flex connection made at 54,000 bps.
CONNECT 56000		K56Flex connection made at 56,000 bps.
CARRIER 300	40	Carrier rate of 300 bps.
CARRIER 1200/75	44	Carrier rate of transmit 1200/receive 75 bps.
CARRIER 75/1200	45	Carrier rate of transmit 75/receive 1200 bps.
CARRIER 1200	46	Carrier rate of 1200 bps.
CARRIER 2400	47	Carrier rate of 2400 bps.
CARRIER 4800	48	Carrier rate of 4800 bps.
CARRIER 7200	49	Carrier rate of 7200 bps.
CARRIER 9600	50	Carrier rate of 9600 bps.

Table A-2. Result Codes (continued)

Result Code	Numeric Value	Description
CARRIER 12000	51	Carrier rate of 12000 bps.
CARRIER 14400	52	Carrier rate of 14400 bps.
* CARRIER 16800	53	Carrier rate of 16800 bps.
* CARRIER 19200	54	Carrier rate of 19200 bps.
* CARRIER 21600	55	Carrier rate of 21600 bps.
* CARRIER 24000	56	Carrier rate of 24000 bps.
* CARRIER 26400	57	Carrier rate of 26400 bps.
* CARRIER 28800	58	Carrier rate of 28800 bps.
* CARRIER 31200		Carrier rate of 31200 bps.
* CARRIER 33600		Carrier rate of 33600 bps.
* CARRIER 32000		Carrier rate of 32000 bps.
* CARRIER 34000		Carrier rate of 34000 bps.
* CARRIER 36000		Carrier rate of 36000 bps.
* CARRIER 38000		Carrier rate of 38000 bps.
* CARRIER 40000		Carrier rate of 40000 bps.
* CARRIER 42000		Carrier rate of 42000 bps.
* CARRIER 44000		Carrier rate of 44000 bps.
* CARRIER 46000		Carrier rate of 46000 bps.
* CARRIER 48000		Carrier rate of 48000 bps.
* CARRIER 50000		Carrier rate of 50000 bps.
* CARRIER 52000		Carrier rate of 52000 bps.
* CARRIER 54000		Carrier rate of 54000 bps.
* CARRIER 56000		Carrier rate of 56000 bps.
RINGBACK	25	Ring Back signal detected.
+FCERROR	+F4	Error occured in Class 1 fax operation.
FAX	33	Fax modem connection estasblished.
DATA	35	Data modem connection established.
# COMPRESSION: CLASS 5	66	The modem has connected in MNP CLASS 5 and COMPRESSION message reporting has been enabled.
# COMPRESSION: V.42bis	67	The modem has connected in V.42bis and COMPRESSION MNP5 message reporting has been enabled.
# COMPRESSION: NONE	69	The modem has connected without data compression and COMPRESSION message reporting has been enabled.
* PROTOCOL: NONE	76	Modem has connected without any form of error connection. (No MNP4 or V.42)
* PROTOCOL: LAPM	77	Modem has connected in the V.42 LAPM mode of error correction.
* PROTOCOL: ALT	80	Modem has connected in the MNP4 mode of error connection.

\#   The COMPRESSION Result Code must be enabled with the W1 command.
*   The CARRIER Result Code and the PROTOCOL Result Code must be enabled with the W1 command.

Table A-3 S-Register Summary

	Register	Title	Default
*	S0	Number of Rings till Auto-Answer	0
	S1	Ring Counter	0
	S2	Escape Character	43
	S3	Carriage Return Character	13
	S4	Line Feed Character	10
	S5	Back Space Character	8
*	S6	Wait For Blind Dialing	2
*	S7	Wait For Carrier After Dial	50
*	S8	Pause Time For Dial Delay	2
*	S9	Carrier Detect Response Time	6
*	S10	Lost Carrier To Hang Up Delay	14
*	S11	DTMF Tone Duration	95
*	S12	Escape Code Guard Time	50
	S13	Reserved	none
	S14	Reserved	none
	S15	Reserved	none
	S16	Reserved	none
	S17	Reserved	none
*	S18	Test Timer	0
*	S19	Reserved	0
	S20	Reserved	none
	S21	Reserved	none
	S22	Reserved	none
	S23	Reserved	none
	S24	Reserved	none
*	S25	Delay To DTR	5
	S26	Reserved	1
	S27	Reserved	none
	S28	Reserved	none
*	S30	Inactivity Timer	0
	S32	XON Character	17
	S33	XOFF Character	19
*	S34	V.34 data rate (bit rate)	11
*	S35	V.34 symbol rate (baud rate)	0
*	S36	Reserved	none
*	S37	Desired Telco Line Speed	0
*	S38	Delay Before Forced Disconnect	20
	S39	Reserved	none
	S40	Reserved	none
	S41	Reserved	none
	S42	Reserved	none
	S43	Reserved	none
	S44	Reserved	none
	S45	Reserved	none
	S46	Reserved	none
	S47	Reserved	none
	S48	Reserved	none
	S82	Reserved	none
	S86	Connection Failure Cause Code	0
*	S91	Transmit level	11

*   Register value may be stored in one of two user profiles with the AT&Wn command.

Appendix B Regulatory

Important F.C.C. Information

This product will be connected to the public telephone network. This network is regulated by the Federal Communications Commission (F.C.C.).

All F.C.C rules must be followed in the use of this product.

F.C.C. Notice to the User

1. <u>Upon request only</u>, you must provide the following data to your telephone utility company (telco):

    (a) Notice of the intention to install or permanently remove an FCC Part 68-registered device or system, and the *F.C.C. registration number.

    (b) The Ringer Equivalence Number (R.E.N., see device label). Note that if several devices are connected on the same line, the sum of the R.E.N. values must not add up to more than 5.0 (A or B). This R.E.N. figure is important to your Telco.

    (c) The USOC jack type to be provided by the telco. Typically these may be RJ11C for single lines, or RJ21X for multi-lines.

    *Note: These items are noted on the equipments FCC compliance label.

2. This device may not be used on telco-operated coin phone lines. Party lines and privately owned coin-phones are subject to local State regulatory policies, and possible additional special State requirements.

3. The telco has the right to make changes to their network which may affect the operation of your equipment, provided you are given adequate advance written notice to permit correct operation.

4. In case of operational problems, disconnect your unit by removing the modular or multiconnector plug from the telco's jack. If your regular phone still works properly, your modem has problems and must remain disconnected and serviced at an authorized service center. If upon the above disconnection your regular phone still has problems, notify your telco that there may be a problem with your phone lines. If there is a problem with the phone lines, you may or may not be required to pay for any repair service to the phone lines. However, if the problem is with lines that are not telco installed, you will be charged for the service.

5. Unless otherwise noted in the User's Manual (e.g. fuses, etc.), user may not, under any circumstances, in or out of warranty, attempt any service, adjustments, or repairs on this unit. It must be returned to the factory or authorized U.S. Service center for all such work. Locations can be obtained from the original place of purchase.

6. Special FCC rules apply to equipment connected behind a PBX or KTS.

FCC Radio Frequency Interference Statement
This modem has certified to comply with the limits for a Class B device, pursuant to Subpart J of Part 15 of the F.C.C. rules.

This Equipment generates and uses radio frequency energy. If not installed and used properly, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of the F.C.C. rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

To determine if the equipment is causing interference to radio and television reception, the user should turn off the computer that the modem has been installed in. If the interference goes away, it is assumed that the modem is causing the interference. The user is encouraged to try to correct the problem by one or more of the following measures:

* Reorient the receiving antennae
* Relocate the computer with respect to the receiver.
* Move the computer away from the receiver.
* Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.
* If necessary, consult the dealer or an experience radio/television technician for additional suggestions.

The Federal Communications Commission has a booklet available that may be of help to the user. The name of the booklet is,"Interference Handbook." It is available from the U.S. Government Printing Office, Washington, D.C., 20402, Stock Number 004-000-00450-7.

The manufacturer is not responsible for any radio interference caused by unauthorized modification or improper use of this equipment. It is the responsibility of the user to correct such interference.

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The Manufacturer makes no representations or warranties, expressed, statutory or implied, regarding the fitness or merchantability of this product for any particular purpose. Further, the Manufacturer is not liable for any damages, including but not limited to, lost profits, lost savings, or other incidental or consequential damages arising out of the use of this product. The Manufacturer also reserves the right to make any improvements or modifications to the product described in this manual at any time, without notice of these changes.

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Appendix G

GLOSSARY of COMMUNICATION TERMS

Active Profile
The current modem settings of the modem. The active profile of the modem is the current values of all S-Registers and AT commands. The active profile is changed by modem software and can also be changed manually by sending AT commands to the modem directly. Once the active profile is configured to meet your special needs you may then store it permanently in the Non-Volatile Ram.

ASCII (American Standard Code for Information Inter-exchange)
A standard character set and coding scheme used to represent letters, numbers, symbols, and control characters. The IBM PC and most micro-computers use ASCII.

Analog
A continuous sound wave or signal, such as a voice, that conventional telephone lines were developed for.

ARQ (Automatic Repeat reQuest)
A term used to describe the automatic retransmission of defective data blocks for the purpose of error detection in MNP and V.42 protocols.

Asynchronous
A way of transmitting data where start and stop bits are used to frame each character. Data is sent and received at irregular periods of time.

Auto Answer
A function of the modem where it is set up to answer an incoming call.

Auto Dial
A function of the modem where it will dial a telephone number for you.

Baud
The unit of signaling speed, specifying the number of signal elements per second. Since a signal element can represent more than one bit, baud rate is not necessarily the same as bits per second.

BPS (BITS PER SECOND)
The number of bits that are transmitted in one second. This is the basic unit of measure for serial data transmission.

Carrier
A continuous frequency capable of being modulated or impressed with a second data-carrying signal.

Command Mode
This is the mode in which the operator, or communications software, can issue commands to the modem.

Cyclic Redundancy Checking (CRC)
A technique used to detect errors in the transmission of data by the affirmation of error codes by bot the sending and receiving modem..

Data Compression
A technique used to reduce the amount of data being sent without reducing the information represented. In effect, modems with data compression transmit data faster than non-compression types. Data compression can be implemented in the Hardware or Software.

DCE (Data Communication Equipment)
A term used to describe any equipment that has the capacity to establish and control the data link via the telephone network.

Data Mode
This is the mode in which data is either being sent or received from a remote device once a connection has been established.

DIGITAL
A non-continuous signal, voltages representing either a on or off condition used to represent 1 data bit.

DIRECT MODE
A direct connection is equivalent to any standard 2400 bps modem connection. The maximum throughput is equal to the connection rate, and the DTE rate must match the connection rate.

DTE (DATA TERMINAL EQUIPMENT)
Any communications equipment which acts as one of the final destinations of a communications network.

DTMF (DUAL TONE MULTI FREQUENCY)
The method of dialing uses tones to represent the numbers to dial.

EIA (Electronics Industries Association)
The U.S. governing party which determines the industry standards for electronic industries.

Full Duplex
A transmission method in which data is sent and received simultaneously over the same line.

Frequency
The number of times that a sound wave repeats itself in a second. It is usually expressed in Hertz (Hz).

Half-Duplex
A method of data transmission in which data flow occurs in both directions, but in only one direction at a time.

Handshaking
An exchange of signals between two communication devices that establishes a connection and allows the transmission of data.

HDLC (HIGH-LEVEL DATA LINK CONTROL)
A common bit-oriented data link protocol issued by the ISO (International Standards Organization).

HERTZ (HZ)
A unit of measure of frequency. Measures the number of cycles (sound waves) that pass through a reference point per second.

HSP (Host Signal Processing)
Refers to using the Host computers processor (Pentium chip) in place of a dedicated chip on the modem (DSP) to perform the Digital Signal Processing.

IRQ (Interrupt ReQuest)

A signal within the computer's processing architecture which allows any peripheral device (such as data being receive at a serial port) to interrupt the hardware and software when the attention of the computer's microprocessor is required.

ITU-T (International Telecommunications Union-Telecommunication)

Formerly called the CCITT, the ITU, which is part of the International Telecommunications Union based in Geneva, has developed a series of modem standards that have been adapted primarily by the post, telephone, and telegraph (PTT) organizations that operate telephone networks of many countries outside the United States. Because of the popularity, certain ITU recommendations have also been followed in designing modems for operation on communications facilities in the United States.

K56Flex

A protocol for communicating at up to 56,000 bps. K56Flex is not compatible with X2.

LAPM (Linked Access Procedure for Modems)

A error control protocol similiar to MNP protocols. Defined in the CCITT V.42 recommendation, it uses CRC and ARQ to assure data reliability.

MANUAL DIAL

The use of a telephone to dial a call.

MNP (MICROCOM NETWORK PROTOCOL)

An error correction protocol developed by MICROCOM, INC.

MODEM

A contraction of the words MOdulator and DEModulator. It is used to transform digital data into analog signals (modulate), at the transmitter, and transform the analog signals into digital data (demodulate), at the receiver.

MODULATION

The process or technique of impressing a data-carrying signal onto a carrier.

NON-VOLATILE MEMORY

A memory location on the modem that allows the user to change the modem default's and then store them permanently. The contents of the memory are not lost when power is removed.

NORMAL MODE

In normal mode, error correction and compression are turned off ant the modem provides data buffers. This allows the terminal rate to be different from the connection rate. However, the maximum modem-to-modem throughput continues to be equal to the connection rate.

OFF HOOK

Indicates that the modem has picked up the phone line.

ON LINE

Indicates that a communications session is in progress.

PULSE DIAL

The type of dialing used by rotary-type telephones. Each digit is represented by a series of pulses.

SYNCHRONOUS

A method of communication where a group of characters are sent as a continuous stream of data at regular intervals of time.

Technical Specifications

◆ Data Modulation Protocol Standards

K56Flex	56,000/54,000/52,000/50,000/48,000/46,000/44,000/ 42,000/40,000/38,000/36,000/34,000/32,000 bps
ITU-T V.34bis	33,600/31,200 bps
ITU-T V.34	28,800/26,400/24,000/21,600/19,200/16,800 bps
ITU-T V.32bis	14,400/12,000/7,200 bps
ITU-T V.32	9,600/4,800 bps
ITU-T V.23	1,200/75 bps (FSK)
ITU-T V.22bis	2,400 bps (QAM)
ITU-T V.22	1,200 bps (DPSK)
Bell 212A	1,200 bps (DPSK)
ITU-T V.21	300 bps (FSK)
Bell 103	300 bps (FSK)

◆ **Fax Modulation or Protocol Standards**

ITU-T V.17	14,400/ 12,000/ 9,600/ 7,200 bps (TCM)
ITU-T V.29	9,600/ 7,200 bps (QAM)
ITU-T V.27ter	4,800/ 2,400 bps (DSPK)
ITU-T V.21 Channel 2	300 bps (FSK)

Fax Send and Receive rates up to 14,400 bps
Group III Compatible
Supports EIA Class 1 Fax Software

◆ **Error Correction**

V.42 LAPM
MNP 2-4

◆ **Data Compression**

V.42bis (up to 4-1 compression)
MNP 5 (up to 2-1 compression)

◆ **Others features**

Software Upgradable to ITU 56K standard
High Throughput Virtual UART for High Speed Operation up to 115,200 bps
PnP Auto Selection of Com Port and IRQ settings
Enhanced AT Command set
NVRAM directory stored profiles
Flow Control (XON/XOFF, RTS/CTS)
Speed Buffering
Automode
Data/Fax/Voice Auto Detection
Automatic Format/Speed Sensing
Low Power Consumption with Auto Power Management
Supports Both Tone and Pulse Dialing
Signal Quality Monitoring and Auto Retrain
Ties Escape Command

Appendix T

Trouble-Shooting

T.1   How to Use this Section

The modem has been designed and manufactured to make telecommunications as easy and painless as possible. However, success with communications depends upon a number of things working together correctly: your computer, your modem, your software, and your telephone line. And, these individual pieces must be working correctly on the other side of the connection as well.

While correcting problems is usually quite simple, the difficulty lies in knowing where to look. This section of the manual is designed to assist you in determining the cause of problems that may occur so they can be fixed.

In addition to this section, you might also look to similar sections in your communications software manual.

T.2   Determining What Serials Ports Are Installed in Your Computer

Whether you are installing an Internal or an External modem in your system, it is a good idea to determine what serial ports are installed in your computer...if any. You may assume that you only have COM1 on your computer, when you actually have both COM1 and COM2. You also might have many other combinations of COM ports.

Most computers have a Serial I/O card installed with COM ports 1 and 2 enabled. A Serial I/O card is required when using an External modem. These cards allow you to connect external modems and a mouse...just to name a couple. Even if you don't have any thing connected to the RS232 jack on the I/O card, it is still using a COM port. Every internal modem has a COM port built inside of it. The COM port and IRQ selection is made via dip switches or jumpers. (Refer to the Quick Installation Reference Card for settings.) A COM port may only be used by one device!

Many problems you may experience installing an Internal modem are caused by configuring the modem's COM port to a port already used by the I/O card installed in your computer system. A symptom of this conflict is the modem's inability to dial. When using an External modem the difficulty lies in determining what COM port is assigned to the physical RS232 jack on the back of your computer. You may think the RS232 jack is COM port 2, when in fact the second port on the I/O card has been set to COM port 4. There are many different possible ways that your system may be configured.

In the case of an Internal modem installation you must first determine which COM ports are already being used by devices in the system. Remember, you cannot set the Internal modem to a COM port address used by another device in the system.

In the case of an External modem installation you must determine if a COM port is enabled on your I/O card that you may plug your modem into. And if so, what is the correct address for the COM port. Another important fact that you should know about your COM port is the type of UART installed. If you want to run your communications software at rates above 19,200 bps, the UART in the COM port must be a 16550.

To help us determine how your system is set up, we can use a diagnostic program that is available with both MS-DOS 6.0 and above or Windows 3.1 to list the addresses that are used by devices in the system. The program is named, "MSD.EXE", and can usually be found under your DOS or Windows directory.

The MSD.EXE diagnostic utility has several useful utilities but for our purposes we will only use the COM port scanning function. To start MSD.EXE, type MSD at the DOS prompt:

C:\DOS>MSD

After running MSD.EXE. the display will show two columns of information ranging from the type of computer you have to the type of devices that are available on your computer. Next to the COM port information is a number showing the number of COM ports that are used in your system. Now that we know how many COM ports are used, we must know which COM ports address are used. Press C to run the COM port scanner.

The following is an example of what you may see:
(The information displayed is dependent on the system being used.)

COM Port	COM1	COM2	COM3	COM4
*Port Address	03F8H	02F8H	02E8H	N/A
Baud Rate	1200	2400	57600	
Parity	None	None	None	
Data Bits	7	8	8	
Stop Bits	1	1	1	
Carrier Detect (CD)	No	No	No	
Ring Indicator (RI)	No	No	No	
Data Set Ready (DSR)	No	No	Yes	
Clear To Send (CTS)	No	No	Yes	
UART Chip Used	8250	8250	16550AF	

*WARNING: To determine the available COM port, refer to the Port Address information. The MSD.EXE utility scans your computer sequentially for any COM ports and displays the information for the COM ports in the order that it scans it in.

This does not necessarily mean that the information it displays is for the designated COM port. For example, the information in the above chart under COM3 is actually the information for COM4. The utility had found that no device was being used in COM3 but did find a device using COM4 and therefore displayed the information from COM4 under COM3.

To determine what COM port is being used. match the information from the Port Address to the following chart:

COM1	03F8-03FF
COM2	02F8-02FF
COM3	03E8-03EF
COM4	02E8-02EF

Using this chart with the example above, we see that the address under COM1 is 03F8 and therefore correctly states the information for COM1. The address listed at COM2 is 02F8 and therefore correctly states the information for COM2. However we find that the address under COM3 is actually the address for COM4, and therefore the information in this column is actually for COM4. We can now safely conclude that COM ports 1. 2. and 4 are being used by devices in the computer.

With the above example an Internal modem may only be set to use COM port 3. Since COM port 1 uses IRQ 4, you must select another IRQ on the Internal modem. This model support IRQ's 2, 3, 4, 5, 10, 11, 12, 15.

T.3   Common Problems and Their Solutions

The most common problems that are encountered are:

1.   The computer, or communications software, does not recognize the modem.

      {Section T.3.1}

2.   The modem will not dial (NO DIALTONE), and/ or answer an incoming call).

      {Section T.3.2}

3.   You can connect with another computer, but the text (or graphics) that you see, is not correct.
      {Section T.3.3}

T.3.1   Modem Recognition

If your modem is not being recognized by your computer (or communications software), the problem usually involves COM ports. Use the following steps to troubleshoot the problem:

1.   Make sure that the COM port selected on the software is the same as the one you have selected on your modem

2.   If installing an Internal modem and you have not followed the instructions at the beginning of this appendix titled. "**Determining what Serial Ports are Installed in Your Computer**". turn off your computer, remove the modem from your computer and follow the instructions in that section.

3.   If using Windows 3.1 or 3.11, make sure you use the control panel to check the port addresses and IRQ's selected by Windows. Verify that the Control Panel port settings match the settings on the modem.

If you have determined that there is not a COM port conflict, then the problem usually involves **IRQ** (interrupt request level) conflicts.

1.   Check to see if you have another device (such as a mouse or sound card) that shares an **IRQ** level with the modem.

If you have determined that there is an IRQ conflict, then use the Quick Installation Reference Card to determine how to change the IRQ used by your modem.

T.3.2   Line Problems

If the modem will not dial (and/or answer). and you have already determined it is not a COM port conflict, do the following:

A.   Check the telephone lines. Make sure that the telephone cord from the wall is firmly connected to the jack in the modem labeled "Line " or "Wall". If it is, unplug the cord from the modem and connect it to a telephone. (make sure that you use the same telephone cord that you used to connect to the modem). If you can't hear a dial tone when you pick up the phone, the telephone line (or outlet) is the source of the problem.

B.   Try using another telephone cord to ensure it is not defective. If you still can't hear a dial tone when you pick up the phone, the telephone outlet is bad or your phone line is out of service. If you do hear a dial tone on the telephone set, but you don't hear the dial tone when the phone is connected to the phone jack on the modem, it may well be a problem with the modem.

If this is the case and your fax/modem is still under warranty, contact the dealer (computer store) where you purchased your fax/modem from and arrange to have it repaired or replaced.

T.3.3   Communication Settings and Line Noise

If you can connect to another number, but the screen display is incorrect (garbage characters, misplaced characters, etc...), the cause is usually one of two problems.

A.   First, your communications program may be configured incorrectly for the modem you are connecting to. Check the **Baud rate, Parity, Data Bits,** and **Stop Bits.** These settings should match that of the other computer. Also, check with the host to determine if you need to emulate a terminal when connecting.

C.   If all of the settings in the software are correct, you might have a "noisy" telephone line. Contact your local telephone company to have them check the line. Notify them that you are using the line for a modem. If the telephone company technician verifies a good phone line, contact the place of purchase of your fax/modem and arrange to have your it repaired or replaced.

T.4   Online Technical Support

If you have access to the World Wide Web be sure to visit the Zoltrix home page at:

http://www.zoltrix.com

You may also want to read the updated Modem Questions and Answers located at:

http://www.zoltrix.com/modem-qa.htm

You may also locate the Technical Support phone numbers and e-mail addresses on the Tech Support Web page at:

http://www.zoltrix.com/techsupp.htm