

Zoltrix 56K High Speed Fax/Modems

Installation Manual

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

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Hardware Manual Summary

This manual offers you information on the setting up and installing of fax/modems. 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. Because this manual is used for both Internal and External models that may or may not support Voice Mail and Speaker Phone features, some parts of the manual may not apply to your model.

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

- Chapter 1, "Fax/Modem Installation"**, provides safety instructions on the set up of your fax/modem. Topics include ESD (Electro-static Discharge) and the setup of the fax/modem. Refer to the **Quick Installation Reference Card** for specific instructions for your model.
- Chapter 2, "Windows 95 Driver Installation"**, provides step by step instructions for installing the Windows 95 Modem drivers. Topics include, setup of the Windows 95 Com Port, setup of the Windows 95 modem driver and testing the Windows 95 modem driver.
- Chapter 3, "Using the Fax/Modem"**, discusses the option of controlling the fax/modem through commands other than those generated by the included software. Topics include, Modem identification, Default INIT strings, Customizing modem settings. Also advanced topics include, Voice Mail, SpeakerPhone, Caller ID and Audio Span.
- Appendix A, "Quick Reference"**, lists AT commands summaries, result code summaries and S-Register summaries and Error Correction and Compression commands for the 56K 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 models covered by this manual.
- Appendix T, "Troubleshooting"**, discusses possible configuration problems and solutions with the modem. Topics include, Determining What Serial Ports Are Installed on your computer, Determining What Serial Ports Windows 95 Recognizes, Common Problems and their Solutions and uploading firmware into the Flash ROM.

Chapter 1

FAX/MODEM INSTALLATION

1.1 Before You Start

If you have an Internal modem and 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 exist. 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 Installation Steps

1. Before installing the modem, **refer to Appendix T** in the section titled "Determining What Serial Ports are Installed in Your Computer" to correctly identify what serial ports are used on your computer system.
2. Refer to the **Quick Installation Reference Card** for the steps to install your modem. The **Quick Installation Reference Card** also includes instructions on how to set the COM ports and IRQ levels on Internal models and suitable locations for your External modem. For some of the steps, you may need to refer to your computer's User's Manual.

You may also refer to the printing on the Internal Fax/Modem for the setting of the COM Ports and IRQ levels.

Chapter 2

WINDOWS 95 DRIVER INSTALLATION

2 Introduction

The **Zoltrix 56K modem** can run in many operating systems including DOS, Windows 3.1x, Windows 95, etc. The **Zoltrix 56K modem** does not require any special driver for use with DOS and Win 3.1. The most important thing is to ensure that the internal modem is set to a Com port and IRQ that is unused in the system and external modems require a functioning external Com port (serial port) using a 16550 UART.

2.1 Windows 95 Software Setup

Before you physically install a internal modem and after you physically install a internal modem, you should verify if the Com port is recognized by Windows 95. **Refer to Appendix T section T.2.1** for instructions to determine what ports Windows 95 recognizes.

Before installing the internal modem you need to first make sure that Windows 95 does not detect the Port that you are going to set the modem to. After installing the Internal modem you need to get Windows 95 to recognize the port.

In the case of external modems, you need to ensure that you have an available Com port on the system that is recognized by Windows 95. In most cases this will be Com 1 or Com 2.

2.1.1 Com Port Setup for the Zoltrix Internal 56K Modem

For internal models, you may have to add the new port to the ports recognized by Windows 95, before you can install the modem driver. If your modem is installed in the computer and the port your modem is set to is not recognized by Windows 95, use the following instructions for installing the port.



1. Double click the  ICON in the Control Panel.


This will bring up the following screen:



2. Click on the  button.

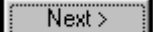
This will bring up the following screen:



3. Click on the  button.

This will bring up the following screen:

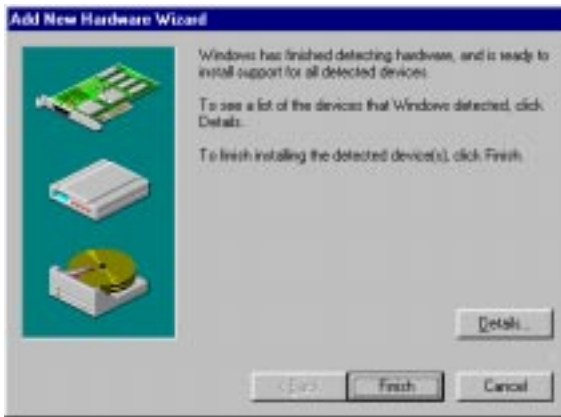


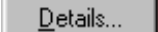
4. Click on the  button to proceed with the auto-detection.

This will bring up the following screen:

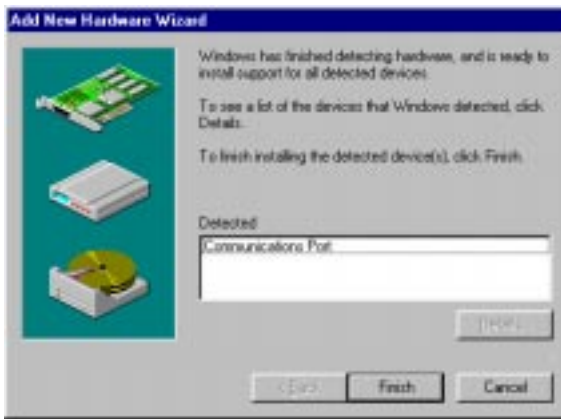



Be patient while Windows 95 is looking for new hardware.
After the search is complete, you will see the following screen:



5. Click on the  details button to view a list of devices found.

This will bring up the following screen:



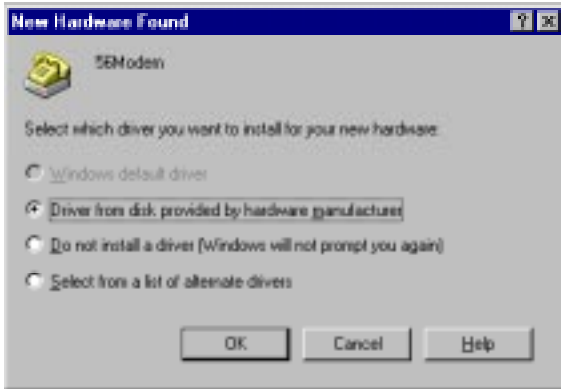
6. Click on the  button to complete the **Port** installation.
7. If the port was recognized and the drivers installed, you can now proceed to section 2.1.4.

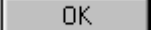
Note: If the port is not detected, you should first verify if Windows 95 already recognizes the Com Port. Refer to Appendix T section T.2.1 for instructions to determine what ports Windows 95 recognizes.

2.1.2 Windows 95 Modem Driver Setup for the Zoltrix External 56K Modem

1. Make sure the external modem is turned on and connected to a working serial port.
2. Start Windows 95. As soon as Windows 95 starts you will see a screen similar to the following:


Note: If you do not see the following screen, you may have the OSR2 version of Win95. refer to the instructions following for Windows 95 (OSR2) installation instructions.



3. Click the  button.

This will bring up a screen similar to the following:

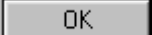


4. If you have a driver diskette, insert the *Zoltrix 56K modem* setup diskette into drive A: and click on the  button

If you have the Zoltrix COMMUNICATIONS CD-ROM, insert the CD-ROM into your CD-ROM drive and select D:\

Note: Replace D: with the drive letter of your CD-ROM drive if necessary



5. Click the  button to complete the installation.

2.1.3 Windows 95 (OSR2) Modem Driver Setup for the Zoltrix External 56K Modem

1. Make sure the external modem is turned on and connected to a working serial port.
2. Start Windows 95. As soon as Windows 95 starts you will see a screen similar to the following:



3. Click on the **Next >** button.

If you did have the driver disk in the drive, you will see a screen similar to the following:



4. Click on the **Finish** button to complete the modem driver installation.

If you did not have the driver disk in the drive, you will see a screen similar to the following:




4. Either insert the driver disk now and click on the back button to go back to step 3
or

Click on the Other Locations button to bring up a screen similar to the following:

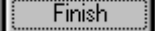


5. Click on the Browse button and then select the correct drive and directory containing the Win95 driver and then click on the OK button.

Note: The  button will be grayed out until you find a directory that actually contains a modem driver.

After Clicking on OK if you do not see a screen similar to the following, the location does not contain the correct driver:



6. Click on the  button to complete the modem driver installation.

2.1.4 Windows 95 Modem Driver Setup for the Zoltrix Internal 56K Modem

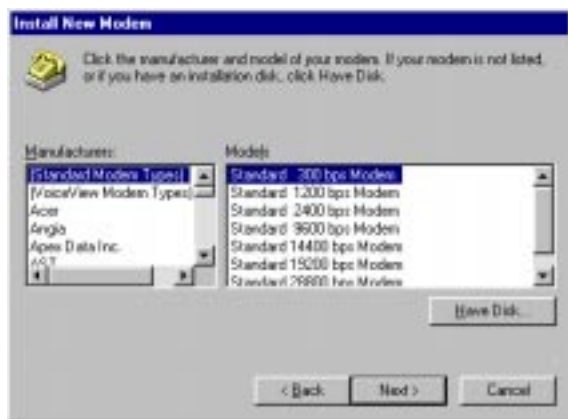


1. Double click on the **Modems** ICON in the Control Panel.
2. If you already have a Windows 95 modem driver installed on the system you will need to click on the **Add...** button to bring up a screen similar to the following:



3. Click on the box located next to the *Don't detect my modem; I will select it from a list* (as indicated in the above picture).
4. Click on the **Next >** button.

This will bring up the following screen:



5. Click on the **Have Disk...** button.

This will bring up the following screen:

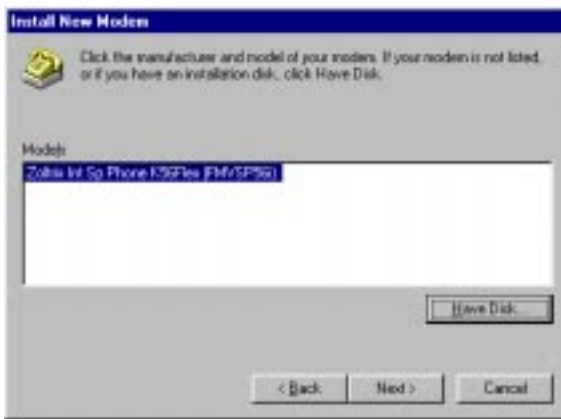



6. If you have a driver diskette, insert the **Zoltrix 56K modem** setup diskette into drive A:
If you have the Zoltrix COMMUNICATIONS CD-ROM, insert the CD-ROM into your CD-ROM drive and select D:\

Note: Replace D: with the drive letter of your CD-ROM drive if necessary

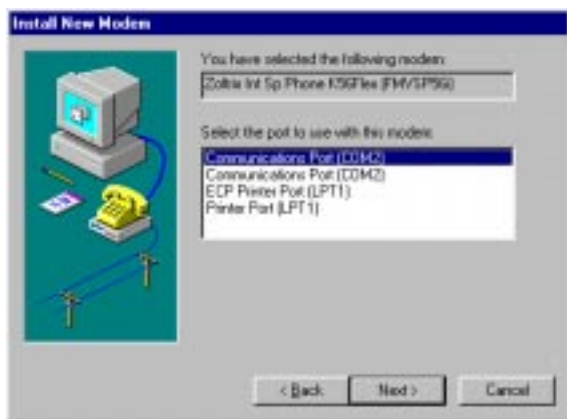
7. Click the  button.


This will bring up a screen similar to the following:



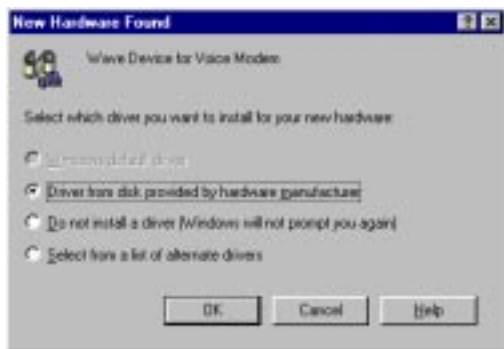
8. Click on the correct model from the list of choices. If you have the Internal Speaker Phone model, click on the model indicated in the previous picture.
9. Click on the  button.

This will bring up a screen similar to the following:



10. Click on the Port the modem is using. In this example Com 2 is selected (as indicated in the previous picture).
11. Click on the  button.

If you are installing a driver for the SpeakerPhone model, you will be informed that a Wave device for modems has been found. The driver will either be automatically installed or you will see a screen similar to the following:



12. Click the  button to install the wave driver.

This will bring up the following screen:



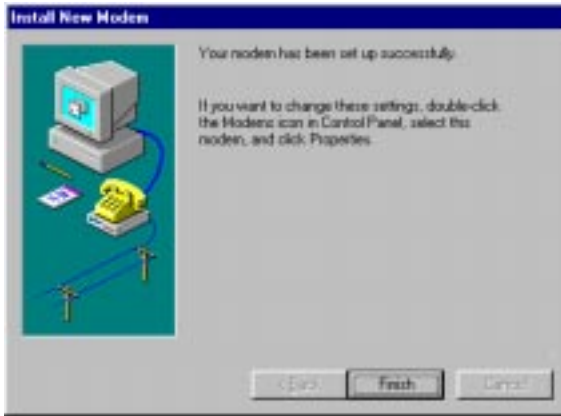
13. If you have a driver diskette, insert the **Zoltrix 56K modem** setup diskette into drive A:

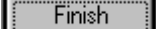
If you have the Zoltrix COMMUNICATIONS CD-ROM, insert the CD-ROM into your CD-ROM drive and select D:\

Note: Replace **D:** with the drive letter of your CD-ROM drive if necessary

14. Click the  button.

This will bring up the following screen:



15. Click on the  button to complete the modem driver installation.

16. Now that you have completed the driver installation, **you must Restart Windows 95!**

2.1.5 Testing the Modem Driver for the Zoltrix 56K Modem

After installing the software drivers and restarting Windows 95, use the following procedure to verify that the **Zoltrix 56K modem** is working.



1. Double click on the

Modems

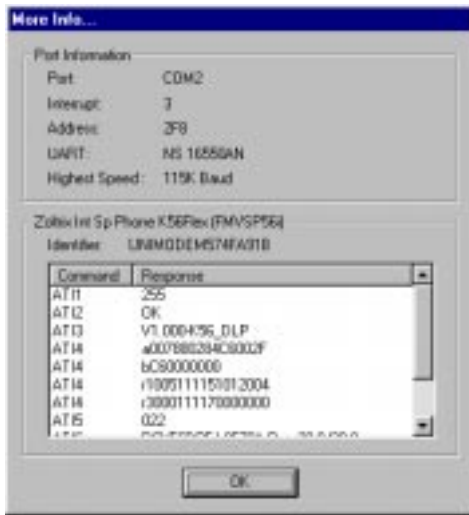
2. Click on the **Diagnostics** tab.

This will bring up a screen similar to the following:



3. Click on the port the **Zoltrix 56K modem** is assigned to (as indicated in the above picture).
4. Click on the **More Info...** button to allow Windows 95 to query the modem.

Windows 95 will give you a short report on the status of the modem and will display a screen similar to the following:



Note: The ATi3 response is of importance because this lists the firmware version. The ATi6 response is also important because it lists the chipset used. Users of the models that support Flash Rom, may download and install new firmware as it becomes available.

Chapter 3

Using the Modem

3.1 Introduction

Fax/modems can be used to transfer or receive data files, or to send and receive faxes to and from any ITU-T Group III fax machine or fax card. Both of these functions require different types of commands to be sent to the fax/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 Modem Identification

This manual was written for both the Internal and External 56K fax/modem. Some models support Voice Mail and Speaker Phone, while other models do not support these features. If your modem has a speaker and a microphone jack, you have the Voice Mail and Speakerphone model.

For technical information of K56 technology, including FAQ's, refer to the following web pages:

<http://www.zoltrix.com/56k-qa.htm>

<http://www.nb.rockwell.com/mcd/K56/home.html>

3.1.2 How to Obtain the Complete AT Commands

You may obtain a complete listing of the commands from either 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. The AT command manual is located in File Area #2 (Modem Information)

3.1.3 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.

3.1.4 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.

3.1.5 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.

Command	Top Speed	Minimum Speed	Modulation
+MS=0,1,300,300	300 bps	300 bps	(V.21) See Bn command.
+MS=64,1,300,300	300 bps	300 bps	(Bell 103) See Bn command.
+MS=1,1,1200,1200	1,200 bps	1,200 bps	(V.22) See Bn command.
+MS=69,1,1200,1200	1,200 bps	1,200 bps	(Bell 212a) See Bn command.
+MS=2,1,2400,2400	2,400 bps	2,400 bps	(V.22bis)
+MS=9,1,4800,4800	4,800 bps	4,800 bps	(V.32)
+MS=10,1,7200,7200	7,200 bps	7,200 bps	(V.32bis)
+MS=9,1,9600,9600	9,600 bps	9,600 bps	(V.32)
+MS=10,1,12000,12000	12,000 bps	12,000 bps	(V.32bis)
+MS=10,1,14400,14400	14,400 bps	14,400 bps	(V.32bis)
+MS=11,1,14400,24000	24,000 bps	14,400 bps	(V.34)
+MS=11,1,24000,33600	33,600 bps	24,000 bps	(V.34)
+MS=56,1,32000,56000	56,000 bps	32,000 bps	(K56Flex)

Note: Refer to section 3.1.2 to download the complete AT command manual.

3.1.6 Custom INIT Strings and Modem Configurations for Hardware V.42bis modems

Because some modems do not recognize the V.42bis handshaking sequence or you may want to make a special type of connection. Use the following Init strings to ensure that the modem will make a successful connection. A common customization is to add the command to limit the modems top speed to the end of the string (ie. +MS=2,1,2400,2400 to limit the attempted speed to 2400 bps).

1) V.42bis Auto

This configuration is the configuration used to attempt all possible connections. This is the default of the modem. The modem will first attempt a V.42bis connection, if the remote modem does not support V.42bis, the modem will attempt an MNP5 connection, if the remote modem does not support MNP5 the modem will attempt an NORMAL connection (No error correction or compression).

AT&F&C1&D2W2

2) MNP5

This configuration will bypass the V.42bis and V.42 negotiation and attempt MNP5 first. If the remote modem does not support MNP5 the modem will attempt an NORMAL connection (No error correction or compression). Use this selection if you know that the remote modem is only a MNP modem and does not support V.42/V.42bis.

AT&F&C1&D2W2S48=128

3) MNP4

This configuration will bypass the V.42bis and V.42 negotiation and attempt MNP4 first. If the remote modem does not support MNP4 the modem will attempt an NORMAL connection (No error correction or compression). Use this selection if you know that the remote modem is only a MNP modem and does not support V.42/V.42bis. This selection turns off the MNP5 compression. MNP5 may actually slow down file transfers of compressed files, therefore you may want to turn MNP5 off but still want the error correction capabilities of MNP4.

AT&F&C1&D2W2S48=128%C0

4) NORMAL (Error Correction and Data Compression OFF)

This configuration will not attempt V.42 or MNP but instead attempt a NORMAL connection. If you know that the remote modem does not support V.42 or MNP, select this configuration type. This will actually speed up the handshaking process. Many non-error-correcting modems do not interpret the V.42 and MNP signals correctly. Using this selection will eliminate the problems seen when calling non-error-correcting modems.

AT&F&C1&D2&Q6W2

Note: You may add additional commands to any of the preceding INIT strings, but as mentioned previously, it is recommended that you put the additional commands at the end of the INIT string.

3.1.7 The Use and Setup of Hardware 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 14,400 bps or 28,800 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 (57,600 bps for V.32bis/14,400 bps modems and 115,200 bps for the V.34/28,800 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 known 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.

3.1.8 Modem Software Compatibility

If your program includes a listing that does not include this modem, you can often select another modem with the same speed. Any Rockwell K56 modem selection should operate the Zoltrix K56 modem. You can also 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 3.1.3 (**Default Initialization Strings**). 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)	230,400 or 115,200 bps if the software does not support the higher rate
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 3.1.3. 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 3.1.5 and 3.1.6.

3.1.9 Fax Software Compatibility

When installing Fax software for your fax/modem you may need to know what Fax Class is supported. Most fax software will automatically determine this, but if your software does not, use the following to determine the correct Fax Class for your fax/modem.

To determine what fax class your modem supports:

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.

AT+FCLASS=? [Enter]

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

If there is a listing of fax/modems to select from and this modem is not listed, select a "generic class 1" or "generic class 2" fax/modem. If a Initialization string is required you can use the following:

AT&F&C1&D2

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>

3.3 Advanced Features

All the features described in this section may not apply to your model. The features described in this section are supported by the Voice Speaker Phone model. If your modem has a speaker and mic jack located on the modem, you have a model that supports the voice and speakerphone functions.

3.3.1 Voice Mail

The Voice mail feature of your modem allows you to turn your computer and modem into a voice answering machine. Because the use and instructions of this feature is software dependant, it is not the intent of this section to describe how to use this feature. Refer to the software manual, online help and readme files for specific information on using the voice mail feature.

One of the main advantages of using a voice modem as an answering machine over a stand alone answering machine, is the ability to create multiple mailboxes for callers to leave messages in. You may also set up mailboxes as fax on demand mailboxes to allow callers to retrieve faxes that you have designated for retrieval.

3.3.2 Speaker Phone

Not all Voice modems are created equal. Some voice modems only support the Voice mail features listed above, while Voice modems with Speaker Phone also support the hands free speaker phone feature. Using the bundled Speaker Phone software in conjunction with the speaker and microphone connected to the modem, you can make and receive calls from your computer without using your telephone handset. You get Full Duplex speaker phone operation from your modem.

Many users are confused on the use of the speaker phone feature and what it is used for. The speaker phone feature is used to make hands free phone calls (via the regular phone network). The speaker phone feature of the modem is not used for internet phone software. The speakers and mic connected to the modem are not used for the internet phone. Internet phone software uses your sound card to send and playback the sounds to the other user. A Full Duplex sound card is required for this function. The speaker phone modems only function during your internet phone call is to send and receive the data.

3.3.3 Caller ID

The **Zoltrix 56K modem** supports Caller ID. This means that if you have subscribed to the Caller ID service from your local phone company, you can see the phone number of the calling party without answering the call. When using Caller ID, you must set your software to answer the call in 2 rings or more. The reason for this is because the Caller ID information is transmitted between the first and the second ring signals received. If you set the modem to answer on 1 ring, the modem would never be able to receive the information before it answered the call.

The use of the Caller ID feature varies depending upon the software used. Refer to the software manual, online help and readme files for more information on using the Caller ID feature.

3.3.4 Audio Span -SVD (Simultaneous Voice and Data)

The *Zoltrix 56K modem* supports Rockwell's **Audio Span**. This is a feature that allows you to send data files to another user of another modem that supports **Audio Span**, while also talking to them on the phone, **using the same phone line**. That's right, this feature not only allows you to talk to a friend while uploading or downloading a file, but also allows you to play your favorite multi-player game over the phone line while also talking to them. Imagine shooting the enemy, while shouting "got you".

Many software companies are adding support for Rockwell's **Audio Span**. But even if the software program does not directly support it, you may get it to operate just by changing the INIT string used by the Program.

3.3.5 How to use Audio Span -SVD (Simultaneous Voice and Data)

Use the following directions to enable the **Audio Span** feature:

1. Call the other party you want to play a game with or send data to, using your telephone connected to the phone jack on your modem.
2. After the caller answers the phone, you can instruct them on exactly what they should do. In this example, inform them that you want to send them a program.
3. Both Parties should now start a communications program in terminal mode (i.e. BitCom, Hyperterminal etc...)
4. Both parties should now type the following command followed by the ENTER key:

AT-SMS=3

5. Now you both need to agree on who is going to dial and who is going to answer.

One party should type the following command followed by the ENTER key:

ATA

While the other party sends the following command followed by the ENTER key:

ATD

While the modems are attempting to make the connection, you will no longer be able to hear the other party on the telephone handset. As soon as the **SVD** connection is established, you will see the CONNECT XXXX message from the modem and will be able to talk to the other party and send or receive files.

When you want to end the connection, just instruct your software to hang up and put the phone headset back on hook.

You could use the same procedure to play a interactive game like Doom. Just modify the INIT string used by the program to include the **-SMS=3** command. An INIT string used successfully to test DOOM using this modem is as follows:

AT &F &C1 &D2 -SMS=3

Just make sure to make a voice connection first using the phones connected to the phone jack on the modems, then instruct the software to dial at one end and answer at the other end.

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)
	ATCn	Carrier Control	1
	ATDn	Dial	T
*	ATE	Command Echo	1
	ATHn	Switch-Hook Control	none
	ATIn	Identification	none
	ATLn	Speaker Volume	1
*	ATMn	Speaker Control	1
*	ATNn	Automode enable	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&Jn	Telephone Jack Selection	0
*	AT&Kn	DTE/Modem Flow Control	3
*	AT&Ln	Line Type	0
*	AT&Mn	Communication Mode	(&Qn)
*	AT&Pn	Dial Pulse Ratio	0 (US)
*	AT&Qn	Communication Mode	5
*	AT&Rn	RTS/CTS Option	1
*	AT&Sn	DSR Option	0
*	AT&Tn	Test And Diagnostic	5
	AT&V	View Current Configuration and User Profiles	none
	AT&V1	Display Last Connection Statistics	none
	AT&Wn	Store User Profile	none
*	AT&Xn	Clock Source Selection	0
*	AT&Yn	Designate Default User Profile	0
	AT&Zn=x	Store Phone Number	none
	AT\An	Maximum MNP Block Size	2
	AT\Bn	Transmit Break	3
	AT\Gn	Modem to Modem Flow Control	0
	AT\Kn	Break Control	5
	AT\Nn	Operation Mode Control	3
	AT\Vn	Single Line Connect Message Enable	3
*	AT%Cn	Compression Control	3
*	AT%En	Enable/Disable Auto Retrain	2
	AT%L	Report Received Signal Level	none
	AT%Q	Report Line Signal Quality	none
	AT+MS=	Select Modulation and speed range	NA
*	Command setting may be stored in one of two user profiles with the AT&Wn command.		

Note: Refer to section 3.1.2 to download the complete AT command manual.

Table A-2 Error Correction and Data Compression Commands

%Cn	Enable/Disable Data Compression Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link (i.e. MNP 4 or V.42) %C0 Disables data compression. %C1 Enables MNP 5 data compression negotiation. %C2 Enables V.42 bis data compression negotiation. %C3 Enables both V.42bis and MNP 5 data compression negotiation.
&Qn	Communication Operating Mode This command is used to control the connection modes permitted. It is used in conjunction with S36 and S48. (Also, see \N.) &Q0 Error correction off. (Direct Mode) &Q5 Error correction on. &Q6 Error correction off. (Normal Mode using speed buffering)
\Nn	Communication Operating Mode This command controls the preferred error correcting mode to be negotiated in a subsequent data connection. \N0 Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.) \N1 Serial interface selected - Selects direct mode and is equivalent to &M0, &Q0 mode of operation. (Forces &Q0.) \N2 Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=7.) \N3 Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces &Q5, S36=7, and S48=7.) \N4 Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces &Q5 and S48=0.) Note: The -K1 command can override the \N4 command. \N5 Selects MNP error-correction mode. Failure to make an MNP error-correction connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=128.)
S36	Negotiation Failure Treatment This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered. S36=0 Modem disconnects. S36=1 Modem stays on-line and a Direct mode connection is established. S36=2 Reserved. S36=3 Modem stays on-line and a Normal mode connection is established. S36=4 An MNP connection is attempted and if it fails, the modem disconnects. S36=5 An MNP connection is attempted and if it fails, a Direct mode connection is established. S36=6 Reserved. S36=7 An MNP connection is attempted and if it fails, a Normal mode connection is established. (Default.)
S48	V.42 Negotiation Action The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if so desired. If an invalid number is entered, it is accepted into the S-Register, but S48 will act as if 128 has been entered. S48=0 Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM. S48=7 Enable negotiation. (Default.) S48=128 Disable negotiation; bypass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.

Table A-3. 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 hook.	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 0600	9	Modem established a connection at 600 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.
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	64	Connection made at 28800 bps.
CONNECT 31200	65	Connection made at 31200 bps.
CONNECT 32000	165	Connection made at 32000 bps. (K56 connection)
CONNECT 33600	66	Connection made at 33600 bps.
CONNECT 34000	166	Connection made at 34000 bps. (K56 connection)
CONNECT 36000	167	Connection made at 36000 bps. (K56 connection)
CONNECT 38000	168	Connection made at 38000 bps. (K56 connection)
CONNECT 38400	17	Connection made at 38400 bps.
CONNECT 40000	169	Connection made at 40000 bps. (K56 connection)
CONNECT 42000	170	Connection made at 42000 bps. (K56 connection)
CONNECT 44000	171	Connection made at 44000 bps. (K56 connection)
CONNECT 46000	172	Connection made at 46000 bps. (K56 connection)
CONNECT 48000	173	Connection made at 48000 bps. (K56 connection)
CONNECT 50000	174	Connection made at 50000 bps. (K56 connection)
CONNECT 52000	175	Connection made at 52000 bps. (K56 connection)
CONNECT 54000	176	Connection made at 54000 bps. (K56 connection)
CONNECT 56000	177	Connection made at 56000 bps. (K56 connection)
CONNECT 57600	18	Connection made at 57600 bps.
CONNECT 115200	19	Connection made at 115,200 bps.
CARRIER 300	40	Carrier rate of 300 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.
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.

Table A-3. Result Codes (Continued)

Result Code	Numeric Value	Description
* 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	65	Carrier rate of 31200 bps.
* CARRIER 33600	66	Carrier rate of 33600 bps.
* CARRIER 32000	150	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 34000	151	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 36000	152	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 38000	153	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 40000	154	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 42000	155	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 44000	156	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 46000	157	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 48000	158	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 50000	159	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 52000	160	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 54000	161	Carrier rate of 32000 bps. (K56 connection)
* CARRIER 56000	162	Carrier rate of 32000 bps. (K56 connection)
# COMPRESSION: MNP5	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 message reporting has been enabled.
# COMPRESSION: NONE	69	The modem has connected without data compression and COMPRESSION message reporting has been enabled.
! PROTOCOL: NONE*	70	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	70	Modem has connected in the MNP4 mode of error connection.
#	The COMPRESSION Result Code must be enabled with S95 bit 5.	
!	The PROTOCOL Result Code must be enabled with S95 bit 3 or W1 command.	
*	The CARRIER Result Code must be enabled with S95 bit 2 or W1 command.	

Note: Refer to section 3.1.2 to download the complete AT command manual.

Table A-4 S-Register Summary

Register	Title	Default	Range	Units
* S0	Number of Rings till Auto-Answer	0	0-255	Rings
S1	Ring Counter	0	0-255	Rings
* S2	Escape Character	43	0-255	ASCII
S3	Carriage Return Character	13	0-127	ASCII
S4	Line Feed Character	10	0-127	ASCII
S5	Back Space Character	8	0-255	ASCII
* S6	Wait For Blind Dialing	2	2-255	Seconds
* S7	Wait For Carrier After Dial	50	1-255	Seconds
* S8	Pause Time For Dial Delay	2	0-255	Seconds
* S9	Carrier Detect Response Time	6	1-255	0.1 Seconds
* S10	Lost Carrier To Hang Up Delay	14	1-255	0.1 Seconds
* S11	DTMF Tone Duration	95	50-255	0.001 Seconds
* S12	Escape Code Guard Time	50	0-255	0.02 Seconds
* S14	General Bit Mapped Options status	138	NA	NA
S16	Bit Mapped Test Options	0	NA	NA
* S18	Test Timer	0	0-255	Seconds
S19	AutoSync Bit Mapped Options	0	NA	NA
* S20	AutoSync HDLC Address	0	NA	NA
* S21	General Bit mapped Options Status	52	NA	NA
* S22	Speaker/Results Bit Mapped Status	117	NA	NA
* S23	General Bit mapped Options Status	62	NA	NA
* S24	Sleep Inactivity Timer	0	0-255	Seconds
S25	Delay To DTR	5	0-255	Seconds
S26	RTS To CTS Delay Interval	1	0-255	0.01 Seconds
* S27	General Bit mapped Options Status	73	NA	NA
* S28	General Bit mapped Options Status	0	NA	NA
S29	Flash Dial Time	70	0-255	0.01
S30	Inactivity Timer	0	0-255	10 Seconds
* S31	General Bit mapped Options Status	194	NA	NA
S32	XON Character	17	0-255	ASCII
S33	XOFF Character	19	0-255	ASCII
* S36	LAPM Failure Control	7	NA	NA
* S37	Desired Telco Line Speed	0	NA	NA
S38	Delay Before Forced Disconnect	20	0-255	Seconds
* S39	Flow Control Bit mapped Options	3	NA	NA
* S40	General Bit mapped Options Status	104	NA	NA
* S41	General Bit mapped Options Status	195	NA	NA
* S46	V.42bis Selection	138	NA	NA
* S48	V.42bis Negotiation Action	7	NA	NA
S82	Break Handling	128	NA	NA
S86	Connection Failure Cause Code	none	0-255	NA
S91	PSTN Transmit Attenuation Level	10	8-15	dbm
* S95	Extended Result Codes	0	NA	NA
* Register value may be stored in one of two user profiles with the AT&Wn command.				

Note: Refer to section 3.1.2 to download the complete AT command manual.

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. Upon request only, 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

Appendix B Regulatory

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.

Disclaimer

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.

CCITT (Consultative Committee for International Telephone and Telegraph)

See ITU-T.

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 both the sending and receiving modem..

Appendix G Glossary

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.

HDLCL (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.

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.

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.

LEASED LINE

A telephone line leased from the telephone company connecting two locations directly on a semi-permanent basis.

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 **MOD**ulator and **DEM**odulator. 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.

RPI

RPI is short for **Rockwell Protocol Interface**. A software scheme to emulate V.42/V.42bis error correction and data compression.

Technical Specifications

- Flash ROM Upgradable to ITU 56K standard (As soon as the standard is ratified)
- Caller ID (Requires Caller ID service from the phone company)
- Data throughput up to 224,000 bps (4 x 56,000)
- DTE Speed up to 230,400 bps
- Supports Com1-Com4
- Supports IRQ's 3,4,5,7,9,10,11,12,15
- **V.42** Hardware based Error Correction
- **MNP 10** Hardware based Error Correction
- **MNP 4** Hardware based Error Correction
- **V.42bis** (4-1) Hardware based Data Compression
- **MNP 5** (2-1) Hardware based Data Compression
- Integrated 16550 UART for High Speed Operation (Internal model only)
- Enhanced Hayes-compatible "AT" Command Set
- Line quality receive level monitoring
- NVRAM directory stored profiles
- Programmable speaker volume control
- Flow Control (XON/XOFF, RTS/CTS)
- Speed Buffering
- Automatic Format/Speed Sensing
- H.324 and V.80 compliant (videophone ready)*

Modem Operating Modes

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
V.34	33,600/31,200 bps 28,800/26,400/24,000/ 21,600/19,200/16,800 bps
V.32bis	14,400/12,000/7,200 bps
V.32	9,600/4,800 bps
V.22bis	2,400 bps
V.22 & Bell 212A	1,200 bps
V.21 & Bell 103	300 bps

Fax Operating Modes

- Fax Send and Receive rates up to 14,400 bps
- V.29 & V.27ter & V.17 Fax Transmission 14,400/9600 send and receive.
- Group III Send and Receive fax compatible
- Supports Class 1 Fax Software

* Requires video camera and video capture support, sound card with microphone input, ITU H.324-compliant videoconferencing application, and the appropriate computer and operating system to run the application.

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, you might also look to similar sections in your communications software manual.

This section also provides information to determine if your modem supports Flash ROM and provide directions for uploading new code into the Flash ROM. Additionally, Zoltrix web site locations that may help in solving the modem problem, are listed.

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.

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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	<u>COM1</u>	<u>COM2</u>	<u>COM3</u>	<u>COM4</u>
*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 previous 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. Most models support IRQ's 2,3,4,5 & 7. Check your Quick Installation Reference Card for the settings on your model. If installing an External modem, you now have to determine what RS232 jack on the back of your computer matches the COM ports found by MSD. This may take a little experimentation. You may want to try COM port 2 first. Most systems are setup with a mouse connected to COM port 1, with an RS232 jack set to COM port 2 ready for a external device.

T.2.1 Determining What Serial Ports Windows 95 Recognizes

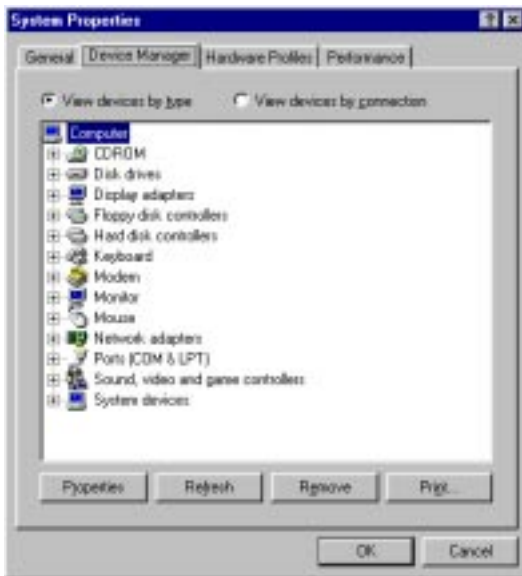
Before you physically install a internal modem and after you physically install a internal modem, you should verify if the Com port is recognized by Windows 95. Use the following instructions to determine what Com ports are recognized by Windows 95.



1. Double click the **System** ICON in the Control Panel.

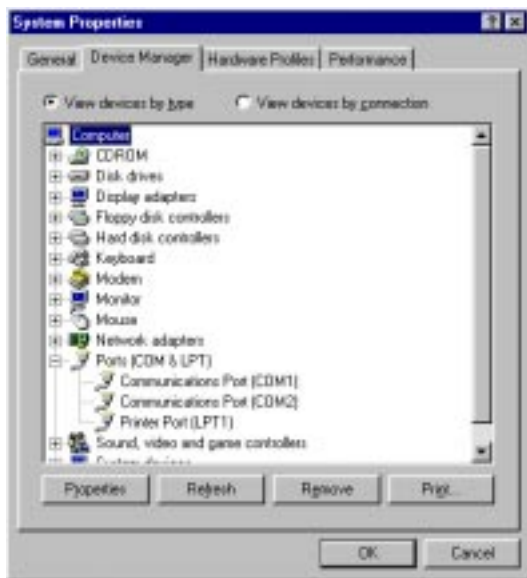
2. Click on the **Device Manager** tab.

This will bring up the following screen:



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3. Double Click on  Ports (COM & LPT) (as indicated on the picture below)



From the picture above, we can see that Windows 95 recognizes Com 1 and Com2.

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:

1. 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.
2. 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.

1. 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.
2. 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 Uploading the firmware into the Flash ROM

Your modem may or may not be Flash ROM upgradable. Refer to the section **T.4.1** below to determine if your model supports Flash ROM. Flash Rom upgradable modems allows you to update the modem whenever there is an update to the modem code. You can download the 56K modem firmware from the Internet, and upload the new code into the modems Flash ROM. Soon after the ITU ratifies a standard for 56K modems, you will be able to upgrade the modem to the new ITU standard. The updated files will be available to download from the Internet on the Zoltrix modem drivers web page at:

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

In the future, there may be a program written to perform the uploading procedure. This will simplify the process. Please check the Zoltrix web site for more information as it becomes available.

You do not need to upload the firmware into the Flash ROM when you first receive the modem. This is done at the factory. But just in case the code is lost, or you have obtained an updated version from the Zoltrix web page, you need to update the Flash ROM with the new code. Please always keep a backup copy of the previous version, just in case you experience problems with the new version.

Before trying to upload the firmware into the Flash ROM, ensure that the PC is functioning properly. Also, do not try uploading any other files to the Flash ROM except files directly from Zoltrix intended for the K56 modem. You may also want to do this when you are sure that the power will not be lost while uploading the firmware. If power is lost while uploading the firmware or you upload the incorrect files, the data in the Flash ROM may be erased and you may not be able to recover it any other way except by returning it to the factory.

T.4.1 How to determine if your modem supports Flash ROM

The easiest way is to look to see if the outside box or Quick Reference claims that the modem supports Flash ROM.

For Internal models you can also easily check the chipset used in the modem to determine if it supports Flash ROM. Following is the code printed on the 56 K Speaker phone chipset that supports Flash ROM:

RCV56**DL**/SP

If you have a non voice model, the response will be slightly different, but if the modem supports Flash ROM, the **DL** will be in the code.

If you have an external modem, you will void your warranty if you open the unit up to verify what chip is used. Therefore, it is not recommended that you use this method with external units. Instead you can assume that the modem does supports the Flash ROM and try to upload the code to verify this. If the modem does not support Flash ROM, the procedure will not work. This will not damage a modem that does not use Flash ROM.

T.4.2 Upload Procedure

1. Start a terminal program that supports the ASCII transfer protocol. (i.e. BitCom or Hyperterminal)
2. If your terminal program allows you to change the timing of the transfer, change the timing to the minimum values to increase the transfer rate of the firmware file.
(This does not need to be done, it will only decrease the time required for the upload.)

3. Make sure that you are in the "terminal mode" by typing **AT** followed by the enter key. You should see the modem respond with **OK**.
4. If the modem responds with **OK**, type **AT**** followed by the enter key. The modem will respond with **Download initiated ..**
5. Instruct your terminal software to upload the **BPFLxxxx.S37** file via the ASCII protocol. (The file name will change with each update. Replace the lower case **xxxx's** with the correct file name.)
6. After the first file is uploaded the modem will respond with:
Download flash code ..
7. Instruct your terminal software to upload the **FLSHxxxx.S37** file via the ASCII protocol. (The file name will change with each update. Replace the lower case **xxxx's** with the correct file name.)
8. After the second file is uploaded the modem will respond with:
Device successfully programmed
9. Now type **AT&F&W0&W1** followed by the enter key to reset the modem.
10. Congratulations, after receiving the **OK** response, the modem Flash ROM has been updated and the modem was reset properly. You can now use the modem again as normal.

T.4.3 Error when Uploading the firmware into the Flash ROM

If an error occurred during the upload of the **BPFLxxxx.S37** file, no harm was done. The firmware inside the Flash ROM has not been erased. Just reset the modem or turn the computer off and then back on.

If the error occurred during the upload of the **FLSHxxxx.S37** file you must follow the next steps to try and recover.

- a. Turn the computer off and then back on.
- b. Start a terminal program that supports the ASCII transfer protocol. (i.e. BitCom or Hyperterminal)
- c. Type **AT**** followed by the enter key.

Note: The modem will not respond to any other **AT** command including **ATZ**.

If the modem does accept the **AT**** command, the modem will respond with

Download initiated ..

Go back to step #5 to try uploading the files again.

If the modem does not accept the **AT**** command, the only way to fix the problem is to pull out the Flash ROM chip and re-program it with a Flash ROM programmer at the factory.

T.5 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>

For technical information of K56 technology, including FAQ's, refer to the following web pages:

<http://www.zoltrix.com/56k-QA.htm>

<http://www.nb.rockwell.com/mcd/K56/home.html>

For AT command manuals, drivers and Flash ROM code, refer to the following web page:

<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>